RCRA

Orientation Manual 2014

Resource Conservation and Recovery Act

RCRA Orientation Manual 2014

United States
Environmental Protection Agency
Solid Waste and Emergency Response (5305W)
Washington, DC 20460

Official Business
Penalty for Private Use $300

EPA530-F-11-003
October 2014
www.epa.gov/epawaste

Recycled/Recyclable—Printed with Vegetable Oil Based Inks on 100% (Minimum 50% Postconsumer) Recycled Paper

RCRA Orientation Manual

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FOREWORD

This manual supersedes the *2008 RCRA Orientation Manual*. The *Manual* has proven to be a popular and valuable resource for anyone working with EPA's solid and hazardous waste management program. Since the manual's initial publication in 1990, the RCRA program has evolved dramatically. As a result of changes in the dynamics of solid and hazardous waste management, as well as changes in the regulatory expectations and demands of government, public, and private entities, the RCRA program has been modified through new regulations, policies, Agency-wide initiatives, and Congressional mandates. The *Manual's* revision reflects the progress that has been made in the program and documents its changes.

At this time, the RCRA Subtitle C hazardous waste regulatory framework is completely in place, and almost all states are implementing large portions of the program. EPA has achieved significant progress in establishing provisions to fully protect both ground water and air resources. Under Subtitle D, the establishment of municipal solid waste landfill criteria ensures adequate protection of human health and the environment from solid waste disposal practices. In addition, the Agency has significantly expanded initiatives to reduce the amount of waste generated and to make waste management more efficient.

Information about RCRA's past, present, and future are contained in two other documents. For a look ahead, *Sustainable Materials Management: The Road Ahead* suggests a roadmap for the future based on materials management—fulfilling human needs and prospering, while using less materials, reducing toxics and recovering more of the materials used. For a look back at past successes, the report *25 Years of RCRA: Building on Our Past to Protect Our Future* commemorates RCRA's 25th Anniversary in October 2001 and highlights the accomplishments of RCRA's protective framework to date. In addition, *RCRA: Reducing Risk from Waste* provides an overview of RCRA including: the history of RCRA, the role of EPA and the states, the regulated community, and municipal and industrial waste issues.

CHAPTER I

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OVERVIEW

The Resource Conservation and Recovery Act (RCRA), an amendment to the Solid Waste Disposal Act, was enacted in 1976 to address the huge volumes of municipal and industrial solid waste generated nationwide.

The goals set by RCRA are:

- To protect human health and the environment from the potential hazards of waste disposal
- To conserve energy and natural resources
- To reduce the amount of waste generated
- To ensure that wastes are managed in an environmentally sound manner.

RCRA also regulates **underground storage tanks (USTs)** that store petroleum or certain chemical products under Subtitle I. Requirements exist for the design and operation of these tanks and the development of systems to prevent accidental spills. Examples of facilities using these tanks include petroleum refineries, chemical plants, and commercial gas stations.

The Medical Waste Tracking Act of 1988 was a 2-year demonstration program that expired in June 1991. It created a Subtitle J program designed to track **medical waste** from generation to disposal. At present, no federal EPA tracking regulations are in effect for medical waste, but many states have adopted their own programs.

The Comprehensive Environmental Response, Compensation, and Liability Act (known as Superfund or CERCLA) is a related statute that deals with cleaning up inactive and abandoned hazardous waste sites. RCRA, on the other hand, deals with materials that are currently destined for disposal or recycling.

RCRA: WHAT IT IS

The term RCRA is often used interchangeably to refer to the law, regulations, and EPA policy and guidance. The law describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program. EPA regulations carry out the Congressional intent by providing explicit, legally enforceable requirements for waste management. These regulations can be found in Title 40 of the Code

of Federal Regulations (CFR), Parts 239 through 282. EPA guidance documents and policy directives clarify issues related to the implementation of the regulations. These three elements are the primary parts of the RCRA program.

■ The Act

The Act provides, in broad terms, general guidelines for the waste management program envisioned by Congress (e.g., EPA is directed to develop and promulgate criteria for identifying hazardous waste). The Act also provides the EPA Administrator (or his or her representative) with the necessary authority to develop these broad standards into specific requirements that implement the law.

THE ACT

The law that describes the kind of waste management program that Congress wants to establish. The Act also provides the Administrator of EPA (or his or her designee) with the authority to implement the program.

What we commonly know as RCRA, or the Act, is actually a combination of the first federal solid waste statutes and all subsequent amendments (see Figure I-1). In 1965, Congress enacted the Solid Waste Disposal Act, the first statute that specifically focused on improving solid waste disposal methods. The Solid Waste Disposal Act established economic incentives for states to develop planning, training, research, and demonstration projects for the management of solid waste. The Act was amended in 1976 by RCRA, which substantially remodeled the nation's solid waste management system and laid out the basic framework of the current hazardous waste management program.

The Act, which has been amended several times since 1976, continues to evolve as Congress alters it to reflect changing waste management needs. The Act was amended significantly on November 8, 1984, by the Hazardous and Solid Waste Amendments (HSWA), which expanded the scope and requirements of RCRA. HSWA was created largely in response to citizen concerns that existing methods of hazardous waste disposal, particularly land disposal, were not safe. Because of their significance and differences in their implementation, HSWA provisions are emphasized throughout this manual. Congress also revised RCRA in 1992 by passing the Federal Facilities Compliance Act, which strengthened the authority to enforce RCRA at federal facilities. In addition, the Land Disposal Program Flexibility Act of 1996 amended RCRA to provide regulatory flexibility for the land disposal of certain wastes.

Figure I-1: The Evolution of Significant RCRA Legislation

Today, the Act consists of 10 subtitles (see Figure I-2). Subtitles A, B, E, F, G, H, I, and J outline general provisions; authorities of the EPA Administrator; duties of the Secretary of Commerce; federal responsibilities; miscellaneous provisions; research, development, demonstration, and information requirements; underground storage tanks; and medical waste tracking. Other subtitles lay out the framework for the two major programs that comprise RCRA: Subtitle C (the hazardous waste management program) and Subtitle D (the solid waste program).

The text of the Act can be found at www.epa.gov/lawsregs/laws.

■ Regulations

The Act includes a Congressional mandate directing EPA to develop a comprehensive set of regulations. **Regulations**, or **rulemakings**, are issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements for the Agency and the regulated community.

Regulations are developed by EPA in an open and public manner according to an established process. When a regulation is formally proposed,

Figure I-2: Outline of the Act

Subtitle	Provisions
A	General Provisions
B	Office of Solid Waste; Authorities of the Administrator and Interagency Coordinating Committee
C	Hazardous Waste Management
D	State or Regional Solid Waste Plans
E	Duties of the Secretary of Commerce in Resource and Recovery
F	Federal Responsibilities
G	Miscellaneous Provisions
H	Research, Development, Demonstration, and Information
I	Regulation of Underground Storage Tanks
J	Standards for the Tracking and Management of Medical Waste

it is published in an official government document called the *Federal Register* to notify the public of EPA's intent to create new regulations or modify existing ones. EPA provides the public, which includes the potentially regulated community, with an opportunity to submit comments. Following an established comment period, EPA may revise the proposed rule based on both an internal review process and public comments.

REGULATIONS

Legal mechanisms that establish standards or impose requirements as mandated by the Act. RCRA regulations are promulgated by EPA, published in the *Federal Register*, and codified in the Code of Federal Regulations.

The final regulation is published, or promulgated, in the *Federal Register*. Included with the regulation is discussion of the Agency's rationale for the regulatory approach, known as preamble language. Final regulations are compiled annually and incorporated in the Code of Federal Regulations (CFR) according to a highly structured format based on the topic of the regulation. This latter process is called **codification**, and each CFR title corresponds to a different regulatory authority. For example, EPA's regulations are in Title 40 of the CFR. The codified RCRA regulations can be found in Title 40 of the CFR, Parts 239-282. These regulations are often cited as 40 CFR, with the part listed afterward (e.g., 40 CFR Part 264), or the part and section (e.g., 40 CFR §264.10).

Although this relationship between an Act and the regulations is the norm, the relationship between HSWA and its regulations differs slightly. Congress, through HSWA, not only provided EPA with a general mandate to promulgate regulations, but also placed explicit instructions in the Statute to develop certain regulations. Many of these requirements are so specific that EPA incorporated them directly into the regulations. HSWA is all the more significant because of the ambitious schedules that Congress established for implementation of the Act's provisions. Another unique aspect of HSWA is that it established **hammer provisions**, or statutory requirements that would go into effect automatically (with the force of regulations) if EPA failed to issue regulations by certain dates.

The interpretation of statutory language does not end with the codification of regulations. EPA further clarifies the requirements of the Act and its regulations through guidance documents and policy.

The RCRA regulations can be found at www.epa.gov/epawaste/laws-regs.

■ Guidance and Policy

Guidance documents are issued by EPA primarily to provide direction for implementing and complying with regulations. They are essentially "how to" documents. For example, the regulations in 40 CFR Part 270 detail what is required in a permit application for a hazardous waste management facility, while the guidance for this Part suggests how to evaluate a permit application to ensure

that all information has been included. Guidance documents also elaborate on the Agency's interpretation of the requirements of the Act.

GUIDANCE = *HOW TO*

Documents developed and issued by EPA to provide instructions on how to implement the requirements of either the Act or regulations.

Policy statements, on the other hand, specify operating procedures that should generally be followed. They are mechanisms used by EPA program offices to outline the manner in which the RCRA programs are implemented. For example, EPA's Office of Resource Conservation and Recovery (ORCR) may issue a policy outlining what actions should generally be taken to achieve RCRA corrective action cleanup goals. In many cases, policy statements are addressed to the staff working on implementation, but they may also be addressed to the regulated community.

POLICY = *SHOULD DO*

Statements developed by EPA outlining a position on a topic or giving instructions on how a procedure should be conducted.

RCRA: HOW IT WORKS

To provide an overall perspective of how RCRA works, each waste program is briefly summarized here. Later, the Subtitle D (solid waste) program is discussed before the Subtitle C (hazardous waste) program. Although this is alphabetically out of order, the structure is designed for better understanding by the reader.

■ Subtitle D—Solid Waste

RCRA Subtitle D focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of nonhazardous solid waste, such as household garbage and nonhazardous industrial solid waste. EPA provides these state and local agencies with information, guidance, policy, and regulations through workshops and publications to help states and the regulated community make better decisions in dealing with waste issues, to reap the environmental and economic benefits of source reduction and recycling of solid wastes, and to require upgrading or closure of all environmentally unsound disposal units. In order to promote the use of safer units for solid waste disposal, EPA developed federal criteria for the proper design and operation of **municipal solid waste landfills** (MSWLFs) and other solid waste disposal facilities. Many states have adopted these criteria into their state solid waste programs.

■ Subtitle C—Hazardous Waste

RCRA Subtitle C establishes a federal program to manage hazardous wastes from **cradle to grave**. The objective of the Subtitle C program is to ensure that hazardous waste is handled in a manner that protects human health and the environment. To this end, there are Subtitle C regulations for the generation, transportation, and treatment, storage, or disposal of hazardous wastes. In practical terms, this means regulating a large number of hazardous waste handlers. As of 2009, EPA had on record approximately 460 treatment, storage, and disposal facilities (TSDFs); 18,000 transporters; and 14,700 large quantity generators (LQGs).

The Subtitle C program has resulted in perhaps the most comprehensive regulations EPA has ever developed. The regulations first identify the criteria to determine which solid wastes are hazardous, and then establish various requirements for the three categories of hazardous waste handlers: generators, transporters, and TSDFs. In addition, the Subtitle C regulations set technical standards for the design and safe operation of TSDFs. These standards are designed to minimize the release of hazardous waste into the environment. Furthermore, the regulations for TSDFs serve as the basis for developing and issuing the permits required by the Act for each facility. Permits are essential to making the Subtitle C regulatory program work, since it is through the permitting process that EPA or a state applies the technical standards to TSDFs.

One of the primary differences between Subtitle C and Subtitle D is the type of waste each regulates. Subtitle C regulates only hazardous waste, a subset of solid waste, whereas Subtitle D primarily regulates nonhazardous solid waste.

WHO IS INVOLVED IN RCRA?

The RCRA program involves many people and organizations, all with varying roles. Congress and the President set overall national direction for the RCRA program through amendments to the Act. EPA, through its Office of Solid Waste and Emergency Response (OSWER), translates this direction into operating programs by developing regulations, guidance, and policy.

Site-specific implementation of the RCRA program is the responsibility of the EPA regions and states. Hazardous and solid waste programs have mechanisms through which states can exercise key program responsibilities. Initial federal responsibilities vary among the different programs.

Under Subtitle D, EPA established minimum criteria for MSWLFs and required each state to gain approval for their MSWLF permitting program through an approval process that ensures that the state's program meets minimum federal criteria. Most of the Subtitle D solid waste program is overseen by the states, and compliance is assured through state-issued permits.

State involvement in the Subtitle C program is similar to involvement in the Subtitle D program. Under Subtitle C, in the authorization process, EPA reviews a state's hazardous waste program and, if it is at least as stringent as the federal program, grants the state authority to implement its own program in lieu of the federal program. These states are known as authorized states.

The **regulated community** that must understand and comply with RCRA and its regulations is a large, diverse group. It includes not only facilities typically thought of as hazardous waste generators, such as industrial manufacturers, but also government agencies and small businesses, such as a local dry cleaner generating small amounts of hazardous solvents, or a gas station with underground petroleum tanks.

Lastly, the general public plays a key role in RCRA by providing input and comments during almost every stage of the program's development and implementation, through rulemaking participation and comments on TSDF permits.

RCRA TODAY

Ensuring responsible waste management practices is a far-reaching and challenging undertaking that engages EPA Headquarters and regions, state agencies, tribes, and local governments, as well as everyone who generates waste. EPA has largely focused on building the hazardous and municipal solid waste programs and fostering a strong societal commitment to recycling and pollution prevention. Since the enactment of RCRA, EPA has built a comprehensive cradle-to-grave regulatory program for hazardous waste management; authorized forty-eight states to implement RCRA; set national baseline standards for municipal solid waste landfills; identified priority pollutants on which to focus hazardous waste reduction efforts; worked in successful partnerships to reduce waste, promote recycling, and build markets for recycled-content products; and provided education and technical assistance.

■ Looking to the Future

In the future, EPA will maintain and build on the effective hazardous and municipal waste programs already in place. At the same time, EPA must increase efforts in resource conservation, sustainability, and safe materials management. Safe waste management and cleanup remain the critical foundation to protect human health and the environment. EPA now relies on a largely complete regulatory structure for hazardous and municipal waste and proven implementation programs to ensure safe management. EPA will assess potential threats from wastes and address critical program improvements in the most effective manner, either through regulatory changes, cooperative voluntary efforts, or other means.

Striving for sustainability and materials management are long-term challenges. EPA will look beyond the traditional definition of waste to determine how programs fits into, and can benefit from, a life cycle approach to ensure that chemicals and materials are managed protectively, in all stages of use and discard. In addition, waste issues must be considered beyond the nation's boundaries to maximize environmental results and achieve sustainability and safe materials management. A top

priority is to reduce the generation of industrial and municipal waste and to conserve resources while reducing environmental impacts. Through the Resource Conservation Challenge (RCC), EPA is undertaking a broad spectrum of efforts to encourage waste minimization, pollution prevention, energy recovery, and recycling. Where necessary, this may require refining the current regulatory system. However, the scope of EPA's regulatory work is narrower and relies more on improving compliance with the existing regulations. There are only two remaining rulemakings to complete the hazardous waste regulatory structure and 1984 statutory mandates. Other regulatory activities are primarily targeted to simplify and add flexibility and facilitate resource conservation and pollution prevention.

EPA believes a key to success for RCRA and for improving the corrective action program will be building new partnerships and coalitions with government agencies, businesses, interest groups, and the public. While EPA has made great strides in working in true partnership with the states, more remains to be done. The goal of faster, more efficient cleanups will continue, and new corrective action goals will focus on the activities that precede completion of final corrective action, remedy selection, and construction. Encouraging facilities to achieve corrective action goals helps move the program toward success and provides increased protection against exposure to contaminants that have been released from corrective action facilities.

■ Conserving Natural Resources

EPA will continue to help society reduce the amount and toxicity of wastes that facilities generate and promote safe recycling and energy recovery. A successful materials management approach will assess risks and ensure that harmful chemicals do not enter the environment throughout the life cycle of material handling. Resources that simply become waste are not available for future generations, and extraction and harvesting of resources can have long-term environmental impacts. Despite protective waste management programs, toxic chemicals can still find their way into the environment throughout the life cycle of materials. Persistent, bioaccumulative, and toxic chemicals released into the environment can present long-term risks to human health and the environment, even in small quantities. The challenge is to mobilize industries, state and local agencies, communities, and the public through collaborative efforts and by harnessing regulatory incentives to minimize threats to human health and the environment. The RCC will be the main vehicle by which EPA works to meet this challenge. The main objectives for conserving natural resources are reducing priority chemicals, stimulating product stewardship and recycling, fostering the transition to materials management, forming partnerships, promoting recycling and safe energy recovery from waste, and engaging consumers and under-served communities.

■ Preventing Future Waste Problems

EPA will sustain and enhance effective state programs for hazardous, municipal, and industrial waste management and EPA regional implementation to ensure protective management tailored to the full spectrum of wastes that facilities generate. The large universe of waste generators and treatment, storage, and disposal facilities (TSDFs) subject to hazardous and solid waste requirements presents a substantial challenge. EPA intends to identify unaddressed significant risks from current and new wastes and waste management practices and incorporate flexibility, and ensure that all wastes are managed protectively without unnecessary costs. The main objectives for preventing future waste problems are setting national goals for hazardous waste management facilities, supporting state implementation of hazardous and solid waste programs, building tribal capacity, maintaining and updating the federal regulatory programs, assisting industries to comply and move beyond compliance, engaging stakeholders, and improving waste and materials management.

■ Cleaning up Problems from Past Practices

EPA will continue to facilitate protective, practical completion of cleanups at hazardous waste TSDFs and help develop and/or strengthen state and tribal waste cleanup programs. These cleanups present a challenge because several thousand RCRA facilities have potentially released hazardous waste to the environment. In addition, cleanup may be costly and can take considerable time. EPA hopes to achieve timely cleanups at high priority facilities and create an environment in which all stakeholders can work together using a variety of tools and cleanup programs. The main objectives for cleaning up problems from past practices are controlling human exposures and groundwater releases, promoting mechanisms for flexible cleanups, supporting a "one cleanup program" framework, promoting revitalization and reuse, and supporting the tribal open dump cleanup and prevention program.

OUTLINE OF THE MANUAL

The remainder of this manual details the three RCRA programs briefly discussed in this introduction. The manual also describes two other components of RCRA: the federal procurement and medical waste tracking programs. In addition, the manual discusses the interrelationships between RCRA's Subtitle C program and other environmental statutes, as well as RCRA's public participation provisions. To supplement this technical description of the RCRA regulatory program, the manual also contains appendices that present important RCRA forms and paperwork requirements and a glossary (for the reader's convenience, the terms that appear in this glossary have been bolded throughout the text).

SUMMARY

RCRA was passed in 1976, as an amendment to the Solid Waste Disposal Act of 1965, to ensure that solid wastes are managed in an environmentally sound manner. The goals of RCRA have changed over time as EPA has implemented the program. The current goals are:

- To protect human health and the environment from the potential hazards of waste disposal
- To conserve energy and natural resources
- To reduce the amount of waste generated
- To ensure that wastes are managed in an environmentally sound manner
- Prevent future problems caused by irresponsible waste management
- Clean up releases of hazardous waste in a timely, flexible, and protective manner.

To achieve these goals, EPA will rely heavily on three programs:

- The current regulatory framework already in place
- Collaborative partnerships with stakeholders, such as those developed under the Resource Conservation Challenge
- The RCRA corrective action program.

There are several components of RCRA:

- Act – The law that describes the kind of waste management program that Congress wants to establish. The Act also provides the Administrator of EPA (or his or her designee) with the authority to implement the Act.
- Regulations – The legal mechanism that establishes standards or imposes requirements as mandated by the Act. RCRA regulations are promulgated by EPA, published in the *Federal Register*, and codified in the CFR.
- Guidance – Documents developed and issued by EPA to provide instructions on how to implement requirements of either the Act or regulations.
- Policy – Statements developed by EPA outlining a position on a topic or giving instructions on how a procedure should be conducted.

RCRA continues to change with amendments to the Statute. HSWA, in particular, significantly

expanded both the scope and detailed requirements of the Act, especially in the context of the land disposal of hazardous wastes. Congress, EPA, states, regulated entities, and the general public are involved in developing and implementing the RCRA program.

EPA continues to improve the RCRA program by using measurable results to identify and promote new initiatives, such as encouraging waste minimization, improving the federal/state partnership in the hazardous waste program, and aiding state and local governments in reaping the environmental and economic benefits of source reduction and recycling.

CHAPTER II

MANAGING NONHAZARDOUS SOLID WASTE

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OVERVIEW

Congress enacted the Solid Waste Disposal Act of 1965 to address the growing quantity of solid waste generated in the United States and to ensure its proper management. Subsequent amendments to the Solid Waste Disposal Act, such as RCRA, have substantially increased the federal government's involvement in solid waste management.

During the 1980s, solid waste management issues rose to new heights of public concern in many areas of the United States because of increasing solid waste generation, shrinking disposal capacity, rising disposal costs, and public opposition to the siting of new disposal facilities. These solid waste management challenges continue today, as many communities are struggling to develop cost-effective, environmentally protective solutions. The growing amount of waste generated has made it increasingly important for solid waste management officials to develop strategies to manage wastes safely and cost effectively.

RCRA encourages environmentally sound solid waste management practices that maximize the reuse

WHAT IS SOLID WASTE?

- Garbage
- Refuse
- Sludges from waste treatment plants, water supply treatment plants, or pollution control facilities
- Industrial wastes
- Other discarded materials, including solid, semisolid, liquid, or contained gaseous materials resulting from industrial, commercial, mining, agricultural, and community activities.

of recoverable material and foster resource recovery. Under RCRA, EPA regulates hazardous solid wastes and may authorize states to do so. Nonhazardous solid waste is predominately regulated by state and local governments. EPA has, however, promulgated some regulations pertaining to nonhazardous solid waste, largely addressing how disposal facilities should be designed and operated. Aside from regulation of hazardous wastes, EPA's primary role in solid waste management includes setting national goals, providing leadership and technical assistance, and developing guidance and educational materials. The Agency has played a major role in this program by providing tools and information through policy and guidance to empower local governments, business, industry, federal agencies, and individuals to make better decisions in dealing with solid waste issues. The Agency strives to motivate behavioral change in solid waste management through both regulatory and nonregulatory approaches.

This chapter presents an outline of the RCRA nonhazardous solid waste program. In doing so, it defines the terms solid waste and municipal solid waste, and it describes the role EPA plays in assisting waste officials in dealing with solid waste management problems. The remainder of this chapter will use the term "solid waste" to mean only nonhazardous solid waste, excluding hazardous waste regulated under RCRA Subtitle C. The chapter will provide an overview of the criteria that EPA has developed for solid waste landfills and will introduce some Agency initiatives designed to promote proper and efficient solid waste management.

DEFINITION OF SOLID WASTE

RCRA defines the term **solid waste** as:

- Garbage (e.g., milk cartons and coffee grounds)
- Refuse (e.g., metal scrap, wall board, and empty containers)
- Sludges from waste treatment plants, water supply treatment plants, or pollution control facilities (e.g., scrubber slags)
- Industrial wastes (e.g., manufacturing process wastewaters and nonwastewater sludges and solids)
- Other discarded materials, including solid, semisolid, liquid, or contained gaseous materials resulting from industrial, commercial, mining, agricultural, and community activities (e.g., boiler slags).

The definition of solid waste is not limited to wastes that are physically solid. Many solid wastes are liquid, while others are semisolid or gaseous.

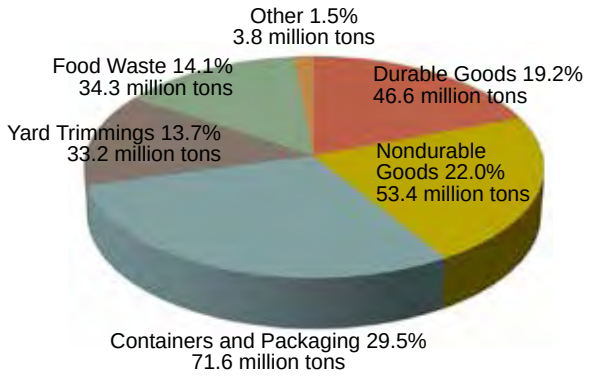
The term solid waste, as defined by the Statute, is very broad, including not only the traditional nonhazardous solid wastes, such as municipal garbage and industrial wastes, but also hazardous wastes. Hazardous waste, a subset of solid waste, is regulated under RCRA Subtitle C. (Hazardous waste is fully discussed in Chapter III.) For purposes of regulating hazardous wastes, EPA established by regulation a separate definition of solid waste. This definition is discussed in Chapter III and pertains only to hazardous waste regulations.

MUNICIPAL SOLID WASTE

Municipal solid waste is a subset of solid waste and is defined as durable goods (e.g., appliances, tires, batteries), nondurable goods (e.g., newspapers, books, magazines), containers and packaging, food wastes, yard trimmings, and miscellaneous organic wastes from residential, commercial, and industrial nonprocess sources (see Figure II-1).

Municipal solid waste generation has grown steadily over the past 49 years from 88 million tons per year (2.7 pounds per person per day) in 1960, to 243 million tons per year (4.3 pounds per person per

Figure II-I: Products Generated in MSW by Weight, 2009 (total weight – 243 million tons)



day) in 2009. While generation of waste has grown steadily, recycling has also greatly increased. In 1960, only about 7 percent of municipal solid waste was recycled. By 2009, this figure had increased to 33.8 percent.

To address the increasing quantities of municipal solid waste, EPA recommends that communities adopt "integrated waste management" systems tailored to meet their needs. The term "integrated waste management" refers to the complementary use of a variety of waste management practices to safely and effectively handle the municipal solid waste stream. An integrated waste management system will contain some or all of the following elements: source reduction, recycling (including composting), waste combustion for energy recovery, and/or disposal by landfilling (see Figure II-2). In designing systems, EPA encourages communities to consider these components in a hierarchical sequence. The hierarchy favors source reduction to reduce both the volume and toxicity of waste and to increase the useful life of manufactured products. The next preferred tier in the hierarchy is recycling, which includes composting of yard and food wastes. Source reduction and recycling are preferred over combustion and/or landfilling, because they divert waste from the third tier and they have positive impacts on both the environment and economy. The goal of EPA's approach is to use a combination of all these methods to safely and effectively manage municipal solid waste. EPA recommends that communities tailor their systems from the four components to meet their specific needs, looking first to source reduction, and second to recycling as preferences to combustion and/or landfilling.

■ Source Reduction

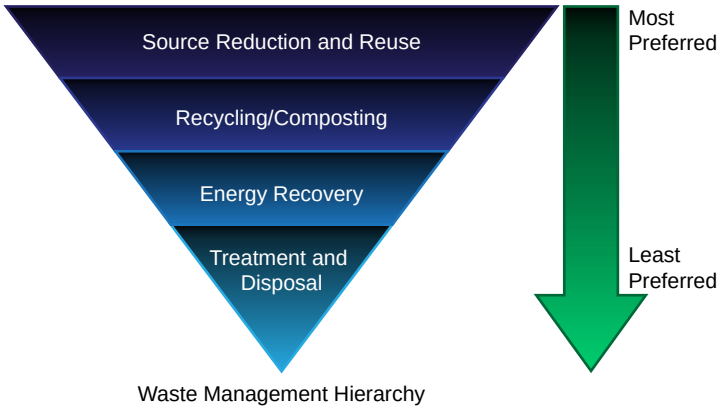
Rather than managing waste after it is generated, **source reduction** changes the way products are made and used in order to decrease waste generation. Source reduction, also called waste prevention, is defined as the design, manufacture, and use of products in a way that reduces the quantity and toxicity of waste produced when the products reach the end of their useful lives. The ultimate goal of source reduction is to decrease the amount and the toxicity of waste generated. Businesses, households, and all levels of government can play an active role in source reduction. Businesses can manufacture products with packaging that is reduced in both volume and toxicity. They also can reduce waste by altering their business practices (e.g., reusing packaging for shipping, making double-sided copies, maintaining equipment to extend its useful life, using reusable envelopes). Community residents can help reduce waste by leaving grass clippings on the lawn or composting them with other yard trimmings in their backyards, instead of bagging such materials for eventual disposal. Consumers play a crucial role in an effective source reduction program by purchasing products having reduced packaging or that contain reduced amounts of toxic constituents. This purchasing subsequently increases the demand for products with these attributes.

■ Recycling

Municipal solid waste **recycling** refers to the separation and collection of wastes, their subsequent transformation or remanufacture into usable or marketable products or materials, and the purchase of products made from recyclable materials. In 2009, 33.8 percent (82.0 million tons) of the municipal solid waste generated in the United States was recycled (see Figure II-3). Solid waste recycling:

- Preserves raw materials and natural resources
- Reduces the amount of waste that requires disposal

Figure II-2: The Solid Waste Management Hierarchy



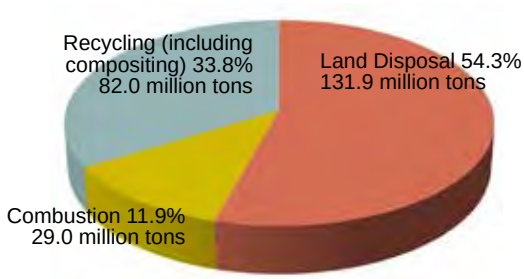
- Reduces energy use and associated pollution
- Provides business and job opportunities
- Reduces pollution associated with use of virgin materials.

Solid waste recycling also reduces greenhouse gas (GHG) emissions. For example, using the Waste Reduction Model (WARM), it can be calculated that the GHG savings of recycling 1 short ton of aluminum instead of landfilling it would be 3.71 metric tons of carbon equivalent (MTCE).

Communities can offer a wide range of recycling programs to their businesses and residents, such as drop-off centers, curbside collection, and centralized composting of yard and food wastes.

Additional information about recycling of common wastes and materials can be found at www.epa.gov/epawaste/conserve/materials.

Figure II-3: Management of MSW in the U.S., 2009 (total weight – 243 million tons)



Composting processes are designed to optimize the natural decomposition or decay of organic matter, such as leaves and food. Compost is a humus-like material that can be added to soils to increase soil fertility, aeration, and nutrient retention. Composting can serve as a key component of municipal solid waste recycling activities, considering that food and yard wastes accounted for nearly 28 percent of the total amount of municipal solid waste generated in 2009. Some communities are implementing large-scale composting programs in an effort to conserve landfill capacity.

For recycling to be successful, the recovered material must be reprocessed or remanufactured and the resulting products bought and used by consumers. Recycling programs will become more effective as markets increase for products made from recycled material. The federal government has developed several initiatives in order to bolster the use of recycled products. EPA's federal procurement guidelines, authorized by RCRA Subtitle F, are designed to bolster the market for products manufactured from recycled materials. The procurement program uses government purchasing to spur recycling and markets for recovered materials. (This program is fully discussed in Chapter V).

■ Combustion

Confined and controlled burning, known as **combustion**, can not only decrease the volume of solid waste destined for landfills, but can also recover energy from the waste-burning process. Modern waste-to-energy facilities use energy recovered from combustion of solid waste to produce steam and electricity. In 2009, combustion facilities handled 11.9 percent (29.0 million tons) of the municipal solid waste generated (see Figure II-3). Used in conjunction with source reduction and recycling, combustion can recover energy and materials and greatly reduce the volume of wastes entering landfills.

There are three types of technologies for the combustion of MSW: mass burn facilities, modular systems, and refuse derived fuel systems. Mass burn facilities are by far the most common types of combustion facilities in the United States. The waste used to fuel the mass burn facility may or may not be sorted before it enters the combustion chamber. Many advanced municipalities separate the waste on the front end to pull off as many recyclable products as possible. Modular systems are designed to burn unprocessed, mixed MSW. They differ from mass burn facilities in that they are much smaller and are portable and can be moved from site to site. Refuse derived fuel systems use mechanical methods to shred incoming MSW, separate out non-combustible materials, and produce a combustible mixture suitable as a fuel in a dedicated furnace or as a supplemental fuel in a conventional boiler system.

Additional information about energy recovery from waste can be found at www.epa.gov/waste/nonhaz/municipal/wte.

■ Landfilling

Landfilling of solid waste still remains the most widely used waste management method. Americans landfilled approximately 54.3 percent (131.9 million tons) of municipal solid waste in 2009 (see Figure II-3). Many communities are having difficulties siting new landfills, largely as a result of increased citizen concerns about the potential risks and aesthetics associated with having a landfill in their neighborhood. To reduce risks to health and the environment, EPA developed minimum criteria that solid waste landfills must meet.

■ Climate Change

Solid waste disposal contributes to greenhouse gas emissions in a variety of ways. First, the anaerobic decomposition of waste in landfills produces methane, a greenhouse gas 21 times more potent than carbon dioxide. Second, the incineration of waste produces carbon dioxide as a by-product. In addition, the transportation of waste to disposal sites produces greenhouse gas emissions from the combustion of the fuel used in the equipment. Finally, the disposal of materials indicates that they are being replaced by new products; this production often requires the use of fossil fuels to obtain raw materials and manufacture the items.

Waste prevention and recycling—jointly referred to as waste reduction—help us better manage the solid waste we generate. But preventing waste and recycling also are potent strategies for reducing greenhouse gas emissions. Together, waste prevention and recycling reduce methane emissions from landfills; reduce emissions from incinerators; reduce emissions from energy consumption; and increase storage of carbon in trees.

Looking at each of these benefits in more detail, waste prevention and recycling (including composting) divert organic wastes from landfills, thereby reducing the methane released when these materials decompose. Recycling and waste prevention allow some materials to be diverted from incinerators and thus reduce greenhouse gas emissions from the combustion of waste. Recycling saves energy because manufacturing goods from recycled materials typically requires less energy than producing goods from virgin materials. Waste prevention is even more effective at saving energy. When people reuse things or when products are made with less material, less energy is needed to extract, transport, and process raw materials and to manufacture products. When energy demand decreases, fewer fossil fuels are burned and less carbon dioxide is emitted to the atmosphere. Finally, trees absorb carbon dioxide from the atmosphere and store it in wood, in a process called “carbon sequestration.” Waste prevention and recycling of paper products allow more trees to remain standing in the forest, where they can continue to remove carbon dioxide from the atmosphere.

Additional information about the relationship between solid waste and climate change can be found at www.epa.gov/climatechange/wycd/waste.

INDUSTRIAL WASTE

Industrial waste is also a subset of solid waste and is defined as solid waste generated by manufacturing or industrial processes that is not a hazardous waste regulated under Subtitle C of RCRA. Such waste may include, but is not limited to, waste resulting from the following manufacturing processes: electric power generation; fertilizer or agricultural chemicals; food and related products or by-products; inorganic chemicals; iron and steel manufacturing; leather and leather products; nonferrous metals manufacturing or foundries; organic chemicals; plastics and resins manufacturing; pulp and paper industry; rubber and miscellaneous plastic products; stone, glass, clay, and concrete products; textile manufacturing; transportation equipment; and water treatment. Industrial waste does not include mining waste or oil and gas production waste.

Each year in the United States, approximately 60,000 industrial facilities generate and dispose of approximately 7.6 billion tons of industrial solid waste. Most of these wastes are in the form of wastewaters (97%). EPA has, in partnership with state and tribal representatives and a focus group of industry and public interest stakeholders, developed a set of recommendations and tools to assist facility managers, state and tribal regulators, and the interested public in better addressing the management of land-disposed, nonhazardous industrial wastes.

Similarly to municipal solid waste, EPA recommends considering pollution prevention options when designing an industrial waste management system. Pollution prevention will reduce waste disposal needs and can minimize impacts across all environmental media. Pollution prevention can also reduce the volume and toxicity of waste. Lastly, pollution prevention can ease some of the burdens, risks, and liabilities of waste management. As with municipal solid waste, EPA recommends a hierarchical approach to industrial waste management: first, prevent or reduce waste at the point of generation (source reduction); second, recycle or reuse waste materials; third, treat waste; and finally, dispose of remaining waste in an environmentally protective manner. There are many benefits of pollution prevention activities, including protecting human health and the environment, cost savings, simpler design and operating conditions, improved worker safety, lower liability, higher product quality, and improved community relations.

When implementing pollution prevention, industrial facilities should consider a combination of options that best fits the facility and its products. There are a number of steps common to implementing any facility-wide pollution prevention effort. An essential starting point is to make a clear commitment to identifying and taking advantage of pollution prevention opportunities. Facilities should seek the participation of interested partners, develop a policy statement committing the industrial operation to pollution prevention, and organize a team to take responsibility for it. As a next step, facilities should conduct a thorough pollution prevention opportunity assessment. Such an assessment will help set priorities according to which options are the most promising. Another feature common to many pollution prevention programs is measuring the program's progress. The actual pollution prevention practices implemented are the core of a program. The following sections give a brief overview of these core activities: source reduction, recycling, and treatment.

■ Source Reduction

Source reduction is the design, manufacture, and use of products in a way that reduces the quantity and toxicity of waste produced when the products reach the end of their useful lives. Source reduction activities for industrial waste include equipment or technology modifications; process or procedure modifications; reformulations or redesign of products; substitution of less-noxious product materials; and improvements in housekeeping, maintenance, training, or inventory control.

One source reduction option is to reformulate or redesign industrial products and processes to incorporate materials more likely to produce lower-risk wastes. Some of the most common practices include eliminating metals from inks, dyes, and paints; reformulating paints, inks, and adhesives to eliminate synthetic organic solvents; and replacing chemical-based cleaning solvents with water-based or citrus-based products.

Newer process technologies often include better waste reduction features than older ones. For industrial processes that predate consideration of waste and risk reduction, adopting new procedures or upgrading equipment can reduce waste volume, toxicity, and management costs. Some examples include redesigning equipment to cut losses during batch changes or during cleaning and maintenance, changing to mechanical cleaning devices to avoid solvent use, and installing more energy and material-efficient equipment.

In-process recycling involves the reuse of materials, such as cutting scraps, as inputs to the same process from which they came, or uses them in other processes or for other uses in the facility. This furthers waste reduction goals by reducing the need for treatment or disposal and by conserving energy and resources. A common example of in-process recycling is the reuse of wastewater.

Some of the easiest, most cost-effective, and most widely used waste reduction techniques are simple improvements in housekeeping. Accidents and spills generate avoidable disposal hazards and expenses. They are less likely to occur in clean, neatly organized facilities. Good housekeeping techniques that reduce the likelihood of accidents and spills include training employees to manage waste and materials properly; keeping aisles wide and free of obstructions; clearly labeling containers with content, handling, storage, expiration, and health and safety information; spacing stored materials to allow easy access; surrounding storage areas

with containment berms to control leaks or spills; and segregating stored materials to avoid cross-contamination, mixing of incompatible materials, and unwanted reactions.

■ Recycling

Industry can benefit from recycling: the separation and collection of byproduct materials, their subsequent transformation or remanufacture into usable or marketable products or materials, and the purchase of products made from recyclable materials.

Many local governments and states have established materials exchange programs to facilitate transactions between generators of byproduct materials and industries that can recycle wastes as raw materials. Materials exchanges are an effective and inexpensive way to find new users and uses for a byproduct material.

Recycling can involve substituting industrial by-products for another material with similar properties which is a component of sustainable materials management. For example, using wastewaters and sludges as soil amendments and using foundry sand in asphalt, concrete, and roadbed construction conserves natural resources. The industrial byproducts replace other, virgin materials, such as fill or Portland cement, not only avoiding disposal costs but also yielding a quality product. State regulatory agencies may require advance approval of planned recycling activities and may require testing of the materials to be recycled. Others may pre-designate certain by-products for recycling, as long as the required analyses are completed. Generally, regulatory agencies want to ensure that industrial byproducts are beneficially used in a safe manner and do not pose a greater risk than the materials they are replacing. Industrial facilities should consult with the state agency for criteria and regulations governing the recycling of industrial byproducts prior to any use or application.

In the last couple of years, several recent events (EPA's proposed rule regarding the disposal of coal combustion residues, the Inspector General's review of the Coal Combustion Products Partnership, and an enhanced focus in the sustainable materials management arena) have shifted the Agency's focus to ensure that these materials are beneficially used in a safe manner. While the Agency still supports safe beneficial use practices, EPA is developing a process to ensure the safety of beneficial use practices.

■ Treatment

Treatment of nonhazardous industrial waste is not a federal requirement. However, it can help to reduce the volume and toxicity of waste prior to disposal. Treatment can also make a waste amenable for reuse or recycling. Consequently, a facility managing nonhazardous industrial waste might elect to apply treatment. For example, treatment might be employed to address volatile organic compound (VOC) emissions from a waste management unit, or a facility might elect to treat a waste so that a less stringent waste management system design could be used. Treatment involves changing a waste's physical, chemical, or biological character or composition through designed techniques or processes. There are three primary categories of treatment – physical, chemical, and biological. Physical treatment involves changing the waste's physical properties such as its size, shape, density, or state (i.e., gas, liquid, solid). Physical treatment does not change a waste's chemical composition. One form of physical treatment, immobilization, involves encapsulating waste in other materials, such as plastic, resin, or cement, to prevent constituents from volatilizing or leaching. Listed below are a few examples of physical treatment:

- Immobilization, including encapsulation and thermoplastic binding
- Carbon absorption, including granular activated carbon and powdered activated carbon
- Distillation, including batch distillation, fractionation, thin film extraction, steam stripping, thermal drying, and filtration
- Evaporation/volatilization
- Grinding
- Shredding
- Compacting
- Solidification/addition of absorbent material.

Chemical treatment involves altering a waste's chemical composition, structure, and properties through chemical reactions. Chemical treatment can consist of mixing the waste with other materials (reagents), heating the waste to high temperatures, or a combination of both. Through chemical treatment, waste constituents can be recovered or destroyed. Listed below are a few examples of chemical treatment:

- Neutralization
- Oxidation
- Reduction
- Precipitation
- Acid leaching
- Ion exchange
- Incineration
- Thermal desorption
- Stabilization
- Vitrification
- Extraction, including solvent extraction and critical extraction
- High temperature metal recovery.

Biological treatment can be divided into two categories–aerobic and anaerobic. Aerobic biological treatment uses oxygen-requiring microorganisms to decompose organic and non-metallic constituents into carbon dioxide, water, nitrates, sulfates, simpler organic products, and cellular biomass (i.e., cellular growth and reproduction). Anaerobic biological treatment uses microorganisms, in the absence of oxygen, to transform organic constituents and nitrogen-containing compounds into oxygen and methane gas (CH_4). Anaerobic biological treatment typically is performed in an enclosed digestor unit.

The range of treatment methods from which to choose is as diverse as the range of wastes to be treated. More advanced treatment will generally be more expensive, but by reducing the quantity and risk level of the waste, costs might be reduced in the long run. Savings could come from not only lower disposal costs, but also lower closure and post-closure care costs. Treatment and post-treatment waste management methods can be selected to minimize both total cost and environmental impact, keeping in mind that treatment residuals, such as sludges, are wastes themselves that will need to be managed.

■ Landfilling

As with municipal solid waste, industrial facilities will not be able to manage all of their industrial waste by source reduction, recycling, and treatment. Landfilling is the least desirable option and should be implemented as part of a comprehensive waste management system. Implementing a waste management system that achieves protective environmental operations requires incorporating performance monitoring and measurement of progress towards environmental goals. An effective waste management system can help ensure proper operation of the many interrelated systems on which a unit depends for waste containment, leachate management, and other important functions. If the elements of an industrial waste landfill are not regularly inspected, maintained, improved, and evaluated for efficiency, even the best designed unit might not operate efficiently. Implementing an effective waste management system can also reduce long- and short-term costs, protect workers and local communities, and maintain good community relations.

Industrial waste landfills can face opposition as a result of concerns about possible negative aesthetic impact and potential health risks. To reduce risks to health and the environment, EPA developed minimum criteria that industrial waste landfills must meet. The federal criteria for nonhazardous industrial waste facilities or practices are provided in 40 CFR Part 257, Subparts A and B. The criteria for solid waste disposal facilities are discussed later in this chapter.

■ Guide for Industrial Waste Management

EPA, in close collaboration with state and tribal representatives through the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), and a focus group of industry and public interest stakeholders, developed a set of recommendations and tools to assist facility managers, state and tribal regulators, and the interested public in better addressing the management of land-disposed, nonhazardous industrial wastes. The *Guide for Industrial Waste Management* (EPA530-R-03-001) provides considerations and Internet-based tools for siting industrial waste management units; methods for characterizing waste constituents; fact sheets and Web sites with information about individual waste

constituents; tools to assess possible risks posed by the wastes; principles for building stakeholder partnerships; opportunities for waste minimization; guidelines for safe unit design; procedures for monitoring surface water, air, and ground water; and recommendations for closure and post-closure care.

The guide is available at www.epa.gov/epawaste/nonhaz/industrial/guide.

CRITERIA FOR SOLID WASTE DISPOSAL FACILITIES

One of the initial focuses of the Solid Waste Disposal Act (as amended by RCRA) was to require EPA to study the risks associated with solid waste disposal and to develop management standards and criteria for solid waste disposal units (including landfills) in order to protect human health and the environment. This study resulted in the development of criteria for classifying solid waste disposal facilities and practices.

On September 13, 1979, EPA promulgated criteria to designate solid waste disposal facilities and practices which would not pose adverse effects to human health and the environment (Part 257, Subpart A). Facilities failing to satisfy the criteria are considered **open dumps** requiring attention by state solid waste programs. RCRA prohibits open dumping. As a result, open dumps had to either be closed or upgraded to meet the criteria for sanitary landfills. States were also required to incorporate provisions into their solid waste programs to prohibit the establishment of new open dumps. States have the option of developing standards more stringent than the Part 257, Subpart A criteria.

Solid waste disposal is overseen by the states, and compliance is assured through state-issued permits. EPA does not issue permits for solid waste management. Each state is to obtain EPA approval for their MSWLF permitting program. This approval process assesses whether a state's program is sufficient to ensure each landfill's compliance with the criteria. In states without an approved program, the federal criteria are self-implementing; the owner or operator of a solid waste disposal facility in those states must directly implement the requirements. In addition to the minimum federal criteria, some states may impose requirements that are more stringent than the federal requirements. Citizen suits (under RCRA §7002) may also be used to enforce the federal criteria in addition to state-issued permits.

■ Technical Criteria for Solid Waste Disposal Facilities

The Part 257, Subpart A regulatory criteria used to classify solid waste disposal facilities and practices consist of general environmental performance standards. The criteria contain provisions designed to ensure that wastes disposed of in solid waste disposal units will not threaten endangered species, surface water, ground water, or flood plains. Further, owners and operators of disposal units are required to implement public health and safety precautions such as disease vector (e.g., rodents, flies, mosquitoes) controls to prevent the spread of disease and restrictions on the open burning of solid waste. In addition, facilities are required to install safety measures to control explosive gases generated by the decomposition of waste, minimize the attraction of birds to the waste disposed in the unit, and restrict public access to the facility. The criteria also restrict the land spreading of wastes with high levels of cadmium and polychlorinated biphenyls (PCBs) in order to adequately protect ground water from these dangerous contaminants.

These criteria serve as minimum technical standards for solid waste disposal facilities. As a result, facilities must meet the Part 257 standards to ensure that ongoing waste management operations adequately protect human health and the environment. If they fail to do so, the facility is classified as an open dump and must upgrade its

WHAT IS AN OPEN DUMP?

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 criteria. Using the Part 257, Subpart A criteria as a benchmark, each state evaluated the solid waste disposal facilities within its borders to determine which facilities were open dumps that needed to be closed or upgraded. For each open dump, the state completed an Open Dump Inventory Report form that was sent to the Bureau of the Census. At the end of fiscal years 1981 through 1985, the Bureau compiled all of the report forms and sent them to EPA, where they were summarized and published annually.

operations or close.

Conditionally Exempt Small Quantity Generator Waste Disposal Facilities

In July of 1996, EPA promulgated standards for non-municipal, nonhazardous waste facilities that may receive **conditionally exempt small quantity generator (CESQG)** waste (40 CFR Part 257, Subpart B). These revisions address location restrictions, requirements for monitoring for ground- water contamination, and corrective action provisions to clean up any contamination. (CESQGs are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

Technical Criteria for Municipal Solid Waste Landfills (MSWLFs)

Protection of human health and the environment from the risks posed by solid waste disposal facilities was an ongoing concern of Congress after RCRA was passed in 1976. As a result, the 1984 Hazardous and Solid Waste Amendments (HSWA) required EPA to report on the adequacy of existing solid waste disposal facility criteria and gather detailed data on the characteristics and quantities of nonhazardous municipal solid wastes.

Report to Congress on Solid Waste Disposal

In October 1988, EPA submitted a Report to Congress indicating that the United States was generating an increasing amount of municipal solid waste. The Report revealed that approximately 160 million tons of municipal solid waste were generated each year, 131 million tons of which were landfilled in just over 6,500 MSWLFs. EPA also reported that although these landfills used a wide variety of environmental controls, they may pose significant threats to ground water and surface water resources. For instance, rain water percolating through the landfills can dissolve harmful constituents in the waste and can eventually seep into the ground, potentially contaminating ground water. In addition, improperly maintained landfills can pose other health risks due to airborne contaminants, or the threat of fire or explosion.

To address these environmental and health concerns, and to standardize the technical requirements for these landfills, EPA promulgated revised minimum federal criteria in Part 258 for MSWLFs on October 9, 1991. The criteria were designed to ensure that MSWLFs receiving municipal solid waste would be protective of human health and the environment. All other solid waste disposal facilities and practices, besides MSWLFs, remain subject to Part 257, Subpart A or B.

Criteria for Municipal Solid Waste Landfills

A **municipal solid waste landfill** is defined as a discrete area of land or excavation that receives household waste. A MSWLF may also receive other types of nonhazardous wastes, such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator (CESQG) waste, and industrial nonhazardous solid waste. In 2009, there were approximately 1,908 MSWLFs in the continental United States.

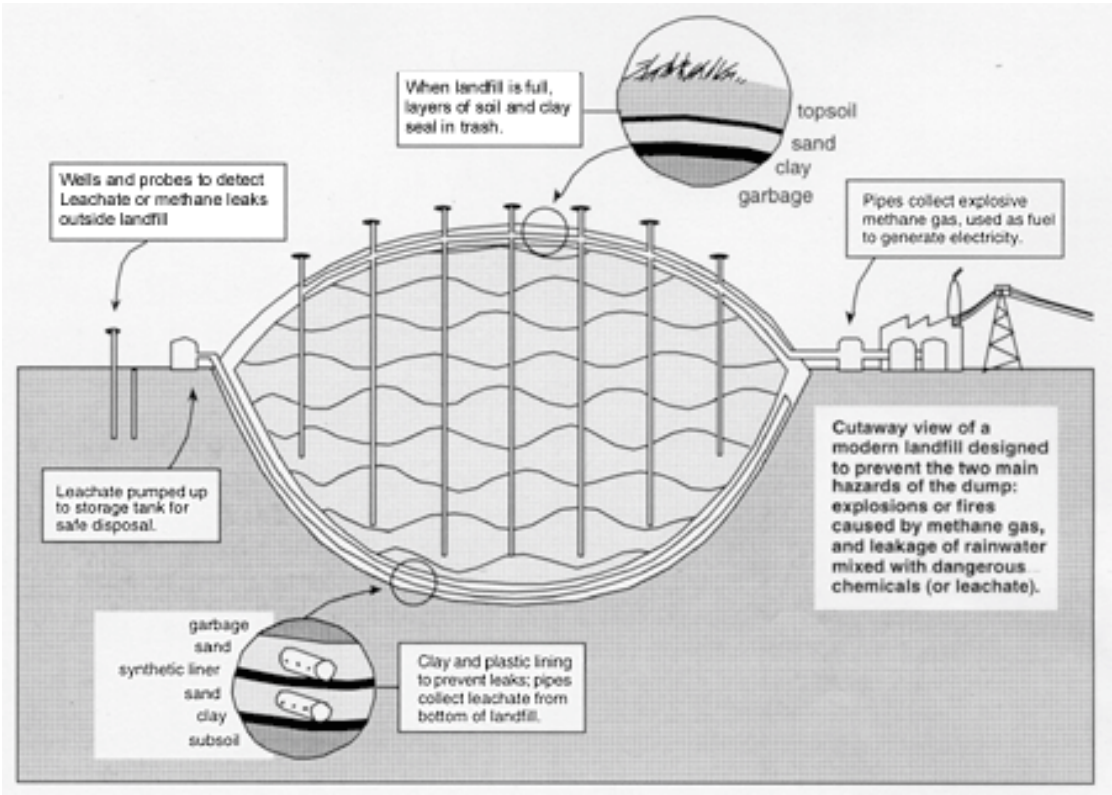
The revised criteria in 40 CFR Part 258 address seven major aspects of MSWLFs (see Figure II-4):

- Location
- Operation
- Design
- Ground-water monitoring
- Corrective action
- Closure and post-closure activities
- Financial assurance.

The location criteria restrict where a MSWLF may be located. New landfills must meet minimum standards for placement in or near flood plains, wetlands, fault areas, seismic impact zones, and other unstable areas. Because some bird species are attracted to landfills, the criteria also restrict the placement of landfills near airports to reduce the bird hazards (i.e., collisions between birds and aircraft that may cause damage to the aircraft or injury to the passengers).

The operating criteria establish daily operating standards for running and maintaining a landfill. The standards dictate sound management practices that ensure protection of human health and the environment. The provisions require covering the landfill daily, controlling disease vectors, and controlling explosive gases. They also prohibit the open burning of solid waste and require the owner and operator of the landfill to control unauthorized access to the unit.

Figure II-4: Cross-Section of a Municipal Solid Waste Landfill



Leachate is formed when rain water filters through wastes placed in a landfill. When this liquid comes in contact with buried wastes, it leaches, or draws out, chemicals or constituents from those wastes. The design criteria require each new landfill to have a liner consisting of a flexible membrane and a minimum of two feet of compacted soil, as well as a leachate collection system. The liner and collection system prevent the potentially harmful leachate from contaminating the soil and ground water below the landfill. States with EPA-approved MSWLF permit programs can allow the use of an alternative liner design that controls ground-water contamination.

In order to check the performance of system design, MSWLF facility managers must also establish a ground-water monitoring program. Through a series of monitoring wells, the facility owner and operator are alerted if the landfill is leaking and causing contamination. If contamination is detected, the owner and operator of the landfill must perform **corrective action** (i.e., clean up the contamination caused by the landfill).

When landfills reach their capacity and can no longer accept additional waste, the criteria stipulate procedures for properly closing the facility to ensure that the landfill does not endanger human health and the environment in the future. The **closure** activities at the end of a facility's use are often expensive, and the owner and operator must have the ability to pay for them. To this end, the criteria require each owner and operator to prove that they have the financial resources to perform these closure and **post-closure** activities, as well as any known corrective action.

■ Bioreactor Landfills

EPA is investigating the feasibility of improving how waste is managed in MSWLFs. Projects are being conducted to assess bioreactor landfill technology. A bioreactor landfill operates to more rapidly transform and degrade organic waste. The increase in waste degradation and stabilization is accomplished through the addition of liquid and air to enhance microbial processes. This bioreactor concept differs from the traditional "dry tomb"

municipal landfill approach. Thus, decomposition and biological stabilization of the waste in a bioreactor landfill can occur in a shorter time frame than occurs in a traditional landfill. This provides a potential decrease in long-term environmental risks and landfill operating and post-closure costs.

Additional information about bioreactor landfills can be found at www.epa.gov/epawaste/nonhaz/municipal/landfill/bioreactors.htm.

ASSISTANCE TO NATIVE AMERICAN TRIBES

EPA developed a municipal solid waste strategy to assist Native American tribes in the establishment of healthy, environmentally protective, integrated solid waste management practices on tribal lands. The initial strategy was based on input from tribal focus groups convened by the National Tribal Environmental Council and discussions with tribal organizations, EPA Regional Indian Program Coordinators, other EPA offices, and other federal agencies with trust responsibilities on Native American lands. The strategy emphasizes building tribal municipal solid waste management capacity, developing tribal organizational infrastructure, and building partnerships among tribes, states, and local governments. Direct EPA support of these goals includes technical assistance, grant funding, education, and outreach.

Solid waste managers on Native American lands face unique challenges. To address issues such as jurisdiction, funding, and staffing, EPA offers several resource guides featuring in-depth information specific to Native American lands. The Agency recognizes that every solid waste management program needs funding to survive and that, in an era of tightening budgets, it may be difficult to find necessary resources. One of EPA's ongoing priorities is to make current information available to help tribes locate the funding they need to develop and implement safe and effective solid waste programs.

One such initiative is the *Tribal Waste Journal*. The journal contains in-depth information on a variety of solid and hazardous waste topics including interviews with representatives from Native American Tribes and Alaskan Native Villages. Each issue focuses on a single topic and presents ideas, approaches, and activities that other Native American Tribes and Alaskan Native Villages have successfully employed.

Additionally, EPA has initiated the Tribal Open Dump Cleanup Project to assist tribes with closure or upgrade of open dump sites. The project is part of a Tribal Solid Waste Interagency Workgroup, which is working to coordinate federal assistance for tribal solid waste management programs. The cleanup project's specific goals include assisting tribes with 1) proposals to characterize/assess open dumps; 2) proposals to develop Integrated Solid Waste Management (ISWM) Plans and Tribal Codes and regulations; 3) proposals to develop and implement alternative solid waste management activities/facilities; and 4) proposals to develop and implement closure and post-closure programs.

Outreach and educational materials are two other tools EPA provides to tribes to support environmentally sound integrated solid waste management practices. The Agency's outreach support helps tribes connect and learn from each other's experiences. Educational resources help tribal leadership as well as the general tribal community understand the importance of good municipal solid waste management. Better understanding ensures that tribal municipal solid waste programs are assigned a high priority and facilitates the communities' adoption of new and improved waste disposal practices.

Additional information about waste management in Indian Country is available at www.epa.gov/epawaste/wycd/tribal.

HOMELAND SECURITY

The Office of Resource Conservation and Recovery's role in the homeland security arena is to provide technical support to Federal, state, local, and tribal authorities, industry, and other stakeholders on waste management decisions before, during, and after a homeland security incident occurs. Most homeland security incidents (e.g., acts of terrorism, large-scale natural disasters, major accidents, and animal disease outbreaks) involve waste management issues and decisions. For example, terrorist events can result in large amounts of contaminated materials and debris, large-scale

natural disasters can generate large quantities of mixed debris, and animal disease outbreaks may result in the need to treat and/or dispose of large volumes of contaminated carcasses. In order to properly manage waste generated from a homeland security incident, the waste needs to be characterized to determine if RCRA applies. For more information on managing homeland security waste, please visit EPA's Waste Management for Homeland Security Incidents at www.epa.gov/waste/homeland.

OTHER SOLID WASTE MANAGEMENT INITIATIVES

Along with the Resource Conservation Challenge (which is discussed in Chapter IV), EPA has developed a number of solid waste management initiatives to help facilitate and promote proper waste management, and encourage source reduction by both industry and the public. Several such initiatives are described below.

■ Recycling Market Development

There are three stages to recycling: collecting recyclable materials; manufacturing recycled-content products; and selling those products. Often symbolized by the chasing arrows logo, all three stages of the recycling process must work effectively in order to close the recycling loop. Creating markets for recycled materials—the third arrow—is critical to the success of the recycling process. Without a strong market for recycled materials, there is no incentive to collect recyclables and manufacture recycled-content products. Market development means fostering businesses that manufacture and market recycled-content products and strengthening consumer demand for those products. Market development can include, for example, expanding the processing and remanufacturing capacity of recycling businesses to handle the increasing volume of collected recyclables.

Across America, more individuals, organizations, businesses, and government agencies are collecting materials for recycling than ever before, which keeps valuable resources out of landfills. However, resource recovery is only part of the recycling story. Recycling also creates new businesses that haul, process, and broker recovered materials, as well as companies that manufacture and distribute products made with recycled content. These recycling businesses put people to work. The jobs created by recycling businesses draw from the full spectrum of the labor market (ranging from low- and semi-skilled jobs to highly skilled jobs). Materials sorters, dispatchers, truck drivers, brokers, sales representatives, process engineers, and chemists are just some of the jobs needed in the recycling industry. Recycling is actively contributing to America's economic vitality.

Additional information about recycling market development, including information for state and local officials, sources of technical and financial assistance for recycling businesses, and information on the economic benefits of recycling can be found at www.epa.gov/epawaste/conserve/rrr/rmd.

Note: Portions of this program were formerly under the Jobs Through Recycling (JTR) program, which is no longer active.

■ Materials and Waste Exchanges

Materials and waste exchanges are markets for buying and selling reusable and recyclable commodities. Some are physical warehouses that advertise available commodities through printed catalogs, while others are simply websites that connect buyers and sellers. Some are coordinated by state and local governments. Others are wholly private, for-profit businesses. The exchanges also vary in terms of area of service and the types of commodities exchanged. In general, waste exchanges tend to handle hazardous materials and industrial process waste while materials exchanges handle nonhazardous items.

Typically, the exchanges allow subscribers to post materials available or wanted on a Web page listing. Organizations interested in trading posted commodities then contact each other directly. As more and more individuals recognize the power of this unique tool, the number of Internet-accessible materials exchanges continues to grow, particularly in the area of national commodity-specific exchanges.

A list of international and national exchanges, as well as state-specific exchanges can be found at www.epa.gov/epawaste/conserve/tools/exchange.htm.

■ Pay-As-You-Throw (PAYT)

Some communities are using economic incentives to encourage the public to reduce solid waste sent to landfills. One of the most successful economic incentive programs used to achieve source reduction and recycling is variable rate refuse pricing, or unit pricing. Unit pricing programs, sometimes referred to as pay-as-you-throw (PAYT) systems, have one primary goal: customers who place more solid waste at the curb for disposal pay more for the collection and disposal service. Thus, customers who recycle more have less solid waste for disposal and pay less. There are a few different types of unit pricing systems. Most require customers to pay a per-can or per-bag fee for refuse collection and require the purchase of a special bag or tag to place on bags or cans. Other systems allow customers to choose between different size containers and charge more for collection of larger containers. EPA's role in the further development of unit pricing systems has been to study effective systems in use and to disseminate documentation to inform other communities about the environmental and economic benefits that unit pricing may have for their community. The number of PAYT communities grew to more than 7,133 in 2007, and the program serves a population of 75 million today. Based on greenhouse gas calculations, PAYT is attributed with reducing an equivalent of over 10 million metric tons of carbon dioxide annually.

Additional information about unit pricing or pay-as-you-throw programs is available at www.epa.gov/payt.

■ Tools for Local Government Recycling Programs

Residential recycling programs can be difficult to sustain. However, communities across the country have developed successful strategies for maintaining and expanding residential recycling programs, and some communities have even turned these programs into cost-saving operations. EPA has developed tools and other resources to help local governments and community leaders learn how to make recycling work in their area. These tools cover topics such as how to improve recycling's economic profile, how to evaluate recycling program costs, community recycling success stories, outreach materials, and resources for recycling in specific sectors. These tools can be found at www.epa.gov/epawaste/conserve/tools/localgov.

■ Full Cost Accounting for Municipal Solid Waste

Full cost accounting is an additional financial management tool that communities can use to improve solid waste management. Full cost accounting is an accounting approach that helps local governments identify all direct and indirect costs, as well as the past and future costs, of a MSW management program. Full cost accounting helps solid waste managers account for all monetary costs of resources used or committed, thereby providing the complete picture of solid waste management costs on an ongoing basis. Full cost accounting can help managers identify high-cost activities and operations and seek ways to make them more cost-effective.

Additional information about full cost accounting can be found at www.epa.gov/fullcost.

■ Construction and Demolition Materials

Under its Resource Conservation Challenge, EPA's Industrial Materials Recycling Program is supporting projects to reduce, reuse, and recycle materials generated from construction, renovation, deconstruction, and demolition of buildings and transportation structures, such as roads and bridges. Construction and demolition materials commonly include concrete, asphalt, wood, glass, brick, metal, insulation, and furniture. From incorporating used or environmentally friendly materials into a building's construction or renovation to disassembling structures for the reuse and recycling of their components, each phase of a building's life cycle offers opportunities to reduce waste.

Additional information about construction and demolition materials is available at www.epa.gov/epawaste/conserve/rrr/imr/cdm. The Resource Conservation Challenge is discussed further in Chapter IV and at www.epa.gov/rcc.

■ Industrial Ecology

The study of material and energy flows and their transformations into products, by-products, and waste throughout industrial and ecological systems is the primary concept of industrial ecology. This initiative urges industry to seek opportunities for the continual reuse and recycling of materials through a system in which processes are designed to consume only available waste streams and to produce only usable waste. Wastes from producers and consumers become inputs for other producers and consumers, and resources are cycled through the system to sustain future generations. Individual processes and products become part of an interconnected industrial system in which new products or processes evolve out of or consume available waste streams, water, and energy; in turn, processes are developed to produce usable resources.

EPA is continually studying these and other programs in order to assist communities in deciding whether one of these programs is right for them. In addition to these initiatives, EPA has published numerous guidance documents designed to educate both industry and the public on the benefits of source reduction, to guide communities in developing recycling programs, and to educate students on the benefits and elements of source reduction and recycling.

SUMMARY

The term “solid waste” includes garbage, refuse, sludges, nonhazardous industrial wastes, hazardous wastes, and other discarded materials. RCRA Subtitle C regulations distinguish those solid wastes which are deemed hazardous and subject to the hazardous waste regulatory program described in Chapter III. Subtitle D addresses primarily nonhazardous solid waste. Subtitle D also addresses hazardous wastes that are excluded from Subtitle C regulation (e.g., household hazardous waste). Management of nonhazardous solid waste is regulated by the states.

Municipal solid waste, a subset of solid waste, is waste generated by businesses and households. EPA recommends an integrated, hierarchical approach to managing solid waste that includes, in descending order of preference:

- Source reduction
- Recycling
- Disposal by combustion and/or landfilling.

As part of Subtitle D, EPA has developed detailed technical criteria for solid waste disposal facilities (40 CFR Part 257) and specific criteria for MSWLFs (40 CFR Part 258):

- Location
- Operation
- Design
- Ground water monitoring
- Corrective action
- Closure and post-closure
- Financial assurance (i.e., responsibility).

In addition, other solid waste management initiatives have been developed by EPA to help facilitate proper waste management. These initiatives focus on the environmental and economic benefits of source reduction and recycling. These initiatives include:

- Jobs through Recycling
- Pay-As-You-Throw
- Full cost accounting
- Construction and demolition materials
- Industrial ecology.

ADDITIONAL RESOURCES

Additional information about municipal solid waste management can be found at www.epa.gov/msw. Additional information on EPA’s Resource Conservation Challenge is available at www.epa.gov/rcc.

CHAPTER III

MANAGING HAZARDOUS WASTE – RCRA SUBTITLE C

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OVERVIEW

The improper management of hazardous waste poses a serious threat to human health and the environment. When EPA began developing the hazardous waste management regulations in the late 1970s, the Agency estimated that only 10 percent of all hazardous waste was managed in an environmentally sound manner.

Some threats posed by the mismanagement of hazardous waste are obvious. Reports of chemical accidents or spills of hazardous waste that close highways, or illegal midnight dumping that contaminates property, are familiar. Yet, even when hazardous waste is managed or disposed of in a careful manner, it may still pose a threat to human health and the environment. For example, toxic hazardous wastes can leak from a hazardous waste landfill that is poorly constructed, improperly maintained, or structurally compromised. Such waste contamination can severely, and sometimes irreversibly, pollute ground water, the primary source of drinking water for half the nation.

Ground water pollution is not the only problem posed by hazardous waste mismanagement. The improper disposal of hazardous waste has polluted streams, rivers, lakes, and other surface waters, killing aquatic life, destroying wildlife, and stripping areas of vegetation. In other cases, careless waste disposal has been linked to respiratory illnesses, skin diseases (including skin cancer), and elevated levels of toxic materials in the blood and tissue of humans and domestic livestock. In still other cases, the mismanagement of hazardous waste has resulted in fires, explosions, or the generation of toxic gases that have killed or seriously injured workers and firefighters.

Since 1980, under RCRA Subtitle C, EPA has developed a comprehensive program to ensure that hazardous waste is managed safely: from the moment it is generated; while it is transported, treated, or stored; until the moment it is finally disposed (see Figure III-1). This cradle-to-grave management system establishes requirements for each of the following:

- **Hazardous Waste Identification**—To facilitate the proper identification and classification of hazardous waste, RCRA begins with hazardous waste identification procedures.

- **Hazardous Waste Recycling and Universal Wastes—**To provide for the safe recycling of hazardous wastes, and facilitate the management of commonly recycled materials, RCRA includes provisions for hazardous waste recycling and universal wastes.
- **Hazardous Waste Generators—**To ensure proper and safe waste management, the RCRA regulations provide management standards for those facilities that produce hazardous waste based on the amount of hazardous waste generated in a calendar month.
- **Hazardous Waste Transporters—**To govern the transport of hazardous waste between management facilities, RCRA regulates hazardous waste transporters.
- **Treatment, Storage, and Disposal Facilities (TSDF)—**To fully protect human health and the environment from hazardous waste treatment, storage, and disposal, the TSDF requirements establish generic facility management standards, specific provisions governing hazardous waste management units, and additional precautions designed to protect soil, ground water, and air resources.
- **Land Disposal Restrictions—**To reduce the hazards posed by permanently land disposed waste, this program requires effective and expeditious hazardous waste treatment.
- **Combustion—**To minimize the hazards posed by the burning of hazardous waste, RCRA imposes strict standards on units conducting such combustion.
- **Permitting—**To ensure that only facilities meeting the TSDF standards are treating, storing, and disposing of hazardous waste, and to provide each TSDF facility with a record of the specific requirements applicable to each part of its operation, RCRA requires owners and operators of these facilities to obtain a permit.
- **Corrective Action—**Since hazardous waste management may result in spills or releases into the environment, the corrective action program is designed to guide the cleanup of any contaminated air, ground water, or soil resulting from such management.
- **Enforcement—**To ensure that RCRA- regulated facilities, from generators to TSDFs, comply with these regulations, RCRA provides EPA with the authority to enforce provisions of the Act.
- **State Authorization—**To empower states and make enforcement more efficient, RCRA also allows EPA to authorize state governments to administer various parts of the RCRA program.

Each of these aspects of the RCRA Subtitle C program is carefully detailed in this chapter.

Figure III-1: RCRA's Cradle-to-Grave Hazardous Waste Management System

Hazardous Waste Generation | Hazardous Waste Transportation | Hazardous Waste Disposal

HAZARDOUS WASTE IDENTIFICATION

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OVERVIEW

What is a hazardous waste? Simply defined, a **hazardous waste** is a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Unfortunately, in order to develop a regulatory framework capable of ensuring adequate protection, this simple narrative definition is not enough. Determining what is a hazardous waste is paramount, because only those wastes that have specific attributes are subject to Subtitle C regulation.

Making this determination is a complex task that is a central component of the hazardous waste management regulations. Hazardous waste is generated from many sources, ranging from industrial manufacturing process wastes, to batteries, to fluorescent light bulbs. Hazardous waste may come in many forms, including liquids, solids, gases, and sludges. To cover this wide range, EPA has developed a system to identify specific substances known to be hazardous and provide objective criteria for including other materials in this universe. The regulations contain guidelines for determining what exactly is a waste (called a solid waste) and what is excluded from the hazardous waste regulations, even though it otherwise is a solid and hazardous waste. Finally, to promote recycling and the reduction of the amount of waste entering the RCRA system, EPA provides exemptions for certain wastes when they are recycled in certain ways.

This chapter introduces the hazardous waste identification process, describes how to determine if a waste is a solid waste, and provides the

regulatory definition for hazardous waste. It also discusses those wastes specifically excluded from Subtitle C regulation and those wastes exempted when recycled.

HAZARDOUS WASTE IDENTIFICATION PROCESS

Proper hazardous waste identification is essential to the success of the RCRA program. This identification process can be a very complex task. Therefore, it is best to approach the issue by asking a series of questions in a step-wise manner (see Figure III-2). If facility owners and operators answer the following questions, they can determine if they are producing a hazardous waste:

1. Is the material in question a solid waste?
2. Is the material excluded from the definition of solid waste or hazardous waste?
3. Is the waste a listed or characteristic hazardous waste?
4. Is the waste delisted?

This chapter will examine these key questions.

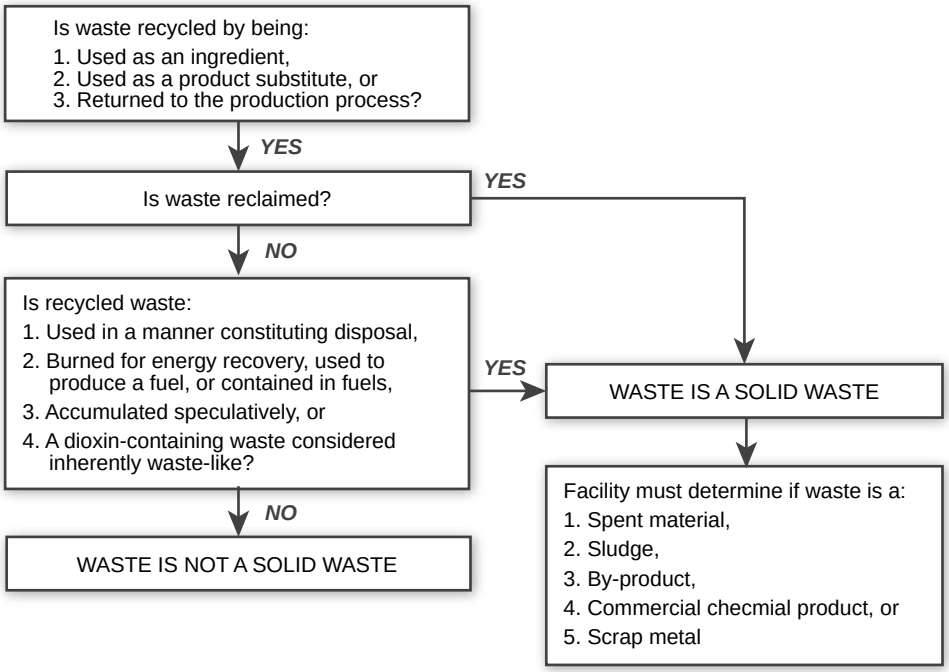
IS THE MATERIAL A SOLID WASTE?

The Subtitle C program uses the term solid waste to denote something that is a waste. In order for a material to be classified as a hazardous waste, it must first be a solid waste. Therefore, the first step in the hazardous waste identification process is determining if a material is a solid waste.

The statutory definition points out that whether a material is a solid waste is not based on the physical form of the material (i.e., whether or not it is a solid as opposed to a liquid or gas), but rather that the material is a waste. The regulations further define **solid waste** as any material that is discarded by being either abandoned, inherently waste-like, a certain military munition, or recycled (see Figure III-3).

- Abandoned—The term **abandoned** simply means thrown away. A material is abandoned if it is disposed of, burned, or incinerated.
- Inherently Waste-Like—Some materials pose such a threat to human health and the environment that they are always considered

Figure III-2: Are All Recycled Wastes Hazardous Wastes?



solid wastes; these materials are considered to be **inherently waste-like**. Examples of inherently waste-like materials include certain dioxin-containing wastes.

- Military Munition—**Military munitions** are all ammunition products and components produced for or used by the U.S. Department of Defense (DOD) or U.S. Armed Services for national defense and security. Unused or defective munitions are solid wastes when abandoned (i.e., disposed of, burned, incinerated) or treated prior to disposal; rendered nonrecyclable or nonuseable through deterioration; or declared a waste by an authorized military official. Used (i.e., fired or detonated) munitions may also be solid wastes if collected for storage, recycling, treatment, or disposal.
- Recycled—A material is **recycled** if it is used or reused (e.g., as an ingredient in a process), reclaimed, or used in certain ways (used in a manner constituting disposal, burned for energy recovery, or accumulated speculatively). (Recycled materials are fully discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes.)

A user-friendly reference document containing a collection of written materials about specific issues related to the definition of solid waste can be found at www.epa.gov/epawaste/hazard/dsw/compendium.htm.

■ Recycled Materials

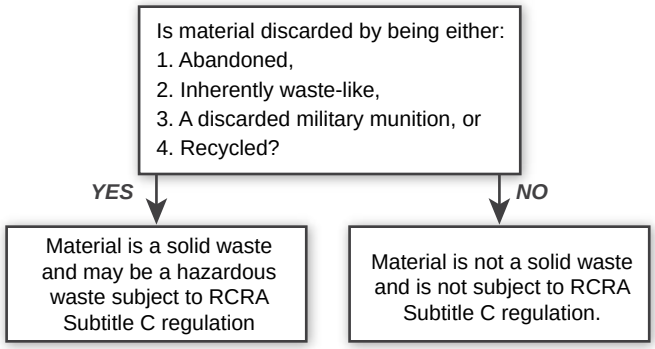
Materials that are recycled are a special subset of the solid waste universe. When recycled, some materials are not solid wastes and, therefore, not hazardous wastes, while others are solid and hazardous waste, but are subject to less-stringent regulatory controls. The level of regulation that applies to recycled materials depends on the material and the type of recycling (see Figure III-4). Because some types of recycling pose threats to human health and the environment, RCRA does not exempt all recycled materials from the definition of solid waste. As a result, the manner in which a material is recycled will determine whether or not the material is a solid waste and, therefore, potentially regulated as

Figure III-4: TCLP Regulatory Levels

Waste Code	Contaminant	Concentration (mg/L)
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100.0
D022	Chloroform	6.0
D007	Chromium	5.0
D023	o-Cresol*	200.0
D024	m-Cresol*	200.0
D025	p-Cresol*	200.0
D026	Total Cresol*	200.0
D016	2,4-D	10.0
D027	1,4-Dichlorobenzene	7.5
D028	1,2-Dichloroethane	0.5
D029	1,1-Dichloroethylene	0.7
D030	2,4-Dichlorotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its epoxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloromethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methylethylketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloroethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5-Trichlorophenol	400.0
D042	2,4,6-Trichlorophenol	2.0
D017	2,4,5-TP (Silver)	1.0
D043	Vinyl chloride	0.2

* If 0-, m-, and p-cresols cannot be individually measured, the regulatory level for total cresols is used.

Figure III-3: Is It a Solid Waste?



a hazardous waste. In order to encourage waste recycling, RCRA exempts three types of wastes from the definition of solid waste:

- Waste Used as an Ingredient—If a material is directly used as an ingredient in a production process without first being reclaimed, then that material is not a solid waste.
- Waste Used as a Product Substitute—If a material is directly used as an effective substitute for a commercial product (without first being reclaimed), it is exempt from the definition of solid waste.
- Wastes Returned to the Production Process—When a material is returned directly to the production process (without first being reclaimed) for use as a feedstock or raw material, it is not a solid waste.

Conversely, materials are solid wastes, and are not exempt, if they are recycled in certain ways. If these materials are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; accumulated speculatively; or are dioxin-containing wastes considered inherently waste-like; then they are defined as solid wastes.

- Used in a Manner Constituting Disposal—**Use constituting disposal** is the direct placement of wastes or products containing wastes (e.g., asphalt with petroleum-refining wastes as an ingredient) on the land.
- Burned for Energy Recovery, Used to Produce a Fuel, or Contained in Fuels—Burning hazardous waste for fuel (e.g., **burning for energy recovery**) and using wastes to produce fuels are regulated activities. Conversely, commercial products intended to be burned as fuels are not considered solid wastes. For example, off-specification jet fuel (e.g., a fuel with minor chemical impurities) is not a solid waste when it is burned for energy recovery because it is itself a fuel.
- Accumulated Speculatively—In order to encourage recycling of wastes as well as ensure that materials are actually recycled, and not simply stored to avoid regulation, EPA established a provision to encourage facilities to recycle sufficient amounts in a timely manner. This provision designates as solid wastes those materials that are **accumulated speculatively**. A material is accumulated speculatively (e.g., stored in lieu of expeditious recycling) if it has no viable market or if the person accumulating the material cannot demonstrate that at least 75 percent of the material is recycled in a calendar year, commencing on January 1 (see Figure III-5).
- Dioxin-Containing Wastes Considered Inherently Waste-Like—Dioxin-containing wastes are considered inherently waste-like because they pose significant threats to human health and the environment if released or mismanaged. As a result, RCRA does not exempt such wastes from the definition of solid waste even if they are recycled through direct use or reuse without prior reclamation. This is to ensure that such wastes are subject to the most protective regulatory controls.

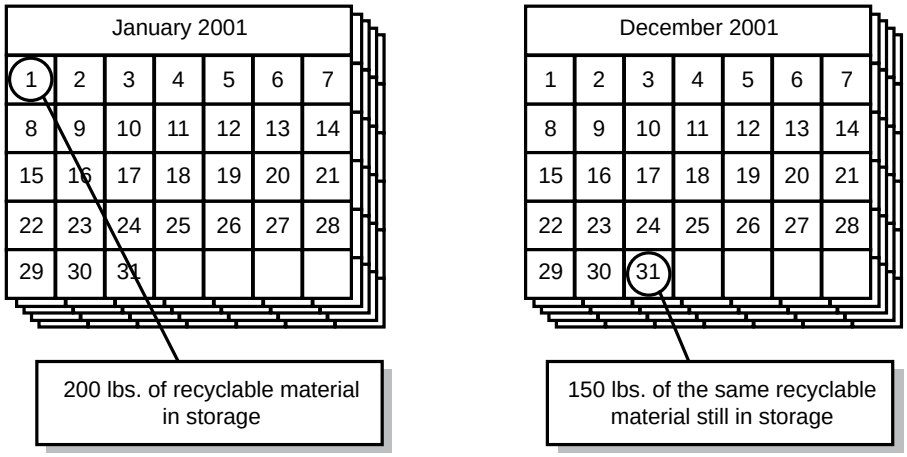
■ Secondary Materials

Not all materials can be directly used or reused without reclamation. A material is **reclaimed** if it is processed to recover a usable product (e.g., smelting a waste to recover valuable metal constituents), or if it is regenerated through processing to remove contaminants in a way that restores them to their usable condition (e.g., distilling dirty spent solvents to produce clean solvents). If **secondary materials** are reclaimed before use, their regulatory status depends on the type of material. For this solid waste determination process, EPA groups all materials into five categories. These secondary materials consist of spent materials, sludges, by-products, commercial chemical products (CCPs), and scrap metal.

Spent Materials

Spent materials are materials that have been used and can no longer serve the purpose for which they were produced without processing. For example, a solvent used to degrease metal parts will eventually become contaminated such that it cannot be used as a solvent until it is regenerated. If a spent material must be reclaimed, it is a solid waste and is subject to hazardous waste regulation. Spent materials are also regulated as solid wastes when used in a manner constituting disposal; burned for energy recovery,

Figure III-5: Materials Accumulated Speculatively



On January 1, 2001, a facility has 200 lbs. of a material that it wants to re-insert directly into its production process. Such a material is technically exempt from the definition of solid waste because it is being recycled through direct reuse without prior reclamation. However, by the end of the calendar year (December 31, 2001), less than 75 percent (i.e., less than 150 lbs.) of the material has been reclaimed or sent off site for reclamation. Therefore, the material has been speculatively accumulated and is no longer exempt from the definition of solid waste. The material may then be regulated as a hazardous waste.

used to produce a fuel, or contained in fuels; or accumulated speculatively (see Figure III-6).

Sludges

Sludges are any solid, semisolid, or liquid wastes generated from a wastewater treatment plant, water supply treatment plant, or air pollution control device (e.g., filters or baghouse dust). Sludges from specific industrial processes or sources (known as listed sludges) are solid wastes when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively. On the other hand, characteristic sludges (which are sludges that exhibit certain physical or chemical properties) are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or

Figure III-6: Regulatory Status of Secondary Materials

	Reclaimed	Used in a Manner Constituting Disposal	Burned for Energy Recovery, Used to Produce a Fuel, or Contained in Fuels	Accumulated Speculatively
Spent Materials	✓	✓	✓	✓
Listed Sludges	✓	✓	✓	✓
Characteristic Sludges		✓	✓	✓
Listed By-Products	✓	✓	✓	✓
Characteristic By-Products		✓	✓	✓
Commercial Chemical Products		✓*	✓*	
Scrap-Metal	✓	✓	✓	✓

contained in fuels; or accumulated speculatively (see Figure III-6). (Listings and characteristics are fully discussed later in this chapter.)

By-Products

By-products are materials that are not one of the intended products of a production process. An example is the sediment remaining at the bottom of a distillation column. By-product is a catch-all term and includes most wastes that are not spent materials or sludges. Listed by-products are solid wastes when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively. On the other hand, characteristic by- products are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively (see Figure III-6).

Commercial Chemical Products

Commercial chemical products (CCPS) are unused or off-specification chemicals (e.g., chemicals that have exceeded their shelf life), spill or container residues, and other unused manufactured products that are not typically considered chemicals. CCPs are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; or burned for energy recovery, used to produce a fuel, or contained in fuels (see Figure III-6).

Scrap Metal

Scrap metal is worn or extra bits and pieces of metal parts, such as scrap piping and wire, or worn metal items, such as scrap automobile parts and radiators. If scrap metal is reclaimed, it is a solid waste and is subject to hazardous waste regulation (see also Chapter III, Hazardous Waste Recycling and Universal Wastes). Scrap metal is also regulated as a solid waste when used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively. This does not apply to processed scrap metal, which is excluded from hazardous waste generation entirely (as discussed later in this chapter).

■ Sham Recycling

For all recycling activities, the above rules are based on the premise that legitimate reclamation or reuse is taking place. EPA rewards facilities recycling some wastes by exempting them from regulation, or by subjecting them to lesser regulation. Some facilities, however, may claim that they are recycling a material in order to avoid being subject to RCRA regulation, when in fact the activity is not legitimate recycling. EPA has established guidelines for what constitutes legitimate recycling and has described activities it considers to be illegitimate or **sham recycling**. Considerations in making this determination include whether the secondary material is effective for the claimed use, if the secondary material is used in excess of the amount necessary, and whether or not the facility has maintained records of the recycling transactions.

SHAM RECYCLING

Sham recycling may include situations when a secondary material is:

- Ineffective or only marginally effective for the claimed use (e.g., using certain heavy metal sludges in concrete when such sludges do not contribute any significant element to the concrete's properties)
- Used in excess of the amount necessary (e.g., using materials containing chlorine as an ingredient in a process requiring chlorine, but in excess of the required chlorine levels)
- Handled in a manner inconsistent with its use as a raw material or commercial product substitute (e.g., storing materials in a leaking surface impoundment as compared to a tank in good condition that is intended for storing raw materials).

IS THE WASTE EXCLUDED?

Not all RCRA solid wastes qualify as hazardous wastes. Other factors must be considered before deciding whether a solid waste should be regulated as a hazardous waste. Regulation of certain wastes may be impractical or otherwise undesirable, regardless of the hazards that the waste might pose.

For instance, household waste can contain dangerous chemicals, such as solvents and pesticides, but subjecting households to the strict

RCRA waste management regulations would create a number of practical problems. As a result, Congress and EPA exempted or excluded certain wastes, such as household wastes, from the hazardous waste definition and regulations. Determining whether or not a waste is excluded or exempted from hazardous waste regulation is the second step in the RCRA hazardous waste identification process. There are five categories of exclusions:

- Exclusions from the definition of solid waste
- Exclusions from the definition of hazardous waste
- Exclusions for waste generated in raw material, product storage, or manufacturing units
- Exclusions for laboratory samples and waste treatability studies
- Exclusions for dredged material regulated under the Marine Protection Research and Sanctuaries Act or the Clean Water Act.

If the waste fits one of these categories, it is not regulated as a RCRA hazardous waste, and the hazardous waste requirements do not apply.

A user-friendly reference document containing a collection of written materials about specific issues related to exclusions from the definition of hazardous waste can be found at www.epa.gov/epawaste/hazard/wastetypes/wasteid/pdfs/rcra2614b-ref.pdf.

■ Solid Waste Exclusions

A material cannot be a hazardous waste if it does not meet the definition of a solid waste. Thus, wastes that are excluded from the definition of solid waste are not subject to RCRA Subtitle C hazardous waste regulation. The exclusions from the definition of solid waste are as follows.

Domestic Sewage and Mixtures of Domestic Sewage

Domestic sewage, or sanitary waste, comes from households, office buildings, factories, and any other place where people live and work. These wastes are carried by sewer to a municipal wastewater treatment plant (called a **publicly owned treatment works** (POTW)). The treatment of these wastes is regulated under the Clean Water Act (CWA). Mixtures of sanitary wastes and other wastes (including hazardous industrial wastes) that pass through a sewer system to a POTW are also excluded from Subtitle C regulation once they enter the sewer. In certain circumstances, this exclusion may be applied to domestic sewage and mixtures of domestic sewage that pass through a federally owned treatment works (FOTW).

Industrial Wastewater Discharges (Point Source Discharges)

Another exclusion from RCRA designed to avoid overlap with CWA regulations applies to **point source discharges**. Point source discharges are discharges of pollutants (e.g., from a pipe, sewer, or pond) directly into a lake, river, stream, or other water body. CWA regulates such discharges under the National Pollutant Discharge Elimination System (NPDES) permitting program. Under this exclusion from the definition of solid waste, wastewaters that are subject to CWA regulations are exempt from Subtitle C regulation at the point of discharge. Any hazardous waste generation, treatment, or storage prior to the discharge is subject to RCRA regulation.

Many industrial facilities that treat wastewater on site utilize this point source discharge exclusion.

Irrigation Return Flows

When farmers irrigate agricultural land, water not absorbed into the ground can flow into reservoirs for reuse. This return flow often picks up pesticide or fertilizer constituents, potentially rendering it hazardous. Because this water may be reused on the fields, it is excluded from the definition of solid waste.

Radioactive Waste

Radioactive waste is regulated by either the Nuclear Regulatory Commission or the U.S. Department of Energy (DOE) under the Atomic Energy Act (AEA). To avoid duplicative regulation under RCRA and AEA, RCRA excludes certain radioactive materials from the definition of solid waste. However, RCRA excludes only the radioactive components of the waste. If a radioactive waste is mixed with a hazardous waste, the resultant mixture is regulated by both AEA and RCRA as a **mixed waste**. Similarly, if a facility generates a hazardous waste that is also radioactive, the material is a mixed waste and is subject to regulation under both RCRA and AEA (the regulatory status of mixed waste is fully discussed later in this chapter).

In-Situ Mining Waste

In-situ (in-place) mining of certain minerals may involve the application of solvent solutions directly to a mineral deposit in the ground. The solvent passes through the ground, collecting the mineral as it moves. The mineral and solvent mixtures are then collected in underground wells where the solution is removed. Such solvent-contaminated earth, or any nonrecovered solvent, is excluded from the definition of solid waste when left in place.

Pulping Liquors

Pulping liquor, also called black liquor, is a corrosive material used to dissolve wood chips for manufacturing of paper and other materials. To promote waste minimization and recycling, EPA excluded pulping liquors from the definition of solid waste if they are reclaimed in a recovery furnace and then reused in the pulping process. If the liquors are recycled in another way, or are accumulated speculatively, they are not excluded.

Spent Sulfuric Acid

Spent sulfuric acid may be recycled to produce virgin sulfuric acid. To promote waste reduction and recycling, such recycled spent sulfuric acid is excluded from the definition of solid waste, unless the facility accumulates the material speculatively.

Closed-Loop Recycling

To further promote waste reduction and recycling, spent materials that are reclaimed and returned to the original process in an enclosed system of pipes and tanks are excluded from the definition of solid waste, provided that:

- Only tank storage is involved, and the entire process, through reclamation, is closed to the air (i.e., enclosed)
- Reclamation does not involve controlled flame combustion, such as that which occurs in boilers, industrial furnaces, or incinerators
- Waste materials are never accumulated in tanks for more than 12 months without being reclaimed
- Reclaimed materials are not used to produce a fuel, or used to produce products that are used in a manner constituting disposal.

An example of such a closed-loop system might include a closed solvent recovery system in which the dirty solvents are piped from the degreasing unit to a solvent still where the solvent is cleaned, and then piped back to the degreasing unit.

Spent Wood Preservatives

Many wood preserving plants recycle their wastewaters and spent wood preserving solutions. These materials are collected on drip pads and sumps, and are in many cases returned directly to the beginning of the wood preserving process where they are reused in the same manner. While the process resembles a closed-loop recycling process, the closed-loop recycling exclusion does not apply because drip pads are open to the air. Consistent with their objective to encourage recycling hazardous waste, EPA developed a specific exclusion for

spent wood preserving solutions and wastewaters containing spent preservatives, provided that the materials have been reclaimed and are reused for their original purpose. In addition, wood preserving solutions and wastewaters are excluded from the definition of solid waste prior to reclamation. To use this exclusion, a facility is required to reuse the materials for their intended purpose and manage them in a way that prevents releases to the environment.

Coke By-Product Wastes

Coke, used in the production of iron, is made by heating coal in high temperature ovens. Throughout the production process many by-products are created. The refinement of these coke by-products generates several listed and characteristic wastestreams. However, to promote recycling of these wastes, EPA provided an exclusion from the definition of solid waste for certain coke by-product wastes that are recycled into new products.

Splash Condenser Dross Residue

The treatment of steel production pollution control sludge generates a zinc-laden residue, called a dross. This material, generated from a splash condenser in a high temperature metal recovery process, is known as a splash condenser dross residue. Because this material contains 50 to 60 percent zinc, it is often reclaimed, reused, or processed as a valuable recyclable material. Since facilities commonly handle this material as a valuable commodity by managing it in a way that is protective of human health and the environment, EPA excluded this residue from the definition of solid waste.

Hazardous Oil-Bearing Secondary Materials and Recovered Oil from Petroleum Refining Operations

Petroleum refining facilities sometimes recover oil from oily wastewaters and reuse this oil in the refining process. In order to encourage waste minimization and recycling, EPA excluded such recovered oil from the definition of solid waste when it is returned to the refinery. Oil-bearing hazardous wastes which are recycled back into the petroleum refining process are also excluded.

Condensates from Kraft Mill Steam Strippers

The kraft process, the most commonly used pulping process today, utilizes various chemicals to break down wood into pulp. This process generates overhead gases that are condensed and often recycled as fuel. To encourage the recycling of these condensates, EPA excluded them from the definition of solid waste provided the condensate is combusted at the mill that generated it.

Comparable Fuels

In order to promote the recycling of materials with high fuel values, certain materials that are burned as fuels are excluded from the definition of solid waste, provided that they meet certain specifications (i.e., are of a certain degree of purity). This is to ensure that the material does not exceed certain levels of toxic constituents and physical properties that might impede burning or are harmful to human health and the environment. Materials that meet this specification are considered comparable to pure or virgin fuels.

Processed Scrap Metal

Scrap metal includes, but is not limited to, pipes, containers, equipment, wire, and other metal items that are no longer of use. To facilitate recycling, scrap metal that has been processed to make it

easier to handle or transport and is sent for metals recovery is excluded from the definition of solid waste. Unprocessed scrap metal is still eligible for an exemption from hazardous waste regulation when recycled (as discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes).

Shredded Circuit Boards

Circuit boards are metal boards that hold computer chips, thermostats, batteries, and other electronic components. Circuit boards can be found in computers, televisions, radios, and other electronic equipment. When this equipment is thrown away, these boards can be removed and recycled. Whole circuit boards meet the definition of scrap metal and are, therefore, exempt from hazardous waste regulation when recycled (as discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes).

On the other hand, some recycling processes involve shredding the board. Such shredded boards do not meet the exclusion for recycled scrap metal. In order to facilitate the recycling of such materials, EPA excluded recycled shredded circuit boards from the definition of solid waste, provided that they are stored in containers sufficient to prevent release to the environment and are free of potentially dangerous components, such as mercury switches, mercury relays, nickel-cadmium batteries, and lithium batteries.

Mineral Processing Spent Materials

Mineral processing generates spent materials that may exhibit hazardous waste characteristics. Common industry practice is to recycle these mineral processing wastes back into the processing operations to recover mineral values. EPA created a conditional exclusion from the definition of solid waste for these spent materials when recycled in the mineral processing industry, provided the materials are stored in certain types of units and are not accumulated speculatively.

Petrochemical Recovered Oil

Organic chemical manufacturing facilities sometimes recover oil from their organic chemical industry operations. EPA excluded petrochemical recovered oil from the definition of solid waste when the facility inserts the material into the petroleum refining process of an associated or adjacent petroleum refinery. Only petrochemical recovered oil that is hazardous because it exhibits the characteristic of ignitability or exhibits the toxicity characteristic for benzene (or both) is eligible for the exclusion.

Spent Caustic Solutions from Petroleum Refining

Petroleum refineries use caustics to remove acidic compounds like mercaptans from liquid petroleum streams to reduce product odor and corrosivity as well as to meet product sulfur specifications. Spent liquid treating caustics from petroleum refineries are excluded from the definition of solid waste if they are used as a feedstock in the manufacture of napthenic and cresylic acid products. EPA believes that spent caustic, when used in this manner, is a valuable commercial feedstock in the production of these particular products and is, therefore, not a solid waste.

Zinc Fertilizers Made from Recycled Hazardous Secondary Materials

EPA promulgated a conditional exclusion from the definition of solid waste for hazardous secondary materials that are recycled to make zinc fertilizers or zinc fertilizer ingredients. Zinc, an important micronutrient for plants and animals, can be removed from zinc-rich manufacturing residue and used to produce zinc micronutrient fertilizer. A second conditional exclusion applies to the zinc fertilizer products made from these secondary materials.

Cathode Ray Tubes Being Recycled

EPA provides a conditional exclusion from the definition of solid waste for cathode ray tubes (CRTs) and CRT glass destined for recycling. EPA promulgated reduced standards to increase the collection and recycling of CRTs, and to reduce the amount of lead in landfills by allowing lead to be reused to make new CRT glass or sent to a lead smelter. Under this exclusion, used, unbroken CRTs are not regulated as solid waste unless they are stored for more than one year. EPA set simplified standards for unbroken CRTs because the risk of lead releases from them is very low. Used, broken CRTs are also not regulated as solid waste as long as the

conditions of the exclusion are met, which includes management and labeling standards. Glass removed from CRTs remains unregulated when destined for recycling at a CRT glass manufacturer or a lead smelter when the conditions of the exclusion are met. In addition, individuals that export used CRTs for recycling are subject to notification requirements and must receive written consent from the receiving country through EPA before shipments can be made. These exporters must also file annual reports with EPA as well. Exporters sending used CRTs for reuse abroad must also comply with certain notification requirements, but do not have to receive consent from the foreign country.

Reusable Solvent-Contaminated Wipes

EPA excludes solvent-contaminated wipes that are sent for cleaning (e.g., sent to a laundry or dry cleaner) and reuse provided certain conditions are met. Solvent-contaminated wipes must be managed in non-leaking, closed containers and be labeled. Additionally, solvent-contaminated wipes cannot be accumulated for more than 180 days and must contain no free liquids when sent for cleaning. Generators must also maintain certain records and the laundry or dry cleaner must be regulated under the Clean Water Act.

■ Hazardous Waste Exclusions

EPA also excludes certain solid wastes from the definition of hazardous waste. If a material meets an exclusion from the definition of hazardous waste, it cannot be a hazardous waste, even if the material technically meets a listing or exhibits a characteristic. There are currently 15 exclusions from the definition of hazardous waste.

Household Hazardous Waste

Households often generate solid wastes that could technically be hazardous wastes (e.g., old solvents, paints, pesticides, fertilizers, or poisons). However, it would be impossible to regulate every house in the United States that occasionally threw away a can of paint thinner or a bottle of rat poison. Therefore, EPA developed the household waste exclusion. Under this exclusion, wastes generated by normal household activities (e.g., routine house and yard maintenance) are excluded from the definition of hazardous waste. EPA has expanded the exclusion to include household-like areas, such as bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds, and day-use recreation areas. While household hazardous waste is excluded from Subtitle C, it is regulated under Subtitle D as a solid waste (as discussed in Chapter II).

Agricultural Waste

To prevent overregulation of farms and promote waste recycling, solid wastes generated by crop or animal farming are excluded from the definition of hazardous waste provided that the wastes are returned to the ground as fertilizers or soil conditioners. Examples of such wastes are crop residues and manures.

Mining Overburden

After an area of a surface mine has been depleted, it is common practice to return to the mine the earth and rocks (overburden) that were removed to gain access to ore deposits. When the material is returned to the mine site, it is not a hazardous waste under RCRA.

Bevill and Bentsen Wastes

In the Solid Waste Disposal Act Amendments of 1980, Congress amended RCRA by exempting oil, gas, and geothermal exploration, development, and production wastes (**Bentsen wastes**); fossil fuel combustion wastes; mining and mineral processing wastes; and cement kiln dust wastes (**Bevill wastes**) from the definition of hazardous waste pending further study by EPA. These wastes were temporarily exempted because they were produced in very large volumes, were thought to pose less of a hazard than other wastes, and were generally not amenable to the management practices required under RCRA. The following paragraphs describe these exclusions in detail.

Fossil Fuel Combustion Waste

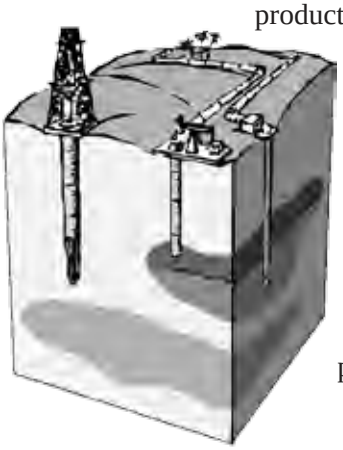
In order to accommodate effective study, fossil fuel combustion wastes were divided into two categories, large-volume coal-fired utility wastes and remaining wastes. After studying these wastes, in 1993, EPA decided to permanently exclude large- volume coal-fired utility wastes, including fly ash, bottom ash, boiler slag, and flue gas emission control waste

from the definition of hazardous waste. Further study by EPA, in 2000, indicated that all remaining fossil fuel combustion wastes need not be regulated under RCRA Subtitle C. However, EPA determined that national non-hazardous waste regulations under RCRA Subtitle D are appropriate for coal combustion wastes (CCW) disposed in surface impoundments and landfills and used as minefill.

In 2007, EPA published a Notice of Data Availability (NODA) regarding the management of CCW in landfills and surface impoundments. After the failure of the coal combustion residual (CCR) surface impoundment at the Tennessee Valley Authority's Kingston facility in December 2008, EPA undertook an effort to assess the structural integrity of other CCR surface impoundments. In 2010, EPA proposed two regulatory options under RCRA for the disposal of CCRs generated from electric utilities and independent power producers. Under the first proposal, EPA would revise its previous regulatory determination and would regulate these residuals as special wastes under Subtitle C when they are destined for disposal in landfills or surface impoundments. Under the second proposal, EPA would maintain the initial regulatory determination and regulate disposal of such materials under Subtitle D by issuing national minimum criteria. EPA also issued a subsequent NODA about additional information regarding CCR surface impoundments at electric utilities. EPA will use comments and information received in response to the proposed rule and NODA as the Agency follows up on the regulatory determination.

Oil, Gas, and Geothermal Wastes

Certain wastes from the exploration and production of oil, gas, and geothermal energy are excluded from the definition of hazardous waste. These wastes include those that have been brought to the surface during oil and gas exploration and production operations, and other wastes that have come into contact with the oil and gas production stream (e.g., during removal of waters injected into the drill well to cool the drill bit).



Mining and Mineral Processing Wastes

Certain wastes from the mining, refining, and processing of ores and minerals are excluded from the definition of hazardous waste.

Cement Kiln Dust

Cement kiln dust is a fine-grained solid by-product generated during the cement manufacturing process and captured in a facility's air pollution control system. After study, EPA decided to develop specific regulatory provisions for cement kiln dust. Until EPA promulgates these new regulatory controls, however, cement kiln dust will generally remain excluded from the definition of hazardous waste.

Trivalent Chromium Wastes

The element chromium exists in two forms, hexavalent and trivalent. EPA determined that while hexavalent chromium poses enough of a threat to merit regulation as a characteristic hazardous waste, trivalent chromium does not. Therefore, to prevent unnecessary regulation, EPA excluded, from the definition of hazardous waste, trivalent chromium- bearing hazardous wastes from certain leather tanning, shoe manufacturing, and leather manufacturing industries.

Arsenically Treated Wood

Discarded arsenically treated wood or wood products that are hazardous only because they exhibit certain toxic characteristics (e.g., contain certain concentrations of leachable metal, pesticide, or organic constituents) are excluded from the definition of hazardous waste. Once such treated wood is used, it may be disposed of by the user (commercial or residential) without being subject to hazardous waste regulation. This exclusion is based on the fact that the use of such wood products on the land is similar to the common disposal method, which is landfilling. This exclusion applies only to end-users and not to manufacturers.

Petroleum-Contaminated Media and Debris from Underground Storage Tanks (USTs)

USTs are used to store petroleum (e.g., gasoline, oil) and hazardous substances (e.g., ammonia). When these tanks leak, the UST program under RCRA Subtitle I provides requirements for cleaning up such spills. To facilitate the corrective action process under the UST regulations, contaminated media (soils and ground water) and debris (tanks and equipment) at sites undergoing UST cleanup that are hazardous only because they exhibit certain toxic characteristics (e.g., contain specific concentrations of leachable organic constituents) are excluded from the definition of hazardous waste.

Spent Chlorofluorocarbon Refrigerants

Chlorofluorocarbons (CFCs) released to the atmosphere damage the stratospheric ozone layer. To promote recycling and discourage the practice of venting used CFCs to the atmosphere as a means of avoiding Subtitle C regulation, EPA excluded recycled CFCs from the definition of hazardous waste since the refrigerants are generally reclaimed for reuse.

Used Oil Filters

In order to promote the recycling and recovery of metals and other products from used oil filters, EPA exempted used oil filters that have been properly drained to remove the used oil.

Used Oil Distillation Bottoms

When used oil is recycled, residues (called **distillation bottoms**) form at the bottom of the recycling unit. To promote used oil recycling and the beneficial reuse of waste materials, EPA excluded these residues from the definition of hazardous waste when the bottoms are used as ingredients in asphalt paving and roofing materials.

Landfill Leachate or Gas Condensate Derived from Certain Listed Wastes

Landfill leachate and landfill gas condensate derived from previously disposed wastes, where such wastes now meet the listing description of one or more of the following listed wastes: K169, K170, K171, K172, K176, K177, K178, and K181, would be regulated as a listed hazardous waste. However, EPA temporarily deferred such landfill leachate and gas condensate from the definition of hazardous waste provided their discharge is regulated under CWA. The exclusion will remain effective while EPA studies how the landfill leachate and landfill gas condensate are currently managed, and the effect of future CWA effluent limitation guidelines for landfill wastewaters.

Disposable Solvent-Contaminated Wipes

EPA conditionally excludes solvent-contaminated wipes (except for wipes that are hazardous due to the presence of trichloroethylene) that are sent for disposal, e.g., to a combustor or landfill. Solvent-contaminated wipes must be managed in non-leaking, closed containers and be labeled. Additionally, solvent-contaminated wipes cannot be accumulated for more than 180 days and must contain no free liquids when sent for cleaning. Generators must also maintain certain records and the combustor or landfill must be regulated under the respective Clean Air Act or RCRA regulations.

■ Raw Material, Product Storage, and Process Unit Waste Exclusions

Hazardous wastes generated in raw material, product storage, or process (e.g., manufacturing) units are exempt from Subtitle C hazardous waste regulation while the waste remains in such units. These units include tanks, pipelines, vehicles, and vessels used either in the manufacturing process or for storing raw materials or products, but specifically do not include surface impoundments. Once the waste is removed from the unit, or when a unit temporarily or permanently ceases operation for 90 days, the waste is considered generated and is subject to regulation.

■ Sample and Treatability Study Exclusions

Hazardous waste samples are small, discrete amounts of hazardous waste that are essential to ensure accurate characterization and proper hazardous waste treatment. In order to facilitate the analysis of these materials, RCRA exempts characterization samples and treatability study samples from Subtitle C hazardous waste regulation.

Waste Characterization Samples

Samples sent to a lab to determine whether or not a waste is hazardous are exempt from regulation. Such samples (typically less than one gallon of waste) are excluded from Subtitle C regulation, provided that these samples are collected and shipped for the sole purpose of determining hazardous waste characteristics or composition. Storage, transportation, and testing of the sample are excluded from RCRA regulation even when the lab testing is complete, provided the sample is returned to the generator, and other specific provisions are met. When shipping the sample to or from the laboratory, the sample collector must comply with certain labeling requirements, as well as any applicable U.S. Postal Service (USPS) or U.S. Department of Transportation (DOT) shipping requirements.

Treatability Study Samples

To determine if a particular treatment method will be effective on a given waste or what types of wastes remain after the treatment is complete, facilities send samples of waste to a lab for testing. EPA conditionally exempts those who generate or collect samples for the sole purpose of conducting treatability studies from the hazardous waste regulations, provided that certain requirements, including packaging, labeling, and recordkeeping provisions, are met. In addition, under specific conditions, laboratories conducting such treatability studies may also be exempt from Subtitle C regulation.

■ Dredge Materials Exclusions

Dredge materials subject to the permitting requirements of 404 of the Federal Water Pollution Control Act of Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 are not considered hazardous wastes.

IS THE WASTE A LISTED HAZARDOUS WASTE?

After a facility determines that its waste is a solid waste and is not excluded from the definitions of solid or hazardous waste, the owner and operator must determine if the waste is a hazardous waste. The first step in this process is determining if the waste is a listed hazardous waste. The hazardous waste listings consist of four lists:

- The F list
- The K list
- The P list
- The U list.

Listed wastes are wastes from generic industrial processes, wastes from certain sectors of industry, and unused pure chemical products and formulations. Because these wastes are dangerous enough to warrant full Subtitle C regulation based on their origin, any waste fitting a narrative listing description is considered a listed hazardous waste.

■ Listing Criteria

Before developing each hazardous waste listing, EPA thoroughly studies a particular wastestream and the threats that it can pose to human health and the environment. If the waste poses sufficient threat, EPA includes a precise description of that

DEFINITION OF HAZARDOUS WASTE

In RCRA §1004(5), Congress defined hazardous waste as a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. Cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or

b. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

Based on this broad definition, Congress instructed EPA to develop more specific criteria for defining solid and hazardous waste. Congress believed that EPA should define hazardous waste using two different mechanisms: by listing certain specific solid wastes as hazardous (i.e., wastes from certain industrial processes or sources), and by identifying characteristics (i.e., physical or chemical properties) which, when exhibited by a solid waste, make it hazardous. Taking Congress' lead, EPA proceeded to develop an elaborate definition of hazardous waste that included both of these mechanisms.

waste on one of four hazardous waste lists within the regulations.

In order to determine whether a waste should be listed in the first place, the Agency developed a set of criteria to use as a guide and a consistent frame of reference when considering listing a wastestream. These criteria were developed by EPA to use in evaluating whether a waste warranted being listed as a hazardous waste. These listing criteria cannot be used by waste handlers for waste identification purposes. Waste handlers must instead consult the actual listings to determine if their waste is regulated as a listed hazardous waste.

There are three different criteria EPA uses to decide whether or not to list a waste as hazardous. The three criteria are:

- The waste typically contains toxic chemicals at levels that could pose a threat to human health and the environment if improperly managed. Such wastes are known as toxic listed wastes.
- The waste contains such dangerous chemicals that it could pose a threat to human health and the environment even when properly managed. These wastes are fatal to humans and animals even in low doses. Such wastes are known as acute hazardous wastes.
- The waste typically exhibits one of the four characteristics of hazardous waste: ignitability, corrosivity, reactivity, and toxicity.

In addition, EPA may list a waste as hazardous, if it has cause to believe that, for some other reason, the waste typically fits within the statutory definition of hazardous waste developed by Congress.

■ Hazardous Waste Listings

EPA has applied the listing criteria to hundreds of specific industrial wastestreams. These wastes are grouped into the four lists located at 40 CFR Part 261, Subpart D. Listed wastes are organized as follows:

- The F list—The F list includes wastes from certain common industrial and manufacturing processes. Because the processes generating these wastes can occur in different sectors of industry, the F list wastes are known as wastes from nonspecific sources. The F list is codified in the regulations in 40 CFR §261.31.
- The K list—The K list includes wastes from specific industries. As a result, K list wastes are

HAZARD CODES

To indicate its reason for listing a waste, EPA assigns a hazard code to each waste listed on the F, K, P, and U lists. The last four hazard codes in the table below apply to wastes that have been listed because they typically exhibit one of the four regulatory characteristics of hazardous waste. The first two hazard codes apply to listed wastes whose constituents pose additional threats to human health and the environment. The hazard codes indicating the basis for listing a waste are:

Toxic Waste ..... (T)
Acute Hazardous Waste.....(H)
Ignitable Waste..... (I)
Corrosive Waste.....(C)
Reactive Waste .....(R)
Toxicity Characteristic Waste.....(E)

The hazard codes assigned to listed wastes affect the regulations that apply to handling the waste. For instance, acute hazardous wastes accompanied by the hazard code (H) are subject to stricter management standards than most other wastes.

known as wastes from specific sources. The K list is found in 40 CFR §261.32.

- The P list and the U list—These two lists include pure or commercial grade formulations of specific unused chemicals. Chemicals are included on the P list if they are acutely toxic. A chemical is acutely toxic if it is fatal to humans in low doses, if scientific studies have shown that it has lethal effects on experimental organisms, or if it causes serious irreversible or incapacitating illness. The U list is generally comprised of chemicals that are toxic, but also includes chemicals that display other characteristics, such as ignitability or reactivity. Both the P list and U list are codified in 40 CFR §261.33.

Each list includes anywhere from 30 to a few hundred listed hazardous wastestreams. All of the wastes on these lists are assigned an identification number (i.e., a waste code) consisting of the letter associated with the list (i.e., F, K, P, or U) followed by three numbers. For example, wastes on the F list may be assigned a waste code ranging from F001 to F039, while wastes on the K list may be assigned a waste code ranging from K001 to K181. These waste codes are an important part of the RCRA regulatory system since waste code assignment has important implications for the future management standards that will apply to the waste.

A user-friendly reference document containing a collection of written materials about specific issues related to the hazardous waste listings can be found at www.epa.gov/epawaste/hazard/wastetypes/pdfs/listing-ref.pdf.

The F List: Wastes From Nonspecific Sources

The F list designates hazardous wastes from common industrial and manufacturing processes. The F list wastes can be divided into seven groups, depending on the type of manufacturing or industrial operation that creates them:

- Spent solvent wastes (waste codes F001 through F005)
- Electroplating and other metal finishing wastes (F006 through F012 and F019)
- Dioxin-bearing wastes (F020 through F023 and F026 through F028)
- Chlorinated aliphatic hydrocarbons production wastes (F024 and F025)
- Wood preserving wastes (F032, F034, and F035)
- Petroleum refinery wastewater treatment sludges (F037 and F038)
- Multisource leachate (F039).

Spent Solvent Wastes

The spent solvent waste listings (F001 through F005) apply to wastestreams that are generated from the use of certain common organic solvents.

Solvents are commonly used in various industries, such as mechanical repair, dry cleaning, and electronics manufacturing, for degreasing and cleaning in addition to other functions. While solvents are chemicals with many uses, these listings only apply to solvents that are used as solvents for their solvent properties (e.g., to solubilize, dissolve, or mobilize other constituents) and are spent (e.g., cannot be used further without reprocessing). In addition, these listings only apply to solvents that contain one or more of the specific organic solvent constituents found in the F001-F005 narrative descriptions. Lastly, these listings only cover solvents that were above a certain concentration before use.

Electroplating and Other Metal Finishing Wastes

The electroplating and other metal finishing waste listings (F006 through F012 and F019) apply to wastestreams that are commonly produced during electroplating and other metal finishing operations. Diverse industries use electroplating and other methods to change the surface of metal objects in order to enhance the appearance of the objects, make them more resistant to corrosion, or impart some other desirable property to them. Industries involved in plating and metal finishing range from jewelry manufacture to automobile production.

Dioxin-Bearing Wastes

The dioxin-bearing waste listings (F020 through F023 and F026 through F028) describe a number of wastestreams that EPA believes are likely to contain dioxins, which are allegedly among the most dangerous known chemical compounds. The dioxin listings apply primarily to manufacturing process wastes from the production of specific

pesticides or specific chemicals used in the production of pesticides. With the exception of F028, all of the dioxin-bearing wastes are considered acutely hazardous wastes and are designated with the hazard code (H). These wastes are therefore subject to stricter management standards than other hazardous wastes.

Chlorinated Aliphatic Hydrocarbon Production Wastes

The F024 and F025 listings apply to specific chlorinated aliphatic production wastes (exclusive of wastewaters and wastewater treatment sludges). K174 and K175 listings apply to certain wastewater treatment sludges associated with chlorinated aliphatic production. Chlorinated aliphatic chemicals are produced for use in the manufacture of other chemical products, most notably to make vinyl chloride, the main ingredient in PVC, a widely-used plastic.

Wood Preserving Wastes

The wood preserving waste listings (F032, F034, and F035) apply to certain wastes from wood preserving operations. Wood used for certain applications is chemically treated to slow the deterioration caused by decay and insects. For example, telephone poles, railroad cross ties, and other wood products are treated to withstand the rigors of outdoor use.

Wood preservation typically involves pressure-treating lumber with pentachlorophenol, creosote, or preservatives containing arsenic or chromium. The wood preserving process creates wastestreams containing these chemicals, such as excess preservative solution that drips from wood products after treatment. Waste from wood preservation using pentachlorophenol is F032, waste from use of creosote is F034, and waste from treating wood with arsenic or chromium is F035.

Another listing, K001, applies to bottom sediment sludges from treating wastewaters associated with wood preserving using creosote and/or pentachlorophenol.

Petroleum Refinery Wastewater Treatment Sludges

The petroleum refinery wastewater treatment sludge listings apply to specific wastestreams from petroleum refineries. The petroleum refining process typically creates large quantities of contaminated wastewater. Before this wastewater can be discharged to a river or sewer, it must be treated to remove oil, solid material, and chemical pollutants.

To remove these hydrocarbons from the wastewater, refineries typically use two methods. In the first step, gravity separates the pollutants from the wastewater. The solids and heavier pollutants sink to the bottom of a tank, forming a sludge, while the lighter materials (called **float**) float to the surface of the wastewater, where they can be skimmed off. The second step uses physical (stirring or agitating) and chemical means to separate remaining pollutants from the wastewater into sludge and float. Most of these various wastewater treatment residues are listed hazardous wastes (K048-K051, F037, F038) either when generated in specific types of units (e.g., K048 from DAF units, or K049 from API separators, etc.) or more generically based upon the type of wastewater treatment process (e.g., F037 for sludges generated by gravitational separation, F038 sludges and/or floats generated by other physical or chemical means).

Other petroleum listings that are not directly associated with wastewater treatment residuals include K171 and K172 (spent hydroprocessing catalysts), K052 and K169 (tank bottoms from leaded gasoline storage and crude oil storage tanks, respectively), and K170 (sediment from clarified slurry oil storage and/or filtration).

Multisource Leachate

The F039 listing applies to multisource leachate, the liquid material that accumulates at the bottom of a hazardous waste landfill. The leachate that percolates through landfills, particularly hazardous waste landfills, usually contains high concentrations of chemicals and is often collected to minimize the potential for it to enter and contaminate the soil or ground water below the unit.

The K List: Wastes From Specific Sources

The K list designates hazardous wastes from specific sectors of industry and manufacturing. Like F list wastes, K list wastes are manufacturing process wastes.

To determine whether a waste qualifies as K-listed, a facility must first determine whether the waste fits within one of the 13 different industrial or manufacturing categories on the list. Second, a facility must determine if this waste matches one of the detailed K list waste descriptions in 40 CFR §261.32. The 13 industries that generate K list wastes are:

- Wood preservation
- Organic chemicals manufacturing
- Pesticides manufacturing
- Petroleum refining
- Veterinary pharmaceuticals manufacturing
- Inorganic pigment manufacturing
- Inorganic chemicals manufacturing
- Explosives manufacturing
- Iron and steel production
- Primary aluminum production
- Secondary lead processing
- Ink formulation
- Coking (processing of coal to produce coke, a material used in iron and steel production).

Previously, the K list also included waste codes for 17 different industries. However, due to various court actions taken, EPA withdrew the K waste codes applicable to wastestreams in the primary copper, primary lead, primary zinc, and ferroalloys industries.

The P and U Lists: Discarded Commercial Chemical Products

The P and U lists designate as hazardous waste pure and commercial grade formulations of certain unused chemicals that are being disposed. Unused chemicals may become wastes for a number of reasons. For example, some unused chemicals are spilled by accident. Others are intentionally discarded because they are off-specification and cannot serve the purpose for which they were originally produced. For a waste to qualify as P- or U-listed, the waste must meet the following three criteria:

- The waste must contain one of the chemicals listed on the P or U list
- The chemical in the waste must be unused
- The chemical in the waste must be in the form of a **commercial chemical product** (CCP).

For purposes of the P and U lists, a CCP is defined as a chemical that is one of the following:

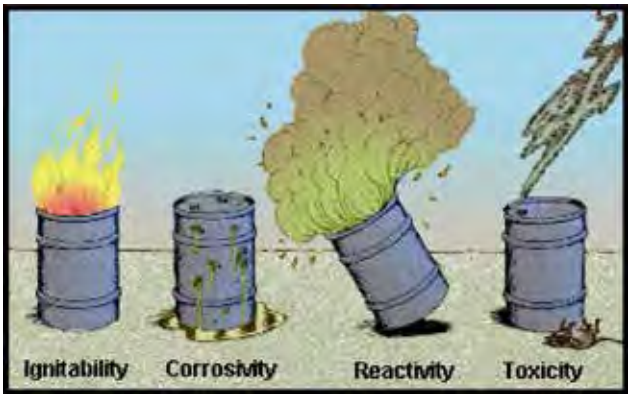
- 100 percent pure
- Technical (e.g., commercial) grade
- The sole active ingredient in a chemical formulation.

While 100 percent pure means that the chemical is the only chemical constituent in the product, **technical grade** means that the formulation is not 100 percent pure, but is of a grade of purity that is either marketed or recognized in general usage by the chemical industry. **Sole active ingredient** means that the chemical is the only ingredient serving the function of the formulation. For instance, a pesticide made for killing insects may contain a poison such as heptachlor, as well as various solvent ingredients that act as carriers or lend other desirable properties to the poison. Although all of these chemicals may be capable of killing insects, only the heptachlor serves the primary purpose of the insecticide product. The other chemicals involved are present for other reasons, not because they are poisonous. Therefore, heptachlor is the sole active ingredient in such a formulation even though it may be present in low concentrations.

■ Wastes Listed Solely for Exhibiting the Characteristic of Ignitability, Corrosivity, and/or Reactivity

Hazardous wastes listed solely for exhibiting the characteristic of ignitability, corrosivity, and/or reactivity are not regulated the same way that other listed hazardous wastes are regulated under RCRA. When a waste meets a listing description for one of the 29 wastes listed solely for exhibiting the characteristic of ignitability, corrosivity, and/or reactivity, the waste is not hazardous if it does not exhibit that characteristic at the point of generation. For example, F003 is listed for the characteristic of ignitability. If a waste is generated and meets the listing description for F003 but does not exhibit the characteristic of ignitability, it is not regulated as a hazardous waste.

Figure III-8: The Mixture Rule



■ Delistings

The RCRA regulations provide a form of relief for listed wastes with low concentrations of hazardous constituents. Through a site-specific process known as **delisting**, a waste handler can submit to an EPA region or authorized state a petition demonstrating that, even though a particular wastestream generated at its facility is a listed hazardous waste, it does not pose sufficient hazard to merit RCRA regulation. For example, a waste generated at a specific facility may meet a listing description even though the process uses different raw materials than EPA assumed were used when listing the waste; thus the waste may not contain the contaminants for which it was listed. Similarly, after treatment of a listed waste, the residue may no longer pose a threat to human health and the environment.

Specifically, the petition must demonstrate that the waste does not:

- Meet the criteria for which it was listed
- Exhibit any hazardous waste characteristics (as discussed later in this chapter)
- Pose a threat to human health and the environment by being hazardous for any other reason (e.g., does not contain additional constituents that could pose a threat).

If the EPA region or state grants a delisting petition, the particular wastestream at that facility will not be regulated as a listed hazardous waste.

IS THE WASTE A CHARACTERISTIC HAZARDOUS WASTE?

After a facility determines its waste is a solid waste and is not excluded from the definitions of solid or hazardous waste, it must determine if the waste is a hazardous waste. This entails determining if the waste is listed and also if the waste is characteristic. Even if a waste is a listed hazardous waste, the facility must also determine if the waste exhibits a hazardous characteristic by testing or applying knowledge of the waste.

Characteristic wastes are wastes that exhibit measurable properties which indicate that a waste poses enough of a threat to warrant regulation as hazardous waste. EPA tried to identify characteristics that, when present in a waste, can cause death or injury to humans or lead to ecological damage. The characteristics identify both acute (near-term) and chronic (long-term) hazards, and are an essential supplement to the hazardous waste listings. For example, some wastes may not meet any listing description because they do not originate from specific industrial or process sources, but the waste may still pose threats to human health and the environment. Therefore, a facility is also required to determine whether such a waste possesses a hazardous property (i.e., exhibits a hazardous waste characteristic). The characteristics are applied to any RCRA solid waste from any industry.

Even if a waste does meet a hazardous waste listing description, the facility must still determine if the waste exhibits a characteristic. If such listed wastes do exhibit a characteristic, the waste poses an additional hazard to human health and the environment, and may necessitate additional regulatory precautions. For example, wastes that are both listed and characteristic may have more extensive **land disposal restrictions (LDR)**

DETERMINING BOTH LISTINGS AND CHARACTERISTICS

A facility must determine both listings and characteristics. Even if a waste is a listed hazardous waste, the facility must then still determine if the waste exhibits a characteristic because waste generators are required to fully characterize their listings. While some wastes may not meet any listing description because they do not originate from specific industrial or process sources, the waste may still pose threats to human health and the environment. As a result, a facility is also required to determine whether such a waste possesses a hazardous property (i.e., exhibits a hazardous waste characteristic).

requirements than those that are only listed (the LDR program is fully discussed in Chapter III, Land Disposal Restrictions).

EPA decided that the characteristics of hazardous waste should be detectable by using a standardized test method or by applying general knowledge of the waste's properties. Given these criteria, EPA established four hazardous waste characteristics:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity.

A user-friendly reference document containing a collection of written materials about specific issues related to the hazardous waste characteristics can be found at www.epa.gov/epawaste/hazard/wastetypes/wasteid/char/hw-char.pdf.

■ Ignitability

The ignitability characteristic identifies wastes that can readily catch fire and sustain combustion.

The **ignitability characteristic** identifies wastes that can readily catch fire and sustain combustion. Many paints, cleaners, and other industrial wastes pose such a hazard. Liquid and nonliquid wastes are treated differently by the ignitability characteristic.

Most ignitable wastes are liquid in physical form. EPA selected a flash point test as the method for determining whether a liquid waste is combustible enough to deserve regulation as hazardous. The flash point test determines the lowest temperature at which the fumes above a waste will ignite when exposed to flame. Liquid wastes with a flash point of less than 60°C (140°F) in closed-cup test are ignitable.

Many wastes in solid or nonliquid physical form (e.g., wood or paper) can also readily catch fire and sustain combustion, but EPA did not intend to regulate most of these nonliquid materials as ignitable wastes. A nonliquid waste is considered ignitable only if it can spontaneously catch fire or catch fire through friction or absorption of moisture under normal handling conditions and can burn so vigorously that it creates a hazard. Certain compressed gases are also classified as ignitable. Finally, substances meeting the DOT's definition of oxidizer are classified as ignitable wastes. Ignitable wastes carry the waste code D001 and are among some of the most common hazardous wastes. The regulations describing the characteristic of ignitability are codified in 40 CFR §261.21.

■ Corrosivity

The corrosivity characteristic identifies wastes that are acidic or alkaline (basic) and can readily corrode or dissolve flesh, metal, or other materials.

The **corrosivity characteristic** identifies wastes that are acidic or alkaline (basic). Such wastes can readily corrode or dissolve flesh, metal, or other materials. They are also among some of the most common hazardous wastes.

An example is waste sulfuric acid from automotive batteries. EPA uses two criteria to identify liquid and aqueous corrosive hazardous wastes. The first is a pH test. Aqueous wastes with a pH greater than or equal to 12.5 or less than or equal to 2 are corrosive. A liquid waste may also be corrosive if it has the ability to corrode steel under specific conditions. Physically solid, nonaqueous wastes are not evaluated for corrosivity. Corrosive wastes carry the waste code D002. The regulations describing the corrosivity characteristic are found in 40 CFR §261.22.

■ Reactivity

The reactivity characteristic identifies wastes that readily explode or undergo violent reactions.

The **reactivity characteristic** identifies wastes that readily explode or undergo violent reactions or react to release toxic gases or fumes. Common examples are discarded munitions or explosives. In many cases, there is no reliable test method to evaluate a waste's potential to explode, react violently, or release toxic gas under common waste handling conditions. Therefore, EPA uses narrative criteria to define most reactive wastes. The narrative criteria, along with knowledge or information about the waste properties, are used to classify waste as reactive.

A waste is reactive if it meets any of the following criteria:

- It can explode or violently react when exposed to water or under normal handling conditions

- It can create toxic fumes or gases at hazardous levels when exposed to water or under normal waste handling conditions
- It can explode if heated under confinement or exposed to a strong igniting source, or it meets the criteria for classification as an explosive under DOT rules
- It generates toxic levels of sulfide or cyanide gas when exposed to a pH range of 2 through 12.5.

Wastes exhibiting the characteristic of reactivity are assigned the waste code D003. The reactivity characteristic is described in the regulations in 40 CFR §261.23.

■ Toxicity

The toxicity characteristic identifies wastes that are likely to leach dangerous concentrations of toxic chemicals into ground water.

When hazardous waste is disposed of in a land disposal unit, toxic compounds or elements can leach into underground drinking water supplies and expose users of the water to hazardous chemicals and constituents. EPA developed the **toxicity characteristic (TC)** to identify wastes likely to leach dangerous concentrations of toxic chemicals into ground water.

In order to predict whether any particular waste is likely to leach chemicals into ground water at dangerous levels, EPA designed a lab procedure to estimate the leaching potential of waste when disposed in a municipal solid waste landfill. This lab procedure is known as the **Toxicity Characteristic Leaching Procedure (TCLP)**.

The TCLP requires a generator to create a liquid leachate from its hazardous waste samples. This leachate would be similar to the leachate generated by a landfill containing a mixture of household and industrial wastes. Once this leachate is created via the TCLP, the waste generator must determine whether it contains any of 40 different toxic chemicals in amounts above the specified regulatory levels (see Figure III-7). These regulatory levels are based on ground water modeling studies and toxicity data that calculate the limit above which these common toxic compounds and elements will threaten human health and the environment by contaminating drinking water. If the leachate sample contains a concentration above the regulatory limit for one of the specified chemicals, the waste exhibits the toxicity characteristic and carries the waste code associated with that compound or element. The TCLP may not be used however, for determining whether remediation waste from manufactured gas plants (MGP) is hazardous under RCRA. Therefore, MGP remediation wastes are exempt from TC regulation. The regulations describing the toxicity characteristic are codified in 40 CFR §261.24, and

Figure III-7: TCLP Regulatory Levels

Waste Code	Contaminant	Concentration (mg/L)
D004	Arsenic	5.0
D005	Barium	100.0
D018	Benzene	0.5
D006	Cadmium	1.0
D019	Carbon tetrachloride	0.5
D020	Chlordane	0.03
D021	Chlorobenzene	100.0
D022	Chloroform	6.0
D007	Chromium	5.0
D023	o-Cresol*	200.0
D024	m-Cresol*	200.0
D025	p-Cresol*	200.0
D026	Total Cresol*	200.0
D016	2,4-D	10.0
D027	1,4-Dichlorobenzene	7.5
D028	1,2-Dichloroethane	0.5
D029	1,1-Dichloroethylene	0.7
D030	2,4-Dichlorotoluene	0.13
D012	Endrin	0.02
D031	Heptachlor (and its epoxide)	0.008
D032	Hexachlorobenzene	0.13
D033	Hexachlorobutadiene	0.5
D034	Hexachloromethane	3.0
D008	Lead	5.0
D013	Lindane	0.4
D009	Mercury	0.2
D014	Methoxychlor	10.0
D035	Methylethylketone	200.0
D036	Nitrobenzene	2.0
D037	Pentachlorophenol	100.0
D038	Pyridine	5.0
D010	Selenium	1.0
D011	Silver	5.0
D039	Tetrachloroethylene	0.7
D015	Toxaphene	0.5
D040	Trichloroethylene	0.5
D041	2,4,5-Trichlorophenol	400.0
D042	2,4,6-Trichlorophenol	2.0
D017	2,4,5-TP (Silver)	1.0
D043	Vinyl chloride	0.2

* If 0-, m-, and p-cresols cannot be individually measured, the regulatory level for total cresols is used.

the TC regulatory levels appear in Table 1 of that same section.

The TCLP is one of the test methods contained in *Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods*, also known as SW-846. SW-846 is EPA's official compendium of analytical and sampling methods that have been evaluated and approved for use in complying with RCRA regulations. In support of the RCRA program, EPA employs analytical chemistry and characteristic testing methodologies, environmental sampling and monitoring, and quality assurance. SW-846 and additional information about RCRA test methods can be found at www.epa.gov/epawaste/hazard/testmethods.

SPECIAL REGULATORY CONVENTIONS

Once a facility generates a hazardous waste, the waste may become mixed with other wastes, be treated and produce residues, or even be spilled. RCRA provides special regulatory provisions to address the regulatory status of hazardous wastes in these situations.

■ Mixture Rule

The **mixture rule** is intended to ensure that mixtures of listed wastes with nonhazardous solid wastes are regulated in a manner that minimizes threats to human health and the environment.

Listed Wastes

The mixture rule regulates a combination of any amount of a nonhazardous solid waste and any amount of a listed hazardous waste as a listed hazardous waste (see Figure III-8). Even if a small vial of listed waste is mixed with a large quantity of nonhazardous waste, the resulting mixture bears the exemptions same waste code and regulatory status as the original listed component of the mixture, unless the generator obtains a delisting. This is intended to prevent a facility from mixing a listed waste with a nonhazardous waste in order to escape having to manage the waste as hazardous.

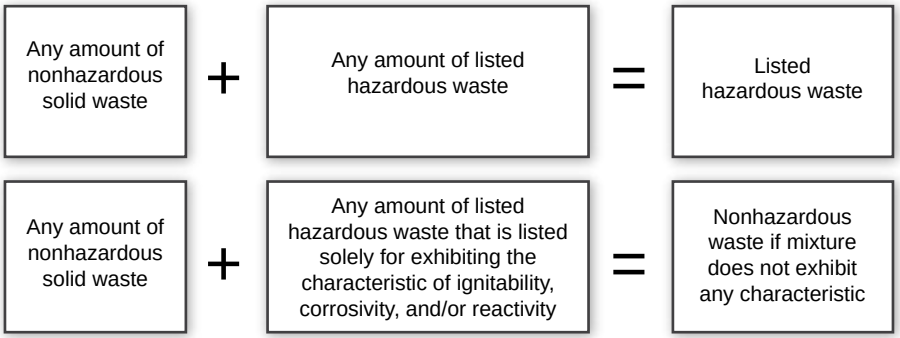
Characteristic Wastes

The mixture rule applies differently to listed and characteristic wastes. A mixture involving characteristic wastes is hazardous only if the mixture itself exhibits a characteristic. Characteristic wastes are hazardous because they possess one of four unique and measurable properties. Once a characteristic waste no longer exhibits one of these four dangerous properties, it no longer deserves regulation as hazardous. Thus, a characteristic waste can be made nonhazardous by treating it to remove its hazardous property; however, EPA places certain restrictions on the manner in which a waste can be treated. (These restrictions will be discussed in Chapter III, Land Disposal Restrictions).

Wastes Listed Solely for Exhibiting the Characteristic of Ignitabilty, Corrosivity, and/or Reactivity

All wastes listed solely for exhibiting the characteristic of ignitability, corrosivity and/ or reactivity characteristic are not regulated as hazardous wastes once they no longer exhibit a characteristic. If a hazardous waste listed only for a characteristic is mixed with a solid waste, the original listing does not carry through to the resulting mixture if that mixture does not exhibit any hazardous waste characteristics. For example, EPA listed the F003 spent solvents as hazardous because these wastes typically display the ignitability characteristic. If F003 waste is treated by mixing

Figure III-8: The Mixture Rule



it with another waste, and the resulting mixture does not exhibit a characteristic, the F003 listing no longer applies.

Exemptions

There are several exemptions from the mixture rule. One exemption applies to certain listed hazardous wastes that are discharged to wastewater treatment facilities in very small or ***de minimis*** amounts. Many industrial facilities produce large quantities of nonhazardous wastewaters as their primary wastestreams. These wastewaters are typically discharged to a water body or local sewer system after being treated to remove pollutants, as required by CWA. At many of these large facilities, on-site cleaning, chemical spills, or laboratory operations create relatively small amounts of hazardous waste. For example, a textile plant producing large quantities of nonhazardous wastewater can generate a secondary wastestream of listed spent solvents from cleaning equipment. Routing such secondary hazardous wastestreams to the facility's wastewater treatment system is a practical way of treating and disposing of these wastes. This management option triggers the mixture rule, since even a very small amount of a listed wastestream combined with very large volumes of nonhazardous wastewater causes the entire mixture to be listed. EPA provided an exemption from the mixture rule for situations where relatively small quantities of listed hazardous wastes are routed to large-volume wastewater treatment systems.

Other exemptions apply to mixtures of listed and characteristic wastes with mining and mineral processing wastes that are excluded from the definition of hazardous waste under the Bevill exemption. Wastes that are hazardous via the mixture rule can also exit Subtitle C regulation through the delisting process.

■ Derived-From Rule

Hazardous waste treatment, storage, and disposal processes often generate residues that may contain high concentrations of hazardous constituents. In order to adequately protect human health and the environment from the threats posed by these potentially harmful wastes, the **derived- from rule** governs the regulatory status of such listed waste residues.

Figure III-9: The Derived-From Rule

Listed Hazardous Waste

Any residue from the treatment, storage, or disposal or a listed waste…

…is still a hazardous waste…

...unless the residue is derived-from a hazardous waste that is listed solely for exhibiting the characteristic of ignitability, corrosivity, and/or reactivity and does not exhibit a characteristic of hazardous waste

or

…unless the waste is recycled to make new products or processed to recover usable materials with economic value (provided that product is not used in a manner constituting disposal or burned for energy recovery)

Listed Wastes

Residues produced from the treatment of listed hazardous wastes may pose a significant threat to human health and the environment. If not captured by the waste's listing description, such waste could escape regulation. To close this potential regulatory gap, EPA created the derived-from rule which states that any material derived from a listed hazardous waste is also a listed hazardous waste (see Figure III-9). For example, ash created by burning a hazardous waste is considered derived-from that hazardous waste. Thus, such ash bears the same waste code and regulatory status as the original listed waste, regardless of the ash's actual properties. This principle applies regardless of the actual health threat posed by the waste residue or the residue's chemical composition.

Characteristic Wastes

Treatment residues and materials derived from characteristic wastes are hazardous only if they themselves exhibit a characteristic.

Wastes Listed Solely for Exhibiting the Characteristic of Ignitability, Corrosivity, and/or Reactivity

If a waste derived from the treatment, storage, or disposal of a hazardous waste listed for the

characteristics of ignitability, corrosivity, and/or reactivity, no longer exhibits one of those characteristics, it is not a hazardous waste. For example, if a sludge is generated from the treatment of F003, and that sludge does not exhibit the characteristic of ignitability, corrosivity, or reactivity, the F003 listing will not apply to the sludge.

Exemptions

There are several regulatory exemptions from the derived-from rule. The first exemption applies to products reclaimed from hazardous wastes. Many listed hazardous wastes can be recycled to make new products or processed to recover usable materials with economic value. Such products derived from recycled hazardous wastes are no longer solid wastes, provided that they are not used in a manner constituting disposal or burned for energy recovery (see Figure III-9). The other exemptions from the derived-from rule apply to residues from specific treatment operations. Wastes that are hazardous via the derived-from rule can also exit Subtitle C regulation through the delisting process.

■ Contained-In Policy

Sometimes listed and characteristic wastes are spilled onto soil or contaminate equipment, buildings, or other structures. The mixture and derived-from rules do not apply to such contaminated soil and materials because these materials are not actually wastes. Soil is considered **environmental media** (e.g., soil, ground water, sediment), while the equipment, buildings, and structures are considered debris (e.g., a broad category of larger manufactured and naturally occurring objects that are commonly discarded). Examples of **debris** include:

- Dismantled construction materials, such as used bricks, wood beams, and chunks of concrete
- Decommissioned industrial equipment, such as pipes, pumps, and dismantled tanks
- Other discarded manufactured objects, such as personal protective equipment (e.g., gloves, coveralls, eyewear)
- Large, naturally occurring objects, such as tree trunks and boulders.

Environmental media and debris are contaminated with hazardous waste in a number of ways. Environmental media become contaminated through accidental spills of hazardous waste or spills of product chemicals which, when spilled, become hazardous wastes. Debris can also be contaminated through spills. Most debris in the form of industrial equipment and personal protective gear becomes contaminated with waste or product chemicals during normal industrial operations.

In order to address such contaminated media and debris, EPA created the **contained-in policy** to determine when contaminated media and debris must be managed as RCRA hazardous wastes.

Environmental media are not, in and of themselves, waste, but are regulated as hazardous waste when they contain (are contaminated by) a RCRA listed hazardous waste or exhibit a characteristic. In these cases, the media and debris must be managed as if they were hazardous waste. EPA considers contaminated media or debris to no longer contain hazardous waste when it no longer exhibits a characteristic of hazardous waste. This applies when the hazardous waste contained within the media or debris is either a characteristic waste or a waste listed solely for a characteristic. Otherwise, when dealing with listed waste contamination, EPA or states can determine that media and debris no longer contain hazardous waste by determining that the media or debris no longer poses a sufficient health threat to deserve RCRA regulation. Once this contained-out determination is made, the media and debris are generally no longer regulated under RCRA Subtitle C. However, under certain circumstances, the RCRA LDR requirements might continue to apply.

MIXED WASTE

RCRA specifically exempts certain radioactive mixed materials from the definition of solid waste. However, some radioactive material may be mixed with hazardous wastes that are regulated under RCRA. In addition, a facility may generate a hazardous waste that is also radioactive. Because the material in both of these situations contains both radioactive material and RCRA hazardous waste, it is referred to as mixed waste under RCRA. RCRA

and AEA regulate these mixed wastes jointly. AEA regulates the RCRA-exempt radioactive portion and RCRA regulates the hazardous waste portion. Mixed waste generators include DOE, power plants, labs, hospitals, and universities using radioactive materials.

EPA has provided increased flexibility to generators and facilities that manage low-level mixed waste (LLMW) and technologically enhanced naturally occurring and/or accelerator-produced radioactive material (NARM) containing hazardous waste. The Agency is exempting LLMW from some RCRA storage and treatment regulations, and LLMW or eligible NARM from RCRA hazardous waste transportation and disposal regulations. These wastes are exempt from RCRA Subtitle C requirements, including permitting, provided they meet specific conditions. The exempt wastes must then be managed as radioactive waste according to Nuclear Regulatory Commission (NRC) regulations.

SUMMARY

In order to determine if a facility is subject to RCRA Subtitle C, the owner and operator must determine if they have a hazardous waste. This determination must be made by using the following methodology:

- Is the material a solid waste?
- Is the waste excluded?
- Is the waste a listed hazardous waste?
- Is the waste a characteristic waste?

A waste must first be a solid waste before it can be a hazardous waste. A solid waste is a waste that is abandoned, inherently waste-like, a military munition, or recycled. On the other hand, if a material is directly reused without prior reclamation by being either used as an ingredient, used as a product substitute, or returned to the production process, then the material is not regulated as a waste at all. If such reused materials, however, are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; accumulated speculatively; or are dioxin-containing wastes considered inherently waste like; then they are regulated as solid wastes. If a recycled material needs reclamation prior to direct use or reuse, its regulatory status is determined by the type of material that it is:

- Spent materials are regulated as solid wastes when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.
- Listed sludges are solid wastes when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.
- Characteristic sludges are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.
- Listed by-products are solid wastes when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.
- Characteristic by-products are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.
- CCPs are not solid wastes when reclaimed, unless they are used in a manner constituting disposal; or burned for energy recovery, used to produce a fuel, or contained in fuels.
- Scrap metal is a solid waste when reclaimed; used in a manner constituting disposal; burned for energy recovery, used to produce a fuel, or contained in fuels; or accumulated speculatively.

Regardless of the type of recycling that takes place, it must be legitimate and not sham recycling.

Some kinds of materials are excluded from the Subtitle C hazardous waste regulations. There are five categories of exclusions:

- Exclusions from the definition of solid waste
- Exclusions from the definition of hazardous waste
- Exclusions for waste generated in raw material, product storage, or manufacturing units

- Exclusions for laboratory samples and waste treatability studies
- Exclusion for dredged material.

If the waste fits one of these categories, it is not regulated as a RCRA hazardous waste, and the hazardous waste requirements do not apply.

If the waste is a solid waste and is not excluded, a facility must determine if it is a listed hazardous waste. The F, K, P, and U lists provide narrative descriptions of wastes from specific industrial processes and sources. Wastes meeting any of these descriptions are listed hazardous wastes. However, through the delisting process, facilities can demonstrate that their wastes does not pose sufficient hazard to warrant Subtitle C regulation as a listed hazardous waste.

Wastes may also be hazardous if they exhibit a characteristic. Even if a facility's waste is listed, the owner and operator must still determine if it exhibits a characteristic. The four characteristics are:

- Ignitability
- Reactivity
- Corrosivity
- Toxicity.

There are special regulatory conventions or provisions that apply to hazardous waste mixtures; treatment, storage, and disposal residues; and contaminated media and debris. These provisions are known as the mixture rule, the derived-from rule, and the contained-in policy.

RCRA and AEA jointly regulate mixed waste, or waste that is radioactive, and listed or characteristic. EPA provided a conditional exemption for LLMW storage, treatment, transportation, and disposal of mixed wastes.

HAZARDOUS WASTE RECYCLING AND UNIVERSAL WASTES

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OVERVIEW

RCRA hazardous wastes do not cease to be dangerous simply because they are being reused, recycled, or reclaimed. Many hazardous waste recycling operations may pose serious health and environmental hazards and should be subject to Subtitle C regulation. Reuse, recycling, and reclamation should be viewed instead as ways of managing hazardous wastes which, if properly conducted, can avoid environmental hazards, protect scarce natural resources, and reduce the nation's reliance on raw materials and energy. Promoting reuse and recovery is certainly one of the goals of RCRA; however, this goal does not take precedence over assuring the proper management of hazardous waste.

EPA has tried, to the extent possible, to develop regulations for hazardous waste management that foster environmentally sound recycling and conservation of resources, but at the same time provide adequate protection of human health and the environment. This chapter outlines the regulations governing recycling of hazardous wastes, and describes special management standards for two commonly recycled wastestreams: used oil and universal wastes.

HAZARDOUS WASTE RECYCLING

The hazardous waste identification process (as discussed in Chapter III, Hazardous Waste Identification) describes how to determine whether a material is a solid and hazardous waste. How a material is regulated under RCRA (i.e., whether or not it is a solid and potentially a hazardous waste) when it is recycled depends on what type of material it is and what type of recycling is occurring. If the recycled material is not a solid waste, then it is not a hazardous waste and is not subject to RCRA Subtitle C requirements. However, if the material qualifies as a solid and hazardous waste, it is subject to RCRA Subtitle C jurisdiction.

THE RECYCLING GOAL OF RCRA

Reuse, recycling, and reclamation are ways of managing hazardous wastes which, if properly conducted, can avoid environmental hazards, protect scarce natural resources, and reduce the nation's reliance on raw materials and energy. While promoting reuse and recovery is certainly one of the goals of RCRA, this goal does not take precedence over assuring the proper management of hazardous waste.

Many hazardous wastes can be recycled safely and effectively. To address the goal of encouraging recycling while protecting human health and the environment, EPA has tried to tailor the level of regulation to reflect the actual hazard of the recycling activity. In this approach to regulation, recycling standards range from full regulation to specialized standards to exemptions from regulation. Handlers of hazardous waste slated for recycling must determine what type of regulation they fall under based on the recycling activity being conducted and the type of material being managed.

■ Full Regulation

Most recycled hazardous wastes are subject to full hazardous waste regulation. This means that handlers of these recyclable materials (i.e., persons who generate, transport, or store prior to recycling) are subject to the same regulations as handlers who are managing hazardous wastes prior to disposal.

While management of the hazardous wastes prior to recycling is subject to regulation, the recycling process itself is exempt from RCRA (except for some air emissions standards as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). For example, if a facility receives hazardous waste spent solvents from another facility for redistillation (heating a mixture to separate it into several pure components), the recycling units themselves are not subject to RCRA design and operating standards for hazardous waste units. However, the owners and operators of the recycling facility must follow all applicable Subtitle C requirements (including the requirement to obtain a permit) for container or tank storage areas used to store such wastes prior to recycling.

■ Exemptions

Not all hazardous wastes pose the same degree of hazard when recycled. EPA believes wastes that may be recycled in a protective manner, or that are addressed under other environmental regulations, warrant exemptions from RCRA Subtitle C. Consequently, handlers of these materials are not subject to any hazardous waste regulations. These exempt recyclable hazardous wastes are:

- Industrial ethyl alcohol
- Scrap metal
- Waste-derived fuels from refining processes
- Unrefined waste-derived fuels and oils from petroleum refineries.

Industrial Ethyl Alcohol

Industrial ethyl alcohol that is reclaimed is exempt from RCRA Subtitle C because the U.S. Bureau of Alcohol, Tobacco and Firearms (BATF) already regulates it from the point of generation to redistillation.

Scrap Metal

Scrap metal that is disposed of or recycled is a solid waste; however, it is exempt from Subtitle C regulation when it is reclaimed (i.e., recycled to recover metal content). This does not apply to processed scrap metal which is excluded from hazardous waste regulation entirely (as discussed in Chapter III, Hazardous Waste Identification).

Waste-Derived Fuels from Refining Processes

Fuels produced by refining oil-bearing hazardous wastes with normal process streams at petroleum refining facilities are exempt if such wastes resulted from normal petroleum refining, production, and transportation practices. For these wastes to be considered refined, they must be inserted into a part of the process designed to remove contaminants. This would typically mean insertion prior to distillation.

Unrefined Waste-Derived Fuels and Oils

Fuels produced at a petroleum refinery from oil-bearing hazardous wastes that are introduced into the refining process after the distillation step, or that are reintroduced in a process that does not include distillation, are exempt if the resulting fuel meets the specifications under the federal recycled used oil standards in 40 CFR §279.11 (as discussed later in this chapter). Oil that is recovered from hazardous waste at a petroleum refinery and burned as a fuel is also exempt provided it meets the used oil specifications.

■ Special Standards

While RCRA specifically exempts some wastes when recycled, some recycling processes may still pose enough of a hazard to warrant some degree of regulation. However, due to the nature of the recycling process itself or the nature of the materials being recycled, these processes may require a specialized set of standards. These processes are:

- Use constituting disposal
- Precious metals reclamation
- Spent lead-acid battery reclamation
- Burning for energy recovery.

Use Constituting Disposal

Use constituting disposal refers to the practice of recycling hazardous wastes by placing them on the land or using them as ingredients in a product that will be placed on the land. To be placed on the land, waste-derived products must: (1) be made for the general public's use; (2) have undergone a chemical reaction so as to be inseparable by physical means; and (3) meet applicable land disposal restrictions (LDR) treatment standards (as discussed in Chapter III, Land Disposal Restrictions). Once these waste- derived products meet these standards, they are no longer restricted from placement on the land. Materials that do not meet these criteria remain regulated. There are also special standards for hazardous wastes used to make zinc micronutrient fertilizers.

Precious Metals Reclamation

Precious metals reclamation is the recycling and recovery of precious metals (i.e., gold, silver, platinum, palladium, iridium, osmium, rhodium, and ruthenium) from hazardous waste. Because EPA found that these materials will be handled protectively as valuable commodities with significant economic value, generators, transporters, and storers of such recyclable materials are subject to reduced requirements.

Spent Lead-Acid Battery Reclamation

Persons who generate, transport, regenerate, collect, and store spent lead-acid batteries prior to reclamation, but do not perform the actual reclamation, are not subject to hazardous waste regulation. EPA established those provisions to encourage the recycling of these batteries. However, owners and operators of facilities that store spent batteries before reclamation, other than spent batteries that are regenerated (processed to remove contaminants and restore the product to a useable condition), are subject to regulation in a manner similar to hazardous waste treatment, storage, and disposal facilities (TSDFs). Handlers of lead-acid batteries may also choose to manage them under the universal waste provisions discussed later in this chapter.

Burning For Energy Recovery

The process of recycling hazardous waste by burning it for energy recovery may pose significant air emission hazards. Therefore, EPA established specific operating standards for units burning hazardous wastes for energy recovery. These units are known as boilers or industrial furnaces (BIFs) (as discussed in Chapter III, Hazardous Waste Combustion).

USED OIL

In developing a hazardous waste regulatory program to facilitate and encourage recycling, Congress felt that certain commonly recycled materials warranted a regulatory program of their own. As a result, Congress and EPA created special management standards for used oil. Under these standards, recycled used oil is not subject to the hazardous waste regulatory program applicable to other recycled materials, but rather to its own management provisions.

Used oil has certain unique properties that make it distinct from most hazardous wastestreams. First of all, used oil is generated by a wide range of entities, including, but not limited to, large manufacturing facilities, industrial operations, service stations, quick-lube shops, and even households. Every year privately owned automobile and light trucks generate over 300 million gallons of used crank

case oil. Secondly, used oil is an easily recyclable material. For example, just one gallon of used oil provides the same 2.5 quarts of lubricating oil as 42 gallons of crude oil. However, even used oil that does not exhibit any characteristics of hazardous waste can have harmful effects if spilled or released into the environment.

■ Used Oil Regulation

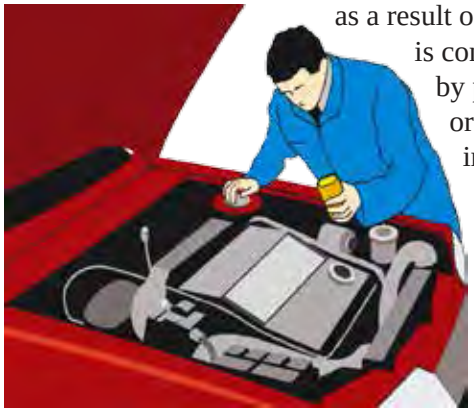
In an effort to encourage the recycling of used oil, and in recognition of the unique properties and potential hazards posed by used oil, Congress passed the Used Oil Recycling Act in 1980. This Act amended RCRA by requiring EPA to study the hazards posed by used oil and to develop used oil management standards to protect human health and the environment. As a result, EPA developed special recycling regulations for used oil that are completely separate from the hazardous waste recycling standards. First, in November 1985, EPA promulgated restrictions on the burning of used oil for energy recovery. Second, in September 1992, EPA developed a more comprehensive used oil recycling program, codified in 40 CFR Part 279, that incorporated the existing burning restrictions and added used oil management standards for all facilities that handle used oil.

Since EPA's used oil program is designed to encourage used oil recycling, Part 279 includes a **recycling presumption**. This is an assumption that all used oil that is generated will be recycled. The recycling presumption simplifies the used oil management system by enabling handlers to only comply with the used oil regulations, instead of the hazardous waste regulations. Only when the used oil is actually disposed of or sent for disposal must handlers determine whether or not the used oil exhibits a characteristic of hazardous waste and manage it in accordance with hazardous waste regulations.

Additional information about used oil management can be found at www.epa.gov/epawaste/conserve/materials/usedoil.

■ What is Used Oil?

Used oil is any oil that has been refined from crude oil or any synthetic oil that has been used and,



as a result of such use, is contaminated by physical or chemical impurities. In other words, used oil must meet each of the following three criteria: origin, use, and contamination. First, the used oil must be derived from crude oil or synthetic oil (i.e., derived from coal, shale, or polymers). Second, the oil must have been used as a lubricant, hydraulic fluid, heat transfer fluid, or other similar uses. Unused oil, such as cleanout tank bottoms from virgin product fuel oil storage, is not used oil because it has not been used. Finally, the used oil must be contaminated by physical or chemical impurities as a result of such use. Physical impurities could include contamination by metal shavings, sawdust, or dirt. Chemical impurities could include contamination by water or benzene, or degradation of lubricating additives.

■ Used Oil Handlers

Persons who handle used oil are subject to specific management requirements depending on the extent of their used oil recycling activities. The following handlers are subject to used oil management standards:

- Generators
- Collection centers and aggregation points
- Transporters
- Transfer facilities
- Processors and rerefiners
- Marketers.

Generators

Used oil **generators** are persons whose act or process produces used oil, or first causes used oil to be subject to regulation. Examples of common generators include car repair shops, service stations, and metalworking industries. Individuals who

generate used oil through the maintenance of their own personal vehicles and equipment, known as used oil **do-it-yourselfers,** are not considered used oil generators.

Collection Centers and Aggregation Points

Used oil collection centers and aggregation points are facilities that accept small amounts (less than 55 gallons) of used oil and store it until enough is collected to ship it elsewhere for recycling. Used oil **collection centers** typically accept used oil from multiple sources that include both businesses and private citizens. Used oil **aggregation points** collect oil from places run by the same owner and operator as the aggregation point, and also from private citizens.

Transporters

Used oil **transporters** are persons who haul used oil in quantities greater than 55 gallons and deliver it to transfer facilities, rerefiners, processors, or burners.

Transfer Facilities

Used oil **transfer facilities** are any structures or areas (such as loading docks or parking areas) where used oil is held for longer than 24 hours, but not longer than 35 days, during the normal course of transportation.

Processors and Rerefiners

Used oil **processors and rerefiners** are facilities that process used oil so that it can be burned for energy recovery or reused. Processing generally includes such activities as: blending used oil with virgin petroleum products, blending used oils to meet the fuel specification, filtration, simple distillation, or any other activity that changes the chemical or physical condition of the used oil.

Burners

Used oil **burners** are handlers who burn used oil for energy recovery in boilers, industrial furnaces, or hazardous waste incinerators.

Marketers

Used oil **marketers** are handlers who either: (1) direct shipments of used oil to be burned as fuel in regulated devices (i.e., boilers, industrial furnaces, and incinerators); or (2) claim that used oil to be burned for energy recovery is on-specification. A marketer must already be a used oil generator, transporter, processor, rerefiner, or burner.

■ Used Oil Management Standards

The used oil management standards apply to a wide variety of facilities with very different business practices. These standards are designed to establish minimum regulations for all facilities, addressing such practices as proper storage, transportation, recordkeeping, and burning. These standards vary by facility type. The most stringent requirements apply to facilities that process or rerefine used oil. Used oil transporters, transfer facilities, and used oil burners are subject to a reduced set of standards. Generators have the fewest requirements.

Used Oil as a Hazardous Waste

Because used oil mixed with hazardous wastes increases the risk to human health and the environment, all handlers are encouraged to keep used oil from becoming contaminated with hazardous wastes. To prevent intentional mixing, EPA subjects mixtures of used oil and listed hazardous waste to all applicable hazardous waste standards.

From an enforcement point of view, however, the Agency cannot always determine if used oil has been mixed with a listed hazardous waste. As a result, EPA decided to use an objective test that focused on the halogen level in used oil (listed spent halogenated solvents were often found to be mixed with used oil). This objective test is known as the **rebuttable presumption**. According to this test, used oil that contains more than 1,000 parts per million (ppm) of total halogens is presumed to have been mixed with a listed hazardous waste and is, therefore, subject to applicable hazardous waste regulations. A person may rebut this presumption by demonstrating, through analysis or other documentation, that the used oil has not been mixed with listed hazardous waste. Nevertheless, used oil that is known to have been mixed with a listed hazardous waste is considered a listed hazardous waste, regardless of the halogen level.

THE REBUTTABLE PRESUMPTION

EPA presumes that used oil that contains more than 1,000 ppm of total halogens has been mixed with a listed hazardous waste and, is therefore, subject to applicable hazardous waste regulations, unless the presumption can be successfully rebutted. A person may rebut this presumption by demonstrating, through analysis or other documentation, that the used oil has not been mixed with listed hazardous waste. For example, a generator has a drum of used oil containing 2,000 ppm of halogens. Even though the used oil was not mixed with a listed hazardous waste, EPA will presume that is the case. The generator, however, can rebut this presumption by demonstrating that the high halogen level is due to mixing with household hazardous wastes, which are not considered hazardous under RCRA. As a result, the drum of oil is regulated as used oil, and not as hazardous waste.

The principle for mixtures of used oil and characteristic hazardous waste is somewhat different. First, if used oil is mixed with a waste that only exhibits the characteristic of ignitability, or is listed solely for ignitability, and the resultant mixture is no longer ignitable, then the mixture can be managed as used oil, despite the inherent characteristics that the used oil may bring to the mixture. EPA believes that materials that are ignitable-only should not affect the chemical constituent or other properties of used oil when mixed and, therefore, should not add additional risks to human health and the environment when burned. However, used oil mixed with a waste that is hazardous because it exhibits one or more characteristics of hazardous waste (other than just ignitability), must no longer exhibit any characteristics if it is going to be managed as used oil.

Used Oil Contaminated with PCBs

The use and disposal of polychlorinated biphenyls (PCBs) are regulated by the Toxic Substances Control Act (TSCA); however, under certain circumstances, used oil containing PCBs may also be regulated by RCRA. In general, used oil containing 50 parts per million (ppm) or greater PCBs is not subject to RCRA used oil standards, but is regulated under TSCA. Used oil being burned for energy recovery and containing less than 50 ppm PCBs is regulated both under the RCRA used oil management standards and the TSCA regulations. Used oil containing less than 50 ppm PCBs that is recycled in any manner other than being burned for energy recovery is generally excluded from TSCA requirements, but it remains subject to the used oil standards in Part 279.

Storage

Although different used oil handlers may have specific management requirements for their oil, all handlers must:

- Store used oil in tanks and containers. Storage of used oil in lagoons, pits, or surface impoundments is prohibited, unless these units are subject to hazardous waste TSDF standards (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities)
- Clearly mark containers and tanks with the words “Used Oil”
- Keep containers and tanks in good condition and free of leaks
- Respond to releases of used oil from their storage units.

Transfer facilities, processors and rerefiners, and burners must also have secondary containment systems to prevent oil from reaching the environment in the event of a spill or leak. Secondary containment consists of an oil-impervious dike, berm, or retaining wall to contain releases, as well as an oil-impervious floor to prevent migration.

Burning Restrictions

Levels of contamination in used oils may vary widely, depending on different types of uses or length of use. Recognizing this fact, EPA has established a set of criteria, called used oil specifications, to evaluate the potential hazards posed by used oil when burned for energy recovery. Used oil that is tested and is not within these set parameters is termed **off-specification used oil**.

Parameter	Allowable Level
Arsenic	5 ppm maximum
Cadmium	2 ppm maximum
Chromium	10 ppm maximum
Flash point	100° F minimum
Lead	100 ppm maximum
Total Halogens	4,000 ppm maximum

Off-specification used oil may be burned for energy recovery, but it is strictly regulated. Such used oil may only be burned in:

- Boilers
- Industrial furnaces
- Hazardous waste incinerators
- Generator space heaters that meet certain operating conditions.

Conversely, used oil that meets all specification levels, otherwise known as **on-specification used oil**, is not subject to any restrictions when burned for energy recovery. In fact, on-specification used oil is comparable to product fuel in terms of regulation. Once the specification determination is made, and certain recordkeeping requirements are complied with, the on-specification oil is no longer subject to used oil management standards.

Recordkeeping and Reporting

Used oil transporters, transfer facilities, processors and rerefiners, burners, and marketers are required to obtain an EPA identification (EPA ID) number. While generators, collection centers, aggregation points, and those who transport their own used oil in shipments of less than 55 gallons do not need an EPA ID number, they may still need a state or local permit.

Used oil transporters, processors, burners, and marketers must also track each acceptance and delivery of used oil shipments. Records can take the form of a log, invoice, or other shipping document and must be maintained for three years.

In addition, used oil processors and rerefiners must:

- File a biennial report of used oil activity
- Prepare a contingency plan detailing how releases will be addressed
- Prepare an analysis plan describing testing protocols at the facility
- Maintain records of shipment and deliveries of used oil
- Maintain an operating record at the facility.

UNIVERSAL WASTE

The special management provisions for used oil clearly eased the management burden and facilitated the recycling of such material. EPA also discovered that subjecting other commonly recycled materials to hazardous waste regulation was burdensome on many handlers of these wastes. This burden has the potential of discouraging waste recycling by facilities who are otherwise willing to engage in such activity. In response to these concerns, EPA promulgated the universal waste program in May 1995. These requirements are codified in 40 CFR Part 273.

The universal waste program promotes the collection and recycling of certain widely generated hazardous wastes, known as **universal wastes**. Through this program, EPA intends to ease the regulatory burden on the facilities that manage universal wastes, particularly by allowing more time for accumulation of these wastes in order to facilitate appropriate recycling or disposal. Three types of waste were originally covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, and hazardous waste thermostats. In July 1999, EPA added hazardous waste lamps to the universal waste regulations. In August 2005, EPA added mercury-containing equipment. Other similar wastes may be added to the universal waste regulations in the future. For example, in 2008, EPA proposed to add pharmaceutical wastes to the universal waste program. The regulated community may also petition the Agency to include additional wastes in the universal waste program.

WHAT ARE UNIVERSAL WASTES?

Universal wastes are subject to special management provisions intended to ease the management burden and facilitate the recycling or proper treatment and disposal of such materials. Four types of waste are currently covered under the universal waste regulations: hazardous waste batteries, hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs, hazardous waste mercury-containing equipment, and hazardous waste lamps. More wastes may be added to the universal waste regulations in the future, but presently only these wastes are included.

There are four types of regulated participants in the universal waste system: small quantity handlers of universal waste (SQHUW), large quantity handlers of universal waste (LQHUW), universal waste transporters, and universal waste destination facilities.

A complete overview of the universal waste regulations can be found at http://www.epa.gov/waste/hazard/wastetypes/universal.

■ Universal Waste Handlers

There are two different types of activities that can make a person a handler of universal waste. First, a handler can be a person who generates, or creates, universal waste. For example, this may include a person who uses batteries, pesticides, mercury-containing equipment, or lamps and who eventually decides that they are no longer usable. Second, a handler can be a person who receives universal waste from other handlers, accumulates the waste, and then sends it on to other handlers, recyclers, or treatment or disposal facilities without performing the actual treatment, recycling, or disposal. This may include a person who collects batteries, pesticides, lamps, or mercury-containing equipment from small businesses and sends the waste to a recycling facility. The universal waste handler requirements depend on how much universal waste a handler accumulates at any one time. All universal waste handlers are prohibited from accumulating universal waste for longer than one year from when it is generated or received (unless the handler can prove that a longer accumulation time is necessary to facilitate proper recovery, treatment, or disposal).

Small Quantity Handlers of Universal Waste

Small quantity handlers of universal waste accumulate less than 5,000 kilograms (kg) (approximately 11,000 pounds (lbs)) of all universal waste categories combined at their location at any time. SQHUW are required to manage universal waste in a way that prevents releases to the environment. SQHUW must also immediately respond to releases of universal waste. SQHUW must distribute basic waste handling and emergency information to their employees to ensure that their staff are aware of proper handling and emergency procedures.

Large Quantity Handlers of Universal Waste

Large quantity handlers of universal waste accumulate a total of 5,000 kg or more of universal waste at any time. The designation as a LQHUW is retained for the remainder of the calendar year in which the 5,000-kg threshold was exceeded and may be reevaluated in the following calendar year. LQHUW must comply with the same requirements as SQHUW, as well as maintain basic records documenting shipments received at the facility and shipments sent from the facility, must obtain an EPA ID number, and must comply with stricter employee training requirements.

■ Universal Waste Transporters

Universal waste **transporters** are persons who transport universal waste from handlers of universal waste to other handlers, destination facilities, or foreign destinations. These wastes do not need to be accompanied by a RCRA hazardous waste manifest during transport, but transporters must comply with applicable DOT requirements.

Transporters may store universal waste for up to 10 days at a transfer facility during the course of transportation. Transfer facilities are transportation related facilities such as loading docks, parking areas, and storage areas. If a transporter keeps universal waste for more than 10 days at one location, the transporter is subject to all applicable SQHUW or LQHUW regulations.

■ Universal Waste Destination Facilities

Universal waste **destination facilities** are facilities that treat, dispose of, or recycle a particular category of universal waste. These facilities are subject to the same requirements as fully regulated hazardous waste TSDFs. Full regulation includes permit requirements, general facility standards, and unit-specific standards (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). The universal waste program includes only two additional specific universal waste requirements for destination facilities. These requirements are procedures for rejecting shipments of universal waste and the documentation of the receipt of universal waste.

■ Exports of Universal Waste

All universal waste handlers are required to submit a notification of intent to export to EPA and obtain written consent from the receiving country prior to shipping any universal waste out of the United States. This written consent must be attached to each shipment, so the universal waste handlers are required to provide a copy of the consent to the transporter transporting the shipment for export. Lastly, handlers that export universal waste to another country must submit annual reports summarizing the actual shipments made during the preceding calendar year by March 1.

STATE UNIVERSAL WASTE

States authorized for the RCRA petition process may add additional universal wastes to the state's universal waste program. In order for a state to add waste to the universal waste program, the waste must be generated by a wide variety of generators, the waste cannot be exclusive to a specific industry, and the waste must be hazardous. In addition, the state must have a collection system in place and ensure that the universal waste program will increase the likelihood that the waste will be recycled. State universal waste is only regulated as universal waste in that state and other states that have the same waste added to their universal waste programs.

An example of a universal waste added to individual state programs is cathode ray tubes, which are vacuum tubes made primarily of glass that constitute the video display component of televisions and computer monitors.

SUMMARY

EPA developed a regulatory approach to regulate different hazardous waste recycling activities in accordance with the degree of hazard they pose. The three types of regulation are: full regulation, exemptions, and special standards.

Persons who generate, transport, and store hazardous wastes prior to recycling must manage them in the same manner as persons who handle hazardous wastes prior to disposal. The recycling process itself is exempt from regulation.

Certain hazardous wastes, based on the manner in which they are recycled, or based on regulation by other environmental statutes, are exempt from hazardous waste regulation. Those wastes are:

- Industrial ethyl alcohol
- Scrap metal
- Waste-derived fuels from refining processes
- Unrefined waste-derived fuels and oils from petroleum refineries.

Some recycling processes are not fully exempt from hazardous waste regulation, but are instead subject to specialized standards. These processes are:

- Use constituting disposal
- Precious metal reclamation
- Lead-acid battery reclamation (regenerated batteries are exempt from hazardous waste regulation entirely)
- Burning for energy recovery.

Certain commonly recycled materials are subject to streamlined hazardous waste regulation. One type of material, used oil, is regulated under its own recycling program. Used oil is defined as any oil that has been refined from crude oil or any synthetic oil that has been used and as a result of such use is contaminated by physical or chemical impurities.

The used oil recycling provisions include management standards for used oil:

- Generators
- Collection centers and aggregation points
- Transporters
- Transfer facilities
- Processors and rerefiners
- Burners
- Marketers.

Another type of material, universal waste, is also subject to streamlined management provisions. The universal waste program is designed to encourage the recycling of certain widely generated hazardous wastes by easing the regulatory burden on persons

who handle, transport, and collect them. Universal wastes consist of:

- Hazardous waste batteries
- Hazardous waste pesticides that are either recalled or collected in waste pesticide collection programs
- Mercury-containing equipment
- Hazardous waste lamps.

The universal waste program includes regulatory provisions for universal waste handlers, transporters, and destination facilities.

REGULATIONS GOVERNING HAZARDOUS WASTE GENERATORS

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OVERVIEW

Under RCRA, hazardous waste generators are the first link in the cradle-to-grave hazardous waste management system. All generators must determine if their waste is hazardous and must oversee the ultimate fate of the waste. RCRA Subtitle C requires generators to ensure and fully document that the hazardous waste they produce is properly identified, managed, and treated prior to recycling or disposal. The regulations applicable to generators of hazardous waste are located in 40 CFR Part 261 and Part 262. (Generators may also be subject to land disposal restrictions (LDR) requirements as discussed in Chapter III, Land Disposal Restrictions). The degree of regulation to which each generator is subject depends to a large extent on how much waste each generator produces every calendar month. This chapter summarizes who is considered a generator and which standards apply based on monthly waste generation rates.

A user-friendly reference document containing a collection of written materials about specific issues related to hazardous waste generators can be found at www.epa.gov/epawaste/hazard/downloads/tool.pdf.

WHO ARE THE REGULATED GENERATORS?

The Subtitle C regulations broadly define the term **generator** to include any person, by site, who:

- First creates or produces a hazardous waste (e.g., from an industrial process)

  or

- First brings a hazardous waste into the RCRA Subtitle C system (e.g., imports a hazardous waste into the United States).

Because generators are the first step in the RCRA Subtitle C system, it is important that they properly classify and identify their waste to ensure proper handling later in the hazardous waste management process. As a result, generators of waste must make the following determinations:

- Is the waste a solid waste?
- Is the waste excluded?
- Is the waste a listed hazardous waste?
- Is the waste a characteristic hazardous waste?

Hazardous waste generators may include various types of facilities and businesses ranging from large manufacturing operations, universities, and hospitals to small businesses, such as dry cleaners and auto body repair shops, and laboratories. Because these different types of facilities generate different quantities of wastes resulting in varying degrees of environmental risk, RCRA regulates generators based on the amount of waste that they generate in a calendar month. As a result, there are three categories of hazardous waste generators:

- Large quantity generators (LQGs)
- Small quantity generators (SQGs)
- Conditionally exempt small quantity generators (CESQGs).

■ Large Quantity Generators

Early in the development of the RCRA program in 1980, EPA recognized that a relatively small number of large scale hazardous waste management facilities generated the majority of the nation's hazardous waste. In order to address the facilities that posed the greatest threat to human health and the environment, EPA focused on those generators that produced the greatest volumes of hazardous waste by establishing standards for large quantity generators.

Large quantity generators are defined as those facilities that generate:

- 1,000 kg or more of hazardous waste per calendar month (approximately 2,200 lbs)

  or

- 1 kg or more of acutely hazardous waste per calendar month (approximately 2.2 lbs).

As of 2011, the Agency estimated the LQG universe to be approximately 14,000 facilities.

■ Small Quantity Generators

The LQG regulations focused on generators whose volume of waste posed the greatest threat to human health and the environment. All other generators that produced less than 1,000 kg of hazardous waste per month (or less than 1 kg of acutely hazardous waste per month) were initially exempted from the RCRA generator requirements.

Because of the concern that such exempt hazardous waste could cause environmental harm, Congress (through the Hazardous and Solid Waste Amendments (HSWA)) required that EPA also regulate those facilities who produce more than

100 kg of hazardous waste but less than 1,000 kg per month. SQGs are defined as those facilities that:

- Generate greater than 100 kg (approximately 220 lbs) and less than 1,000 kg of hazardous waste per calendar month

  and

- Accumulate on-site 6,000 kg or less (approximately13,200 lbs) of hazardous waste at any time.

In 2011, The Agency estimated the SQG universe to be about 75,000 facilities .

■ Conditionally Exempt Small Quantity Generators

Until HSWA, facilities generating waste below the 100-kg cut-off point were exempt from RCRA regulatory requirements. HSWA resulted in a third category of generators, **conditionally exempt small quantity generators** (CESQGs). These generators are defined as those facilities that produce:

- 100 kg or less of hazardous waste per calendar month

  or

- 1 kg or less of acutely hazardous waste per calendar month.

Beyond the monthly generation limits, the CESQG requirements additionally limit the facility's total hazardous waste accumulation quantities to less than 1,000 kg of hazardous waste, 1 kg or less of acute hazardous waste, or 100 kg or less of any residue from the cleanup of a spill of acute hazardous waste at any time.

The Agency currently estimates the CESQG universe to be between 293,000 and 470,000 facilities.

■ Episodic Generation

Because a generator's category is determined on a monthly basis, it is possible that a generator's categorycan change from one month to the next, depending on the quantity of hazardous waste generated in a particular month. This is referred to as **episodic generation**. If a generator's status does in fact change, the generator is required to comply with the respective regulatory requirements for that class of generators for the waste generated in that particular month.

■ State Regulations

State classification of generator categories may be different from those outlined above. Some states regulate all generators of hazardous waste (i.e., there is no exempt category), while other states classify generators by waste type rather than by generated volume. Therefore, it is imperative that generators contact their respective state agency to determine if state generator regulations differ from federal requirements.

LARGE AND SMALL QUANTITY GENERATOR REGULATORY REQUIREMENTS

LQGs and SQGs are subject to regulations contained in 40 CFR Part 262 that require each generator to:

- Identify whether their solid waste is a hazardous waste, and if so, count the quantity of hazardous waste generated in the calendar month (See 40 CFR 261.5 (c) and (d)) to determine its generator category
- Obtain an EPA ID number
- Comply with accumulation and storage requirements at 40 CFR 262.34 (including requirements for training and emergency arrangements)
- Prepare the hazardous waste for transportation
- Track the shipment and receipt of such waste
- Meet recordkeeping and reporting requirements.

LQGs and SQGs may also be subject to LDR requirements.

Because SQGs produce a smaller portion of the nation's hazardous waste, Congress was concerned that full regulation might be economically

burdensome and inappropriate. Consequently, Congress authorized EPA to reduce the regulatory requirements applicable to SQGs provided that such requirements were still protective of human health and the environment. This chapter fully discusses these regulatory requirements and notes the differences between LQG and SQG regulatory provisions.

■ Waste Identification and Counting

In order to determine which generator standards a facility must comply with, generators are required to identify each waste that they generate and determine all applicable listings and characteristics. After determining which wastes are hazardous, each month, generators are responsible for totaling (or **counting**) the weight of all hazardous wastes generated in that month in order to determine if they will be regulated as an LQG, SQG, or CESQG for that particular month.

■ EPA Identification Numbers

One way that EPA monitors and tracks generators is by assigning each LQG and SQG a unique **EPA Identification (ID) number**. If you generate, treat, store, dispose, transport, or offer for transportation hazardous waste, you must have an ID number. Furthermore, the generator is forbidden from offering hazardous waste to any transporter or treatment, storage, and disposal facility (TSDF) that does not also have an EPA ID number. ID numbers are issued to each generator for each individual site or facility property where hazardous waste is generated. In most cases, generators request EPA ID numbers from the state implementing agency. Some states use the federal application form (EPA Form 8700-12) while other states use their own state forms.

Additional information regarding EPA ID numbers, including the forms and instructions can be found at www.epa.gov/epawaste/inforesources/data/form8700/forms.htm.

■ Accumulation of Waste

LQGs and SQGs are also subject to facility waste management standards. An LQG may accumulate hazardous waste on site for 90 days or less without being subject to RCRA permitting requirements provided they comply with all management specified standards. Under temporary, unforeseen, and uncontrollable circumstances, this 90-day period may be extended for up to 30 days by the state or EPA on a case-by-case basis. LQGs storing wastewater treatment sludges from electroplating operations (F006) may store that waste for 180 or 270 days if the waste is to be recycled.

LQGs must comply with the following requirements:

- Proper Management—The waste is properly accumulated in containers, tanks, drip pads, or containment buildings. Hazardous waste containers must be kept closed and marked with the date on which hazardous waste accumulation began. Tanks and containers are required to be marked with the words "Hazardous Waste." The generator must ensure and document that waste is shipped off site within the allowable 90-day period.
- Preparedness and Prevention—LQGs are required to have an emergency coordinator, coordinate with local emergency response authorities, and to test and maintain emergency equipment.
- Emergency Plan—LQGs are required to have formal written contingency plans and emergency procedures in the event of a spill or release.
- Personnel Training—Facility personnel must be trained in the proper handling of hazardous waste through an established training program.

Considering the lesser risks posed by the generation of smaller quantities of hazardous waste, SQGs are subject to less extensive facility waste management provisions. An SQG may accumulate hazardous waste on site for 180 days or less without being subject to RCRA permitting requirements provided they comply with all specified management standards. SQGs transporting hazardous waste for off-site treatment, storage, or disposal over distances greater than 200 miles may accumulate waste for up to 270 days. SQGs must comply with the following requirements:

- Proper Management—The waste is properly accumulated in either tanks or containers marked

with the words "Hazardous Waste." Containers must also be kept closed and marked with the date on which accumulation began.

- Emergency Plan—The SQG requirements include specified emergency responses; however, SQGs are not required to have written contingency plans. They are required to ensure that an emergency coordinator is on the premises, or on-call at all times, and have basic facility safety information readily accessible.
- Personnel Training—SQGs are not required to have an established training program but must ensure that employees handling hazardous waste are familiar with proper handling and emergency procedures.

■ Preparation for Transport Regulations

Pre-transport regulations are designed to ensure safe transportation of hazardous waste from the point of origin to the ultimate disposal site. In developing hazardous waste pre-transport regulations, EPA adopted the Department of Transportation's (DOT) regulations for packaging, labeling, marking, and placarding. These DOT regulations can be found at 49 CFR Parts 172, 173, 178, and 179. DOT regulations require:

- Proper packaging to prevent leakage of hazardous waste during both normal transport conditions and potentially dangerous situations (e.g., if a drum falls off of a truck).
- Labeling, marking, and placarding of the packaged waste to identify the characteristics and dangers associated with its transport.

These pre-transport regulations only apply to generators shipping waste off site for treatment, storage, or disposal. Transportation on site is not subject to these pre-transport requirements.

■ The Manifest

As previously discussed, the Subtitle C program is designed to manage hazardous waste from cradle to grave. The Uniform Hazardous Waste Manifest (*EPA Form 8700-22*) plays a crucial part in this management system. (A sample of the manifest can be found in Appendix A.) The **manifest** allows all parties involved in hazardous waste management (e.g., generators, transporters, TSDFs, EPA, state agencies) to track the movement of hazardous waste from the generator's site to the site where the waste will be treated, stored, or disposed. A RCRA manifest contains the following federally required information:

- Name, address, and EPA ID number of the hazardous waste generator, transporter(s), and designated facility
- DOT description of the waste's hazards
- Quantities of the wastes transported and container type.

Each manifest also contains a certification that states:

- The shipment has been accurately described and is in proper condition for transport.
- The generator has a waste minimization program in place at its facility to reduce the volume and toxicity of hazardous waste to the degree economically practicable, as determined by the generator.
- The treatment, storage, or disposal method chosen by the generator is the most practicable method currently available that minimizes the risk to human health and the environment.

Each time a waste is transferred (e.g., from a transporter to the **designated facility** or from a transporter to another transporter), the manifest must be signed to acknowledge receipt of the waste. A copy of the manifest is retained by each individual in the transportation chain. Once the waste is delivered to the designated facility, the owner and operator of that facility must sign and return a copy of the manifest to the generator. This system ensures that the generator has documentation that the hazardous waste has arrived at its ultimate destination. To further ensure the safe transport of hazardous waste, a generator may not offer waste for transport unless that transporter has an EPA ID number.

In March 2005, EPA finalized revisions to the manifest form and regulations. EPA standardized the content and format of the current manifest form and the continuation sheet so that the same form could be used by waste handlers nationwide. EPA also improved tracking procedures for hazardous waste shipments that destination facilities (i.e., TSDFs)

reject, wastes consisting of residues from non-empty hazardous waste containers, and wastes entering or leaving the United States. Finally, EPA established a new acquisition process for obtaining the new manifest form. Waste handlers may obtain new forms from any source that has registered with EPA to print and distribute the form.

Currently, the Agency is in the process of initiating the development of an electronic manifest system (e-manifest) to allow generators, transporters, TSDFs to document and track waste shipments electronically. This system will not be ready for a few more years.

■ Recordkeeping and Reporting

The recordkeeping and reporting requirements for LQGs and SQGs provide EPA and the states with a method to track the quantities of hazardous waste generated and the movement of hazardous wastes. The generator regulations in 40 CFR Part 262 contain four primary recordkeeping and reporting requirements:

- Biennial reporting
- Information collection requests
- Exception reporting
- Three-year record retention.

Biennial Reporting

The Office of Resource Conservation and Recovery (ORCR) relies on data to determine the best ways to develop, implement, and enforce the RCRA program, and to assess its success. EPA, in partnership with the states, biennially collects information from LQGs and TSDFs about the generation, management, and final disposition of hazardous wastes regulated under RCRA. When regulated parties provide their data, the state or EPA regional office enters the data into a computer database.

After review to ensure the quality of the data, ORCR enters it into a data system called RCRAInfo, where states and EPA can access it. EPA uses the information collected to:

- Provide EPA and the states with an understanding of hazardous waste generation and management in the United States
- Help EPA measure the quality of the environment, such as monitoring industry compliance with the regulations and evaluating waste minimization efforts taken by industry, and
- Communicate national hazardous waste information to the public and government agencies, and the regulated community, primarily through publication of the National Biennial RCRA Hazardous Waste Reports.

For more information, please go to the National Biennial RCRA Hazardous Waste Report, available at www.epa.gov/biennialreport.

Information Collection Requests

In order to collect the information that ORCR needs to develop, implement, and enforce the RCRA program, and to assess its success, ORCR requires members of the regulated community to submit data. In order for EPA to legally enforce such a requirement, the forms used to collect the data must be approved by the President's Office of Management and Budget (OMB) through the Information Collection Request (ICR) process. ICRs are usually approved for only three years, after which EPA must apply to renew them. This process, laid out in the Paperwork Reduction Act, requires an ICR before collecting the same or similar information from ten or more members of the public. An ICR:

- Describes the information to be collected
- Gives the reason the information is needed, and
- Estimates the time and cost "burden" for the public to answer the request.

Exception Reporting

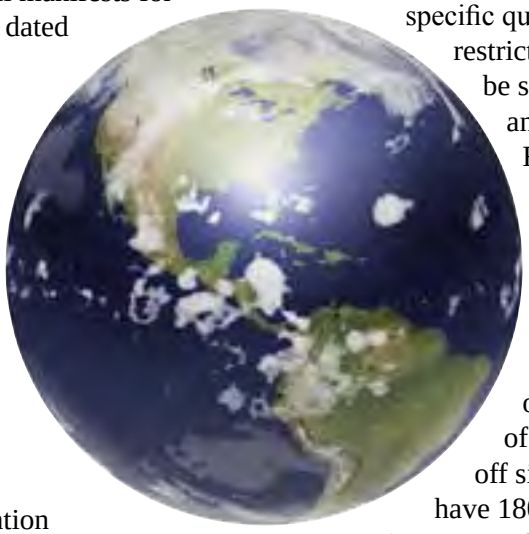
The RCRA regulations ensure that the transport of hazardous waste from its point of generation to its point of treatment, storage, or disposal is documented through a manifest system. This system requires the designated facility to return a signed and dated copy of the manifest to the generator in order to acknowledge receipt of the waste. If the generator does not receive this paperwork, additional steps need to be taken in order to locate the waste. As a result, LQGs and SQGs who transport waste off site but do not receive a signed and dated copy of

the manifest from the designated facility within 45 days from the date on which the initial transporter accepted the waste, must submit an **exception report** to the EPA Regional Administrator. The exception report must describe efforts made to locate the waste and the results of those efforts.

SQGs who do not receive a signed and dated copy of the manifest from the designated facility within 60 days must send a copy of the original manifest to the EPA Regional Administrator with a note indicating that they have not received a return copy.

Record Retention

Generators must keep a copy of each biennial report and any exception reports for at least three years from the due date of the report. Generators are also required to keep copies of all manifests for three years, or until a signed and dated copy of the manifest is received from the designated facility. The manifest received from the designated facility must be kept for at least three years from the date on which the hazardous waste was accepted by the initial transporter. Finally, records of waste analyses and determinations performed by the generator must be kept for at least three years from the date the waste was last sent to an on-site or off-site TSDF. These retention periods may be extended automatically during the course of any unresolved enforcement action regarding the regulated activity, or as requested by the EPA Administrator.



CONDITIONALLY EXEMPT SMALL QUANTITY GENERATORS

While CESQGs are not subject to the requirement to obtain an EPA ID number, comply with hazardous waste accumulation and storage requirements, follow the manifest system, or meet recordkeeping and reporting requirements, they are subject to limited generator waste management standards. CESQGs may also be subject to DOT requirements. CESQGs must identify their hazardous waste, comply with the waste accumulation quantity limit requirements, and ensure waste treatment or disposal in an on-site or off-site:

- Permitted or interim status hazardous waste TSDF
- State hazardous waste facility
- State permitted, licensed, or registered solid waste disposal facility
- State MSWLF
- Recycling facility
- Universal waste facility.

QUANTITY AND TIME LIMITS

LQGs, SQGs, and CESQGs are subject to specific quantity and time limits that restrict the amount of waste that may be stored on site at any one time, and the length of such storage. For example, SQGs may not accumulate or store more than 6,000 kg of hazardous waste on site at any one time, and CESQGs may not accumulate or store 1,000 kg or more of hazardous waste on site at any one time. LQGs must move all of the waste that they generate off site within 90 days, while SQGs have 180 days to move all waste off site or up to 270 days if they must ship the waste to a TSDF located more than 200 miles. If SQGs or CESQGs exceed their respective waste accumulation or storage quantity limits, or if LQGs or SQGs exceed their respective accumulation time limits, the facility becomes a storage facility subject to all applicable requirements for TSDFs (including permitting) unless they have received an accumulation time limit extension from EPA or their state.

Several years ago, EPA promulgated less stringent regulations for generators of F006 waste in order to promote legitimate recycling of metal-bearing electroplating sludges. As a result, large quantity generators are allowed to accumulate F006 sludges up to 180 or 270 days without a permit provided they meet certain conditions.

INTERNATIONAL SHIPMENTS

Not all hazardous wastes that are managed in the United States originate in this country. Similarly, not all wastes generated in the United States are managed exclusively in this country. To ensure that such international shipments are handled in a manner that protects human health and the environment, RCRA contains management provisions for both hazardous waste imports and exports. Because such shipments are also governed by various international treaties and agreements, the RCRA regulations include provisions which implement these treaties and agreements.

■ Hazardous Waste Imports

Under RCRA, any person importing a hazardous waste into the United States from a foreign country is subject to the hazardous waste generator standards. As a result, an importer is subject to all generator requirements, including the completion of a hazardous waste manifest. Subpart F of Part 262 contains special instructions for importers completing the manifest.

In addition, any TSDFs, or interim status TSDFs, that intend to receive imported hazardous waste from a foreign source must notify the EPA Regional Administrator in writing at least four weeks prior to receiving the first shipment of hazardous waste. Any subsequent shipments of the same waste from the same foreign source do not require this notification. Once the TSDF receives import shipments of hazardous waste, the site must send a copy of each shipment's manifest to EPA within 30 days of shipment delivery, and include details on the foreign generators and imported wastes in their normal Biennial Report submission. If the import shipment is from an Organization for Economic Cooperation and Development (OECD) country (except Canada or Mexico), under 262 Subpart H, the TSDF would also have to send a copy of the OECD tracking document to EPA and to the competent authorities of all other concerned countries within three working days of shipment delivery.

■ Hazardous Waste Exports

RCRA also contains specific requirements for hazardous waste exports. For example, there are specific notification requirements for exports of hazardous wastes that prohibit the export of hazardous waste unless the exporter obtains written consent from the receiving country prior to shipment. This written consent must be attached to the manifest accompanying each waste shipment.

To export a hazardous waste, the exporter must notify the EPA Administrator 60 days prior to when the waste is scheduled to leave the United States. This notification may cover export activities extending over a 12-month period, unless information in the notification changes. If the importing country agrees to accept the hazardous waste, EPA will send an **Acknowledgment of Consent** to the exporter, who may then export the waste to the accepting country.

Subpart E of Part 262 contains the detailed export requirements for hazardous waste shipments that would not be governed by the OECD multilateral agreement (as discussed later in this chapter). Subpart H of Part 262 contains the export requirements for shipments destined for an OECD country, with the exception of Canada and Mexico.

■ International Treaties

Two international treaties may affect U.S. hazardous waste import and export practices. They are the Basel Convention and the OECD Council Decision.

Basel Convention

The **Basel Convention** establishes standards for the transboundary movement of hazardous waste, solid waste, and municipal incinerator ash, including notice to and written confirmation from the receiving country prior to export. As of July 2011, 176 countries were party to the Convention. Although the United States is not currently a party to the Basel Convention, the Convention still affects U.S. importers and exporters in the following manner. Parties to the Basel Convention cannot trade Basel-covered wastes with nonparties in the absence of a bilateral or multilateral agreement (in this case, a separate agreement between countries or groups of countries to govern the transboundary movement of waste). As a result, U.S. businesses, as a practical matter, can only import such wastes

from and export such wastes to those Basel countries with which the U.S. government has negotiated a separate waste trade agreement. Those countries with which the United States has entered into such bilateral agreements for import and export include Canada and Mexico. Those countries with which the United States has entered into a bilateral agreement for import include Malaysia, Costa Rica, and the Philippines.

Organization for Economic Cooperation and Development Council Decision

The **OECD Council Decision** is another multilateral agreement that establishes procedural and substantive controls for the import and export of hazardous waste recyclables between OECD member nations. The agreement is intended to ease the trade of such recyclables and minimize the possibility that such wastes will be abandoned or handled illegally. As of 2006, there were 30 member countries in the OECD. Since the United States is a member of OECD and is a party to the Decision, U.S. businesses can trade recyclables with other member OECD nations (including those that are also party to the Basel Convention). However, transboundary movement between the United States and the countries of Canada, Mexico, Costa Rica, Malaysia, and the Philippines is still governed by each individual bilateral agreement and not by the OECD Decision.

In May 2002, OECD published a decision that made revisions to the controls of transboundary movements of waste destined for recovery operations. Because OECD council decisions are legally binding for member countries, this decision has to be implemented in all member countries through the enactment of national legislation. As a result, in January 2010, EPA made corresponding changes to the regulations in 40 CFR Part 262, Subpart H, such as:

- Requiring U.S. recovery facilities to submit a certificate after recovery of the waste has been completed,
- Adding provisions to ensure that hazardous wastes are returned to the country of export in a more timely and documented manner when it is necessary to do so, and
- Adding new procedures for imported hazardous wastes that are initially managed at U.S. accumulation and transfer facilities to better track and document that subsequent recovery by a separate recycling facility is completed in an environmentally sound manner.

FARMER EXCLUSION

Although a farmer may be a generator of hazardous waste, waste pesticides disposed of on a farmer's own property in compliance with specified waste management requirements, including the disposal instructions on the pesticide label, are not subject to the generator requirements. This exclusion is intended to prevent the double regulation of farmers under both RCRA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

ACADEMIC LABORATORIES ALTERNATIVE REQUIREMENTS

In December 2008, EPA established alternative standards for the management of hazardous waste in laboratories owned by **eligible academic entities** (the Academic Labs Rule). The requirements in 40 CFR Part 262, Subpart K offer an alternative to the requirements for satellite accumulation areas in 40 CFR §262.34(c) and are tailored to the specific circumstances of teaching and research laboratories, including the high number of individual wastes, the variability in such wastes, the transient nature of those generating the wastes (e.g., students), and the multiple points of generation.

ACADEMIC LABORATORIES ALTERNATIVE REQUIREMENTS

The Academic Labs Rule is considered to be neither more nor less stringent than the current hazardous waste regulations. Therefore, Subpart K is only effective automatically in states that do not have final authorization for the implementation of RCRA (e.g., Iowa and Alaska). Other states are encouraged by EPA, but not required, to adopt the rule. In addition, states may adopt only portions of the rule or may have similar rules in place.

SUMMARY

Hazardous waste generators regulated under RCRA fall into three categories, based on the amount of hazardous waste generated per calendar month:

- LQGs
- SQGs
- CESQGs.

LQGs and SQGs must:

- Identify and count waste
- Obtain an EPA ID number
- Comply with accumulation and storage requirements (including requirements for training and emergency arrangements)
- Prepare the waste for transportation
- Track the shipment and receipt of such waste
- Meet recordkeeping and reporting requirements.

LQGs and SQGs may also be subject to LDRrequirements.

CESQGs are not subject to most of the generator requirements applicable to LQGs and SQGs, but they must identify their hazardous waste, comply with waste accumulation and storage quantity limit requirements, and ensure waste treatment or disposal in an on-site or off-site:

- Permitted or interim status hazardous waste TSDF
- State hazardous waste facility
- State permitted, licensed, or registered solid waste disposal facility
- State municipal solid waste landfill
- Recycling facility
- Universal waste facility.

Any person importing hazardous waste into the United States from a foreign country is subject to hazardous waste generator standards. RCRA also contains specific requirements for hazardous waste exports. Importers and exporters must also comply with the provisions of international trade treaties, such as the Basel Convention and the OECD Council Decision.

Because farmers disposing of certain pesticide wastes on their own land are subject to regulation under both RCRA and FIFRA, RCRA specifically excludes such farmers from the generator requirements. In addition, EPA established alternative standards for eligible academic entities that are tailored to the specific circumstances of teaching and research laboratories,

ADDITIONAL RESOURCES

Additional information about hazardous waste generators can be found at www.epa.gov/epawaste/hazard/generation.

REGULATIONS GOVERNING HAZARDOUS WASTE TRANSPORTERS

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OVERVIEW

Hazardous waste transporters play an integral role in the cradle-to-grave hazardous waste management system by delivering hazardous waste from its point of generation to its ultimate destination. Since such transporters are moving regulated wastes on public roads and highways, rails, and waterways, they are regulated not only by RCRA, but by the Department of Transportation (DOT) standards as well. To avoid regulatory discrepancies and redundant regulations, the hazardous waste transporter regulations were developed jointly by EPA and DOT. Although the regulations are integrated, they are not located in the same part of the CFR. DOT's Hazardous Materials Transportation Act regulations are found in 49 CFR Parts 171-179, while the RCRA Subtitle C transporter requirements are located in 40 CFR Part 263. This chapter summarizes only the RCRA Subtitle C transporter regulations. Please consult the DOT regulations for a complete understanding of hazardous waste transporter requirements.

WHO ARE THE REGULATED TRANSPORTERS?

A hazardous waste **transporter** under Subtitle C is any person engaged in the off-site transportation of hazardous waste within the United States, if such transportation requires a manifest. Off-site transportation of hazardous waste includes shipments from a hazardous waste generator's facility property to another facility for treatment, storage, or disposal. Regulated off-site transportation includes shipments of hazardous waste by air, rail, highway, or water.

Transporter regulations only apply to the off-site transportation of hazardous waste. The transporter regulations do not apply to the on-site transportation of hazardous waste within a facility's property or boundary. Examples of such on-site transportation include generators and TSDFs transporting waste within their facilities, or on their own property. On site also refers to geographically contiguous properties, even if the properties are separated by a public road. Consequently, a facility may ship wastes

between two properties without becoming subject to the hazardous waste transporter regulations, provided that the properties are contiguous. Transporter requirements do apply to shipments between noncontiguous properties that require travel on public roads.

REGULATORY REQUIREMENTS FOR TRANSPORTERS

A transporter of hazardous waste is subject to several regulations under RCRA and must:

- Obtain an EPA identification (ID) number
- Comply with the manifest system
- Properly handle hazardous waste discharges.

■ EPA Identification Number

One way that EPA keeps track of hazardous waste transporters is by requiring each transportation company to obtain an EPA ID number. Without this ID number, the transporter is forbidden from transporting hazardous waste. Unlike generator EPA ID numbers, which are site-specific, transporter numbers are assigned to the transportation company as a whole. This means that each individual truck does not receive a unique number, but rather, uses the number issued to the company's headquarters location.

■ The Manifest

With the exception of water and rail shipments and the transport of certain small quantity generators (SQG) recycling wastes, a transporter may not accept hazardous waste from a generator unless the waste is accompanied by a properly prepared manifest. Upon receiving the waste, the transporter must sign and date the manifest to acknowledge receipt and return a copy to the generator before leaving the generator's property. A copy of the manifest must accompany the shipment of the waste at all times. Once a transporter has accepted a waste, the transporter is required to deliver the entire quantity of waste to the next designated transporter or to the designated facility. Upon turning the waste over to another transporter or to the designated facility, the transporter is required to have the manifest signed and dated by the recipient. All transporters are required to keep a signed copy of the manifest for three years from the date the initial transporter accepted the waste. If the waste cannot be delivered as the manifest directs, the transporter must contact the generator and receive further instructions on whether to return the waste or take it to another facility.

If a waste is rejected by the TSDF designated on the manifest to receive the waste, then the transporter must follow the tracking procedures for full load rejections or partial rejections, depending on the circumstances of the rejection. The transporter must also follow the applicable tracking procedures for regulated quantities of container residues.

These manifest requirements are slightly different for water and rail transporters. Water and rail transporters must comply with the directions on the manifest, obtain an EPA ID number, and must be listed on the manifest, but the manifest is not required to physically accompany the waste shipment at all times. Instead, both water and rail transporters can use another shipping document instead of the manifest, provided that it contains the same information as the manifest (excluding the EPA ID number, generator certification, and signatures). The initial water or rail transporter must sign and date the manifest or shipping document and ensure that it reaches the designated facility, and the final water or rail transporter must ensure that the owner and operator of the designated facility signs the manifest or shipping paper. Intermediate water and rail transporters are not required to sign the manifest or shipping paper.

Because one of the primary goals of RCRA is to foster resource recovery and recycling, the transporter regulations contain a special exemption from the manifest requirements for transporters who handle certain recycled (or reclaimed) wastes generated by SQGs. This exemption is intended to facilitate the recycling of small quantities of hazardous wastes that are transported in a protective manner. To qualify for this exemption, the waste must be reclaimed under a contractual agreement between the SQG and a recycling facility. The agreement must specify the type of waste reclaimed and the frequency of shipments. In addition, the vehicle used to transport the waste must be owned and operated by the recycling facility. Both the generator and transporter are responsible for keeping a copy of the reclamation agreement on file for three years after the agreement ends.

On March 4, 2005, EPA established new requirements revising the Uniform Hazardous Waste Manifest regulations and the manifest and continuation sheet forms (70 FR 10776). The revisions announced in the March 2005 final rule standardize the content and appearance of the manifest form and continuation sheet (Forms 8700-22 and 22a) and make the forms available from a greater number of sources. The final rule also establishes new procedures for tracking certain types of hazardous waste shipments with the manifest. These types of shipments include non-empty hazardous waste containers and hazardous wastes that enter or leave the United States. In the case of rejected shipments or container residues, the new manifest provides new data fields in the existing "Discrepancy" block on the manifest (Item 18 on the new form) to record information for these shipments. The new manifest form also contains a new block (entitled "International Shipments"), which hazardous waste transporters and other hazardous waste handlers will use to record information for hazardous waste import and export shipments.

■ Handling Hazardous Waste Discharges

Even though the regulations are designed to ensure that hazardous waste shipments are conducted safely, the transportation of hazardous waste can still be dangerous as there is always the possibility that an accident may occur. To address this possibility, the regulations require transporters to take immediate action to protect human health and the environment if a release occurs (e.g., notifying local authorities and diking the discharge area). When a serious accident or spill occurs, the transporter must notify the National Response Center (NRC) by phone. The Centers for Disease Control (CDC) must also be informed if the spill involves disease-causing agents.

The regulations also authorize certain federal, state, or local officials to handle transportation accidents. Specifically, if immediate removal of waste is necessary to protect human health or the environment, one of these officials may authorize a nonmanifested removal of the waste by a transporter without an EPA ID number.

TRANSFER FACILITIES

Transporters accepting hazardous waste from a generator or another transporter may need to hold waste temporarily during the normal course of transportation. A **transfer facility** is defined as any transportation-related facility, such as loading docks, parking areas, storage areas, and other similar areas where shipments are held during the normal course of transportation. A transporter may hold waste at a transfer facility for up to 10 days.

ADDITIONAL REGULATORY REQUIREMENTS

Even though transporters are regulated under Part 263 of the RCRA regulations and DOT provisions, there are certain situations when a transporter may be subject to additional RCRA regulatory requirements. For example, if a transporter stores waste at a transfer facility for more than 10 days, the transfer facility becomes a storage facility subject to all applicable requirements for treatment, storage, and disposal facilities (TSDFs) (including permitting).

In other situations, a transporter may be subject to RCRA hazardous waste generator requirements. For example, transporters may import hazardous waste into the United States, thus causing the waste to become subject to the RCRA regulations. Also, transporters may mix separate hazardous wastes with different DOT shipping descriptions

into a single container, thus physically producing a hazardous waste. In these instances, transporters are responsible for complying with the RCRA hazardous waste generator provisions (as discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

SUMMARY

A regulated transporter is defined under Subtitle C as any person engaged in the off-site transportation of hazardous waste, if such transportation requires a manifest. The transporter regulations do not apply to the on-site transportation of hazardous waste within a facility's property boundary.

Transporters of hazardous waste must comply with both EPA and DOT regulations. The RCRA Subtitle C regulations require a transporter to:

- Obtain an EPA ID number
- Comply with the manifest system
- Properly handle hazardous waste discharges.

During the normal course of transportation, transporters may hold waste temporarily (for up to 10 days) at a transfer facility.

Transporters of hazardous waste may also be subject to Subtitle C generator or storage facility requirements (e.g., if the transporter stores waste at a transfer facility for more than 10 days or imports hazardous waste into the United States).

REGULATIONS GOVERNING TREATMENT, STORAGE, AND DISPOSAL FACILITIES

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OVERVIEW

Treatment, storage, and disposal facilities (TSDF) are the last link in the cradle-to-grave hazardous waste management system. The requirements for TSDFs, located in 40 CFR Parts 264 and 265, are more extensive than the standards for generators and transporters. They include general facility operating standards, as well as standards for the various types of units in which hazardous waste is managed. General facility standards address good management practices for any facility engaged in hazardous waste management. The technical standards go beyond these requirements to ensure that all elements of the TSDF are constructed and operated to prevent leaks of hazardous waste into the environment. The technical standards also address the diversity of hazardous waste operations being conducted around the country by guiding facilities in the proper design, construction, operation, maintenance, and closure of a variety of hazardous waste treatment, storage, and disposal units. These unit standards include requirements for a wide range of hazardous waste management units, from containers (e.g., 55-gallon drums) to landfills, in order to ensure that these units handle waste safely and effectively.

WHAT IS A TSDF?

With some exceptions, a TSDF is a facility engaged in one or more of the following activities:

- **Treatment**—Any method, technique, or process designed to physically, chemically, or biologically change the nature of a hazardous waste.

- **Storage**—Holding hazardous waste for a temporary period, after which the hazardous waste is treated, disposed of, or stored elsewhere.
- **Disposal**—The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on or in the land or water. A disposal facility is any site where hazardous waste is intentionally placed and where the waste will remain after a TSDF stops operation.

To help owners and operators of new and existing TSDFs comply with new RCRA regulations, RCRA divides them into two categories: permitted (new) and interim status (existing).

■ Permits and Interim Status

When Congress enacted RCRA in 1976, it directed EPA to develop standards for new TSDFs (those built after the standards were established) and for facilities that were already in operation. Congress further required that the standards for both new and existing facilities differ only where absolutely necessary.

New TSDFs, those facilities constructed after the regulations were promulgated, must be designed and built to meet the standards EPA deemed necessary to protect human health and the environment. To handle hazardous waste, a new facility must obtain a permit, in accordance with provisions in 40 CFR Part 270, before it begins operation. These facilities are called **permitted facilities**. (Permitting is fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities). The permit lays out the standards and requirements applicable to the specific activities conducted at that facility, including both the general facility standards and the standards applicable to each type of unit at the facility. The requirements for permitted facilities are located in 40 CFR Part 264.

On the other hand, facilities already in existence and operating may not immediately be able to meet the design and operating standards for new facilities. For example, when RCRA was enacted, existing hazardous waste management facilities immediately became subject to regulation, while other existing facilities managing nonhazardous waste were brought into RCRA by regulatory changes that made these wastes hazardous. For both sets of TSDFs, EPA created a special category of regulations to allow these facilities to gradually come up to speed with the standards for permitted facilities. These facilities are called **interim status facilities**. While in interim status, facilities must comply with these separate standards, which are often less stringent than the standards for permitted facilities and are not tailored to individual sites, until they receive their permit. The requirements for interim status facilities are located in 40 CFR Part 265.

While the standards for permitted facilities are often similar to those for interim status facilities, there are circumstances where the standards for new facilities would be impracticable for existing facilities to implement immediately. This chapter will focus primarily on the standards for permitted facilities, contrasting them with the standards for interim status facilities where appropriate.

■ Exemptions

In order to promote certain beneficial activities or to avoid overlapping with the requirements of other parts of RCRA or other environmental laws, RCRA exempts certain types of facilities or operations from the standards for permitted and interim status TSDFs.

Permits-by-Rule

Facilities that have permits for certain activities under other environmental laws may qualify for a special form of a RCRA permit, known as a **permit-by-rule**. These activities include ocean disposal of hazardous wastes regulated under the Marine Protection, Research, and Sanctuaries Act (MPRSA); underground injection of hazardous wastes regulated under the Safe Drinking Water Act (SDWA); and treatment of hazardous wastewaters in a publicly owned treatment works (POTW) regulated under the Clean Water Act (CWA). Under this exemption, the facility's non-RCRA permit serves in place of a RCRA permit, provided the facility is in compliance with that permit and other basic RCRA administrative requirements. (Permits- by-rule are fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities).

Conditionally Exempt Small Quantity Generator Waste

Facilities that treat (including recycle), store, or dispose of only hazardous waste generated by conditionally exempt small quantity generators (CESQGs) are excluded from the TSDF standards. RCRA requires that such facilities be permitted, licensed, or registered by the state to handle nonhazardous industrial or municipal solid waste, or qualify as a recycling facility. (CESQGs are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

Recyclable Materials

RCRA provides separate, reduced regulations for TSDFs recycling certain materials. These recycling facilities are generally exempt from the TSDF standards, but may be required to comply with streamlined hazardous waste management requirements. These reduced provisions apply to facilities recycling:

- Precious metals
- Lead-acid batteries
- Used oil
- Hazardous waste burned in boilers and industrial furnaces.

For other recyclable materials, there are no special requirements. For example, facilities recycling the following materials are exempt from all TSDF standards:

- Industrial ethyl alcohol
- Used batteries returned to the manufacturer for regeneration
- Scrap metal
- Fuels produced from refining oil-bearing hazardous wastes
- Oil reclaimed from hazardous waste. (Recyclable materials are fully discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes).

Generators

Generators accumulating waste on site in accordance with the generator regulations do not need a permit and do not have to comply with the permitted TSDF standards. They must comply with only those interim status standards specified in the generator regulations. On the other hand, if small quantity generators (SQGs) or CESQGs exceed their respective storage limits, or if large quantity generators (LQGs) or SQGs exceed their respective accumulation time limits, the facility becomes a storage facility subject to all applicable requirements for TSDFs (including permitting). (Generators are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators

Farmers

Farmers disposing of pesticide wastes on their own property in compliance with the disposal instructions on the pesticide label are also not subject to the TSDF standards. Congress did not want to regulate farmers under both RCRA and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Therefore, farmers meeting these management conditions are exempt from the TSDF standards.

Totally Enclosed Treatment Units

Totally enclosed treatment units (TETUs) are designed and constructed to eliminate the potential for hazardous wastes to escape into the environment during treatment. If directly connected to an industrial production process, and treatment prevents the release of hazardous constituents into the environment, TETUs are exempt from the TSDF standards.

Elementary Neutralization Units

Elementary neutralization units (ENUs) are containers, tanks, tank systems, transportation vehicles, or vessels that neutralize wastes that are hazardous only for exhibiting the characteristic of corrosivity (D003). Neutralization in such units is exempt from the TSDF standards. However, neutralization in other types of units is regulated.

Wastewater Treatment Units

Wastewater treatment units (WWTUs) are tanks or tanks systems that treat hazardous wastewaters and discharge them pursuant to CWA (e.g., the discharge is sent to a POTW or to surface water under a NPDES permit). Such units are exempt from the TSDF regulations.

Emergency Response

Treatment, storage, and disposal activities that are part of an emergency response action taken to immediately contain or treat a spill of hazardous waste are exempt from TSDF standards. On the other hand, any treatment, storage, or disposal after the emergency situation has passed is subject to full regulation. Likewise, any hazardous waste generated during an emergency action must be managed in accordance with the generator standards.

Transfer Facilities

A transfer facility is a transportation-related facility, including loading docks and parking and storage areas, where shipments of hazardous waste are temporarily held during the normal course of transportation. A transfer facility temporarily storing a manifested shipment of hazardous waste for less than 10 days before transfer to the next designated facility is not subject to the TSDF standards. On the other hand, if transporter storage at a transfer facility exceeds 10 days, the transfer facility becomes a storage facility subject to all applicable requirements for TSDFs (including permitting). (Transfer facilities are fully discussed in Chapter III, Regulations Governing Hazardous Waste Transporters).

Adding Absorbent

Because liquid hazardous wastes are not allowed in a landfill, absorbents must be added to the container to remove the visible liquids. Adding absorbent to hazardous waste may be considered hazardous waste treatment, thus triggering the TSDF standards. However, to promote the reduction of the amount of liquid hazardous waste sent to landfills, the regulations for hazardous waste treatment do not apply to a facility adding absorbent to waste when the waste is first put into a container. Subsequent addition of absorbent is not covered under this exemption and may be considered treatment subject to the TSDF standards.

Universal Waste Handlers

Handlers and transporters of recycled batteries, pesticides, mercury-containing equipment, and lamps are exempt from the TSDF standards. (Universal wastes are fully discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes).

GENERAL FACILITY STANDARDS

If a TSDF is not exempt under any of these provisions, then it must comply with the standards for fully regulated TSDFs. These standards cover good management practices, including keeping track of the amount and type of wastes entering the facility, training employees to safely manage hazardous waste, and preparing to avoid hazardous waste emergencies.

■ EPA Identification Numbers

As with generators and transporters of hazardous waste, TSDF owners and operators are required to notify EPA of the types of hazardous waste they plan to treat, store, or dispose of by applying for an EPA identification (ID) number.

■ Waste Analysis

To keep track of the wastes being sent for treatment, storage, or disposal, TSDF owners and operators must analyze waste shipments. The TSDF's permit will list the types of hazardous waste that a facility is allowed to treat, store, or dispose. Analyzing the waste received ensures that the facility only handles wastes they are permitted to handle, and ensures that the wastes are treated, stored, or disposed properly. A **waste analysis plan** outlines the procedures necessary to ensure proper treatment, storage, or disposal. The plan must be written, kept on site, and answer six basic questions:

- How will the TSDF know if the waste received is the same as that described on the manifest?
- Which waste constituents should the TSDF analyze?
- How should samples be taken?
- What type of testing and analytical methods should the facility use?
- How often should the waste be retested?
- What are the acceptance and rejection criteria for each wastestream?

The waste analysis must be repeated periodically to ensure that the information on a given waste is accurate and current. At a minimum, the waste analysis must be repeated when the TSDF is

notified or has reason to believe that the process or operation generating the hazardous waste has changed. Waste analysis must also be repeated when inspection indicates that the hazardous waste received does not match the information on the accompanying manifest.

■ Security

Security provisions are intended to prevent accidental or unauthorized entry into the active portion of a facility (i.e., where hazardous waste is treated, stored, or disposed). Unless the TSDF owner and operator demonstrates to the implementing agency that livestock or unauthorized persons who enter the facility will not be harmed and will not interfere with compliance with the regulations, the facility must install the following security measures:

- A 24-hour surveillance system that continuously monitors and controls entry onto the active portion of the facility (e.g., television monitoring, guards)

  or

- An artificial or natural barrier (e.g., a fence) that completely surrounds the active portion of the facility and serves as a means to control entry to the active portion of the facility at all times through gates or entrances
- A sign reading: "Danger—Unauthorized Personnel Keep Out" at each entrance to the active portion of the facility. The sign must be written in English and any other language that is predominant in the area surrounding the facility. Alternative language conveying the same message may also be used.

■ Inspection Requirements

To make sure that the facility is operating properly, the TSDF owner and operator must visually inspect the facility for malfunction, deterioration, operator errors, and leaks. The inspections should follow a written inspection schedule developed and followed by the owner and operator. The schedule identifies the types of problems to be checked and how often inspections should be conducted. Areas where spills are more likely to occur, such as loading and unloading areas, must be inspected daily when in use. Unit-specific inspections or requirements also must be included in the schedule. The owner and operator must record inspections in a log or summary and must remedy any problems identified during inspections.

■ Personnel Training

TSDF owners and operators must provide training to ensure that employees at the facility understand the risks posed by management of hazardous waste and are prepared to respond in the case of an emergency. The training program must be completed six months from the date the facility is subject to the TSDF standards, or six months after the date a worker is newly employed. This training program must be reviewed annually.

■ Requirements for Ignitable, Reactive, or Incompatible Waste

To avoid dangerous accidents, fires, or explosions, special care must be taken in handling ignitable, reactive, or incompatible wastes. TSDF owners and operators handling ignitable and reactive wastes must be able to demonstrate that these wastes are protected from ignition sources. Such protection includes "No Smoking" signs placed where ignitable and reactive wastes are stored, designation of separate smoking areas, and additional handling requirements. Similarly, owners and operators must take precautions against the combined storage of wastes that might react dangerously with one another, or with the unit in which they are stored. Such a reaction might be a fire or explosion, or the release of toxic dusts, gases, or fumes. To determine if particular wastes or storage units are compatible, the RCRA regulations list some common potentially incompatible wastes (40 CFR Part 264, Appendix V). For compatibility of wastes not listed in the regulations, the owner or operator may need to test the waste and the unit for compatibility.

■ Location Standards

Certain types of terrain may increase the dangers associated with managing hazardous waste. To protect people and the environment around these areas, RCRA imposes restrictions on where TSDFs

can be built. The location standards for building new TSDFs include restrictions on siting TSDFs in floodplains or earthquake-sensitive areas. Additionally, TSDF owners and operators may not place noncontainerized or bulk liquid hazardous waste in a salt dome, salt bed formation, or underground mine or cave. Congress has granted one exception to this rule: DOE's Waste Isolation Pilot Project (WIPP) in New Mexico.

PREPAREDNESS AND PREVENTION

The preparedness and prevention standards are intended to minimize and prevent emergency situations at TSDFs, such as a fire, an explosion, or any unplanned release of hazardous waste or hazardous waste constituents to the air, soil, or surface water. These regulations require maintenance and routine testing of emergency equipment, alarms, minimum aisle space (to accommodate movement of personnel and equipment during emergencies), and provisions for contacting local authorities (police, fire department, hospitals, and emergency response teams) involved in emergency responses at the facility.

CONTINGENCY PLANS AND EMERGENCY PROCEDURES

A TSDF must be prepared to respond to unavoidable emergencies. Contingency plans and emergency procedures provide the owner and operator with mechanisms to respond effectively to emergencies. The goal of these requirements is to minimize hazards resulting from fires, explosions, or any unplanned release of hazardous waste or constituents to air, soil, or surface water. To help guide these activities, the owner and operator must maintain a written contingency plan at the facility, and must carry out that plan immediately in the event of an emergency.

■ Contingency Plan

The contingency plan describes emergency response arrangements with local authorities and lists the names, addresses, and telephone numbers of all facility personnel qualified to work with local authorities as emergency coordinators. Where applicable, the plan might also include a list of emergency equipment and evacuation plans. If the owner and operator has already prepared an emergency or contingency plan in accordance with other regulations (e.g., the Spill Prevention, Control, and Countermeasures (SPCC) rules as discussed in Chapter VI, Legislative Framework for Addressing Hazardous Waste Problems), they can amend the existing plan to incorporate hazardous waste management provisions.

The contingency plan must be reviewed and amended when the applicable regulations or facility permits are revised, if the plan fails in an emergency, or when there are changes to the facility, the list of emergency coordinators, or the list of emergency equipment. A copy of the contingency plan (and any revisions) must be maintained at the facility and provided to all local authorities who may have to respond to emergencies.

■ Emergency Coordinator

The TSDF owner and operator must designate an emergency coordinator to guide emergency response activities. The emergency coordinator is responsible for assessing emergency situations and making decisions on how to respond. There must be at least one employee either on the facility premises or on call with the authority to commit the resources needed to carry out the contingency plan.

■ Emergency Procedures

During an emergency, measures must be taken to ensure that fires, explosions, and releases do not occur, recur, or spread. In the event of an imminent or actual emergency situation, the emergency coordinator must immediately activate internal facility alarms or communication systems and notify appropriate state and local authorities. If the coordinator determines that the emergency threatens human health or the environment outside of the facility and finds that evacuation of local areas may be advisable, the coordinator must notify appropriate authorities, and either the designated government official for the area or the National Response Center.

MANIFEST, RECORDKEEPING, AND REPORTING

To keep track of hazardous waste activities, TSDF owners and operators must keep records and make reports to EPA. The manifest system tracks each off-site shipment of hazardous waste. The operating record and biennial report detail facility and waste management over time.

■ Manifest

When a waste shipment is received from off site, the TSDF owner and operator must sign and date all copies of the manifest to verify that the waste has reached the appropriate designated facility. The TSDF must keep a copy for its records and send a copy to the generator within 30 days to verify that the waste has been accepted. If the off-site shipment originated in a foreign country, the TSDF owner and operator must send a copy of the signed and dated manifest to EPA in Washington, D.C. within 30 days of shipment delivery. If the owner and operator of a TSDF must send the waste to an additional TSDF for further treatment or disposal, they must initiate a new manifest.

A new manifest must also be used for rejected shipments or container residues that are forwarded to an additional TSDF or are returned to the actual generator. If, however, the TSDF rejects the entire waste shipment before the delivering transporter leaves the TSDF's facility, then the TSDF may use the original manifest.

■ Operating Record

To keep track of hazardous waste activity at the facility, the owner and operator is required to keep, until the facility closes, a written operating record on site describing all waste received; methods and dates of treatment, storage, and disposal; and the wastes' location within the facility. All information should be cross-referenced with the manifest number. Other information that the TSDF must keep in its operating record includes:

- Waste analysis results
- Details of emergencies requiring contingency plan implementation
- Inspection results (required to be kept for three years).

While most records may be kept in computer files, the TSDF owner and operator must keep original, signed copies of all manifests for inspection purposes. All records and plans must be available for inspection.

■ Biennial Report

To track hazardous waste activity nationwide, RCRA requires TSDFs to report to EPA the types and amounts of hazardous wastes generated, received, treated, stored, and disposed. TSDFs that generate hazardous waste through the course of on- site treatment, storage, or disposal must also describe waste minimization efforts taken to reduce the volume and toxicity of wastes generated, as well as describe the changes in volume or toxicity actually achieved, compared with those achieved in previous years. Reports are due to the EPA Regional Administrator on March 1 of each even-numbered year, and must detail the waste managed during the previous (odd-numbered) year. For example, the biennial report covering 2009 activities would be due March 1, 2010. Additionally, some states may require submission of such reports annually. Each owner and operator should consult their state agency for more specific biennial reporting information.

■ Import Notification

If a TSDF, or interim status TSDF, expects to receive hazardous waste from a foreign source, the TSDF owner or operator must notify the EPA Regional Administrator in writing at least four weeks prior to the date they would receive the first shipment. Subsequent shipments of the same waste from the same source would not require this notification.

■ Additional Reports

Other reports that must be supplied to the implementing agency include, but are not limited to, reports of releases, fires and explosions, ground water contamination and monitoring data, and facility closure information. Spills may also trigger reporting requirements under the Comprehensive

Environmental Response, Compensation, and Liability Act (CERCLA), the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Clean Water Act (CWA). (CERCLA and EPCRA are fully discussed in Chapter VI.)

STANDARDS FOR HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL UNITS

Hazardous waste managed at TSDFs may be treated, stored, or disposed of in several different types of units. In order to ensure that hazardous wastes are managed properly and in a safe manner, RCRA imposes design, construction, operation, maintenance, closure, and financial assurance requirements on hazardous waste management units.

Some of these units treat, store, or dispose of hazardous waste in or on the ground. Because these land-based units (i.e., land treatment units, landfills, surface impoundments, and waste piles) manage waste directly on the land, they have the potential to generate hazardous leachate that can pose a serious threat to soil, surface water, ground water, and human health and the environment.

To minimize the potential for leachate to threaten human health and the environment, EPA developed design and operating standards that use a combination of different technologies and good operating practices to detect, contain, and clean up any leaks that might occur.

Waste management has the potential to threaten air as well. In order to minimize the risks that hazardous waste management poses to air, RCRA includes standards to control air emissions from certain hazardous waste management operations and units.

■ Containers

Containers are one of the most commonly used and diverse forms of hazardous waste storage units. A container is any portable device in which a material is stored, transported, treated, or otherwise handled. Examples of hazardous waste containers include, but are not limited to: 55-gallon drums, large tanker trucks, railroad cars, small buckets, and test tubes. When EPA promulgated the unit-specific requirements for hazardous waste containers, the Agency emphasized that although mismanagement of containers has caused severe contamination in the past, relatively few regulations would be needed to ensure proper management. As a result, the container standards consist of very streamlined and basic management requirements.

Design Standards

Containers must be in good condition. Containers that are deteriorating (e.g., cracked, rusted, or leaking) cannot be used. Waste stored in defective containers must be transferred to containers in good condition or managed in another type of unit.

Operating Requirements

Containers holding hazardous waste must be kept closed, except when adding or removing waste, to prevent their contents from spilling. In addition, containers must not be handled, opened, or stored in a way that might cause them to leak.

Inspections

In order to ensure that containers are being managed in compliance with these regulations, owners and operators must visually inspect container storage areas periodically for leaking and deteriorating containers.

Release Prevention and Response

To further prevent releases of hazardous waste into the environment, containers holding liquid hazardous wastes at a permitted TSDF must have a secondary containment system. Secondary containment is emergency short-term storage designed to hold leaks from hazardous waste management units. An example of a secondary containment system for containers is a sloped concrete pad that drains leaked waste into a tank. The secondary containment system must be free of cracks, able to contain the spill, and emptied quickly. Containers at interim status facilities do not have secondary containment requirements.

Special Wastes

When handled improperly, some wastes can ignite or explode. To protect communities near the facility from these dangers, containers holding ignitable or reactive wastes must be located at least 50 feet from the facility's property line.

Other Requirements

In addition to the provisions above, containers storing or treating certain hazardous wastes are subject to RCRA air emission control requirements (as discussed later in this chapter). LQGs and SQGs accumulating waste in containers are subject to the interim status TSDF standards for these units. SQGs, however, are not subject to the air emission control requirements. (Generator requirements are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

■ Containment Buildings

A **containment building** is a completely enclosed self-supporting structure (i.e., with four walls, a roof, and a floor) used to store or treat noncontainerized waste. Containment buildings are generally used for the management of hazardous waste debris and other bulky and high volume hazardous wastes, but may be employed for the management of any nonliquid hazardous waste.

Design Standards

The design standards for containment buildings stress structural soundness and hazardous waste leak prevention. To ensure that a containment building meets these standards, a professional engineer must certify that the unit is designed and installed according to the following specifications:

- The containment building must be completely enclosed with four walls, a floor, and a roof.
- The walls, floor, and roof must be constructed of man-made materials with enough strength to withstand movement of wastes, personnel, and heavy equipment within the building.
- Dust control devices, such as air-lock doors or negative air pressure systems (that pull air into the containment building) must also be used as necessary to prevent hazardous waste dust from escaping through these building exits.
- All surfaces in the containment building that come into contact with wastes during treatment or storage must be chemically compatible with such wastes. Incompatible wastes that might cause unit failure cannot be placed in containment buildings.

If the containment building is used to manage hazardous waste with visible liquids, or if waste treatment being conducted in the building requires the addition of liquids to the waste, the owner and operator must equip the unit with the following:

- A primary barrier constructed of materials to prevent migration of the waste into the barrier
- A liquid collection system to minimize standing liquids in the containment building and to facilitate liquid removal
- A leak detection system located immediately beneath the floor to indicate any weakness in the floor and leaks of hazardous waste from the unit
- A secondary barrier, such as a liner, constructed around the unit to contain any leaks and to facilitate cleanup before they reach nearby soils, surface water, or ground water. As with the unit floor, the secondary barrier must be structurally sound and chemically resistant to wastes and liquids managed in the containment building.

Some containment buildings designate certain areas (known as wet areas) for the management of liquid-containing wastes. Such buildings only need secondary containment for these wet areas, provided that waste liquids cannot migrate to the dry areas of the containment building.

Operating Requirements

Containment building operating requirements focus primarily on maintenance and inspection of the unit, recordkeeping requirements, and provisions for response to releases of hazardous waste. Among other requirements, owners and operators must:

- Maintain the floor so that it is free of significant cracks, corrosion, or deterioration
- Repair or replace surface coatings or liners that are subject to wear from movement of waste, personnel, or equipment as often as needed
- Limit the height of wastes piled within the unit
- Maintain dust control devices at all openings to prevent emissions from the unit
- Provide a decontamination area within the containment building (e.g., an area for washing vehicles and equipment prior to leaving the building) to prevent the tracking of waste out of the unit.

Inspections

Containment buildings must be inspected at least once every seven days, with all activities and results recorded in the operating log. During inspection, the owner and operator should evaluate the unit's integrity and assess nearby soils and surface waters to detect any signs of waste release. For purposes of these inspections, the owner and operator should also consider information from monitoring or leak detection equipment.

Release Prevention and Response

If a release is discovered during an inspection or at any time, the owner and operator must take the leaking portion of the unit out of service and take all appropriate steps to repair the leak and contain the released waste. The owner and operator must also notify the EPA Regional Administrator of the release and of the proposed schedule for repair of the unit. Upon completion of all necessary repairs and cleanup, a qualified, registered, professional engineer must verify, to the EPA Regional Administrator, that the facility complied with the plan.

Other Requirements

LQGs accumulating waste in containment buildings are subject to the interim status TSDF standards for these units. (Generator requirements are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

■ Drip Pads

Drip pads are engineering structures consisting of a curbed, free-draining base, constructed of nonearthen materials, and designed to convey wood preservative chemical drippage from treated wood, precipitation, and surface water run-on to an associated collection system at wood preserving plants. In the wood preserving process, preservative solutions are commonly applied to wood products using a pressure treating process. Once the preservative solution has been applied to the wood, it is removed from the process unit and excess solution is allowed to drip from the wood onto drip pads. The pads collect the drippage (along with rainwater and surface water that has entered the pad) and convey it to a tank, container, or other such unit until the waste may be recycled, treated, or disposed of (see Figure III-10).

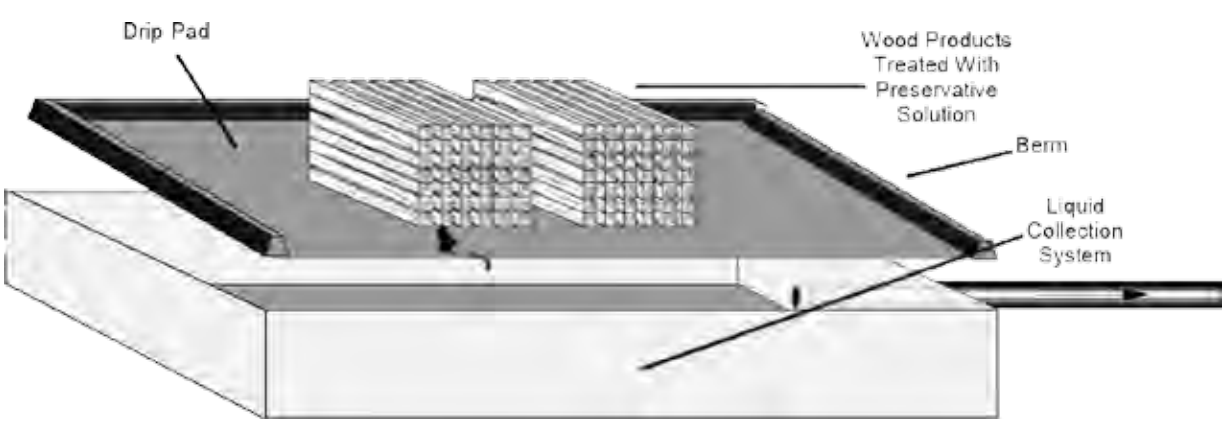
Design Standards

The various elements of a drip pad must be designed and constructed to handle the wastes managed on the unit and prevent those wastes from leaking into the environment.

Pad

The owner and operator of the drip pad must construct the pad of nonearthen materials (e.g., concrete or metal) and ensure that the pad is strong enough to prevent collapse, cracking, or other failure. The surface of the pad must have a raised barrier (called a berm) around the perimeter to prevent waste from running off the pad. It must be

Figure III-10: Cross-Section of a Drip Pad



sloped to help the drippage flow into the collection unit, and must either be treated with impermeable sealers, coatings, or covers to prevent liquid from seeping into the base, or have a liner with a leak detection and collection system.

Liquid Collection System

The liquid collection system must be designed to prevent overflow, allow facility personnel to easily remove waste from the unit, and comply with the hazardous waste tank standards. Where applicable, the liquid collection system must also be protected from rain water running into and out of the unit.

Liner and Leak Detection System

The liners and leak detection system for drip pads do not have specific technical design criteria, but must be structurally sound and chemically compatible with the preservative drippage, and must be able to signal releases from the drip pad at the earliest practicable time.

Operating Requirements

Generally, a drip pad must be free of cracks and show no signs of corrosion or other types of deterioration. Drip pads must be cleaned frequently to allow for inspections of the entire drip pad surface without interference from accumulated wastes and residues. In addition to occasional cleaning, drippage and precipitation from the liquid collection system must be emptied as often as necessary to prevent the waste from flowing over the curb around the unit. All collection tanks must also be emptied as soon as possible after storms to ensure that they do not overflow back onto the pad. Lastly, owners and operators must minimize the tracking of hazardous waste by personnel and vehicles.

Inspections

Drip pads must be inspected weekly and after storms to ensure that the pad and the liquid collection systems are functioning properly and to check for deterioration of or leaks from the units. If, upon inspection, a drip pad shows any deterioration, the owner and operator must take the affected portion of the unit out of service for repairs before returning it to service.

Other Requirements

LQGs accumulating waste on drip pads are subject to the interim status TSDF standards for these units. (Generator requirements are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators).

■ Land Treatment Units

Land treatment units, or land farms, are seldom-used land disposal units. Land treatment involves the application of waste on the soil surface, or the incorporation of waste into the upper layers of the soil in order to degrade, transform, or immobilize hazardous constituents present in hazardous waste. The waste is placed in the portion of the surface soil above the water table (or the highest point of the ground water flow) to let the soil microbes and sunlight degrade the hazardous waste. The design and operating requirements for land treatment units are quite different from other waste management units because they utilize biodegradation as a method of hazardous waste treatment, thus necessitating certain operating and waste management conditions.

Design Standards

Land treatment units must be equipped with run-on, run-off, and wind dispersion controls. Run-on and run-off controls prevent rain water and other liquids from running onto the unit (and creating leachate) and stop this leachate from running off the unit, thus carrying contaminants into surrounding soils, surface waters, and ground water. Wind dispersal controls prevent wind gusts from blowing small particles of hazardous waste off a land treatment unit into the air and surrounding soils and surface water. To prevent wind dispersal, owners and operators of land treatment units must apply a wind dispersal control, such as a cover, to the unit.

Operating Requirements

The operating requirements for land treatment units are intended to promote and maintain the biodegradation of hazardous wastes placed in the unit. Maintenance of proper soil pH, careful management of waste application rate, and control of surface water run-off are all key to the

operation of a land treatment unit. The operation requirements include:

- Controls on the rate and method of waste application
- Measures to control soil acidity
- Measures to enhance microbial and chemical reactions
- Measures to control the moisture content of the area where wastes are treated.

Treatment Program and Demonstration

In order to guarantee that these waste treatment practices will be conducted to properly degrade the waste, owners and operators of land treatment units must design a treatment program that takes into account the characteristics of the site and the wastes to be handled. The owner and operator must then demonstrate to EPA the effectiveness of this program. A treatment demonstration may involve field testing on a sample soil plot or laboratory testing. Interim status land treatment units are not required to establish a treatment program, but owners and operators can only place hazardous waste in the land treatment unit if the waste will be rendered nonhazardous or less hazardous.

Food Chain Crops

In some cases, an owner and operator may grow food-chain crops (crops grown for human consumption) in a land treatment unit. The Agency believes that this can be done safely if the owner and operator can demonstrate that hazardous constituents are not present in the crop in abnormally high levels. Additionally, if cadmium is present in the unit, the owner and operator must comply with additional management standards.

Inspections

The owner and operator must inspect the treatment area weekly and after storms to ensure that the unit is in compliance with the operating criteria. In addition, the owner and operator must establish a soil monitoring program. If there is significant evidence that the wastes in the unit are not responding to treatment and are sinking towards the water table, the owner and operator must notify the EPA Regional Administrator within seven days and modify the treatment program to ensure the sufficient treatment of hazardous constituents within the treatment zone.

Special Wastes

Certain types of hazardous wastes pose such a threat to human health and the environment that their management requires additional regulatory precautions. Considering the risks associated with the treatment, storage, and disposal of certain dioxin-containing hazardous wastes (F020, F021, F022, F023, F026, and F027), the RCRA regulations restrict the management of these wastes in land treatment units. As a result, owners and operators can only manage these wastes in a permitted land treatment unit in accordance with a special management plan approved by the EPA Regional Administrator. These wastes may not be handled in interim status land treatment units because these units do not meet the strict construction standards and, thus, may not be sufficiently protective.

■ Landfills

A **landfill** is a disposal unit where nonliquid hazardous waste is placed in or on the land. Landfills are the final disposal site, the ultimate grave, for a significant portion of the hazardous waste that is generated in the United States.

Design Standards

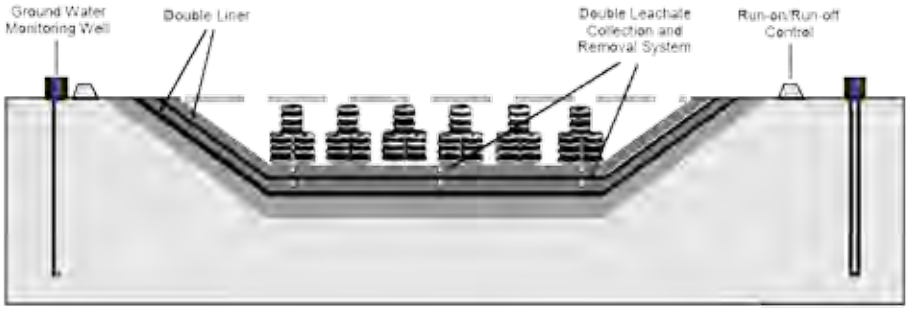
To minimize the potential for leachate to leak from a landfill, EPA developed the following design standards (see Figure III-11):

- Double liner
- Double leachate collection and removal system
- Leak detection system
- Run-on, run-off, and wind dispersal controls
- Construction quality assurance.

Double Liner

The double liner system has two components: a top liner and a composite bottom liner. The top liner, usually a synthetic material, keeps the liquid waste in the unit and prevents migration of hazardous leachate and waste into the liner. The composite bottom liner, consisting of a synthetic liner (made

Figure III-11: Cross-Section of a Landfill



of a special kind of plastic) on top of three feet of compacted soil material, is designed to prevent any liquids that have leaked through the top liner from reaching underlying soils and ground water.

Double Leachate Collection and Removal System

Landfills must also be equipped with two leachate collection and removal systems. The first rests on the top liner, and the second between the top liner and the bottom composite liner. The top system collects any leachate that has filtered down through the waste in the unit and pumps it out to a collection tank, where it may be collected and disposed. The bottom system collects any leachate that has leaked through the top liner and similarly pumps it out to a collection tank, where it may similarly be collected and disposed.

Leak Detection System

While the lower leachate collection and removal system will continually remove the small amounts of liquid that might seep through the top liner, it may not be capable of handling a larger leak. Larger leaks can apply strong pressure on the bottom liner, potentially causing it to fail. To avoid this problem, RCRA requires that a leak detection system be installed within the leachate collection and removal system. This system must be able to detect when the flow rate into the leachate collection and removal system is above a normal operating range, and warn the owner and operator that the top liner may be leaking.

Run-On, Run-Off, and Wind Dispersal Controls

The run-on, run-off, and wind dispersal requirements are identical to those for land treatment units.

Construction Quality Assurance

None of these technologies are effective if the landfill is installed improperly or constructed of inferior materials. To ensure that a landfill meets all the technological requirements, EPA requires a **construction quality assurance** program. The program mandates a construction quality assurance plan that identifies how construction materials and their installation will be monitored and tested and how the results will be documented. The program must be developed and implemented under the direction of a registered professional engineer, who must also certify that the construction quality assurance plan has been successfully carried out and that the unit meets all specifications before any waste is placed into the unit.

Operating Requirements

In order to prevent the formation and migration of leachate in landfills, owners and operators may not place liquid hazardous wastes in a landfill, unless the wastes are in:

- Very small containers, such as ampules
- Containers, such as batteries, that contain small amounts of liquid for purposes other than storage
- **Lab packs** which consist of drums filled with many small containers packed in nonbiodegradable absorbent materials.

Owners and operators may add nonbiodegradable absorbents to containers of liquid hazardous waste to remove any visible liquids. After all visible liquids have been removed, the owner and operator may then place the waste in a landfill.

Inspections

To ensure that the liners and leachate collection and removal systems are working properly, landfill owners and operators must:

- Inspect liners for any problems after construction or installation and continue inspections weekly and after storms to monitor for evidence of deterioration or damage
- Monitor leachate collection and removal system sumps at least weekly to measure the amount of liquid in the sumps and determine whether the upper liner might be leaking. This is designed to verify both the integrity of the liner and the efficiency of the leachate pump. If the level indicates a substantial leak, the owner and operator must notify EPA and respond in accordance with the facility's response action plan.

Release Prevention and Response

In order to prepare for a leak from a landfill, RCRA requires that owners and operators of hazardous waste landfills develop a response action plan. The response action plan outlines the short- and long-term actions to be taken in the event of a leak. A short-term action might involve shutting off the flow of hazardous waste into the landfill. A long-term action might involve emptying the unit and repairing or replacing the damaged liner or leachate collection and removal systems. As part of the plan, in the event of a leak, the owner and operator must notify the EPA Regional Administrator, determine what short-term actions must be taken, determine the location, size, and cause of any leak, and report the findings to the EPA regional office.

Special Wastes

Similar to land treatment units, permitted landfills can only treat, store, or dispose of certain dioxin-containing hazardous wastes (F020, F021, F022, F023, F026, and F027) if the unit has a special management plan approved by the EPA Regional Administrator. These wastes cannot be managed in interim status landfills.

Special Requirements for Certain Containers in Landfills

Over time, the hazardous waste containers placed in a landfill will decompose and collapse, creating air pockets under the landfill cover. When the wastes surrounding the container settle to fill the void, the liner may also settle. Such settling may cause the liner to stretch or tear. To prevent significant voids that could cause collapse of final covers and tearing of liners when containers erode and to maintain and extend available capacity in hazardous waste landfills, containers placed in a landfill must either be:

- At least 90 percent full

  or

- Crushed, shredded, or in some other way reduced in volume (unless they are very small containers, such as ampules).

■ Surface Impoundments

A **surface impoundment** is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it must be lined with man-made materials) that is used to treat, store, or dispose of liquid hazardous waste. Examples include holding ponds, storage pits, and settling lagoons.

Design Standards

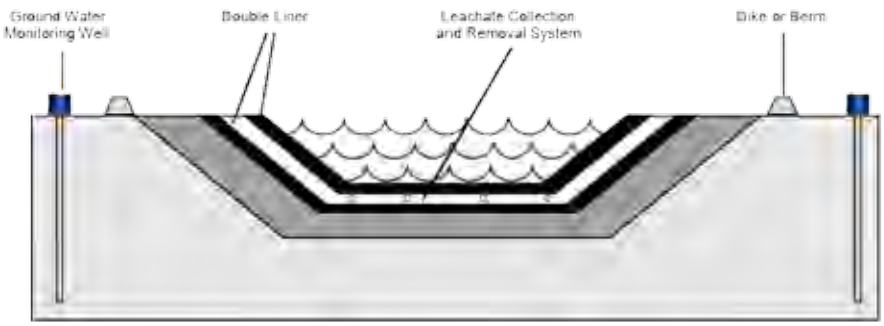
To minimize the potential for leachate to leak from a surface impoundment, EPA developed the following design standards (see Figure III-12):

- Double liner
- Leachate collection and removal system
- Leak detection system
- Dikes, berms, and freeboard
- Construction quality assurance.

Double Liner

The double liner system requirements are identical to those for hazardous waste landfills.

Figure III-12: Cross-Section of a Surface Impoundment



Leachate Collection and Removal System

The unit must be equipped with a leachate collection and removal system between the top liner and the bottom composite liner. The system collects any leachate that has leaked through the top liner and pumps it out to a collection tank. The system features a pump system and drainage layers to slow the flow of the leak. The system must be designed with a minimum bottom slope to help drainage, be made of materials that will not chemically react with the wastes placed in the unit, and be able to remove the liquids at a specified minimum rate.

Leak Detection System

The leak detection system requirements are identical to those for hazardous waste landfills.

Dikes, Berms, and Freeboard

A surface impoundment must also be designed to prevent the flow of liquids over the top of an impoundment (overtopping). This is accomplished by constructing and maintaining dikes or berms (walls or man-made hills surrounding the unit) and ensuring a minimum distance (called freeboard) between the surface of the waste and the top of the impoundment to prevent overflow during high winds or rainstorms.

Construction Quality Assurance

The construction quality assurance program requirements are identical to those for hazardous waste landfills.

Inspections

To ensure that the liners and leachate collection and removal system are working properly, owners and operators of hazardous waste surface impoundments must:

- Inspect liners and dikes or berms for any problems after construction or installation, and continue inspections weekly and after storms to monitor for evidence of deterioration, sudden drops in the level of the impoundment contents, and severe erosions of dikes and other containment devices
- Monitor leachate collection and removal system sumps at least weekly to measure the amount of liquid in the sump and determine whether the upper liner might be leaking. This is designed to verify both the integrity of the liner and the efficiency of the leachate pump. If the level indicates a substantial leak, the owner and operator must notify EPA and respond in accordance with the facility's response action plan.

Release Prevention and Response

The release prevention and response requirements are identical to those for hazardous waste landfills.

Special Wastes

Similar to land treatment units and landfills, permitted surface impoundments can only treat, store, or dispose of certain dioxin-containing hazardous wastes (F020, F021, F022, F023, F026,

and F027) if the unit has a special management plan approved by the EPA Regional Administrator. These wastes cannot be managed in interim status surface impoundments.

Other Requirements

Other surface impoundment requirements include retrofitting provisions and air emissions requirements.

Surface Impoundment Retrofitting

Surface impoundments handling nonhazardous wastes are not subject to these extensive hazardous waste surface impoundment design and operating requirements. However, such impoundments may become subject to RCRA if the waste being handled in the unit becomes a hazardous waste as a result of a new hazardous waste listing or characteristic. In these cases, the owner and operator of the impoundment must retrofit the unit to meet the standards described above, or cease receipt of the hazardous waste and begin the closure process. Owners and operators have four years from the day that the listing or characteristic is finalized (in the *Federal Register*) to retrofit or close. For example, owners and operators of surface impoundments that became subject to RCRA as the result of the promulgation of the toxicity characteristic waste codes on March 29, 1990, were required to retrofit those units to meet the design and operating standards, or cease receipt of hazardous waste and begin closure by March 29, 1994.

These retrofitting requirements may be waived by the implementing agency under special circumstances. The impoundment must be designed, operated, and located in such a manner that there will be no migration of hazardous constituents into ground water or surface water at any time. Furthermore, the impoundment may contain only characteristic TC wastes. The implementing agency will determine on a site-specific basis whether a waiver from the retrofitting requirement is protective of human health and the environment.

Air Emissions

In addition to these requirements, surface impoundments storing, treating, or disposing of certain hazardous wastes are subject to RCRA air emission control requirements (as discussed later in this chapter).

■ Tanks

Tanks are stationary devices (as opposed to portable containers) used to store or treat hazardous waste. They are widely used for storage or accumulation of hazardous waste because they can accommodate huge volumes of material, sometimes in the tens of thousands of gallons. Tanks are used for the treatment of hazardous waste because of their structural strength and versatility. In order to ensure that a tank system can hold hazardous waste for its intended lifetime, a TSDF owner and operator must ensure that the tank is properly designed. RCRA requires that the tank system or components be designed with an adequate foundation, structural support, and protection from corrosion to prevent it from collapsing or leaking. In order to ensure that a tank is properly designed, an independent, qualified, registered, professional engineer must certify that the unit meets these requirements.

Design Standards

Hazardous waste tanks must be installed properly and designed to protect against corrosion.

Installation

Because even the most flawlessly designed tanks can fail if installed improperly, new tank systems must be inspected by an independent qualified expert prior to use to ensure that the tank was not damaged during installation. The owner and operator must repair any damage before the installation is complete or the system is in use. All new tanks and ancillary equipment must be tested to make sure that there are no leaks, and any leaks discovered must be fixed before the tanks are covered, enclosed, or placed in use.

Corrosion Protection

When metal tanks are in contact with soil or water, they can corrode and leak. To prevent leaks from corroded tanks, RCRA requires tanks made wholly or partly of metal to be designed and installed with adequate corrosion protection. To ensure that a tank is properly protected, an owner and operator must develop a written design plan. The design should

take into account information specific to the site, such as soil moisture and acidity, that can affect the corrosion rate of the tank. The unit must have one or more of the following corrosion protection methods:

- Construction materials that are corrosion-resistant (e.g., fiberglass)
- Corrosion-resistant coating in combination with cathodic protection (cathodic protection prevents tanks from corroding by reversing the naturally occurring electric current in the ground that can degrade tank walls)
- Electrical isolation devices.

Existing tanks do not have to meet these requirements because of the high cost of installing corrosion protection on tanks that are already in the ground. However, owners and operators of existing tanks must assess the structural integrity of the units to ensure that they are designed and maintained to contain the wastes stored or treated within them without failing, collapsing, or rupturing. Such assessments must be certified by an independent, qualified, registered, professional engineer.

Operating Requirements

Hazardous waste tanks must be operated in a manner that minimizes or eliminates releases. Chemicals that may cause any part of the tank's system to fail may not be placed in the unit.

Because the loading or filling of tanks brings the potential for spills or releases of waste into the environment, such spills or overflows from the tank system must also be prevented by using, at a minimum:

- Spill prevention controls, such as valves designed to prevent the backflow of waste while a tank is being filled
- Overfill prevention controls, such as alarms that sound when the waste level in the tank gets too high, and valve systems that automatically close when overfill is likely
- Sufficient room within an uncovered tank between the surface of the waste and the top of the tank (minimum freeboard).

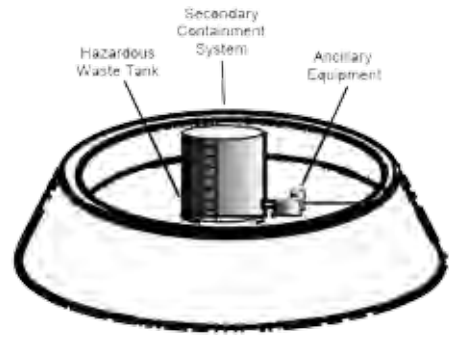
Inspections

To verify that hazardous waste tanks and components are operated and maintained in satisfactory condition, owners and operators must inspect their tanks daily. To meet these objectives, inspections must thoroughly identify leaks, deterioration, corrosion, or structural fatigue in any portion of the tank or system components. In addition to visual inspections, owners and operators must also take into account any data received from leak detection monitors and other tests.

Release Prevention and Response

The release response requirements require leak detection systems to detect leaks, and secondary containment devices to contain any leaks that might occur from the tank or ancillary equipment (see Figure III-13). All new hazardous waste tank systems must have leak detection and secondary containment before being placed in service. Existing systems must be equipped with secondary containment by different deadlines, based on a phased-in schedule determined by the age of the tank.

Figure III-13: Secondary Containment for Tanks



Leak Detection

Hazardous waste tanks must be equipped with a leak detection system. The leak detection system must be able to detect failure in either the main tank or secondary containment system generally within 24 hours. Thermal conductivity sensors, electrical resistivity sensors, and vapor detectors are commonly used leak detection devices. Daily visual inspections may also be used where tanks and tank components are physically accessible.

Secondary Containment

To make sure the tank system will perform properly, secondary containment systems must be designed, installed, and operated to ensure that:

- No waste is released to the surrounding soil, ground water, or surface water
- Construction materials or liners are compatible with the waste to be stored or treated in the tank
- The tank is capable of containing accumulated material until it is promptly removed (generally within 24 hours)
- The tank has sufficient structural strength to prevent failure
- The foundation can resist failure due to normal movement of the surrounding soils (settlement, compression, or uplift).

Owners and operators must meet these requirements by using one of the following secondary containment devices:

- An external liner that completely surrounds the unit with an impermeable material
- A vault (the tank rests in an underground chamber usually constructed with concrete floors and walls and an impermeable cover)
- A double-walled tank (the tank is completely enclosed inside another tank with a leak detection monitoring system installed between the two)
- An EPA-approved alternative design.

In addition to the tank itself, all ancillary equipment (e.g., pipes, valves, trenches connected to the tank or tank system) must have full secondary containment. Examples of secondary containment for ancillary equipment include lined trenches, and jacketed or double-walled piping. When inspected daily, however, the following equipment is exempt from this requirement:

- Aboveground piping (not including flanges, joints, valves, and connections)
- Welded flanges, welded joints, and welded connections
- Seal-less or magnetic coupling pumps
- Aboveground pressurized piping systems with automatic shut-off devices.

Despite these precautions, occasionally a tank system or secondary containment system will leak or spill hazardous waste. When this happens, the owner and operator must immediately take the tank out of operation and determine the cause of the release. To prevent the spill from moving further away from the tank, the owner and operator must also remove and properly dispose of any contaminated soil, ground water, or surface water. In addition, the owner and operator must notify the EPA Regional Administrator or National Response Center, and submit a follow-up written report to the EPA Regional Administrator within 30 days. The tank must then either be repaired or closed.

Other Requirements

In addition to these requirements, tanks storing or treating certain hazardous wastes are also subject to RCRA air emission control requirements (as discussed later in this chapter). LQGs and SQGs accumulating waste on site in tanks are subject to the interim status TSDF standards for these units. (Generator requirements are fully discussed in Chapter III, Regulations Governing Hazardous Waste Generators). SQGs, however, are not subject to the air emission control requirements.

■ Waste Piles

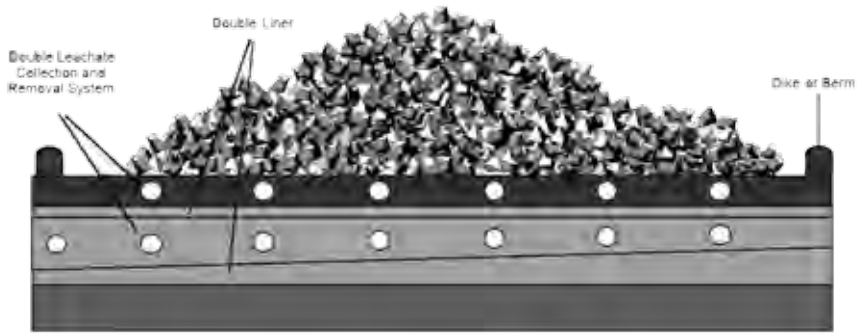
A **waste pile** is an open pile used for treating or storing nonliquid hazardous waste. The standards for these units are very similar to those for landfills, but the difference is that waste piles may be used for temporary storage and treatment only, not disposal.

Design Standards

To minimize the potential for leachate to leak from a waste pile, EPA developed the following design standards (see Figure III-14):

- Double liner
- Double leachate collection and removal system
- Leak detection system
- Run-on, run-off, and wind dispersal controls
- Construction quality assurance.

Figure III-14: Cross-Section of a Waste Pile



Double Liner

The double liner system requirements are identical to those for hazardous waste landfills and surface impoundments.

Double Leachate Collection and Removal System

The double leachate collection and removal system requirements are identical to those for hazardous waste landfills.

Leak Detection System

The leak detection system requirements are identical to those for hazardous waste landfills and surface impoundments.

Run-On, Run-Off, and Wind Dispersal Controls

The run-on, run-off, and wind dispersal control requirements for permitted waste piles are identical to those for hazardous waste landfills. However, interim status waste piles are not subject to the storm water controls, but are subject to wind dispersal controls.

Construction Quality Assurance

The construction quality assurance program requirements are identical to those for hazardous waste landfills and surface impoundments.

Operating Requirements

Under no circumstances can an owner and operator place liquid hazardous waste in a waste pile.

Inspections

The liner and leachate collection and removal system inspection requirements are identical to those for hazardous waste landfills.

Release Prevention and Response

The release prevention and response requirements are identical to those for hazardous waste landfills.

Special Wastes

Similar to land treatment units, landfills, and surface impoundments, permitted waste piles can only treat, store, or dispose of certain dioxin-containing hazardous wastes (F020, F021, F022, F023, F026, and F027) if the unit has a special management plan approved by the EPA Regional Administrator. These wastes cannot be managed in interim status waste piles.

Other Requirements

Owners and operators of permitted waste piles that are located indoors and meet special requirements are subject to reduced regulation. Specifically, the waste pile must:

- Be located inside or under a structure
- Not receive liquid wastes
- Be protected from surface water run-on
- Be designed and operated to control dispersal of waste
- Be managed to prevent the generation of leachate.

If these standards are met, the owner and operator of the permitted waste pile is exempt from ground water monitoring requirements as well as the design and operation requirements for waste piles. RCRA provides this exemption because when properly designed and maintained, indoor waste piles can prevent hazardous leachate from forming or leaking into the environment.

■ Miscellaneous Units

When RCRA was enacted in 1976, there was a diverse universe of hazardous waste management units in existence. Some of these units did not fit the definition of any of the typical hazardous waste management practices described earlier in this chapter. These include physical, chemical, and biological treatment units; thermal treatment units; and underground injection control (UIC) wells. As a result, EPA established interim status standards for these units. When EPA established final permitted TSDF standards for all hazardous waste management units, the Agency did not establish final standards for physical, chemical, and biological treatment units or thermal treatment units, but rather grouped them together and permitted them as miscellaneous units. EPA did not include UIC wells in this miscellaneous unit category because such wells were later addressed under SDWA.

At present, all new hazardous waste management units that do not fit the definition of one of the types of units discussed earlier in this chapter or an incinerator or boiler and industrial furnace (BIF) (as discussed in Chapter III, Hazardous Waste Combustion) are permitted as miscellaneous units. This section of the chapter will present the management standards for such units. For historical purposes, this section of the chapter will also present the interim status standards for physical, chemical, and biological treatment units; thermal treatment units; and UIC wells.

Because the standards for miscellaneous units address treatment, storage, and disposal processes that are not addressed by other unit-specific standards, the following management standards consist of general operating requirements that may be modified and amended based on site-specific considerations.

Permitted Miscellaneous Units

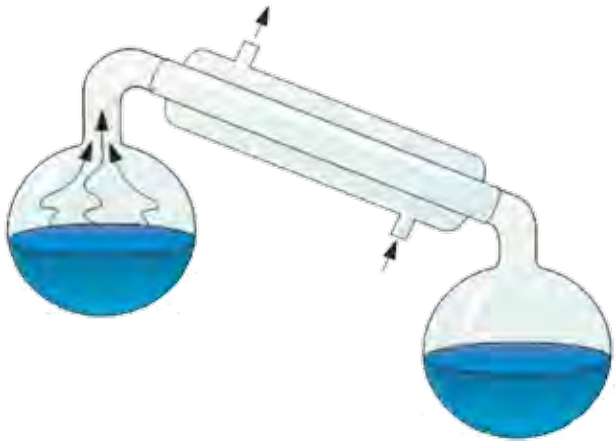
Since some TSDFs treat, store, or dispose of waste in units that are different from the previously described hazardous waste management units, RCRA established broad and protective management provisions for miscellaneous units to allow for the use of new and innovative waste management technologies. The RCRA standards are designed to give the implementing agency the flexibility to tailor permit standards, on a case-by-case basis, to these unique waste management practices.

Miscellaneous units are defined as treatment, storage, or disposal units other than:

- Containers, containment buildings, drip pads, land treatment units, landfills, surface impoundments, tanks, or waste piles (as discussed earlier in this chapter)
- Incinerators or BIFs (as discussed in Chapter III, Hazardous Waste Combustion)
- Corrective action management units (CAMUs) (as discussed in Chapter III, Corrective Action to Cleanup Hazardous Waste Contamination)
- Units permitted for research, development, and demonstration (RD&D) (as discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities)
- UIC wells.

Miscellaneous units may include, but are not limited to:

- Geologic repositories (e.g., underground caves)
- Deactivated missile silos
- Thermal treatment units



- Units for the open burning or detonation of waste explosives
- Chemical, physical, or biological treatment units.

Since miscellaneous units are subject to site-specific design and operating requirements, RCRA requires that owners and operators applying for a permit provide the implementing agency with detailed information on unit design and potential environmental impacts. The owner and operator must provide detailed plans and engineering reports describing the unit location, design, construction, operation, maintenance, monitoring plans, and inspection plans.

Owners and operators must also provide detailed information on the potential pathways of human or environmental exposure to hazardous waste or hazardous constituents. Under these provisions, owners and operators must evaluate the potential magnitude and nature of potential human and environmental exposure to air, surface water (including wetlands), ground water, and soil. Owner and operators of miscellaneous units are required to conduct monitoring, testing, data analysis, inspections, and response actions (if necessary) in order to ensure that the unit is in compliance with its general performance standards, and that waste management has not threatened any of these environmental mediums.

Interim Status Chemical, Physical, and Biological Treatment Units

When RCRA was first enacted in 1976, some of the diverse hazardous waste management units in existence were chemical, physical, and biological treatment units. Such units employed unique treatment processes, such as distillation, centrifugation, reverse osmosis, ion exchange, and filtration. The Agency established interim status standards for such units to address the safe containment of hazardous waste, hazardous waste constituents, and treatment by-products.

The operating standards for these units require that:

- Waste is compatible with treatment equipment
- Ignitable and reactive wastes are decharacterized immediately before or after placement in the treatment process or equipment
- Waste analysis and trial treatment tests verify that treatment will meet applicable requirements
- Owners and operators inspect discharge control, safety, and monitoring equipment daily; and inspect construction materials of treatment processes and confinement structures weekly.

Interim Status Thermal Treatment Units

After the enactment of RCRA, another set of diverse hazardous waste management units in existence were thermal treatment units. EPA established interim status standards for these units to allow for the development of alternative treatment processes in units that did not meet the definition of an incinerator or BIF (as discussed in Chapter III, Hazardous Waste Combustion).

Thermal treatment is defined as the treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste. Thermal treatment units include carbon regeneration units and other devices employing processes, such as molten salt pyrolysis, calcination, wet-air oxidation, and microwave destruction.

The operating standards for these units require:

- The establishment of steady, normal conditions of operation or readiness
- Waste analysis to determine the heating value of the waste, and concentrations of halogens, sulfur, lead, and mercury
- Monitoring and inspections of temperature and emission-control instruments, the stack plume, and all process and ancillary equipment.

The implementing agency also has the flexibility to develop standards for these units on a case-by-case basis when considering the technology-specific data submitted by the applicant. It is probable that the regulations for specific thermal treatment units will reference the incinerator, boiler, and industrial furnace standards due to the similarities between the units.

Interim Status Underground Injection Control Wells

Underground injection control wells are units into which hazardous waste is permanently disposed

of by injection 1/4 mile below an aquifer with an underground source of drinking water (as defined under SDWA). EPA originally intended to regulate UIC wells disposing of hazardous waste under SDWA. At the inception of the RCRA program, however, many states did not yet have a SDWA-approved UIC program. As a result, EPA imposed RCRA requirements on such units until states gained SDWA approval for their UIC programs. Because UIC wells were not addressed by the unit-specific hazardous waste management standards, RCRA initially regulated such UIC wells as interim status units. These standards required UIC wells to comply with interim status general facility standards, with the exception of closure and financial assurance.

After states gained SDWA approval for their UIC programs, such wells became regulated jointly by SDWA and RCRA. SDWA regulates the design, operating, and closure standards for the well itself, while RCRA regulates any other hazardous waste-related activities at that facility up until the point of injection. While such wells are no longer subject to RCRA interim status standards, they would need a RCRA permit-by-rule, requiring compliance with only certain RCRA administrative requirements.

As an alternative to receiving a SDWA UIC well permit (accompanied by a RCRA permit-by-rule), UIC well owners and operators could also choose to apply for a full RCRA permit as a miscellaneous unit.

CLOSURE

All hazardous waste TSDFs will eventually stop receiving waste for treatment, storage, or disposal. After these facilities are closed, the owner and operator must either remove all waste that has accumulated in units at the facility, or leave the waste in place while maintaining the units in a way that ensures they will not pose a future threat to human health and the environment. RCRA Subtitle C's closure and post-closure standards are designed to achieve this goal.

The closure and post-closure regulations are divided into two parts: the general standards applicable to all TSDFs, and the technical standards for specific types of hazardous waste management units. These combined requirements ensure that a specific unit or facility will not pose a future threat to human health or the environment after a TSDF closes. This discussion will focus on the general closure standards applicable to all TSDFs.

■ Closure Requirements

Closure is the period directly after a TSDF stops its normal operations. During this period, a TSDF stops accepting hazardous waste; completes treatment, storage, and disposal of any wastes left on site; and disposes or decontaminates equipment, structures, and soils. Some owners and operators will completely remove all waste that was treated, stored, or disposed in their unit. This operation is known as **clean closure**. In order to demonstrate clean closure, an owner and operator must show that levels of hazardous contaminants at the facility do not exceed EPA-recommended exposure levels.

Closure Plan

To ensure that a TSDF is closed properly, the owner and operator must prepare a closure plan that details exactly how and when facility closure will take place, and must submit the plan to their implementing agency for approval. Permitted facilities are required to submit a closure plan to their implementing agency at the time of permit application. The approved closure plan then becomes an enforceable component of their permit. Interim status facilities must have a written closure plan on the premises six months after they become subject to RCRA. The closure plan must contain:

- A description of how the owner and operator will close each hazardous waste management unit
- A description of how and when the owner and operator will achieve final closure of the whole facility
- An estimate of the maximum amount of hazardous waste kept on site over the life of the facility
- A detailed description of closure methods, including the actions necessary to remove and manage waste and decontaminate the site
- A description of any other steps necessary to comply with the closure standards, such as

ground water monitoring or leachate collection (depending on the type of unit).

When there is a change in the design or operation of the facility, a change in the expected closure date, or an unexpected event (e.g., discovering more contaminated soil than originally anticipated), the owner and operator or the implementing agency must amend the closure plan to address the additional steps necessary to safely close the facility. In such instances, permitted facilities must submit an application to modify their permit, while interim status facilities must submit the proposed modification to the implementing agency for approval.

Closure Timetable

To ensure that facility closure is begun and completed in a timely manner, the closure regulations establish specific timetables for the initiation and completion of closure activities (see Figure III-15). An owner and operator of a closing TSDF must:

- Notify the implementing agency that they expect to begin closure activities (notification must take place at least 60 days before for surface impoundments, landfills, waste piles, and land treatment units, and at least 45 days before for all other units)
- Begin closure activities within 30 days of receiving the final shipment of hazardous waste
- Remove all hazardous wastes from the TSDF or dispose of the wastes on site within 90 days of beginning closure
- Complete all closure activities within 180 days of beginning closure
- Certify that closure has been completed in accordance with the specifications in the approved closure plan within 60 days of completing closure. The certification must be signed by the owner and operator and by an independent, registered, professional engineer.

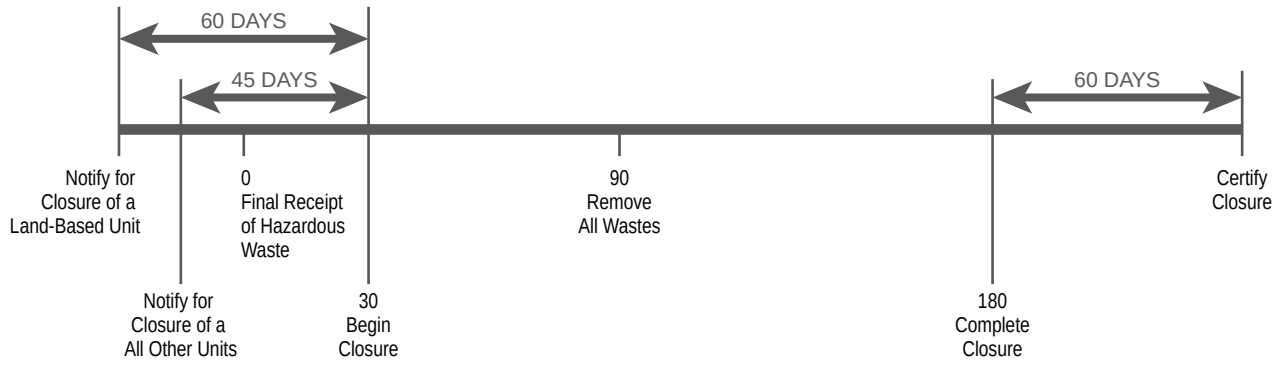
The implementing agency may grant extensions, if required closure activities will take more time, or if the facility or unit has the capacity to accept more hazardous or nonhazardous waste.

During closure, all contaminated equipment, structures, and soils must be properly disposed or decontaminated. During this process, an owner and operator may become a generator of hazardous waste and must, therefore, comply with the generator requirements.

Delay of Closure

The closure timetable is designed to guarantee that closure is completed as soon as practicable after the final receipt of hazardous waste in order to minimize risks posed to human health and the environment. On the other hand, owners and operators of landfills, surface impoundments, and land treatment units may have room to accept nonhazardous waste at the time of closure. To enable these TSDFs to continue operation, RCRA allows these facilities to delay closure of such units. This delay is not available to any other units. Those units for which owners and operators choose to delay closure are still subject to all applicable RCRA hazardous waste requirements and must meet special requirements designed to

Figure III-15: Timetable of Closure Activities



ensure that the disposal of both the nonhazardous and hazardous waste will in no way endanger human health and the environment.

Survey Plat

After a TSDF ceases hazardous waste activity and closes all units, it still may be important to know exactly where hazardous wastes were handled (especially for purposes of future sale of the property). To preserve this information, the owner and operator must submit to the implementing agency or local zoning authority a survey plat indicating the location and dimensions of the closed hazardous waste units. The survey plat must be submitted no later than the submission of certification of closure for each hazardous waste disposal unit.

■ Post-Closure Requirements

Some TSDFs are intended for the final disposal of hazardous waste. Land treatment units, landfills, and surface impoundments are the only units where an owner and operator may permanently dispose of hazardous waste. Because such permanent land disposal brings the potential for releases from the unit over a long-term period, these owners and operators must conduct post-closure monitoring and maintenance activities. Other TSDFs may not be able to remove all hazardous wastes and decontaminate all equipment. Since these owners and operators cannot clean close, they must close such units as landfills and comply with the post-closure requirements for landfills.

Post-closure is the period after closure during which owners and operators conduct monitoring and maintenance activities to preserve the integrity of the disposal system and continue to prevent or control releases from the disposal units. Post-closure care consists of two primary responsibilities: ground water monitoring and maintaining the waste containment system (e.g., covers, caps, and liners). Such activities include:

- Maintaining the final cover, the leak detection system, and the ground water monitoring systems
- Providing long-term protection from liquids migrating into the closed unit, promoting drainage of liquid, and accommodating settling of waste in the unit
- Making sure that the final cover, liners, or other containment or monitoring systems are not disturbed
- Monitoring ground water to detect any releases of hazardous constituents.

The post-closure period normally lasts for 30 years after closure is completed, but may be either extended or shortened by the EPA Regional Administrator.

Post-Closure Plan

In order to ensure that the post-closure care of the facility is properly carried out, the owner and operator must design and implement a post-closure plan. The owner and operator must submit the plan with the post-closure permit application. The plan must include:

- A description of planned ground water monitoring activities
- A description of planned maintenance activities
- The name, address, and telephone number of the facility contact person or office.

Post-Closure Notices

As with the survey plat for closure, owners and operators of TSDFs required to perform post-closure activities must, within 60 days after the facility originally certified closure, provide the local zoning or land use authority and the EPA Regional Administrator with a record of the type, location, and quantity of hazardous wastes in each disposal unit at the facility. Also, a notice must be placed in the property deed and recorded. This notice must state that the land was used for hazardous waste management, that the use of the land is restricted, and that the survey plat and record of closure were submitted to the local zoning authority and the EPA Regional Administrator.

Certification of Completion of Post-Closure Care

No later than 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, the owner

and operator must submit to the EPA Regional Administrator a certification that the post-closure care period was performed in accordance with the specifications established in the approved closure plan.

FINANCIAL ASSURANCE

The RCRA closure and post-closure requirements are designed to protect human health and the environment from the long-term threats associated with hazardous waste management and permanent disposal. Many of these detailed requirements apply at the end of a facility's waste management operations and can be very expensive. To prevent a facility from ceasing operations and failing to provide for the potentially costly closure and post-closure care requirements, EPA promulgated regulations requiring TSDFs to demonstrate that they have the financial resources to properly conduct closure and post-closure in a manner that protects human health and the environment.

The TSDF general facility standards include precautions to prepare a facility for accidents, spills, and any resulting emergency responses. Such unexpected events could damage third parties by impacting human health or property outside the facility. In order to compensate third parties for injury or damage that might result from such events (known as **liabilities**), the RCRA regulations require TSDF owners and operators to demonstrate that they have the financial resources to pay for bodily injury or property damage that might result from waste management. The closure, post-closure, and liability financial resource requirements are called **financial assurance**.

In addition to requiring facilities to set aside funds for closure, post-closure, and liabilities, the RCRA regulations specify the financial mechanisms that TSDF owners and operators must use to ensure that the financial resources are available in the event that they are needed.

■ Financial Assurance for Closure/ Post-Closure Care

After a TSDF owner and operator prepares the required written closure and post-closure plans for their facility, they must prepare a cost estimate that reflects how much it would cost to hire a third-party contractor to close the facility. These estimates provide the base figure for the amount of financial assurance a facility must provide.

Cost Estimates

Cost estimates must reflect the cost of hiring a third party to conduct all activities outlined in the closure and post-closure plans. Closure cost estimates are based on the point in the facility's operating life when closure would be the most expensive. Post-closure cost estimates are based on projected costs for an entire post-closure period of 30 years, unless reduced or extended by the implementing agency.

Cost Adjustments

Closure and post-closure cost estimates must be adjusted annually for inflation until closure is completed. Owners and operators must also adjust cost estimates following any changes to their closure or post-closure plans that would raise the costs involved. For example, the addition of treatment units would mean that they will require decontamination at closure. The closure and post-closure estimates must be recalculated to reflect the additional expenses.

Period of Coverage

TSDF owners and operators must maintain financial assurance until closure and post-closure are complete. Within 60 days after receiving the owner or operator's and an independent registered professional engineer's certification of final closure, the implementing agency will notify the owner and operator that financial assurance for final closure is no longer required. Similarly, within 60 days after receiving these certifications of completion of post-closure care, the implementing agency will notify the owner and operator that financial assurance for post-closure is no longer required.

■ Accident Liability Requirements

TSDF owners and operators must also be able to compensate third parties for bodily injury or property damage that might result from hazardous waste management at a facility. This coverage

ensures that, in the event of an accidental release of hazardous constituents, money will be available to compensate affected third parties suffering bodily injury or property damage. All TSDFs must demonstrate liability coverage for sudden accidents. In addition, TSDFs with land-based units (e.g., landfills) must also demonstrate liability coverage for nonsudden accidents.

Sudden Accidental Occurrences

The inherent risks posed by hazardous waste management at all TSDFs bring the possibility of sudden accidents. These **sudden accidental occurrences** are defined as events that are not continuous or repeated. Examples of sudden accidental occurrences are fires and explosions. The minimum financial requirements include at least $1 million per occurrence, and an annual total (known as annual aggregate) of at least $2 million.

Nonsudden Accidental Occurrences

Because land-based units are located directly on the land, they bring an increased risk of slow, long-term nonsudden leaks to soil and ground water, and exposure to human health and the environment. These **nonsudden accidental occurrences** are defined as events that take place over time and involve continuous or repeated exposure to hazardous waste. An example of a nonsudden accidental occurrence is a leaking surface impoundment that contaminates a drinking water source over time. The minimum financial requirements include at least $3 million per occurrence, and an annual aggregate of at least $6 million.

These liability financial assurance coverage amounts apply on an owner and operator basis, not on a per facility basis. Consequently, owners and operators must provide $1 million per occurrence and $2 million annual aggregate for sudden accidental occurrences, and $3 million per occurrence and $6 million annual aggregate for nonsudden accidental occurrences (if applicable), regardless of the number of facilities owned and operated.

Period of Coverage

TSDF owners and operators must maintain financial liability coverage until closure is complete. Within 60 days after receiving a TSDF's certification of final closure, the implementing agency must notify the owner and operator that liability financial assurance is no longer required. Liability coverage is not required during the post-closure period. The implementing agency may, however, require liability coverage if closure was not completed in accordance with the facility's closure plan.

■ Financial Assurance Mechanisms

Financial assurance mechanisms are the different ways an owner and operator can show that funds are available to pay for closure, post-closure, and liability requirements. An owner and operator may demonstrate financial assurance through one or more of the following financial assurance mechanisms:

- Trust fund
- Surety bond (two types)
  - Payment bond
  - Performance bond
- Letter of credit
- Insurance
- Financial test
- Corporate guarantee.

Trust Fund

A **trust fund** allows a facility to set aside money in increments, according to a phased-in schedule (known as a pay-in period). At the end of this pay-in period, the facility will have enough money set aside to cover its financial assurance costs and will have funds specifically earmarked for closure, post-closure, and liability requirements.

Under some of the other mechanisms (surety bonds and letters of credit), owners and operators must establish a standby trust fund into which any payments made by the mechanism will be deposited. EPA will then use this trust fund to cover the respective costs.

Surety Bonds

A **surety bond** is a guarantee by a surety company that specifies that closure, post-closure, and liability obligations will be fulfilled. If the owner and

operator fail to pay the costs specified in a bond, the surety company is liable for the costs. There are two types of surety bonds:

- **Payment bond**—A payment bond will, in the event an owner and operator fail to fulfill their financial assurance closure and post-closure obligations, fund a standby trust fund in the amount equal to the value of the bond. Payment bonds can also be used for liability.
- **Performance bond**—A performance bond guarantees that the owner and operator will comply with their closure and post-closure requirements. Performance bonds can also be paid into a standby trust fund. Interim status facilities may not use performance bonds.

Letter of Credit

A **letter of credit** is a credit document issued to a TSDF by a financial institution, covering the cost of closure, post-closure, or liability activities.

Insurance

The owner or operator of a TSDF may take out an **insurance** policy to cover the cost of closure, post-closure, and liability requirements in the event that the owner and operator is unable to satisfy these obligations.

Financial Test

Some companies are of such size and financial strength that they have the assets to absorb the costs of closure, post-closure, and liability obligations. As a result, owners and operators can demonstrate and document their financial strength by using the **financial test** to satisfy the TSDF financial assurance requirements.

Corporate Guarantee

While not all companies will be able to meet the financial test requirements, they may be owned by a company (or have a sibling company) that has the financial standing and ability to meet the financial test requirements. In these cases, a TSDF owner and operator may arrange a **corporate guarantee** by demonstrating and documenting that its corporate parent, corporate grandparent, sibling corporation, or a firm with a substantial business relationship with the owner or operator meets the financial test requirements on its behalf.

GROUND WATER MONITORING

The treatment, storage, or disposal of hazardous waste directly on the land creates the potential to generate hazardous waste leachate that can carry hazardous contaminants into the environment. Such contaminants can pose a serious threat to ground water resources.

Ground water is water found below the land surface in the part of the earth's crust in which all voids are filled with water. This water accumulates in an aquifer, an underground rock formation, that provides a significant amount of ground water to drinking wells and springs.

Ground water serves as a very important resource by providing drinking water and municipal water supplies for approximately 50 percent of all Americans. In some areas, ground water supplies 100 percent of the water supply for all uses. Ground water is also a very critical resource in agriculture. Farmers rely on this resource to irrigate the crops that are later sold at markets across the country.

The importance of ground water is highlighted by that fact that it is very difficult and expensive to clean once contaminated. Cleanup can take decades, and in certain cases cannot restore ground water to usable conditions.

■ General Requirements

In order to protect this valuable resource and avoid costly cleanups, RCRA requires TSDF owners and operators of land-based treatment, storage, or disposal units (i.e., land treatment units, landfills, surface impoundments, and waste piles) to monitor the ground water passing under their facilities to ensure that their hazardous waste management activities are not contaminating the ground water.

Waivers and Exemptions

Some land-based units are designed or managed in a way that does not bring the potential for ground

water contamination. Such waivers or exemptions from the ground water monitoring requirements apply to:

- Man-made structures that do not receive liquid wastes, have inner and outer containment layers and a leak detection system between the containment layers, and are designed to prevent the entry of rain water
- Land treatment units that do not release hazardous constituents into the environment during the post-closure period
- Indoor waste piles
- Units that do not have the potential to leak hazardous waste into the environment
- Units that have been clean closed.

Ground Water Monitoring Provisions

The purpose of the ground water monitoring requirements is to require owners and operators of land-based units to monitor the ground water that passes beneath their TSDF in order to detect leaks of hazardous waste, and facilitate cleanup as soon as possible. As a result, owners and operators must install monitoring wells to detect contamination in the aquifer nearest the ground surface. In order to ensure that the information received from the monitoring wells is accurate, TSDF owners and operators must have:

- Enough wells installed in the right places to accurately represent the ground water activity under the facility
- Properly installed wells (poorly installed wells may give false results)
- Lined or cased wells to prevent the collapse of monitoring well bore holes
- Consistent sampling and analysis procedures
- Statistical methods to avoid false evidence of a release
- Accurate records containing any information collected.

The ground water monitoring requirements vary for permitted and interim status TSDFs. The interim status ground water monitoring requirements are designed to generate information about ground water quality for use in developing the facility's permit, as well as detect and clean up releases.

■ Permitted Facilities

Facilities with permitted land treatment units, landfills, surface impoundments, or waste piles must develop a ground water monitoring program. This ground water monitoring program consists of three phases:

- Detection monitoring, to detect if a leak has occurred
- Compliance monitoring, to determine if an established ground water protection standard has been exceeded once a leak has occurred
- Corrective action, to clean up contamination caused by the leak

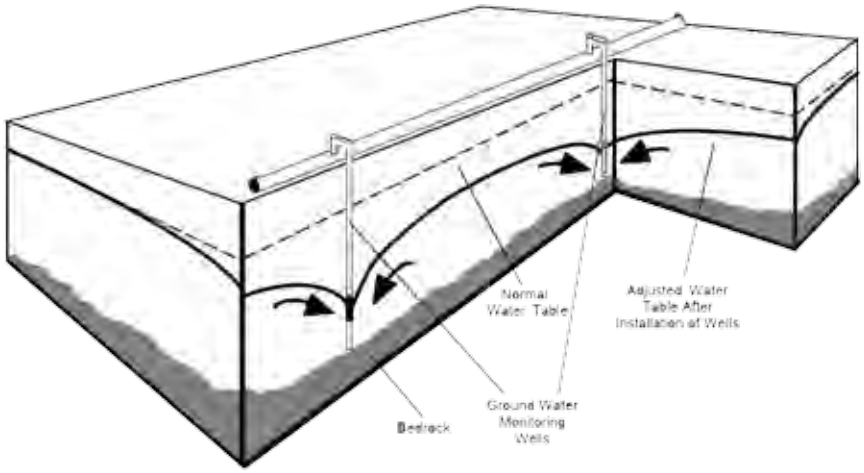
Because different TSDFs handle different types of wastes and will have units of different age and design, each TSDF's program is unique and site- specific.

Detection Monitoring Program

Detection monitoring is the first step of ground water monitoring. The goal is to detect and characterize any leaks of hazardous waste from the unit. The owner and operator compares the results from the sampling wells to the background groundwater levels to determine if there is any evidence of an increase over background levels (see Figure III-16). An increase from the background levels might indicate a leak from the unit. If evidence indicates that the unit is leaking, the owner and operator must:

- Notify the EPA Regional Administrator within seven days
- Immediately sample all wells for hazardous constituents
- Determine which hazardous constituents are present and at what levels
- Submit an application to modify the facility's permit to move into the second phase of the ground water monitoring program (compliance monitoring)
- Submit a cleanup feasibility plan.

Figure III-16: Detection Monitoring



In detection monitoring, owners and operators compare the sample results from the ground water monitoring wells to the background water quality levels. A change from background levels might indicate a leak from the unit.

If the owner and operator can prove that the contamination did not result from their facility, they can continue detection monitoring.

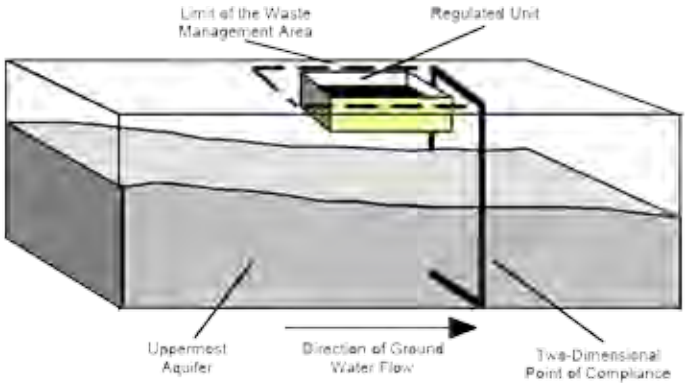
Compliance Monitoring Program

Once the owner and operator has established that a release has occurred, they must develop and implement a **compliance monitoring** program (see Figure III-17). The goal of compliance monitoring is to ensure that the amount of hazardous waste that has leaked into the uppermost aquifer does not exceed acceptable levels. In order to determine what these acceptable levels are, RCRA requires the owner and operator to establish a ground water protection standard (GWPS). The GWPS has four parts: identification of hazardous constituents; identification of concentration levels for each constituent; establishment of a compliance point; and determination of a compliance period during which the GWPS applies.

Hazardous Constituents

For purposes of compliance monitoring, **hazardous constituents** are those constituents that have been detected in the uppermost aquifer and are

Figure III-17: Compliance Monitoring



During the compliance monitoring program, an owner and operator must ensure that the amount of hazardous waste that has leaked into the uppermost aquifer does not exceed acceptable levels. To achieve this, an owner and operator must establish a ground water protection standard, which includes identification of hazardous constituents, identification of concentration levels for each constituent, establishment of a point of compliance, and determination of a compliance period.

reasonably expected to be in or derived from the waste contained in the unit.

Concentration Limits

Concentration limits are the maximum levels of hazardous waste or hazardous constituents allowed to be present in the ground water. The concentration levels can be:

- Background levels
- **Maximum contaminant levels (MCLs)** borrowed from SDWA
- **Alternative concentration limits (ACLs)** established by the EPA Regional Administrator.

Point of Compliance

The **point of compliance** is the vertical point where the owner and operator must monitor the uppermost aquifer to determine if the leak exceeds the GWPS.

Compliance Period

The compliance period is the length of time during which an owner and operator must conduct compliance monitoring or perform cleanup. Generally, this period will cover the rest of the TSDF's operating life and may extend into the post-closure period.

The owner and operator must monitor at least semiannually to determine if the GWPS has been exceeded. The specifics of the GWPS will be listed in the TSDF's permit.

During the compliance period, the owner and operator must determine whether there is any evidence of increased contamination for any of the hazardous constituents specified in the GWPS. This is accomplished by comparing information collected at the point of compliance to the concentration limits set in the GWPS. The owner and operator must also analyze the samples from compliance wells for all RCRA hazardous constituents at least annually to determine if any additional constituents are present that are not specified in the GWPS. If additional constituents are found, they must be added to the list of constituents in the GWPS.

If the GWPS is exceeded, the owner and operator must:

- Notify the EPA Regional Administrator in writing within seven days
- Submit an application to modify the facility's permit to move into the third phase of the ground water monitoring program (corrective action)
- Continue to monitor in accordance with the compliance monitoring program.

If the owner and operator can prove that the increased contamination resulted from a source other than their facility, or that the increase was due to an error in analyzing the sample or natural variations in ground water, they must notify the EPA Regional Administrator in writing within seven days. On the other hand, if the contamination is found to have resulted from a unit at the TSDF, the owner and operator must initiate cleanup.

Corrective Action Program

The goal of ground water corrective action (cleanup) is to clean the ground water to meet the GWPS. To clean up the contamination, the owner and operator must either remove the hazardous constituents from the ground water or treat them in place. The specific measures undertaken to clean the ground water will vary with each facility (see Figure III-18).

Effectiveness

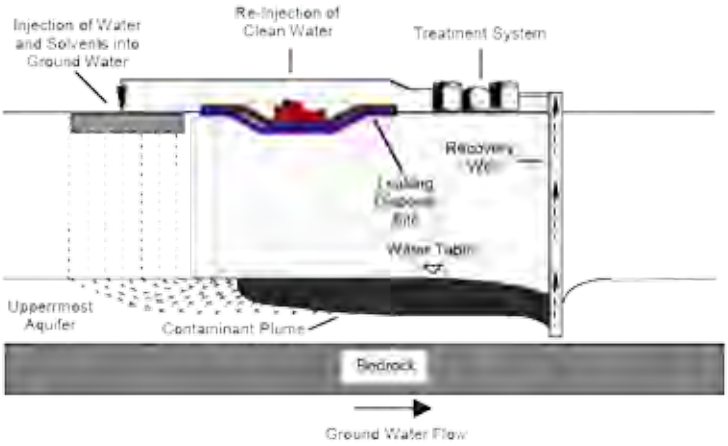
To make sure the owner's and operator's corrective action program is working properly, they must monitor the ground water under the TSDF, and then report semiannually on the effectiveness of the corrective action program.

Time Period

Once the ground water has been treated to meet the GWPS, the owner and operator may stop corrective action and return to compliance monitoring. During the compliance period, facilities may move between compliance monitoring and corrective action as necessary to respond to new releases from the unit.

If the compliance period ends and corrective action is still being conducted, corrective action

Figure III-18: Ground Water Corrective Action



An example of ground water corrective action is a ground water pump and treat system. In order to remediate contamination that has leaked from a disposal site into the uppermost aquifer, the owner and operator injects water and solvents into the ground. The groundwater flow carries the water and solvents to the contaminant plume, flushes the plume of the contamination, and carries the contaminants to a recovery well where the contaminated water is pumped to the surface and treated. Clean water is then re-injected into the ground water for reuse in the pump and treat process.

must continue as long as necessary to achieve the GWPS. Only after the owner and operator has met the GWPS for three consecutive years may they stop corrective action. If the unit is still in the post- closure period, the owner and operator may then reinstate a detection monitoring program. If the post-closure period has elapsed, the TSDF has completed its requirements under RCRA ground water monitoring.

■ Interim Status Facilities

The requirements for interim status facilities were designed to supply background data on these facilities before permitting, and to act as a warning system to detect any releases to ground water prior to issuing a permit to the facility. The interim status program is similar to the permitted ground water monitoring program, but does not include cleanup provisions. If cleanup is required at an interim status facility, it will be addressed under RCRA §3008(h) or §7003 corrective action authorities (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination), or in the facility permit when issued. The interim status ground water monitoring program is comprised of two phases: an indicator evaluation and a ground water quality assessment.

Indicator Evaluation

To determine if the units at a TSDF are leaking, the owner and operator must monitor the ground water under the facility. The information collected from the monitoring wells is compared to data on background water quality to determine if any contamination of the uppermost aquifer has occurred. If the information indicates that there may be a release from the facility, the owner and operator must then begin the second phase, the ground water quality assessment. If an owner and operator assumes or already knows that contamination of the uppermost aquifer has occurred, they may initiate the ground water quality assessment instead of an indicator evaluation program.

Ground Water Quality Assessment Program

Once the owner and operator has determined that there may have been a release from the unit, the ground water quality assessment helps to determine the extent of the release. If an owner and operator must perform a ground water quality assessment, they must notify the EPA Regional Administrator within seven days, and prepare and submit a plan on how to conduct a ground water quality assessment to the EPA Regional Administrator within 15 days. In the ground water quality assessment, the owner and

operator must establish how fast the unit is leaking, how far the leak has spread, and the concentrations of constituents in the contamination. The owner and operator must repeat this assessment at least quarterly until final closure of the facility, and must keep records of all required analyses and evaluations on site. They must also submit an annual report to the EPA Regional Administrator detailing the status of the ground water quality assessment program.

AIR EMISSION STANDARDS

While many hazardous waste TSDF standards are designed to protect ground water, potential contamination of air resources also represents a threat to human health and the environment. During the process of hazardous waste treatment, storage, or disposal, hazardous constituents can escape into the air.

One particular class of these constituents, volatile organics, evaporate easily and have been linked to several adverse health effects. In order to control the release of these emissions from hazardous waste management processes, RCRA imposes air emission control requirements on units that commonly manage hazardous waste with organics.

■ Process Vents

Certain types of hazardous waste units are commonly used to manage wastes with high levels of volatile organics. As a result, the first set of air emission requirements addresses **process vents** associated with the distillation, fractionation, thin-film evaporation, solvent extraction, and air and steam stripping of hazardous waste with an annual average total organic concentration of 10 parts per million by weight (ppmw). Owners and operators of TSDFs with these treatment processes must reduce organic emissions from affected process vents at their entire facility. To meet this standard, the owner and operator may either modify the treatment process or install a device to control organic emissions.

■ Equipment Leaks

Volatile organics can also escape into the air through gaps between connections of hazardous waste management **equipment**, or other leaks from such equipment. As a result, the second set of air emission regulations establishes specific leak detection and repair programs for equipment (e.g., valves, pumps, and compressors) that contains or contacts hazardous waste with at least 10 percent by weight organics. These programs require leak detection monitoring and inspection. In addition, once a leak has been detected, the equipment must be repaired.

■ Tanks, Surface Impoundments, and Containers

In order to further protect human health and the environment from the risks posed by volatile organics, the final set of RCRA air emission standards require TSDF owners and operators to control organic air emissions from hazardous waste tanks, surface impoundments, and containers. RCRA requires these controls if the units manage waste with an average volatile organic concentration above 500 ppmw. These air emission controls prevent the release of organic constituents through installation of a control device (e.g., a flare), or prevention of emissions.

Tanks

TSDF tank owners and operators are subject to one of two different sets of requirements depending on the vapor pressure of the waste being managed in the unit. Tanks which store hazardous waste below certain vapor pressures (known as Level 1 tanks), must be equipped with, at a minimum, a fixed roof. Those tanks that store waste with higher vapor pressures (known as Level 2 tanks), have five compliance options that range from putting the tank in an enclosure vented to a control device to using a closed-vent system that vents emissions from the unit to a control device.

Surface Impoundments

TSDF surface impoundment owners and operators must either install a cover (e.g., an air- supported structure or a rigid cover) over the impoundment, which must be vented through a closed-vent system to a control device, or equip the surface impoundment with a floating membrane cover.

Containers

TSDF owners and operators are subject to one of three different sets of requirements for containers depending on the size of the container, the organic content of hazardous waste placed in the container, and whether or not waste stabilization (as discussed in Chapter III, Land Disposal Restrictions) occurs in the container. Small containers (between $0.1m^3$ and $0.46m^3$) and large containers (greater than $0.46m^3$) storing waste with a low vapor pressure (known as Level 1 containers) must either comply with DOT requirements, be equipped with a closed cover, or be fitted with a vapor suppressing barrier. Large containers storing waste with a high vapor pressure (known as Level 2 containers) may either meet DOT specifications, operate with no detectable emissions, or be vapor tight (i.e., no vapors can escape the unit). The last category of containers (Level 3 containers) are those units conducting waste stabilization. These containers must be vented through a closed-vent system to a control device.

■ Other Requirements

The air emission standards require owners and operators to keep certain records demonstrating compliance with these standards in the facility's operating log.

LQGs are subject to the interim status air emission control requirements for process vents, equipment leaks, containers, and tanks. SQGs, however, are not subject to these air emission control requirements.

SUMMARY

The RCRA Subtitle C TSDF standards impose requirements on units that treat, store, or dispose hazardous waste. These standards include full operation and management requirements for permitted facilities (those built after the standards were established) and less stringent provisions for interim status facilities (those that were already in operation).

The TSDF standards require facilities to comply with:

- General facility standards
- Preparedness and prevention requirements
- Contingency plans and emergency procedure provisions
- Manifest, recordkeeping, and reporting requirements.

TSDF owners and operators can treat, store, or dispose of waste in a variety of units. Each unit has its own specific standards governing unit design, construction, operation, and maintenance. Owners and operators can manage their waste in any of the following units:

- Containers
- Containment buildings
- Drip pads
- Land treatment units
- Landfills
- Surface impoundments
- Tanks
- Waste piles
- Miscellaneous units.

LQGs accumulating waste in containers, containment buildings, drips pads, and tanks are subject to the interim status TSDF standards for these units. SQGs accumulating waste in containers and tanks are subject to the interim status standards for these units.

The TSDF standards also establish requirements to ensure that hazardous waste management units are closed in a manner that protects human health and the environment. The closure provisions require the facility to stop accepting waste; remove all waste from management units; and decontaminate all soils, structures, and equipment. Some units (i.e., land treatment units, landfills, and surface impoundments) serve as places for the final disposal of hazardous waste. These land disposal units must comply with additional post-closure requirements to ensure proper long-term unit maintenance.

Because closure and post-closure activities can be very expensive, the TSDF standards require owners and operators to demonstrate financial assurance. These provisions also require all TSDFs to set aside funds in order to compensate third parties for bodily injury and property damage that might result from hazardous waste management operations.

RCRA's TSDF standards also include provisions to protect ground water and air resources from hazardous waste contamination. RCRA requires owners and operators of land-based units (i.e., land

treatment units, landfills, surface impoundments, and waste piles) to monitor the ground water below their TSDF for possible contamination, and clean up any discovered contamination.

In order to protect air resources, TSDFs are required to install unit controls to prevent organic emissions from escaping into the air. The air emissions controls apply to process vents, equipment leaks, containers, surface impoundments, and tanks.

LAND DISPOSAL RESTRICTIONS

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OVERVIEW

A common hazardous waste management practice is to place hazardous waste in land-based units (i.e., land treatment units, landfills, surface impoundments, or waste piles). In 2009, approximately 56 percent of hazardous wastes generated under RCRA were permanently disposed by deepwell/underground injection, landfill and land treatment/application/farming . The permanent disposal of hazardous waste in land-based units has the potential to threaten human health and the environment through ground water contamination. As a result, the RCRA program contains extensive technical requirements to ensure that land-based units prevent hazardous leachate from escaping into the environment. To complement the unit-specific standards, which alone do not fully protect human health and the environment from the potential risks of land-based hazardous waste management, RCRA includes the land disposal restrictions (LDR) program.

The LDR program approaches ground water protection differently from unit-specific technical standards. This program does not mandate physical barriers to protect ground water, but instead requires that hazardous wastes undergo fundamental physical or chemical changes so that they pose less of a threat to ground water, surface water, and air when disposed. The obvious advantage of such hazardous waste treatment is that it provides a longer lasting form of protection than does simple hazardous waste containment. While synthetic barriers designed to prevent the migration of leachate can break down and fail over time, physical and chemical changes to the waste itself provide a more permanent type of protection.

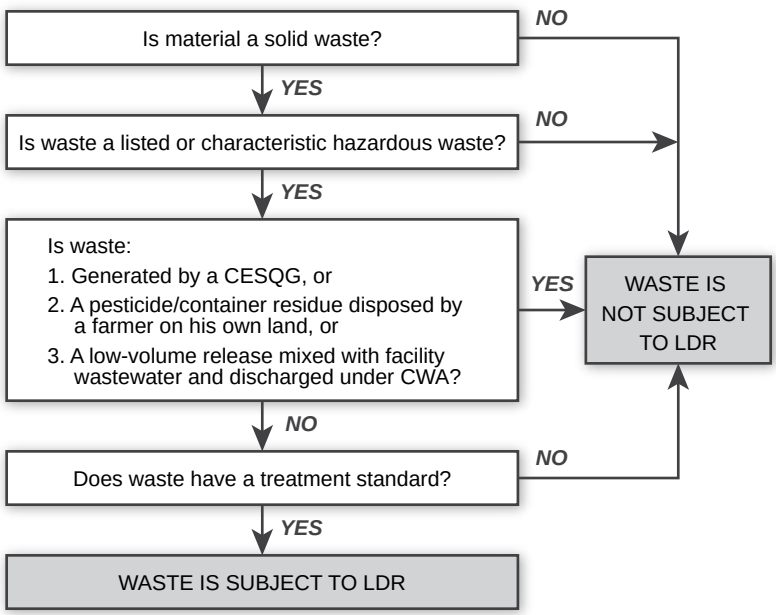
When directing EPA to establish the LDR program, Congress called for regulations that specified concentrations of hazardous constituents or methods of treatment that would substantially decrease the toxicity of hazardous waste or decrease the likelihood that contaminants in such wastes would leach. EPA responded to these requirements by establishing waste-specific treatment standards that dictate to what extent waste must be treated. All hazardous wastes, except under certain circumstances, must meet a specific treatment standard before they can be disposed.

APPLICABILITY

Wastes must be a RCRA hazardous waste in order to be subject to the LDR program. In other words, unless a waste meets the definition of a solid and hazardous waste, its disposal is not regulated under the LDR program. Once a generator identifies its

waste as hazardous (either listed, characteristic, or both), the waste is assigned a waste code. When EPA establishes a treatment standard for the waste code, the waste will then become restricted (i.e., subject to the LDR requirements). RCRA requires that EPA establish treatment standards for hazardous wastes within six months of promulgating a new listing or characteristic. Until EPA establishes a treatment standard for a waste, this newly identified or newly listed waste (i.e., waste for which EPA has yet to establish a treatment standard) can continue to be land disposed without treatment. When EPA promulgates a final treatment standard for a waste, handlers of the waste must manage it in accordance with all the LDR requirements and cannot dispose of it on the land until it meets all applicable treatment standards (see Figure III-19).

Figure III-19: Land Disposal Restrictions Applicability



While the LDR program generally applies to all persons who generate, transport, treat, store, or dispose of restricted hazardous wastes, there are exclusions from the LDR requirements. The following wastes are not subject to the LDR program:

- Waste generated by conditionally exempt small quantity generators (CESQGs)
- Waste pesticides and container residues disposed of by farmers on their own land
- Newly identified or newly listed hazardous wastes for which EPA has yet to promulgate treatment standards
- Certain waste releases that are mixed with a facility's wastewater and discharged pursuant to the Clean Water Act (CWA).

Wastes meeting any of these descriptions may continue to be land disposed without being subject to the LDR program.

The LDR requirements attach to a hazardous waste at its point of generation. In other words, once a waste has been generated, identified, and assigned a waste code, it must be treated in accordance with LDR requirements before being disposed. As a general principle, a hazardous waste must meet all applicable treatment standards to be eligible for land disposal. For purposes of the LDR program, a generator of a listed hazardous waste must determine if the waste also exhibits any hazardous waste characteristics. If it does, then the waste must be treated to meet both the listed and characteristic treatment standards before land technologies that must be performed on the waste before it can be disposed.

EPA bases the LDR treatment standards on the performance of disposal.

LDR PROHIBITIONS

The LDR program consists of three main components: the disposal prohibition, the dilution prohibition, and the storage prohibition. This series of prohibitions restricts how wastes subject to LDR requirements are handled. The most visible aspect of the LDR program is the disposal prohibition, which includes treatment standards, variances, alternative treatment standards, and notification requirements. **Land disposal** means placement in or on the land, except in a corrective action unit, and includes, but is not limited to,

placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault, or bunker intended for disposal purposes. The dilution and storage prohibitions work in tandem with the disposal prohibition to guide the regulated community in proper hazardous waste management. The dilution prohibition ensures that wastes are properly treated, and the storage prohibition ensures that waste will not be stored indefinitely to avoid treatment.

■ Disposal Prohibition

The first component of the LDR program, the **disposal prohibition**, prohibits the land disposal of hazardous waste that has not been adequately treated to reduce the threat posed to human health and the environment. The criteria that hazardous wastes must meet before being disposed of are known as **treatment standards**. These treatment standards can be either concentration levels for hazardous constituents that the waste must meet or treatment available technologies. EPA conducts extensive research into available treatment technologies to determine which proven, available technology is the best at treating the waste in question. The technology that best minimizes the mobility or toxicity (or both) of the hazardous constituents is designated as the **Best Demonstrated Available Technology (BDAT)** for that waste. The treatment standards are based on the performance of this BDAT.

When treatment standards are set as concentration levels, the regulated community may use any method or technology (except dilution, as discussed later in this chapter) to meet that concentration level. The concentration level is based on the performance of the BDAT, but the regulated community does not need to use this technology to meet the treatment standard. EPA prefers to use concentration-based standards because they stimulate innovation and the development of alternative treatment technologies. However, when EPA feels that the waste will only be effectively treated by the BDAT or when there is no way to measure hazardous constituent levels, the Agency will designate a technology as the treatment standard. This means that the regulated community must treat the waste with that specific technology in order to meet the treatment standard.

DISPOSAL PROHIBITION

The disposal prohibition prohibits the land disposal of hazardous waste that has not been adequately treated to reduce the threat posed by such waste.

The treatment standards are found in the regulations in a table arranged by hazardous waste code (40 CFR §268.40). Concentration-based treatment standards appear in the table as numeric values. The treatment standards that require the use of a specific technology are expressed as a five-letter code representing the technology (see Figure III-20). There are 31 such codes representing specific technology-based standards. Descriptions of these codes and the technologies that they require are found in the regulations in a separate table in 40 CFR §268.42 (see Figure III-21).

Characteristic Hazardous Wastes

Both listed and characteristic hazardous wastes must meet the LDR treatment standards before they are eligible for land disposal. There are, however, some unique situations that arise when dealing with characteristic wastes (those with the letter “D” waste code designation) under the LDR program.

The treatment standards for most characteristic hazardous wastes entail rendering the waste nonhazardous (i.e., decharacterizing the waste or removing the characteristic). However, some characteristic waste treatment standards have additional requirements. The regulated community must examine these wastes for **underlying hazardous constituents**. These constituents are not what causes the waste to exhibit a characteristic, but they can pose hazards nonetheless. The underlying hazardous constituents must be treated in order to meet contaminant-specific levels. These levels are referred to as the **universal treatment standards (UTS)**, and are listed in a table in the RCRA regulations (40 CFR §268.48). This is why some characteristic wastes that no longer exhibit a characteristic must still be treated to meet additional LDR requirements. Once such characteristic hazardous wastes have been decharacterized and treated for underlying constituents, they can be disposed of in a nonhazardous waste landfill.

Figure III-20: Excerpts from the 40 CFR §268.40 Treatment Standards Table

Concentration-Based Standard

TREATMENT STANDARDS FOR HAZARDOUS WASTE					
Waste Code	Waste Description and Treatment/Regulatory Subcategory	Regulated Hazardous Constituent		Wastewaters	Nonwastewaters
		Common Name	CAS Number	Concentration in mg/l or Technology Code	Concentration in mg/kg Unless notes as "mg/l TCLP," or Technology Code
K009	Distillation bottoms from the production of acetaldehyde from ethylene	Chloroform	67–66–3	0/046	6.0
K026	Stripping still tails from the production of methyl ethyl pyridines	N/A	N/A	CMBST	CMBST

Technology-Based Standard

Variances, Extensions, and Exemptions

If a restricted waste does not meet its applicable treatment standard, it is prohibited from land disposal. Although most wastes become eligible for disposal by meeting the treatment standards, in some instances this may not be possible. For example, there may not be enough treatment capacity to treat a waste, or the concentration level may not be achievable. To address these situations, EPA established procedures that allow wastes to be disposed of under special circumstances. The following exemptions, variances, and extensions allow wastes to be disposed of without meeting their respective treatment standards, or to be treated to a different standard:

- National capacity variances
- Case-by-case extensions
- No-migration variances

Figure III-21: Summary of Selected Technologies from the 40 CFR §268.42 Technology-Based Standards Table

Code	Technology	Description
BIODG	Biodegradation	Biodegradation uses microorganisms to break down organic compounds to make a waste less toxic.
CHRED	Chemical reduction	Chemical reduction converts metal and inorganic constituents in wastewater into insoluble precipitates that are later settled out of the wastewater, leaving a lower concentration of metals and inorganics in the wastewater.
CMBST	Combustion	Combustion destroys organic wastes or makes them less hazardous through burning in boilers, industrial furnaces, or incinerators.
DEACT	Deactivation	Deactivation is treatment of a waste to remove the characteristic of ignitability, corrosivity, or reactivity. Deactivation can be achieved using many of the treatment technologies in 40 CFR §268.42, Table 1. Part 268, Appendix VI recommends technologies that can be used to deactivate specific wastestreams.
MACRO	Macroencapsulation	Macroencapsulation is the application of a surface coating material to seal hazardous constituents in place and prevent them from leaching or escaping.
NEUTR	Neutralization	Neutralization makes certain wastes less acidic or certain substances less alkaline.
PRECP	Precipitation	Precipitation removes metal and inorganic solids from liquid wastes to allow for safe disposal.
REMTL	Recovery of Metals	Recovery of organics uses direct physical removal methods to extract metal or inorganic constituents from a waste.
RORGS	Recovery of Organics	Recovery of organics uses direct physical removal methods (e.g., distillation, steam stripping) to extract organic constituents from a waste.
STABL	Stabilization	Stabilization (also referred to as solidification) involves the addition of stabilizing agents (e.g., Portland cement) to a waste to reduce the leachability of metal constituents.

- Variances from a treatment standard
- Equivalent treatment method variances
- Surface impoundment treatment exemptions.

While national capacity variances, when needed, are automatically granted to all affected hazardous waste management facilities, the other five exemptions, variances, and extensions require a facility to specifically petition the Agency.

National Capacity Variances

When developing a treatment standard, EPA examines the available treatment capacity to determine whether it is sufficient to handle current and future waste management needs. If the Agency determines that nationally there is not enough capacity to treat a waste, EPA can automatically extend the effective date of the waste's treatment standard. Such an extension to the effective date is intended to give the waste treatment industry more time to develop the capacity to handle the waste. Wastes under a national capacity variance can be disposed of, without meeting the treatment standards, in landfills and surface impoundments that meet minimum technical requirements (e.g., liners, leachate collection and removal systems, and leak detection systems). (These technical requirements are fully discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities).

CASE STUDY: DECHARACTERIZED WASTES AND THE REQUIREMENT TO TREAT FOR UNDERLYING HAZARDOUS CONSTITUENTS

A facility generates an industrial nonwastewater that contains benzene, acetone, and methanol. The generator determines that their waste is not listed based on its origin, but upon testing the waste, determines that it fails the TCLP for benzene. As a result, the waste is identified as D018. According to the LDR treatment standard for D018, the benzene in the waste must be treated to a standard of 10 mg/kg, and the waste must also be treated for acetone and methanol underlying hazardous constituents. The generator decides to treat the waste in containers at the facility. After treatment, the benzene meets the 10 mg/kg standard and no longer exhibits a characteristic. Although the waste is technically no longer a hazardous waste, it must be treated for the acetone and methanol underlying hazardous constituents before it can be land disposed.

Case-by-Case Extensions

A facility may petition EPA for a case-by-case extension to delay the effective date of a waste's treatment standard, upon showing that capacity does not exist for that particular waste. Similar to national capacity variances, wastes granted case-by- case extensions can be disposed of without meeting the treatment standards in landfills and surface impoundments that meet minimum technical requirements. However, these extensions are no longer available for most wastes because they may only be granted within four years of the promulgation of the LDR treatment standard.

No-Migration Variances

No-migration variances differ from capacity variances in that they apply to the disposal unit instead of to the waste, and allow wastes to be disposed of in the unit without meeting the treatment standards. To obtain a no-migration variance for a disposal unit, a facility must petition EPA and demonstrate that there will be no migration of hazardous constituents from the unit (i.e., the waste will not leak or escape from the unit) for as long as the wastes remain hazardous.

Variances from a Treatment Standard

Variances from a treatment standard allow the regulated community to petition EPA and show that the required LDR treatment standard is not appropriate for their waste, or that the treatment standard is not achievable. If a variance is granted, EPA will specify an alternative standard to meet.

Determinations of Equivalent Treatment

Determinations of equivalent treatment allow the regulated community to petition EPA and demonstrate that a technology different from the required LDR treatment technology can achieve the same results. If approved, the applicant can use the alternative technology in place of the required technology.

Surface Impoundment Treatment Exemptions

Surface impoundment treatment exemptions allow the regulated community to petition EPA for permission to treat hazardous waste in surface impoundments (surface impoundments are fully

discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). Under normal circumstances, owners and operators cannot place untreated hazardous waste on the land, even if it is in a land-based unit for treatment. Since many facilities use surface impoundments as a means of treating waste, the surface impoundment treatment exemption allows owners and operators to conduct such treatment under certain conditions. Surface impoundments treating waste under this exemption must comply with double liner and minimum technical requirements, and provisions for the removal of sludges and treatment residues.

Alternative Treatment Standards

In establishing treatment standards, the Agency applied the BDAT methodology to the typical forms of waste generated by industry. Some forms of hazardous waste are unique and were not taken into account by the BDAT process when treatment standards were established. As a result, EPA created a number of broad, alternative treatment standards for special types of waste.

Lab Packs

Laboratories commonly generate small volumes of many different listed hazardous wastes. Rather than manage all these wastes separately, labs often consolidate these small containers into **lab packs**. Trying to meet the individual treatment standards for every waste contained in a lab pack would be impractical. To ease the compliance burden, EPA established an alternative treatment standard for lab packs that allows the whole lab pack to be incinerated, followed by treatment for any metal in the residues (§268.42(c)). Treatment using this alternative standard satisfies the LDR requirements for all individual wastes in the lab pack. However, there are limits on the types of wastes that may be included in lab packs.

Debris

Debris can become contaminated with hazardous waste accidental releases or spills. While such contaminated debris is typically regulated under the contained-in policy (as discussed in Chapter III, Hazardous Waste Identification), it may also be subject to LDR treatment standards. The physical characteristics of such debris may make it difficult to meet the LDR treatment standard for the waste that is contaminating it. For example, incinerating a solvent-saturated brick wall might not be possible without damaging the rotating combustion chamber in an incinerator. Instead of requiring debris to meet these sometimes inappropriate and difficult standards, EPA established a set of alternative standards that can be used to treat hazardous debris (40 CFR §268.45, Table 1). The alternative standards range from removing all contaminants with high pressure washing, to encapsulating the debris in order to prevent hazardous constituents from leaching. Debris treated with these alternative treatment standards meets the LDR requirements, and in many cases, can be disposed of as nonhazardous waste.

Soil

Cleanup, or remediation, of hazardous waste sites will often produce contaminated soil. Contaminated soil must be handled as hazardous waste if it contains a listed hazardous waste or if it exhibits a characteristic of hazardous waste (see discussion of the contained-in policy in Chapter III, Hazardous Waste Identification). As with hazardous waste, land disposal of hazardous soil is prohibited until the soil has been treated to meet LDR standards. These contaminated soils, due to either their large volume or unique properties, are not always amenable to the waste code-specific treatment standards found in §268.40. Because of this, EPA promulgated alternative soil treatment standards in §268.49.

The alternative soil treatment standards mandate reduction of hazardous constituents in the soil by 90 percent or ten times UTS, whichever is higher. Removal of the characteristic is also required if the soil is ignitable, corrosive, or reactive.

Notification, Certification, and Recordkeeping

In order to properly track the hazardous waste that is generated, transported, treated, stored, and disposed of, EPA imposes certain LDR notification, certification, and recordkeeping requirements on generators and treatment, storage, and disposal facilities (TSDFs). LDR notifications inform the next waste handler how the waste must be treated to meet the treatment standard or if it can be disposed of without treatment. When wastes do not need to meet a treatment standard, or already meet

the standard, EPA requires the handler to sign a statement certifying such a claim.

Generators must send a notification with the initial shipment of every waste and keep a copy in their on-site files. If the waste, process, or receiving facility changes, another notification is required. The information that the notification must include varies according to the status of the waste. For example, the notification requirements will differ slightly if the waste meets its treatment standard or is subject to a national capacity variance.

Treatment facilities have to send similar notifications along with the shipment of treated wastes to disposal facilities and keep a copy in their on-site files. A certification normally accompanies this notification stating that the waste meets its treatment standards and may be land disposed. Disposal facilities are the final link in the waste management chain. As a result, they have to test the waste residue that they receive to ensure that it meets the treatment standards.

Each hazardous waste handler must comply with certain recordkeeping requirements for LDR notifications and paperwork. Generators, treatment facilities, and disposal facilities must keep copies of all LDR paperwork associated with the waste they ship or receive in their facility files for three years.

Characteristic wastes that are decharacterized subsequent to the point of generation (i.e., they become nonhazardous) are handled differently. Once a waste is decharacterized and has met its full LDR treatment standards, it can go to a RCRA Subtitle D nonhazardous waste facility. Copies of these LDR notifications and certifications are sent to the EPA Region or authorized state and placed in the facility's files and sent to the EPA Region or authorized state rather than to the receiving Subtitle D facility. This is intended to protect Subtitle D facilities from the burden of hazardous waste paperwork.

■ Dilution Prohibition

The second component of the LDR program is the **dilution prohibition**. When a waste's treatment standard is expressed as a numeric concentration level, it is often easier and less expensive to dilute the waste in water or soil in order to reduce the concentration of the hazardous constituents. This type of activity does not reduce the overall or mass load of toxic chemicals that could be released to the environment, and is inconsistent with the goals of the LDR program. To prevent this activity from being practiced, EPA established the dilution prohibition. The dilution prohibition states that it is impermissible to dilute hazardous waste to circumvent proper treatment. Adding water or soil to a waste to dilute it, combining wastes not amenable to the same type of treatment, and incinerating metal wastes are all examples of impermissible dilution.

DILUTION PROHIBITION

The dilution prohibition forbids dilution, such as the addition of soil or water to waste, in order to reduce the concentrations of hazardous constituents, and can prohibit treatment of a waste by ineffective or inappropriate treatment methods. Examples of ineffective or inappropriate treatment include biodegradation, combustion, or incineration of metals, and stabilization of organics. The clearest objective indication that proper treatment is being conducted is if the treatment is the same type as that on which the treatment standard is based (i.e., if the treatment method is the same as the BDAT that established the waste's treatment standard) or if the treatment process actually destroys or removes hazardous constituents.

■ Storage Prohibition

The final component of the LDR program is the **storage prohibition**. Before a waste can be treated, it is usually stored in units, such as containers and tanks. These storage units are not intended for the long-term management of waste, and therefore, are not required to provide the same level of protective measures as disposal units. To prevent indefinite storage, EPA regulations state that if waste storage exceeds one year, the facility has the burden of proving that such storage is being maintained in order to accumulate quantities necessary for effective treatment or disposal. For storage less than one year, EPA has the burden of proving that such storage is not for the purpose of accumulating quantities necessary for effective treatment or

STORAGE PROHIBITION

The storage prohibition prevents the indefinite storage of untreated hazardous waste for reasons other than the accumulation of quantities necessary for effective treatment or disposal.

disposal. Generators accumulating waste on site within their respective accumulation time limits (as discussed in Chapter III, Regulations Governing Hazardous Waste Generators), and transfer facilities temporarily storing manifested shipments of hazardous waste for less than 10 days (as discussed in Chapter III, Regulations Governing Hazardous Waste Transporters), are not subject to this burden of proof requirement.

HISTORY OF LDR

The LDR program has a complicated history. The progression of the LDR program is important in understanding how and why the LDR program operates the way it does today (see Figure III-22).

The Hazardous and Solid Waste Amendments (HSWA) established the authority for the LDR program. When HSWA was enacted, EPA had already listed and identified a large number of hazardous wastes. As a result, the Agency had to gradually address these wastes by establishing LDR treatment standards in stages. Congress directed EPA to address certain high-risk and high-volume wastes first, and established a three-part schedule for EPA to follow in addressing the remaining wastes. The three parts of this schedule are known as the Thirds.

Before EPA could address the wastes in the Thirds, the Agency was required to address those wastes that were high-risk (dioxins) and those wastes that were generated in large amounts (solvents). The treatment standards for these wastes were promulgated on November 7, 1986. This rulemaking also established the basic framework for the LDR program.

Because EPA's promulgation of LDR treatment standards for the large number of wastes in the Thirds would take considerable time, the Agency established interim treatment standards to ensure adequate protection of human health and the environment. These interim standards are known as the **California List**. The list, based on a program established by California's Department of Health Services, became effective on July 8, 1987. These standards did not target specific waste codes, but rather wastes containing certain toxic constituents or exhibiting certain properties. As EPA established waste-specific treatment standards in the Thirds, the California list provisions were superseded. All of the provisions on the list have now been superseded.

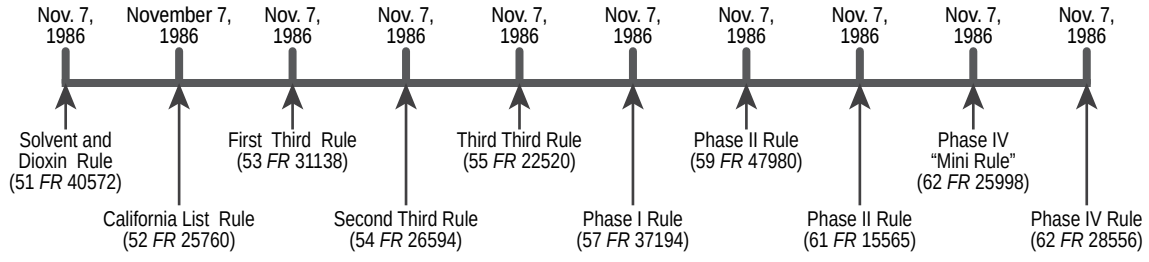
To address the wastes that were to be covered under the Thirds, EPA ranked the wastes according to hazard and volume generated. Those wastes that posed the greatest potential threat were addressed first through a rulemaking on August 17, 1988. These wastes are known as the First Third wastes.

The treatment standards for the Second Third wastes were promulgated on June 23, 1989, and the treatment standards for the Third Third wastes were promulgated on June 1, 1990.

While EPA was addressing the solvents, dioxins, and the Thirds, other hazardous wastes were being listed and identified as part of the Agency's continuing process of hazardous waste identification. These newly listed and identified wastes, which became subject to RCRA after HSWA, were grouped in their own respective schedules. These schedules are known as the Phases. These schedules not only promulgated treatment standards for newly listed and identified wastes, but also made minor modifications and improvements to the LDR regulatory program.

On August 18, 1992, EPA promulgated Phase I, which finalized treatment standards for the first set

Figure III-22: Significant Land Disposal Restrictions Rulemakings



of newly listed wastes and established alternative treatment standards for hazardous debris. On September 19, 1994, EPA promulgated Phase II, which also finalized treatment standards for additional newly listed wastes and added the UTS table (40 CFR §268.48). On April 8, 1996, EPA promulgated Phase III, which not only finalized treatment standards for a third set of newly listed wastes, but also prohibited the combustion of metals (such treatment is ineffective and thus constitutes impermissible dilution). On May 12, 1997, EPA promulgated the first half of Phase IV (called the Phase IV "Mini-Rule"), which finalized the last set of treatment standards for newly listed wastes and modified the LDR notification requirements. The second half of Phase IV, published on May 26, 1998, completed the schedule established by the Phases by finalizing treatment standards for newly identified toxicity characteristic metal wastes and formerly exempt mineral processing wastes, and established alternative treatment standards for soil contaminated with hazardous waste.

With the completion of the four Phases, EPA has promulgated standards for all currently identified and listed hazardous wastes. EPA now promulgates the LDR treatment standards for a waste when the waste is initially identified or listed.

SUMMARY

The LDR program is designed to protect ground water from contamination by requiring hazardous wastes to be physically or chemically altered to reduce the toxicity or mobility of hazardous constituents prior to disposal. The LDR requirements apply to all hazardous wastes (with a few exceptions) once a treatment standard has been established for the waste. These requirements attach at the point of generation, at which time generators must determine both hazardous waste listings and characteristics. Based on this determination, the waste must meet all applicable treatment standards before disposal. The LDR program consists of prohibitions on:

- Disposal
- Dilution
- Storage.

The disposal prohibition requires that hazardous wastes be treated to meet waste specific treatment standards before disposal. These standards are based on the BDAT process and requires treatment to a specific concentration level or treatment by a specific technology. EPA established a series of variances, exemptions, and extensions to address those situations where the required treatment standard cannot be achieved. The LDR program also includes alternative treatment standards for unique wastestreams, such as lab packs, debris, and soil. To ensure that wastes receive proper treatment and are managed appropriately, EPA also established notification and recordkeeping requirements.

The dilution prohibition prevents treatment by ineffective or inappropriate methods. The storage prohibition is intended to require expeditious treatment.

Since 1986, when the first treatment standards were promulgated, the LDR program has continually evolved. EPA has finished establishing treatment standards for all existing, newly identified, and newly listed wastes based on two rulemaking schedules (the Thirds and Phases), and the Agency now establishes treatment standards for hazardous wastes when they are either listed or identified.

ADDITIONAL RESOURCES

Additional information about the topics covered in this chapter can be found at www.epa.gov/epawaste/hazard/tsd/ldr.

HAZARDOUS WASTE COMBUSTION

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OVERVIEW

Approximately 200 TSDFs use **combustion**, the controlled burning of substances in an enclosed area, as a means of treating and disposing of hazardous waste.

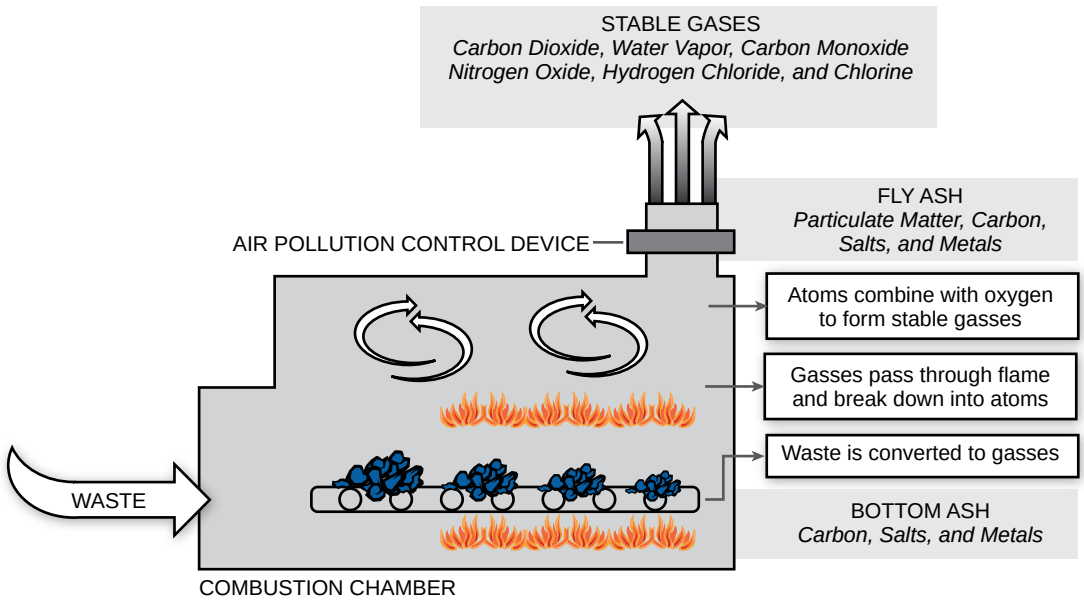
As a hazardous waste management practice, combustion has several unique attributes. First, if properly conducted, it permanently destroys toxic organic compounds contained in hazardous waste by breaking their chemical bonds and reverting them to their constituent elements, thereby reducing or removing their toxicity. Second, combustion reduces the volume of hazardous waste to be disposed of on land by converting solids and liquids to ash. Land disposal of ash, as opposed to disposal of untreated hazardous waste, is in many instances both safer and more efficient.

Combustion is an intricate treatment process. During burning, organic wastes are converted from solids and liquids into gases. These gases pass through the flame, are heated further, and eventually become so hot that their organic compounds break down into the constituent atoms. These atoms combine with oxygen and form stable gases that are released to the atmosphere after passing through air pollution control devices.

The stable gases produced by combustion of organics are primarily carbon dioxide and water vapor. Depending on waste composition, however, small quantities of carbon monoxide, nitrogen oxides, hydrogen chloride, and other gases may form. These gases have the potential to cause harm to human health and the environment. The regulation of these emissions is the primary focus of the RCRA combustion unit standards.

The management or disposal of metals and ash, other by-products of the combustion process, also causes concern. Ash is an inert solid material composed primarily of carbon, salts, and metals. During combustion, most ash collects at the bottom of the combustion chamber (**bottom ash**). When this ash is removed from the combustion chamber, it may be considered hazardous waste via the derived-from rule or because it exhibits a characteristic. Small particles of ash (particulate matter that may also have metals attached), however, may be carried up the stack with the gases (**fly ash**). These particles and associated metals are also regulated by the combustion regulations, as they may carry hazardous constituents out of the unit and into the atmosphere. Since combustion will not destroy inorganic compounds present in hazardous waste, such as metals, it is possible that such compounds may also end up in bottom ash and fly ash at harmful concentrations. Ash residue is subject to applicable RCRA standards and may need to be treated for

Figure III-23: The Combustion Process



metals or other inorganic constituents prior to land disposal (see Figure III-23).

In the early years of RCRA, EPA intended for facilities to combust as much hazardous waste as possible and landfill the resultant ash. This process destroyed the majority of the waste, thus reducing the volume requiring disposal. However, it was determined that incomplete or improperly conducted combustion had the potential to present a major public health risk, and therefore, became the topic of much public outcry. This public concern, coupled with EPA's advancements in assessing potential risks arising from combustion, caused a shift in EPA's strategy on combustion. This shift in thinking resulted in the increasing stringency of combustion requirements over time.

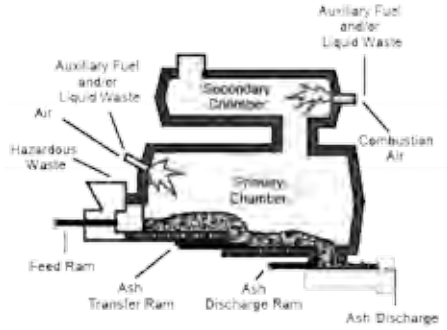
WHAT ARE THE REGULATED UNITS?

Hazardous wastes are combusted for various purposes. The purpose of combustion is directly related to the type of unit used. There are two classes of combustion units, those that burn waste for destruction and those that burn waste for energy recovery or recover materials from the hazardous waste.

■ Incinerators

The first class of combustion units are hazardous waste incinerators. Incineration is the combustion of hazardous waste primarily for destruction (i.e., disposal). Incineration is a method of thermal destruction of primarily organic hazardous waste using controlled flame combustion (see Figure III-24). This process can reduce large volumes of waste materials to ash and lessen toxic gaseous emissions. An **incinerator** is an enclosed device that uses controlled flame combustion and does not meet the more specific criteria for classification as a boiler, industrial furnace, sludge dryer (a unit that dehydrates hazardous sludge), or carbon regeneration unit (a unit that regenerates spent activated carbon). Incinerators

Figure III-24: Cross-Section of an Incinerator



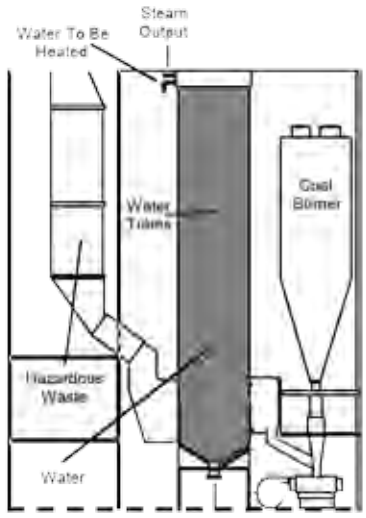
also include infrared incinerators (a unit that uses electric heat followed by a controlled flame afterburner) and plasma arc incinerators (a unit that uses electrical discharge followed by a controlled flame afterburner).

■ Boilers and Industrial Furnaces

The second class of combustion units are boilers and industrial furnaces (BIFs). Boilers are used to recover energy from hazardous waste, while industrial furnaces are used to recover energy and/or material values from the hazardous waste.

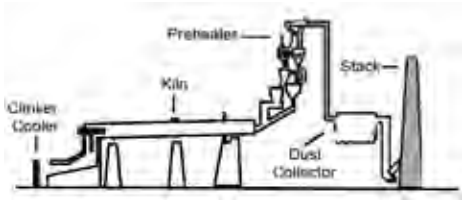
EPA defines **boilers** as enclosed devices that use controlled flame combustion to recover and export energy in the form of steam, heated fluid, or heated gases. A boiler is comprised of two main parts, the combustion chamber used to heat the hazardous waste and the tubes or pipes that hold the fluid used to produce energy (see Figure III-25). The regulatory definition of boiler requires that these two parts be in close proximity to one another to ensure the effectiveness of the unit's energy recovery system and to maintain a high thermal energy recovery efficiency. In addition, the unit must export or use the majority of the recovered energy for a beneficial purpose.

Figure III-25: Cross-Section of a Boiler



Industrial furnaces are enclosed units that are integral parts of a manufacturing process and use thermal treatment to recover materials or energy from hazardous waste (see Figure III-26). These units may use hazardous waste as a fuel to heat raw materials to make a commodity (e.g., a cement kiln making cement) or the unit may recover materials from the actual hazardous waste (e.g., a lead smelter recovering lead values). The following 12 devices meet the definition of an industrial furnace:

Figure III-26: Cross-Section of a Cement Kiln



- **Cement kiln**
- Aggregate kiln
- Coke oven
- Smelting, melting, and refining furnace
- Methane reforming furnace
- Pulping liquor recovery furnace
- Lime kiln
- Phosphate kiln
- Blast furnace
- Titanium dioxide chloride process oxidation reactor
- Halogen acid furnace (e.g., hydrochloric acid production furnace)
- Combustion device used in the recovery of sulfur values from spent sulfuric acid.

After notice and comment, EPA may add other devices to this list of industrial furnaces upon consideration of factors related to the design and use of the unit.

Not all units that meet the definition of boiler or industrial furnace are subject to the 40 CFR Part 266, Subpart H, boiler and industrial furnace standards. Each individual unit must first be evaluated against a number of exemptions from the BIF requirements. For a variety of reasons (e.g., to avoid duplicative regulation), EPA exempted the following units from the BIF regulations:

- Units burning used oil for energy recovery
- Units burning gas recovered from hazardous or solid waste landfills for energy recovery

- Units burning hazardous wastes that are exempt from RCRA regulation, such as household hazardous wastes
- Units burning hazardous waste produced by conditionally exempt small quantity generators (CESQGs)
- Coke ovens burning only K087 decanter tank tar sludge from coking operations
- Certain units engaged in precious metals recovery
- Certain smelting, melting, and refining furnaces processing hazardous waste solely for metals recovery
- Certain other industrial metal recovery furnaces.

REGULATORY REQUIREMENTS

Emissions from hazardous waste combustors are regulated under two statutory authorities—RCRA and the Clean Air Act (CAA). Applicable RCRA regulations include 40 CFR Part 264, Subpart O, and Part 265, Subpart O, for incinerators and 40 CFR Part 266, Subpart H, for BIFs. RCRA permitting requirements for these units are provided in 40 CFR Part 270. These units are also subject to the general TSDF facility standards under RCRA. Certain combustion units that burn hazardous waste are also subject to emission standards under the CAA, including incinerators, cement kilns, **lightweight aggregate kilns**, industrial boilers, and hydrochloric acid production furnaces. The **maximum achievable control technology (MACT)** standards set emission limitations for dioxins and furans, metals, particulate matter, hydrogen chloride and chlorine, hydrocarbons/carbon monoxide, and **destruction and removal efficiency** (DRE) for organics. Once a facility has demonstrated compliance with the MACT standards by conducting its comprehensive performance test and submitting its Notification of Compliance (NOC), it is no longer subject to the RCRA emission requirements with few exceptions. RCRA permitted facilities, however, must continue to comply with their permitted emissions requirements until they obtain modifications to remove any duplicative emissions conditions from their RCRA permits. Also, RCRA permits will continue to be required for all other aspects of the combustion unit and the facility that are governed by RCRA (e.g., corrective action, general facility standards, other combustion-specific concerns such as materials handling, risk-based emission limits and operating requirements, and other hazardous waste management units.) The combustion standards under RCRA, as well as the MACT standards under the CAA, are discussed below.

In September 1999, EPA issued a joint Clean Air Act (CAA)/RCRA rule that upgraded the emission standards for Phase I hazardous waste combustors (i.e., incinerators, cement kilns, and lightweight aggregate kilns), based on the maximum achievable control technology (MACT) approach commonly employed under the CAA. This process develops technology-based, emission limits for individual hazardous air pollutants. Much like the BDAT concept for land disposal restrictions (LDR) (as discussed in Chapter III, Land Disposal Restrictions), the MACT emission standards are based on the performance of a technology. Research is performed that determines the specific pollutants that need to be treated. The best corresponding technology is then used to treat those pollutants.

Consistent with EPA's trend of gradually increasing the stringency of standards over time, this joint rule promulgated more stringent emissions standards for dioxins, furans, mercury, cadmium, lead, particulate matter, hydrogen chloride, chlorine gas, hydrocarbons, carbon monoxide, and several low-volatile metals. After the promulgation of this rule, a number of parties representing the interests of both industrial sources and the environmental community, requested judicial review of this rule.

In July 2001, the United States Court of Appeals for the District of Columbia Circuit vacated the challenged portions of the rule. When it made its decision, the Court invited any of the parties to request, either that the current standards remain intact, or that EPA be allowed time to publish interim standards. Acting on this initiative, EPA and the other parties jointly asked the Court for additional time to develop interim standards, and the Court granted this request. On February 13, 2002, EPA published these interim standards which temporarily replace the vacated standards. Since the development of the interim standards, litigation has prevented the

promulgation of the final standards. A ruling by the DC court on Brick MACT has prevented the final rule even further from being promulgated.

■ Combustion Standards under RCRA

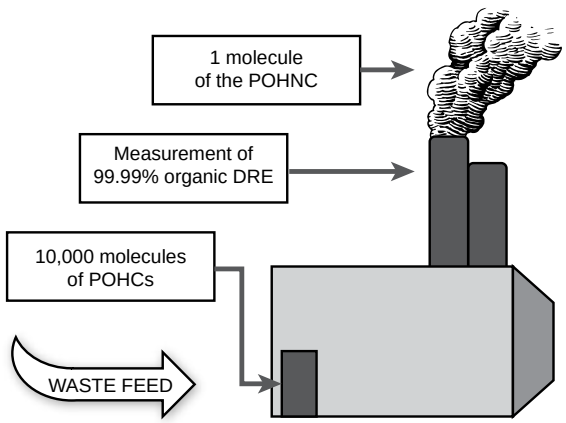
Emissions from combustion units may comprise a variety of hazardous pollutants. To minimize potential harmful effects of these pollutants, EPA developed performance standards to regulate four pollutant categories: organics, hydrogen chloride and chlorine gas, particulate matter, and metals. Boilers and most industrial furnaces, hereafter referred to as RCRA combustion units, have performance standards that they must meet. For each category or type of emission, the regulations establish compliance methods and alternatives.

Organics

Because the primary purpose of a combustion unit is to destroy the organic components found in hazardous waste, it is essential to verify that the unit is efficiently destroying organics in the waste. This is determined based on the unit's organic destruction and removal efficiency (DRE) as demonstrated in a trial burn. Since it would be nearly impossible to determine the DRE results for every organic constituent in the waste, certain **principal organic hazardous constituents (POHCs)** are selected for this demonstration. These POHCs are selected for each facility based on their high concentration in the wastestream and their greater difficulty to burn. If the unit achieves the required DRE for the POHCs, then it is presumed that it will achieve the same (or better) DRE for all other easier-to-burn organics in the wastestream. At least one POHC will be selected from each wastestream that the facility manages. The facility designates the selected POHCs in their permit application (the permitting process for combustion units is fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities).

The combustion unit must demonstrate a DRE of 99.99 percent for each POHC in the hazardous wastestream. This means that for every 10,000 molecules of the POHC entering the unit, only one molecule can be released to the atmosphere. In addition, due to an increased threat to human health and the environment posed by certain dioxin-containing wastes (F020, F021, F022, F023, F026, and F027), the required DRE for POHCs in these units has been established at 99.9999 percent, or one released molecule for every one million burned (see Figure III-27). These DRE standards must be met by both incinerators and BIFs.

Figure III-27: Performance Standards for Organics



POHCs are chosen based on their high concentration in the waste stream and their greater difficulty to burn. If the unit demonstrates the required DRE for the POHCs, then it is presumed that it will be able to achieve the same (or better) DRE for all other easier-to-burn organics in the wastestream. For every 10,000 molecules of POHCs that enter a combustion process, the unit must destroy 9,999 of them.

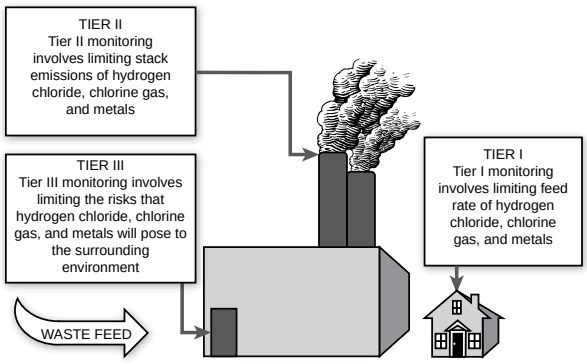
Hydrogen Chloride and Chlorine Gas

Hydrogen chloride and chlorine gases form when chlorinated organic compounds in hazardous wastes are burned. If uncontrolled, this chlorine can become a human health risk and is a large component in the formation of acid rain. EPA has developed different requirements to control the emissions of chlorine from the different classes of combustion units.

Boilers and most industrial furnaces must follow a tiered system for the regulation of both hydrogen chloride and chlorine gas. The owner and operator determines the allowable feed or emission rate of total chlorine by selecting one of three approaches, called tiers. Each tier differs in the amount of monitoring, and in some cases, air dispersion modeling (i.e., modeling the air pathways through which pollutants may travel), that the owner and operator is required to conduct (see Figure III-28).

Each facility can select any of the three tiers. Factors that a facility may consider in selecting

Figure III-28: Performance Standards for Hydrogen Chloride, Chlorine Gas, and Metals



a tier include the physical characteristics of the facility and surrounding terrain, the anticipated waste compositions and feed rates, and the level of resources available for conducting the analysis. The main distinction between the tiers is the point of compliance. This is the point at which the owner and operator must ensure that chlorine concentrations will be below EPA's acceptable exposure levels. The owner and operator must determine if the cost of conducting monitoring and modeling is worth the benefit of possibly combusting waste with a higher concentration of chlorine (see Figure III-29).

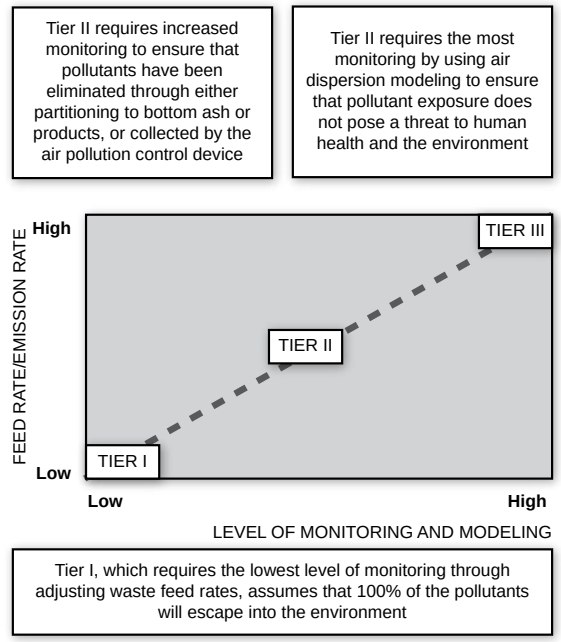
Particulate Matter

The third combustion unit performance standard is for **particulate matter**. Particulate matter consists of small dust-like particles emitted from combustion units. The particles themselves are not normally toxic, but may become caught in the lungs (causing respiratory damage) if inhaled, or may enter into the environment where they can cause either ecological damage or, via food chain intake, can reenter the human health exposure pathway. In addition, particulate matter may provide a point of attachment for toxic metals and organic compounds. To minimize these adverse conditions, RCRA combustion units may not emit more than 180 milligrams per dry standard cubic meter (dscm) of particulate matter.

Metals

The final performance standard is for toxic metals. For RCRA combustion units, both carcinogenic

Figure III-29: The Tiered System of Modeling and Monitoring



Owners and operators can choose any tier for their hydrogen chloride, chlorine gas, and metals monitoring; however, the level of monitoring and modeling increase with each tier.

and noncarcinogenic metals are regulated under the same type of tiered system as chlorine. The facility determines an appropriate tier for each regulated metal and assures that the facility meets these feed rate and emission standards. A different tier may be selected for each metal pollutant (see Figure III-28).

Additional Performance Standards

EPA may require owners and operators of hazardous waste combustion units, including those regulated by the CAA MACT standards, to comply with additional performance standards by virtue of the omnibus authority. This authority allows EPA to incorporate additional terms and conditions into a facility's permit as necessary to protect human health and the environment.

EPA recommends that site-specific risk assessments, incorporating direct and indirect exposures, be considered on a case-by-case basis during the combustion unit's permitting process. These risk assessments may be used to evaluate the unit's impact on the surrounding environment. If a site-specific risk assessment shows that additional protection should be afforded to the surrounding

environment, EPA will include the necessary permit conditions and limitations in the permit pursuant to the omnibus authority (Omnibus permitting authority is fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities).

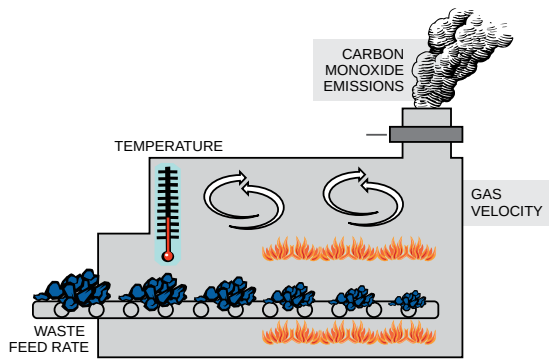
Operating Requirements

The goal of setting operating requirements for hazardous waste combustion units is to ensure that the unit will operate in a way that meets the performance standards for organics, hydrogen chloride and chlorine gas, particulate matter, and metal pollutants. The unit's permit will specify the operating conditions that have been shown to meet the performance standards for organics, chlorine gas, particulate matter, and metals (permit requirements for combustion units are fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities).

A RCRA permit for a hazardous waste combustion unit sets operating requirements that specify allowable ranges for, and requires continuous monitoring of, certain critical parameters that will ensure compliance with the performance standards. Operation within these parameters ensures that combustion is performed in the most protective manner and the performance standards are achieved (see Figure III-30). These parameters, or operating requirements, may include:

- Maximum waste feed rates
- Control of the firing system
- Allowable ranges for temperature
- Limits on variations of system design and operating procedures
- Gas flow rate.

Figure III-30: Operating Requirements



Combustion facilities must operate in accordance with certain conditions that specify allowable ranges and limits for waste feed rates, temperature, gas velocity, and carbon monoxide emissions.

■ MACT Standards Under CAA

Section 112 of the CAA establishes a regulatory process to address emissions of hazardous air pollutants (HAP) from stationary sources, including hazardous waste combustors. Section 112(d) of the CAA requires EPA to promulgate national emission standards for hazardous air pollutants (NESHAP) for hazardous waste combustors. These technology-based NESHAP standards must reflect the maximum reductions of HAP achievable and are commonly referred to as maximum achievable control technology (MACT) standards.

EPA issued the NESHAP for new and existing hazardous waste combustors on October 12, 2005. This final rule established standards for several HAP or HAP surrogates, including chlorinated dioxin and furans, other toxic organic compounds, toxic metals for three different volatility groups (volatile – mercury; semivolatile metals – lead and cadmium; and low volatile metals – arsenic, beryllium and chromium), hydrogen chloride and chlorine, and particulate matter. The emission standards are codified in 40 CFR part 63, Subpart EEE.

In March 2007, a federal court issued an opinion vacating and remanding the CAA section 112(d) MACT standards for the Brick and Structural Clay Ceramics source categories (these categories are a separate source category than hazardous waste combustors). After considering the implications of this court decision, EPA requested a voluntary remand of the MACT standards for hazardous waste combustors. A federal court granted EPA's request in August 2009. As a result of the remand, EPA is required to conduct rulemaking to revise all the MACT emission standards for hazardous waste combustors promulgated in the 2005 rule.

The compliance framework for these MACT combustion units is similar to that used to comply with the RCRA emission standards. Sources are required to demonstrate compliance with emission standards via a comprehensive performance test and establish operating limits to ensure compliance on

a daily basis. Generally speaking, sources can use any combination of control technologies to achieve the emission standards (e.g., back-end air pollution controls or front-end pollutant feed controls).

Organics

To control the emission of organics, these units must comply with similar DRE requirements to the other hazardous waste combustion units. Owners or operators of MACT combustion units must select POHCs and demonstrate a DRE of 99.99 percent for each POHC in the hazardous wastestream. Sources that burn hazardous waste F020-F023 or F026-F027 have a required DRE of 99.9999 percent for each POHC designated. Additionally, for dioxins and furans, EPA promulgated more stringent standards under MACT. For example, under the final standards MACT incinerators and cement kilns that burn waste with dioxins and furans, must not exceed an emission limitation of either 0.2 nanograms of toxicity equivalence per dry standard cubic meter **(TEQ/dscm)** or 0.4 nanograms TEQ/dscm at the inlet to the dry particulate matter control device. This unit of measure is based on a method for assessing risks associated with exposures to dioxins and furans.

Hydrogen Chloride and Chlorine Gas

Rather than a tiered system to control hydrogen chloride and chlorine gas emissions, MACT combustion units must meet numerical emission limits for total chlorine. Owners and operators of these units must ensure that the total chlorine emission does not exceed specific limits, expressed in ppmv (parts per million by volume). For example, the current allowable limit of total chlorine for a new incinerator is 21 ppmv. The owner or operator may choose to achieve this level by controlling the amount of chlorine entering the incinerator. By achieving the regulatory emission limit of chlorine, both hydrogen chloride and chlorine gas emissions will be reduced.

Particulate Matter

EPA developed more stringent standards for particulate matter in order to control certain metals. This surrogate is used because particulate matter may provide a point of attachment for toxic metals that can escape into the atmosphere from a combustion unit. For instance, a new LWAK cannot exceed an emission limit of 57 mg/dscm of particulate matter.

Metals

Hazardous waste combustors do not follow a tiered approach to regulate the release of toxic metals into the atmosphere. The MACT rule finalized numerical emission standards for three categories of metals: mercury, low-volatile metals (arsenic, beryllium, and chromium), and semi-volatile metals (lead and cadmium). Units must meet emission standards for the amount of metals emitted. Currently, a new incinerator must meet an emission limit of 8.1 ug/dscm for mercury, 23 ug/dscm for the low-volatile metals, and 10 ug/dscm for the semi-volatile metals.

Operating Requirements

Owners or operators of MACT units must ensure that the MACT emission standards are not exceeded. To do this, the unit must operate under parameters that are demonstrated in a **comprehensive performance test (CPT)**. The unit's operating parameters, such as temperature, pressure, and waste feed are then set based on the result of the comprehensive performance test and documented in a notification of compliance. **Continuous monitoring systems (CMS)** are used to monitor the operating parameters.

The facility may also request to use an advanced type of monitoring known as **continuous emissions monitoring systems (CEMS)**. CEMS directly measure the pollutants that are exiting the combustion unit stack at all times. If a facility is approved to use a CEMS, they do not need to comply with the operating parameter that would otherwise apply.

ADDITIONAL REQUIREMENTS

Because hazardous waste combustion units are a type of TSDF, they are subject to the general TSDF standards (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities) in addition to combustion unit performance standards and operating requirements. Combustion units are also subject to specific waste

analysis, inspection and monitoring, and residue management requirements.

While combusting hazardous waste, the combustion process and equipment must be monitored and inspected to avoid potential accidents or incomplete combustion. The monitoring and inspection requirements for incinerators, cement kilns, and LWAKs are detailed in the CAA regulations, while the requirements for BIFs are determined on a site-specific basis. Possible inspection and monitoring requirements include:

- Monitoring the combustion temperature, and hazardous waste feed rate
- Sampling and analyzing the waste and exhaust emissions to verify that the operating requirements established in the permit achieve the performance standards
- Conducting visual inspections of the combustion unit and its associated equipment
- Testing the emergency waste feed cut-off system and associated alarms
- Placing monitoring and inspection data in the operating log.

Residues from the combustion of hazardous waste are also potentially subject to RCRA regulation. If a combustion unit burns a listed hazardous waste, the ash could also be considered a listed waste via the derived-from rule. The owner and operator must also determine whether this ash exhibits any hazardous waste characteristics. The same is true if a unit burns waste that only exhibits a characteristic. Ash that exhibits a characteristic must be managed as a hazardous waste.

SUMMARY

Combustion, the controlled burning of hazardous substances in an enclosed area, has the potential to adversely affect human health and the environment, and it is therefore subject to strict regulation. As a result, the burning of hazardous waste in incinerators and BIFs is regulated through stack emission limitations and unit operating requirements.

Combustion standards are comprised of two types of regulations: (1) standards under RCRA; and (2) MACT standards under the CAA.

RCRA combustion units must meet performance standards, including a demonstration of the unit's DRE for certain POHCs, and meet emission standards for hydrogen chloride, chlorine gas, metals, and particulate matter. Operating requirements are intended to ensure that the combustion unit will operate in a way that meets the performance standards for these pollutants. Operating conditions may include:

- Maximum waste feed rate
- Control of the firing system
- Allowable ranges for temperature
- Limits on variations of system design and operating procedures
- Gas flow rate.

The MACT standards under the CAA currently regulate several types of combustor units that burn hazardous waste: incinerators, cement kilns, lightweight aggregate kilns, boilers, and hydrochloric acid production furnaces. MACT combustion units must comply with strict emission limitations for dioxins, furans, metals, particulate matter, DRE, and total chlorine. To achieve the limits, the facility owner or operator may use a single or multiple pollution control technologies for the combustion unit. The facility also uses a CMS to monitor operating parameters such as temperature, pressure, waste feed, or CEMS to monitor the pollutants exiting the unit.

In addition to operating and performance requirements, all combustion units are subject to specific waste analysis, inspection and monitoring, and residue management requirements.

ADDITIONAL RESOURCES

A complete overview of the MACT standards and additional information about hazardous waste combustion can be found at www.epa.gov/epawaste/hazard/tsd/td/combustion.htm.

PERMITTING OF TREATMENT, STORAGE AND DISPOSAL FACILITIES

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OVERVIEW

When RCRA was enacted, Congress recognized the risks posed by the treatment, storage, and disposal of large volumes of hazardous waste at treatment, storage, and disposal facilities (TSDFs). Considering these risks, Congress felt that TSDF management activities needed to be closely regulated to prevent spills, accidents, and mechanical failures. In addition, because these activities involve different units and different waste management methods, they require tailored standards. For example, land disposal units need precautions, such as liners and ground water monitoring, to ensure protection of ground water resources. Similarly, incinerators need special provisions, such as emission control requirements, to ensure protection of air resources. In response to these concerns, EPA promulgated extensive technical standards for the design and safe operation of hazardous waste TSDFs (these regulations are fully discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). However, these design and operating standards were not enough. Congress wanted a more tangible guarantee that TSDFs would comply with their extensive management standards in a way that would adequately protect human health and the environment.

WHAT ARE PERMITS?

Permits provide TSDF owners and operators with the legal authority to treat, store, or dispose of hazardous waste and detail how the facility must comply with the regulations. Compliance with the permit ensures that hazardous waste is handled in a controlled manner that is protective of human health and the environment. Permits also serve as an implementation mechanism, and as a means by which EPA can track waste management at facilities that choose to handle hazardous waste.

TSDFs are unique in that their owners and operators choose to enter the hazardous waste industry. Unlike generators who produce hazardous waste incidental to their normal business operations, TSDF owners and operators make it their business to manage hazardous waste. Because these facilities choose to enter the hazardous waste industry, and engage in waste management processes that pose varied and extensive risks to human health and the environment, Congress wanted to ensure that these facilities would comply with the TSDF standards.

As a result, TSDFs are required to obtain permission, in the form of an operating permit, which establishes the administrative and technical conditions under which waste at the facility must be managed. Specifically, permits provide TSDF owners and operators with the legal authority to treat, store, or dispose of hazardous waste and detail how the facility must comply with the regulations. Compliance with the permit ensures that hazardous waste is handled in a controlled manner that is protective of human health and the environment. Permits also serve as an implementation mechanism, and as a means by which EPA can track waste management at facilities that choose to handle hazardous waste.

Permits can be issued by EPA, authorized states, or both. The permitting agency has the authority to issue or deny permits and is responsible for verifying that facilities are operating in compliance with the conditions set forth in that permit. Owners and operators of facilities that do not comply with permit provisions are subject to possible RCRA enforcement actions, including financial penalties.

APPLICABILITY

All TSDF owners and operators must submit a comprehensive permit application that covers the full range of TSDF standards, including general facility provisions, unit-specific requirements, closure and financial assurance standards, and any applicable ground water monitoring and air emissions provisions. The permit application must demonstrate that the permittee's methods of handling the waste are consistent with the level of protection of human health and the environment required by RCRA.

Some facilities are not required to obtain a RCRA permit when handling hazardous waste provided that they meet certain conditions specified in the regulations. EPA has determined that the requirements of the permit process would place an unnecessary regulatory burden on these facilities because the manner in which they manage the waste does not pose a significant threat to human health and the environment. These exceptions include:

- Large quantity generators (LQGs) accumulating waste on site for less than 90 days (as discussed in Chapter III, Regulations Governing Hazardous Waste Generators)
- Small quantity generators (SQGs) accumulating waste on site for less than 180 days (as discussed in Chapter III, Regulations Governing Hazardous Waste Generators)
- Farmers disposing of waste pesticides and container residues on their own land
- Owners and operators of elementary neutralization units (ENUs), totally enclosed treatment units (TETUs), and wastewater treatment units (WWTUs) (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities)
- Transporters storing manifested wastes at transfer facilities for a period of 10 days or less (as discussed in Chapter III, Regulations Governing Hazardous Waste Transporters)
- Owners and operators performing containment activities during an immediate response to an emergency
- Universal waste handlers and transporters (as discussed in Chapter III, Hazardous Waste Recycling and Universal Wastes)
- Persons adding absorbent material to hazardous waste in a container and persons adding waste to absorbent material in a container.

If any of these facilities treat, store, or dispose of hazardous waste in a manner not covered by one of these exclusions, they are subject to the RCRA permit requirements for that activity. For example, if a LQG exceeds the 90-day accumulation time limit, the facility becomes a storage facility and the owner and operator must obtain a RCRA operating permit.

Recycling units are also exempt from permitting requirements because the recycling process itself is exempt from RCRA (except for some air emission standards). However, recycling facility owners and operators must follow all applicable Subtitle C requirements (including the requirement to obtain a permit) for any waste management prior to recycling.

PERMITTING PROCESS

Owners and operators who are subject to the permitting requirements must submit a permit application in accordance with specific permit application procedures (see Figure III-31). While the operator has the duty to obtain the permit, both the owner and operator must sign it. Once a permit has been approved for a specified duration, changes may be necessary and permit modification procedures, which are analogous to the initial permit application, must be followed. The procedures have been established to account for facility-specific conditions by providing flexibility and ample opportunity for public involvement.

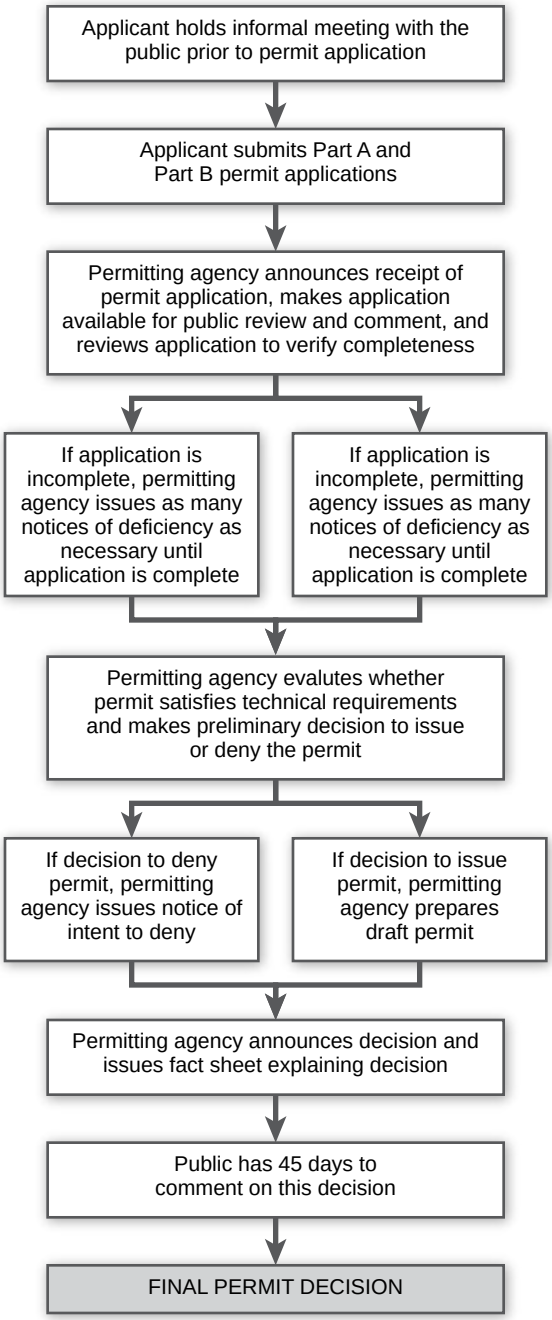
■ Informal Meeting Prior to Application

Prior to submitting a permit application, an applicant must announce and hold an informal meeting with the public. The purpose of this meeting is for the applicant to explain the operating plans for the facility, including the waste the facility will handle and associated waste management processes, to the public, and for the public to pose questions and make suggestions. This informal public meeting is also intended to provide the owner and operator with issues and concerns to consider when drafting the permit. The permitting agency also uses this meeting to compile a mailing list for future public outreach.

■ Permit Submission

After the public meeting, the applicant can submit the permit application to the permitting agency. The permit application is divided into two parts, Part A and Part B. The Part A application is submitted on a designated form, *EPA Form 8700-23*, and requires basic information about the facility, such as the name of the facility owner and operator, the facility location, the hazardous waste management processes, the design capacity of these processes, and the hazardous waste that will actually be handled at the facility. This form can be downloaded from the Internet at www.epa.gov/epawaste/inforesources/data/form8700/forms.htm.

Figure III-31: The Permitting Process



The Part B application is submitted in narrative form and provides site-specific information associated with the waste management activities that will be conducted at the facility, and includes geologic, hydrologic, and engineering data (see Figure III-32). The Part B application covers the details associated with the waste management activities that will occur at the facility, and therefore often consists of volumes of documents.

Figure III-32: Examples of Part A and Part B Information Requirements

PART A

- Activities conducted that require a permit
- Facility name, mailing address, and location
- Facility North American Industry Classification System (NAICS) codes
- Treatment, storage, and disposal processes
- Design capacity of waste management units
- Lists of wastes to be managed at facility
- Permits received or applied for under other regulatory programs
- Topographic map.

PART B

- General facility description
- Analyses of wastes to be managed
- Facility security procedures
- Inspection schedule
- Contingency plan
- Procedures and precautions to prevent release of waste into environment
- Procedures and precautions to prevent accidental ignition or reaction of waste
- Facility location information

Owners and operators of new facilities must submit Parts A and B simultaneously. This submission must occur at least 180 days prior to the date on which physical construction is expected to begin. An owner and operator cannot begin construction of the facility until the application is reviewed and a final permit is issued.

■ Permit Review

The permitting agency announces its receipt of the permit application and makes the application available for public review and comment. Simultaneously, the agency reviews the application to verify its completeness. If the permitting agency determines that the application is incomplete, it issues a **notice of deficiency** to the permittee describing the additional information that is necessary for a complete application. Such notices can be issued numerous times during the permit review and revision process. Each time the agency receives information, it reviews the content, and if necessary, issues another notice until the application is complete.

When the application contains all of the necessary information, the permitting agency notifies the permittee of the application's completeness and will begin an evaluation to determine whether it satisfies the appropriate technical requirements. After the evaluation, the permitting agency makes a preliminary decision on whether to issue or deny the permit. If the permitting agency determines that the application is complete and satisfies all applicable requirements, the agency prepares a draft permit. If the permitting agency determines that the application does not demonstrate compliance with the RCRA standards, it will tentatively deny the permit and issue a **notice of intent to deny**.

■ Preparation of the Draft Permit

In preparing the draft permit, the implementing agency incorporates all applicable technical requirements and all other conditions associated with the operations to be conducted at the facility into the permit. In addition, general and administrative conditions are placed in all draft permits and require the permittee, among other things, to:

- Comply with all provisions of the permit
- Provide any relevant information that is requested by the permitting agency
- Comply with all reporting requirements
- Allow the facility to be inspected
- Take all reasonable steps to protect human health and the environment.

In addition, the draft permit includes a statement of the permitting agency's right to modify, revoke and reissue, or terminate the permit as necessary. The draft permit also includes the term of the permit.

If a facility needs to conduct corrective action, but cannot complete the cleanup before the permit is issued, the permitting agency may include a schedule of compliance in the permit. This schedule establishes interim and final dates for the completion of specific cleanup goals, as well as reporting requirements.

■ Taking Public Comment

Once the draft permit is complete, or the notice of intent to deny has been issued, the permitting agency announces its decision by sending a letter to everyone on the facility mailing list, placing a notice in a local paper, and broadcasting the decision over the radio. The permitting agency also issues a fact sheet to explain the decision. After the announcement, the public has 45 days or more to comment on the decision. Citizens may request a public hearing to address concerns by contacting the permitting agency. The permitting agency may also hold a hearing at its own discretion, if deemed necessary. There is at least a 30-day public notice period before the hearing is convened.

If information submitted during the initial comment period appears to raise substantial new questions concerning the permit, the permitting agency may reopen or extend the comment period. In this situation, the permitting agency may also decide to revise the draft permit or issue a notice of intent to deny.

■ Finalizing the Permit

After the comment period closes, the implementing agency prepares a response to all significant public comments and makes the final permit decision by either issuing or denying the permit. The owner and operator may appeal the decision to EPA's Environmental Appeals Board. When this administrative appeal is exhausted, the petitioner may seek judicial review of the final permit decision.

■ Duration of the Permit

RCRA permits are effective for a fixed term of a maximum of 10 years. However, EPA can issue a permit for less than the allowable term. Limiting permit duration assures that facilities are periodically reviewed and that their requirements are updated to reflect the current state-of-the-art hazardous waste management practices. Considering the increased risks posed by the management of hazardous waste on the land, land disposal unit permits are to be reviewed five years after the date of issuance or reissuance and modified as necessary. An expiring permit can be continued when the permittee has submitted a timely application for a new permit by the expiration date of the existing permit. Permits that continue remain fully effective and enforceable.

■ Permit Modifications

EPA views permits as living documents that can be modified to allow facilities to implement technological improvements, comply with new environmental standards, respond to changing waste streams, and generally improve waste management practices. The permitting agency cannot anticipate all of the administrative, technical, or operational changes required over the permit term for the facility to maintain a state-of-the-art operation, and therefore, permit modifications are inevitable. The regulations governing permit modifications were developed to provide owners and operators and EPA with flexibility to change permit conditions, expand public notification and participation opportunities, and allow for expedited approval if no public concerns exist regarding a proposed change. Permit modifications can be requested by either the permittee or the permitting agency.

The regulations for permittee-requested modifications establish three classes of modifications. Class 1 modifications cover routine changes, such as correcting typographical errors or replacing equipment with functionally equivalent equipment. Class 2 modifications address common or frequently occurring changes needed to maintain a facility's level of safety or a facility's requirement to conform to new regulations. Class 3 modifications cover major changes that substantially alter the facility or its operations (see Figure III-33). Procedures differ among the three classes of permittee-requested modifications based on the degree of change. Class 1 modifications have minor administrative requirements and may or may not need prior Agency approval. Class 2 and 3

Figure III-33: Examples of Permit Modification Classifications

Class 1	Class 2	Class 3
Adminstrative and informational changes	Changes in frequency or content of inspection schedules	Addition of corrective action program
Correction of typographical errors	Changes to corrective action program	Creation of a new landfill as part of closure
Changes in names, addresses, and phone numbers of emergency coordinators	Extensions of post-closure care period	Addition of compliance monitoring to ground water monitoring program
Changes to waste sampling and analysis methods to comply with new regulations	Changes to facility training plan that affect the type or amount of employee training	Reduction in post-closure care period
Changes to analytical quality assurance and quality control plan to comply with new regulations	Changes in number, location, depth, or design of groundwater monitoring wells	Addition of temporary incinerator for closure activities

Note: Permit modifications are classified in more detail in 40 CFR §270.42, Appendix I

modifications have more substantial administrative requirements and require prior Agency approval followed by a process similar to the permitting process.

The permitting agency may request a permit modification if there are substantial alterations or additions to the facility, if new information is received by the permitting agency that was not available at the time of permit issuance, or if new regulations or judicial decisions affect the conditions of the permit. The permitting agency will request that the facility initiate the modification procedures for the type of change being requested. The permitting agency may terminate a permit if the facility fails to comply with any condition of the permit or does not disclose or misrepresents any relevant facts, or if the permitted activity endangers human health and the environment.

■ Omnibus Provision

Some hazardous waste management practices may pose threats to human health and the environment that are not specifically addressed by the RCRA regulations. To address such instances, HSWA increased the authority of EPA when writing permits by creating the **omnibus provision**. This authority allows EPA to add conditions that are not specifically described in Part 264 to an operating permit, where the permit writer demonstrates that the additional standards are necessary to protect human health and the environment. For example, EPA could invoke the omnibus authority to require a TSDF owner and operator to conduct a site-specific risk assessment of the impact on endangered species before issuing an operating permit to the facility, even though such risk assessments are not specifically mandated by the RCRA regulations.

■ Permit-as-a-Shield

In general, compliance with a RCRA permit is considered compliance with the RCRA regulations for enforcement purposes. This gives permittees the security of knowing that if they comply with their permits, they will not be enforced against for violating new requirements that were not established in the original permit. This is referred to as the **permit-as-a-shield** provision. EPA believes that the most useful purpose of a permit is to specifically prescribe the requirements that a facility has to meet to allow that facility to plan and operate with knowledge of what rules apply.

While permit-as-a-shield protects a facility from having to comply with new regulatory requirements that were not included in the original operating permit, some regulatory requirements are of such importance to the protection of human health and the environment that EPA feels that TSDFs should have to comply with them immediately. As a result, the permit-as-a-shield provision does not apply to some types of new regulatory provisions. Examples are the land disposal restrictions (LDR) standards, the liner and leak detection requirements for certain land disposal units, and the organic air emissions provisions.

INTERIM STATUS

Many TSDFs were already existing and operating when they became subject to RCRA regulatory

HOW DOES INTERIM STATUS OPERATE?

Beginning in 1980, XYZ Corporation began treating and storing nonhazardous petroleum refinery sludges at one of its facilities. On November 2, 1990, EPA promulgated F037 and F038 hazardous waste listings for such sludges. As a result, the sludges became subject to the hazardous waste regulations and XYZ's facility became subject to the RCRA TSDF standards. However, rather than ceasing operations, the facility was allowed to operate under the interim status provisions until it received an operating permit. Under these provisions, XYZ was required to submit a Part A permit application six months after the date of publication of the regulatory change that subjected it to the RCRA standards (i.e., by May 2, 1991).

XYZ's Part B permit application must be submitted when requested by the permitting agency. The permitting agency will give the facility at least six months from the date of request to submit the Part B. If XYZ is managing these sludges in land disposal units, the owner and operator must submit their Part B within 12 months of becoming subject to the regulations (i.e., by May 2, 1992) or they will lose interim status.

requirements as a result of a statutory or regulatory change. These owners and operators were immediately subject to the RCRA requirements, including the requirement to obtain an operating permit. Many of these facilities were not able to immediately meet the required TSDF design and operating standards in order to obtain an operating permit. Congress recognized that it would be virtually impossible for the Agency and authorized states to issue permits to all existing TSDFs before the RCRA Subtitle C program became effective in November 1980. As a result, Congress established provisions to give these facilities "interim status." Interim status allows a facility to operate without a permit as long as it complies with certain general facility and unit-specific TSDF standards until the implementing agency can make a final permit determination. These interim status requirements are self-implementing until the facility submits its Part B permit application and receives its final permit.

■ Qualifying for Interim Status

In order to qualify for interim status, the facility must have:

- Existed (operating or in construction) on the effective date of the rule that brought the facility into the RCRA program
- Submitted a Part A permit application
- Notified EPA of hazardous waste activity.

■ Changes During Interim Status

Changes can be made to a facility operating under interim status provided that the owner and operator submits a revised Part A permit application that includes justification for the proposed change before any changes are made. The following changes are permissible:

- Management of hazardous wastes not previously identified in Part A of the permit application
- Increases in the design capacity of processes used at the facility
- Changes to, or additions of, hazardous waste processes
- Changes in the ownership or operational control of the facility
- Changes made in accordance with an interim status corrective action order under §3008(h) (corrective action is fully discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination)
- Addition of newly regulated hazardous waste units.

Changes to an interim status facility may not be made if they amount to "reconstruction" of the facility. Any change that requires a capital expenditure exceeding 50 percent of the cost of construction of a comparable new facility is considered reconstruction. This reconstruction prohibition prevents interim status facilities from constructing entirely new facilities while operating under self-implementing standards, in order to avoid the scrutiny of the permitting process that would otherwise apply to new facilities. The reconstruction prohibition does not apply if the changes are necessary to comply with the LDR regulations, the hazardous waste tank regulations, or a corrective action order, among other things.

■ Termination of Interim Status

Interim status is terminated either when the permitting agency makes a final determination on the Part B permit application (to either issue or deny a

permit), or when the facility fails to furnish a Part B application on time.

An owner and operator of an interim status facility may submit the Part B voluntarily or in response to a request from the state or EPA. However, an owner and operator of a facility already in existence must submit the Part B in accordance with HSWA-mandated deadlines for specific types of units. If a permittee fails to submit the Part B before the expiration of the specified statutory time period, the facility loses interim status immediately. These deadlines were imposed because Congress wanted to ensure that hazardous waste management units that posed increased threats to human health and the environment would not operate in interim status indefinitely.

SPECIAL FORMS OF HAZARDOUS WASTE PERMITS

Some hazardous waste management operations and practices require special permit provisions. These provisions provide the permitting agency flexibility in developing permit conditions and procedures for permit administration. These special forms of permits include:

- Permits-by-rule
- Emergency permits
- Research, development, and demonstration (RD&D) permits
- Land treatment demonstration permits
- Combustion permits
- Post-closure permits
- Remedial Action Plans.

Additionally, EPA has developed another special type of permit called a "standardized permit." The "standardized permit" streamlines the permitting process for hazardous waste generators who subsequently store or non-thermally treat hazardous waste in tanks, containers, or containment buildings.

■ Permits-by-Rule

EPA issues permits under different environmental statutes. In some instances, the RCRA regulations may overlap with the requirements of another statute. In order to avoid unnecessary duplicative regulation, RCRA allows these facilities' non-RCRA permits to serve in place of a RCRA permit, provided that such facilities are in compliance with that permit and other basic RCRA administrative requirements. Permits-by-rule are available for:

- Ocean disposal vessels and barges regulated under the Marine Protection, Research, and Sanctuaries Act (MPRSA)
- Underground injection control (UIC) wells regulated under the Safe Drinking Water Act (SDWA)
- Publicly owned treatment works (POTWs) regulated under the Clean Water Act (CWA).

■ Emergency Permits

In emergency situations, EPA can forego the normal permitting process for hazardous waste management activities. Specifically, when EPA or an authorized state finds there is an imminent and substantial endangerment to human health and the environment, it can issue a temporary emergency permit to allow treatment, storage, or disposal of hazardous waste by a nonpermitted facility or by a permitted facility that has not been permitted to engage in such activity. The duration of an emergency permit cannot exceed 90 days.

■ Research, Development, and Demonstration Permits

Owners and operators who propose to use innovative hazardous waste treatment technologies can receive a research, development, and demonstration (RD&D) permit, provided that permit standards for such an activity have not already been established by EPA. The RD&D permit requirements specify that a facility can only receive those wastes necessary to determine the efficiency of the treatment technology. RD&D permits provide for the construction and operation of the facility for up to one year, but may be renewed up to three times with each renewal not exceeding one year. In order to expedite the issuance of RD&D permits, EPA may modify or waive the usual permit application and issuance requirements, with the exception of financial responsibility and public participation.

When issuing RD&D permits, EPA must maintain consistency with its mandate to protect human health and the environment.

■ Land Treatment Demonstration Permits

Before a land treatment facility can obtain a final permit, the owner and operator must demonstrate that hazardous constituents in a waste can be completely degraded, transformed, or immobilized in the treatment zone. Land treatment demonstration permits allow an owner and operator to perform these required treatment demonstrations in order to obtain a final TSDF operating permit. Such demonstration permits are issued for treatment or disposal, and may include field tests or laboratory analysis conditions, unit design criteria, construction standards, operation provisions, and maintenance requirements (land treatment unit standards are fully discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities).

■ Combustion Permits

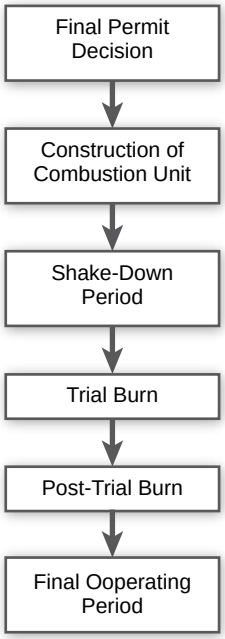
Combustion permits specify the conditions under which a combustion facility must operate. A facility's permit specifies the operating conditions, such as waste feed rate, unit temperature, gas velocity, and carbon monoxide emissions, which guarantee that a combustion unit will meet its respective performance standards (i.e., pollutant-specific air emissions limitations). The permit also specifies combustion unit waste analysis, inspection and monitoring, and residue management requirements. Additionally, the permit sets conditions for all other hazardous waste storage, treatment, and disposal units at the facility.

Owners and operators must obtain a RCRA operating permit before beginning construction of a combustion unit. However, it is impossible to prescribe which specific operating conditions will limit air emissions without a constructed unit that the owner and operator can actually test to determine if adequate protection of human health and the environment is being achieved. As a result, the permit process for combustion units is comprised of four phases intended to test the unit's operation prior to the issuance of the final permit to ensure that the unit can operate in accordance with its operating conditions (see Figure III-34). These phases include:

- Shake-down period, during which the combustion unit is brought to the level of normal operating conditions in preparation for the trial burn
- **Trial burn**, during which burns are conducted so that performance can be tested over a range of conditions
- Post-trial burn, during which the data from the trial burn is evaluated and the facility may operate under conditions specified by the permitting agency
- Final operating period, which continues throughout the life of the permit.

The permitting agency specifies operating conditions for all phases based on a technical evaluation of the combustion unit's design, the information contained in the permit application and trial burn plan, and results of burns from other combustion units. The operating conditions are established such that the combustion unit will theoretically meet performance standards at all times. The results from the trial burn are used to verify the adequacy of the proposed operating conditions.

Figure III-34: Combustion Unit Permitting



Interim Status Combustion Units

Owners and operators of interim status combustion units must demonstrate that their units meet all applicable performance standards by submitting performance data developed during actual burns. Performance data is used by the permitting agency to determine whether the combustion unit meets RCRA performance standards when burning a particular waste under a specific set of operating conditions.

While many hazardous waste combustion units are subject to RCRA permitting, units subject to MACT standards (cement kilns, lightweight aggregate kilns, and incinerators) must also obtain a Clean Air Act (CAA) Title V permit. The CAA permitting process is different than the RCRA process because CAA permits are completed after a facility has demonstrated compliance with the emission standards, while a RCRA permit is issued prior to compliance testing.

Prior to the compliance date, hazardous waste combustion facilities that are subject to the MACT standards must comply with the Title V permit application requirements. Facilities that are currently permitted under RCRA may need to modify their RCRA permit in order to make design and operational changes to come into compliance with the MACT standards. These facilities must continue to comply with the RCRA permit conditions until these conditions either expire or are removed; they are not automatically removed upon promulgation of the MACT standards.

■ Post-Closure Permits

Owners and operators of hazardous waste disposal units, and owners and operators of hazardous waste management units that cannot clean close and must close as landfills, must conduct post- closure care, including ground water monitoring and maintenance of an impermeable cap (post-closure is fully discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). The standards for permitted facilities incorporate post-closure care requirements into the facility's operating permit to ensure that post-closure care is performed in a protective manner. However, because interim status facilities do not yet have an operating permit, the RCRA regulations require that interim status facilities needing post-closure care obtain a post-closure permit or an enforceable document containing the same regulatory requirements as a permit. This will ensure that interim status facilities meet all applicable requirements for permitted facilities, including the ground water monitoring standards.

■ Remedial Action Plans

Remedial Action Plans (RAPs) are a special form of RCRA permit that a facility may obtain to treat, store, or dispose of hazardous remediation waste at a remediation waste management site. Often, remedies selected for cleanup sites involve treating, storing or re-disposing of hazardous remediation waste. Before the existence of RAPs, these activities required the same type of permit as that for as-generated process waste management. Traditional RCRA permits, however, are not always well suited to cleanup activities. RAPs allow additional flexibility in public participation, provide for streamlined information requirements during the permit application process, and eliminate the requirement to perform facility-wide corrective action.

■ Standardized Permits

On September 8, 2005, in order to increase the efficiency and effectiveness of the permitting process, EPA finalized the implementation of a standardized permit for facilities that generate hazardous waste and store or non-thermally treat the waste in tanks, containers, and containment buildings on site. The standardized permit streamlines the permit process by allowing facilities to obtain and modify permits more easily while maintaining the protectiveness currently existing in the individual RCRA permit process. For example, public participation is still required during the permitting process, but unlike the existing individual permit, public notice is not required at the application submittal, though an informal meeting prior to the application is still necessary. In addition, when seeking a standardized permit, the permitting agency does not need to verify completeness of the application. Also, the permit modification procedures are less cumbersome for a standardized permit.

SUMMARY

The RCRA regulations require hazardous waste TSDFs to obtain an operating permit that establishes the administrative and technical conditions under

which hazardous waste at the facility must be managed. Such permits cover the full range of TSDF standards, including general facility provisions, unit-specific requirements, closure and financial assurance standards, and any applicable ground water monitoring and air emissions provisions.

In order to obtain a permit, a TSDF owner and operator must comply with specific application procedures. The permitting process consists of the following stages:

- Informal meeting prior to application
- Permit submission
- Permit review
- Preparation of the draft permit
- Taking public comment
- Finalizing the permit.

After issuance, permits may need to be modified to allow facilities to implement technological improvements, comply with new environmental standards, respond to changing waste streams, and generally improve waste management practices. These modifications can be initiated by either the facility or the permitting agency.

Facilities that were existing and operating on the effective date of a regulation that required them to obtain an operating permit are considered interim status facilities. They are allowed to continue operating as long as they comply with certain general facility and unit-specific TSDF standards until the implementing agency makes a final permit determination.

Some waste management operations and practices require special permit provisions. These special forms of permits include:

- Permits-by-rule
- Emergency permits
- RD&D permits
- Land treatment demonstration permits
- Combustion permits
- Post-closure permits
- Remedial Action Plans.

Additionally, EPA has developed another special type of permit called a "standardized permit."

ADDITIONAL RESOURCES

Additional information about RCRA permitting can be found at www.epa.gov/epawaste/hazard/tsd/permitting.htm.

CORRECTIVE ACTION TO CLEAN UP HAZARDOUS WASTE CONTAMINATION

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OVERVIEW

Past and present activities at RCRA facilities have sometimes resulted in releases of hazardous waste and hazardous constituents into soil, ground water, surface water, sediments, and air. The Resource Conservation and Recovery Act generally mandates that EPA requires the investigation and cleanup, or remediation, of these hazardous releases at RCRA facilities. This program is known as **corrective action**. Approximately 3,780 facilities are undergoing corrective action, three times the number of sites found on the Superfund National Priorities List (NPL) (as discussed in Chapter VI, CERCLA). The degree of investigation and subsequent corrective action necessary to protect human health and the environment varies significantly among these facilities.

The corrective action program is a unique part of RCRA because there are no comprehensive cleanup regulations. Instead, EPA implements corrective action primarily through guidance, and enforces it largely through statutory authorities established by the Hazardous and Solid Waste Amendments (HSWA). Prior to HSWA, EPA's statutory authority to require cleanup of hazardous releases was limited to situations where the contamination presented an "imminent and substantial endangerment to health or the environment." Regulatory authority was limited to releases identified during ground water monitoring at RCRA- regulated land-based hazardous waste units, such as landfills or surface impoundments. Through HSWA, Congress substantially expanded EPA's corrective action authority, allowing the Agency to address any releases of hazardous waste or hazardous constituents to all environmental media at both RCRA permitted and nonpermitted facilities.

Rather than implementing a rigid regulatory framework for corrective action, the Agency developed guidance and policy documents to assist facilities conducting cleanups. EPA developed a set of targeted administrative reforms, known as the RCRA Cleanup Reforms, to achieve faster, more efficient cleanups. The RCRA Cleanup Reforms represent a comprehensive effort to address key impediments to cleanups, maximize program flexibility, and spur progress toward a set of national cleanup goals.

CORRECTIVE ACTION IMPLEMENTATION

One of the keys to understanding the RCRA corrective action program is knowing how a facility becomes subject to corrective action. Facilities generally are brought into the RCRA corrective action process when there is an identified release of hazardous waste or hazardous constituents, or when EPA is considering a facility's RCRA permit application. Additionally, a facility owner or operator may volunteer to perform corrective action by entering an agreement with EPA in order to expedite the process.

■ Permitted Corrective Action

When a facility is seeking a permit, or when a permit is already in place, EPA can incorporate corrective action into the permit requirements. Permitted facilities are required under 40 CFR Part 264, Subpart F, to monitor ground water to detect and correct any releases from regulated land-based hazardous waste land disposal units (LDUs) (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities). HSWA further expanded EPA's permit authority for corrective action to address all environmental media, as well as releases from areas other than regulated LDUs, such as tanks or containers. Permits issued to RCRA facilities must, at a minimum, contain schedules of compliance to address these releases and include provisions for financial assurance to cover the cost of implementing those cleanup measures. The HSWA statutory provisions for addressing corrective action in permits are as follows:

- Releases from **solid waste management units** (SWMUs) – Under the authority of §3004(u) of the Act, EPA requires corrective action for releases of hazardous waste or hazardous constituents from SWMUs in a facility's permit. A SWMU is any discernible unit where solid or hazardous wastes have been placed at any time, or any area where solid wastes have been routinely and systematically released.
- Releases beyond the facility boundary – §3004(v) of the Act authorizes EPA to impose corrective action requirements for releases that have migrated beyond the facility boundary. This corrective action provision can be complementary to §3004(u), but it is not expressly limited to releases from SWMUs.
- Omnibus permitting authority – This provision, found in §3005(c)(3) of the Act, allows EPA or an authorized state to include any requirements deemed necessary in a permit, including the requirement to perform corrective action. This authority is particularly useful at permitted facilities when there is a release not associated with any particular SWMU. (Omnibus permitting authority is fully discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities).

■ Corrective Action Orders

EPA also possesses additional authorities to order corrective action that are not contingent upon a facility's permit. The statutory provisions to issue corrective action orders are:

- Releases at interim status facilities – §3008(h) of the Act authorizes EPA to require corrective action or other necessary measures through an administrative enforcement order or lawsuit, whenever there is or has been a release of hazardous waste or constituents from an interim status RCRA facility (i.e., a facility that has not yet received a RCRA permit).
- Imminent and substantial endangerment – This authority, found in §7003 of the Act, allows EPA, upon evidence of past or present handling

of solid or hazardous waste, to require any action necessary when a situation may present an imminent and substantial endangerment to health or the environment (i.e., poses significant threat or harm). This authority applies to all facilities subject to RCRA, whether or not they have a RCRA permit. EPA can waive other RCRA requirements (e.g., a permit) to expedite the cleanup process under this provision.

■ Voluntary Corrective Action

Corrective action does not need to be initiated subject to permit requirements or an enforcement order. Owners and operators of RCRA-regulated facilities may also volunteer to perform corrective action. There are some activities which may be necessary to achieve corrective action goals at a facility; however, these may require formal approval by EPA or the state. EPA, therefore, encourages owners and operators to work closely with EPA and state agencies to obtain sufficient oversight during voluntary cleanup activities.

IMPROVING CORRECTIVE ACTION

EPA identified several factors that inhibit the efficiency and timeliness of the cleanup program. In some instances, cleanups have suffered from an emphasis on process steps, instead of process goals. Thus, EPA seeks to reduce these hindrances by allowing more flexibility during the cleanup process. EPA has reformed the corrective action program by: addressing specific disincentives through regulatory changes; focusing on near-term goals; and stressing results-based approaches, instead of a process-based scheme.

The Agency finalized provisions to facilitate faster, more efficient cleanups. For example, EPA established alternative soil standards for cleanups (as discussed in Chapter III, Land Disposal Restrictions); harmonized the sometimes duplicative closure and correction action requirements; and increased flexibility for "cleanup only" facilities by developing streamlined RCRA cleanup permits, removing the obligation for facility-wide corrective action, and introducing new units for managing cleanup wastes.

■ Special Provisions for Cleanup

Cleaning up RCRA facilities under the corrective action program may involve the management of large amounts of waste such as contaminated soils, water, debris, and sludges which contain a listed waste or exhibit a characteristic of hazardous waste. Such cleanup wastes are referred to as **remediation wastes**. Remediation wastes are generally subject to the same management standards as newly generated RCRA hazardous waste, including treatment, storage, and disposal facility (TSDF) standards, permits, and land disposal restrictions (LDR). These management standards are sometimes counterproductive when applied to cleanups because they may unnecessarily slow the corrective action process and increase the cost of corrective action without providing a concomitant level of protection of human health and the environment. Figure III-35 illustrates potential disincentives to the cleanup program and EPA's remedies.

Figure III-35

Potential Disincentives	Special Provisions for Cleanup
Obtaining a traditional RCRA permit for treatment, storage or disposal	Remedial Action Plan (RAP)
LDU minimum technical requirements	Remediation waste management units (i.e., CAMUs, TUs, and staging piles)
LDR treatment standards	Alternative LDR soil treatment standards

In order to mitigate the impact of these management standards on the corrective action program, EPA promulgated streamlined regulations that allow the use of alternative remediation waste permit and unit standards. These alternative standards ensure cleanups are fully protective while eliminating some of the regulatory hurdles associated with waste management. For example, the Agency promulgated a modified version of a permit, the Remedial Action Plan (RAP). Unlike the traditional RCRA permit, the RAP is tailored to the needs of a facility that manages remediation waste.

EPA also provided options for increased cleanup flexibility by establishing three types of remediation waste management units: **temporary units (TUs)**,

corrective action management units (CAMUs), and **staging piles**.

TUs are tanks or container storage areas that EPA designated to be used solely for the treatment or storage of remediation wastes during cleanups. EPA or authorized states can modify the design, operating, and closure standards that normally apply to these units in order to facilitate prompt cleanup of contaminated waste sites.

A CAMU is an area within a facility that is used only for managing CAMU-eligible wastes for implementing corrective action or cleanup at the facility. A CAMU must be located within the contiguous property under the control of the owner or operator where wastes to be managed in the CAMU originated. By designating an area as a CAMU, EPA exempts that area from LDR and the LDU minimum technological requirements (MTR). However, waste must meet minimum treatment standards for its principal hazardous constituents (PHCs), and CAMUs must meet minimum liner and cap standards similar to the criteria for municipal solid waste landfills (MSWLFs) in Part 258 (See Chapter II).

A staging pile is a unit designated by EPA for the temporary accumulation of solid, non-flowing remediation waste during cleanups. Staging piles do not have to meet MTR, and LDR treatment standards do not apply to the remediation waste managed within these units. Owners and operators may not place any liquids in staging piles and cannot conduct any significant treatment within these units.

■ Environmental Indicators

Although the ultimate goal of the corrective action program is completing final site cleanup, EPA assesses the program using environmental indicators. EPA developed two environmental indicators to focus efforts on early risk reduction, risk communication, and resource protection. EPA uses the environmental indicators to measure progress toward meeting the national cleanup goals established by the Government Performance Results Act of 1993 (GPRA). To meet the GPRA objectives, EPA designated 1,714 RCRA facilities as the cleanup baseline because of the potential for unacceptable exposure to pollutants and/or for ground water contamination. EPA identified many of these facilities using the **National Corrective Action Prioritization System** (NCAPS), a computer-based ranking system that prioritizes the cleanup of the site relative to other sites. The relative ranking (i.e., high, medium, or low) assigned to each site is based on an evaluation of four pathways of actual or potential contamination (i.e., ground water, surface water, air, and soil).

The environmental indicators used are Current Human Exposures Under Control and Migration of Contaminated Groundwater Under Control. The initial goal was that by the year 2005, 95 percent of the baseline facilities have current human exposures under control and 70 percent have migration of contaminated groundwater under control. These environmental indicators will also aid site decision makers by clearly showing where risk reduction is necessary, thereby helping regulators and facility owner and operators reach agreements earlier on which stabilization measures or cleanup remedies must be implemented.

By the deadline of September 30, 2005, EPA had surpassed both goals, reaching 96% and 78%, respectively. The second RCRA cleanup baseline represented an expanded list of 1,968 facilities at which EPA and the authorized States focused their attention from 2006 to 2008. The 2008 goals were to have human exposures controlled at 95% of these facilities, the migration of contaminated groundwater controlled at 81% of these facilities, final remedy decisions made at 36% of these facilities, and final remedies constructed at 27% of these facilities. The Agency surpassed all four goals, reaching 96%, 83%, 43%, and 34% respectively.

The RCRA cleanup baseline has expanded to include all 3,779 facilities expected to need corrective action. Because EPA has set ambitious goals for 2020 that relate to these facilities, the group is called the 2020 Corrective Action Universe. The goals for 2020 apply to the full corrective action universe and are to have human exposures controlled at 65% of facilities, the migration of contaminated groundwater controlled at 55% of these facilities, and final remedies constructed at 32% of these facilities.

■ RCRA Cleanup Reforms

The goals for the RCRA Corrective Action program remain challenging. To more effectively meet these goals and speed up the pace of cleanups, EPA introduced RCRA Cleanup Reforms in 1999 and additional Reforms in 2001. The 1999 and 2001 Reforms build upon actions taken by EPA and states in recent years to accelerate cleanups. The 1999 Reforms outline policies to remove obstacles to efficient cleanups, maximize program flexibility, and initiate progress toward the GPRA cleanup goals. The RCRA Cleanup Reforms of 2001 highlight those activities that EPA believes would best accelerate program progress and foster creative solutions.

■ RCRA Brownfields Prevention Initiative

A potential RCRA Brownfield facility is a facility that is not in full use, where there is redevelopment potential, and reuse or redevelopment of that site is slowed due to real or perceived concerns about actual or potential contamination, liability, and RCRA requirements. EPA launched the RCRA Brownfields Prevention Initiative with the goal of encouraging the reuse of potential RCRA Brownfields so that the land better serves the needs of the community either through more productive commercial or residential development or as greenspace.

Success stories of RCRA facilities that have been cleaned up and either reused or redeveloped can be found at www.epa.gov/epawaste/hazard/correctiveaction/bfields.htm.

TRADITIONAL CORRECTIVE ACTION COMPONENTS

Corrective action typically includes five elements common to most, though not all, cleanup activities: initial site assessment, site characterization, interim actions, evaluation of remedial alternatives, and implementation of the selected remedy. However, no one approach is likely to be appropriate for all corrective action facilities; therefore, a successful corrective action program must be procedurally flexible. These five elements should be viewed as evaluations necessary to make good cleanup decisions, not prescribed steps along a path. EPA emphasizes that it does not want studies to be undertaken simply for the purpose of completing a perceived step in a perceived process.

■ Initial Site Assessment

The first element in most cleanup programs is an initial site assessment. During the initial site assessment, information is gathered on site conditions, releases, potential releases, and exposure pathways to determine whether a cleanup may be needed and to identify areas of potential concern. In the corrective action program, this step is commonly referred to as RCRA Facility Assessment (RFA). Overseeing agencies may also use initial site assessments to set relative priorities among facilities and allocate resources.

■ Site Characterization

Before cleanup decisions can be made, some level of characterization is necessary to ascertain the nature and extent of contamination of a site and to gather information necessary to support selection and implementation of appropriate remedies. This step is often referred to as the RCRA Facility Investigation (RFI). A successful RFI will identify the presence, movement, fate, and risks associated with environmental contamination at a site and will elucidate the chemical and physical properties of the site likely to influence contamination migration and cleanup.

■ Interim Actions

While site characterization is underway or before a final remedy is selected, there is often need for interim actions at a corrective action facility. Interim actions are used to control or abate ongoing risks to human health and the environment in advance of the final remedy selection. For example, actual or potential contamination of drinking water supplies may necessitate an interim action to provide alternative drinking water sources.

■ Evaluation of Remedial Alternatives

Before choosing a cleanup approach, program implementors and facility owners and operators will typically analyze a range of alternatives and evaluate

their advantages and disadvantages relative to facility-specific conditions. Such a study is typically called the Corrective Action Measures Study (CMS).

■ Remedy Implementation

Remedy implementation typically involves detailed remedy design, remedy construction, remedy operation and maintenance, and remedy completion. In the corrective action program, this step is often referred to as Corrective Measures Implementation (CMI).

SUMMARY

Through a process called corrective action, EPA requires RCRA-regulated facilities to investigate and clean up releases of hazardous waste or constituents to the environment.

Corrective action is included as a requirement in a facility's permit through §3004(u), §3004(v), or §3005(c)(3) statutory authorities. Corrective action can also be made through an enforcement order through §3008(h) or §7003 statutory authorities. Facilities may also voluntarily choose to clean up their contamination. EPA implements the corrective action program primarily through guidance, and has not promulgated comprehensive cleanup regulations.

Remediation wastes are those managed for the purpose of implementing corrective action, and may include contaminated soils, water, debris and sludges that contain a listed waste or exhibit a characteristic of hazardous waste.

EPA promulgated provisions more appropriate for managing remediation waste, including the streamlined permit, or RAP, and remediation waste management units, including the TU, CAMU, and staging pile.

EPA recently developed a set of targeted administrative reforms, known as the RCRA Cleanup Reforms, to achieve faster, more efficient cleanups. The RCRA Reforms represent a comprehensive effort to address key impediments to cleanups, maximize program flexibility, and spur progress toward a set of ambitious national cleanup goals.

ADDITIONAL RESOURCES

Additional information about corrective action can be found at www.epa.gov/correctiveaction. Further information about other EPA cleanup programs can be found at www.epa.gov/epawaste/hazard/correctiveaction/cleanup.htm.

ENFORCEMENT OF HAZARDOUS WASTE REGULATIONS

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OVERVIEW

The effective implementation of the RCRA program depends on whether the people and companies regulated under RCRA comply with its various requirements. The goals of the RCRA enforcement program are to ensure that the regulatory and statutory provisions of RCRA are met, and to compel necessary action to correct violations. EPA and the states achieve these goals by closely monitoring hazardous waste handler (e.g., generator, transporter, and treatment, storage, and disposal facility (TSDF)) activities, taking expeditious legal action when noncompliance is detected, and providing compliance incentives and assistance. Facility inspections by federal and state officials are the primary tool for monitoring compliance. When noncompliance is detected, legal action, in the form of an administrative order, a civil lawsuit, or a criminal lawsuit, may follow, depending on the nature and severity of the problem. EPA has also issued several policies to provide incentives for businesses to voluntarily evaluate their own compliance and disclose violations, and to assist small businesses in complying with the regulations. The combination of effective monitoring, expeditious legal action, and compliance incentives and assistance is intended to reduce the number of facilities operating in violation of RCRA requirements and to deter potential violations.

This chapter describes the three essential aspects of the enforcement program: compliance monitoring, enforcement actions, and compliance incentives and assistance. Almost all of the enforcement provisions detailed in this chapter are based on the Act, federal EPA policy, and Agency regulations. It is important to note that state requirements may be more stringent than those mandated by the federal government, and state enforcement authorities and procedures may differ from those of EPA.

COMPLIANCE MONITORING

One aspect of the enforcement program is monitoring facilities to verify that they are in compliance with the RCRA regulatory requirements. Monitoring serves several purposes,

such as allowing EPA and the states to assess the effectiveness of specific legal actions that may have been taken already against a facility, and enabling EPA to gather data in support of a future rulemaking. In addition, the overall compliance monitoring program allows EPA to evaluate the effectiveness of state programs and to monitor nationwide compliance with RCRA. Finally, monitoring acts as a deterrent, encouraging compliance with the regulations by making acts of noncompliance susceptible to enforcement actions.

■ Inspections and Information Gathering

The primary method of collecting compliance monitoring data is through an inspection. Section 3007 of the Act provides the authority for conducting inspections. This section allows a representative of EPA or an authorized state to enter any premises where hazardous waste is handled to examine records and take samples of the wastes. Similarly, the Department of Transportation (DOT) may participate where waste transporters are involved. While all TSDFs must be inspected at least once every two years, the Hazardous and Solid Waste Amendments (HSWA) require that all federal- and state-operated facilities be inspected annually. Facilities may also be inspected at any time if EPA or the state has reason to suspect that a violation has occurred. Finally, facilities may be chosen for an inspection when specific information is needed to support the development of RCRA regulations and to track program progress and accomplishments.

Inspections may be conducted by EPA, an authorized state, or both. Typically, either the state or EPA has overall responsibility, or the lead, for conducting the inspection. The inspection may include a formal visit to the facility, a review of records, taking of samples, and observation of operations.

There are many types of inspections. However, the compliance evaluation inspection (CEI) is the primary mechanism for detecting and verifying RCRA violations by hazardous waste generators, transporters, and TSDFs. Types of inspections differ based upon the purpose, facility status, and the probable use of inspection results.

TYPES OF ENFORCEMENT INSPECTIONS

- **Compliance Evaluation Inspection**—Routine inspections to evaluate compliance with RCRA. These inspections usually encompass a file review prior to the site visit; an on-site examination of generation, treatment, storage, or disposal areas; a review of records; and an evaluation of the facility's compliance with RCRA.
- **Case Development Inspection**—An inspection when significant RCRA violations are known, suspected, or revealed. These inspections are usually intended to gather data in support of a specific enforcement action.
- **Comprehensive Ground Water Monitoring Evaluation**—An inspection to ensure that ground water monitoring systems are designed and functioning properly at RCRA land disposal facilities.
- **Compliance Sampling Inspection**—Inspections to collect samples for laboratory analysis. This sampling inspection may be conducted in conjunction with any other inspection.
- **Operations and Maintenance Inspection**—Inspections to ensure that ground water monitoring and other systems at closed land disposal facilities continue to function properly. These inspections are usually conducted at facilities that have already received a thorough evaluation of the ground water monitoring system through a comprehensive ground water monitoring inspection.
- **Laboratory Audit**—Inspections of laboratories performing ground water monitoring analysis to ensure that these laboratories are using proper sample handling and analysis protocols.

■ Conducting the Inspection

Several steps are generally followed in RCRA inspections to ensure consistency and thoroughness; these steps are summarized below. The inspector prepares for the inspection by:

- Coordinating inspection activities with other regulatory or enforcement personnel as necessary
- Reviewing facility files
- Preparing an inspection plan
- Developing a checklist
- Packing appropriate safety equipment.

The first stage of the actual inspection is the facility entry. Upon entry, the inspector generally

holds an opening conference with the owner and operator to discuss the nature of the inspection and to describe the information and samples to be gathered. Following the opening conference, the actual inspection takes place, which may involve:

- Reviewing facility operations and waste management practices
- Reviewing records
- Conducting a visual inspection
- Identifying sampling requirements.

Finally, the inspector holds a closing conference with the owner or operator to allow him or her to respond to questions about the inspection and to provide additional information. The inspector usually summarizes what he or she observed.

After the visit is completed, the inspector prepares a comprehensive report that summarizes the records reviewed, any sampling results, and the facility's compliance status with respect to RCRA.

The most important result of any inspection is the determination of whether the facility is in compliance with the regulations. The inspector may also determine compliance through examination of the reports that facilities are required to submit, or are part of normal waste handler operations. Inspection reports may contain information about the wastes being handled, the method of handling, and the ultimate disposal of wastes. Reports are submitted as required in a permit or enforcement order (e.g., corrective action schedules of compliance) and by regulation (e.g., biennial report). If the facility is not complying with all of the appropriate state or federal requirements, then an enforcement action may be taken.

ENFORCEMENT ACTIONS

When compliance monitoring uncovers a violation, enforcement action may be used to bring facilities into compliance with applicable Subtitle C regulations. The goal of enforcement actions is to compel:

- Compliance with RCRA's waste handling regulations
- Compliance with RCRA's recordkeeping and reporting requirements
- Monitoring and corrective action in response to any releases of hazardous waste and hazardous constituents.

EPA (or an authorized state) has a broad range of enforcement options including:

- Administrative actions
- Civil judicial actions
- Criminal actions.

A decision to pursue one of these options is based on the nature and severity of the problem.

■ Administrative Actions

An **administrative action** is an enforcement action taken by EPA or a state under its own authority. Administrative enforcement actions can take several forms, including EPA or the authorized state issuing an administrative order requiring a facility to implement specific corrective measures to filing an administrative complaint commencing a formal administrative adjudication. Administrative actions tend to be resolved quickly and can often be quite effective in bringing the facility into compliance with the regulations or in remedying a potential threat to human health or the environment. There are two types of administrative actions, informal actions and formal actions.

ADMINISTRATIVE ENFORCEMENT ACTIONS: A CASE STUDY

Following a routine inspection at a university, four facilities within the campus were found to be in violation of various RCRA requirements involving the management of hazardous wastes and the preparation of emergency procedures. EPA initiated an administrative action against the university to assess appropriate civil penalties. After negotiations with the university, EPA agreed to sign a consent order to set the cash penalty at $69,570 and allow the university to perform three supplemental environmental projects worth $279,205. One project was to promote pollution prevention in the school's laboratories; the second was a hazardous chemical waste management training program to promote environmental compliance; and the third was the renovation of a building for use as a lead poison resource center to promote public health within a disadvantaged community.

Informal Actions

An **informal action** is an action by EPA or an authorized state that notifies the facility of a **violation**. EPA or the state will notify the facility that they are not in compliance with some provision of the regulations and what the facility needs to do to come into compliance. The letter may also set out the enforcement actions that will follow if the facility fails to remedy the violation.

Formal Actions

Alternatively, EPA or the state can take a **formal administrative action** when significant noncompliance is detected, or the facility does not respond to an informal enforcement action. Formal actions often take the form of an administrative order, which is issued directly under the authority of RCRA and imposes enforceable legal duties. Alternatively, EPA may file an administrative complaint initiating an action before one of the EPA's Administrative Law Judges (ALJs). These administrative tools can be used to force a facility to comply with specific regulations; to take corrective action; to perform monitoring, testing, and analysis; or to address a threat to human health and the environment. An administrative order can be issued as a consent order, which documents an agreement between the Agency and the violator or can be issued by the Agency acting unilaterally. EPA can issue four types of administrative orders under RCRA:

- Compliance orders—§3008(a) of RCRA allows EPA to issue an order requiring any person who is not complying with a requirement of RCRA to take steps to come into compliance. A compliance order may require immediate compliance or may set out a schedule for compliance. The order can contain a penalty of up to $32,500 for each day of noncompliance and can include a suspension or revocation of a facility's permit or interim status. When EPA issues a compliance order, the person to whom the order is issued can request a hearing on any factual provisions of the order. If no hearing is requested, the order will become final 30 days after it is issued.
- Corrective action orders—§3008(h) allows EPA to issue an order requiring corrective action at an interim status facility when there is evidence of a release of a hazardous waste or a hazardous constituent into the environment. EPA can issue a §3008(h) order to require corrective action activities including investigations, repairing liners, or pumping to treat ground water contamination, and any other action deemed necessary. In addition to requiring corrective action, these orders can suspend interim status and impose penalties of up to $32,500 for each day of noncompliance with the order (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination).
- Orders to conduct monitoring, analysis, and testing—If EPA finds that a substantial hazard to human health or the environment exists, the Agency can issue an administrative order under §3013. A §3013 order is used to evaluate the nature and extent of the problem through monitoring, analysis, and testing. These orders can be issued either to the current owner or operator of the facility or to a past owner or operator (if the facility is not currently in operation or if the present owner and operator cannot be expected to have actual knowledge of the potential release). Violation of §3013 orders can result in penalties of up to $6,500 per day.
- Imminent and substantial endangerment orders—In any situation where an imminent and substantial endangerment potential to health or the environment is caused by the handling of solid or hazardous wastes, EPA can order any person contributing to the problem to take steps to abate the endangerment, which may include cleanup or other necessary actions. This order can be used against any contributing party, including past or present generators, transporters, or owners or operators of the site. Violation of §7003 orders can result in penalties of up to $6,500 per day (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination).

In Fiscal Year (FY) 2010, EPA issued 1,302 administrative compliance orders (ACOs).

■ Civil Judicial Actions

In addition to formal and informal administrative actions, some statutory authorities allow EPA to initiate **civil judicial actions**. A judicial action is a formal lawsuit, filed in court, against a person who has either failed to comply with a statutory or regulatory requirement or administrative order, or against a person who has contributed to a release of hazardous waste or hazardous constituents. Civil judicial actions are often employed in situations that present repeated or significant violations or where there are serious environmental concerns. Attorneys from the U.S. Department of Justice (DOJ) prosecute RCRA civil cases for EPA, while the state attorneys general assume this role for the states. In FY 2010, EPA submitted 233 civil case referrals to DOJ; $82 million in civil penalties were assessed.

Judicial actions are useful in several situations. When the person being sued has not complied with a previously issued administrative order, the courts may impose penalties to force the person to comply. When a long-term solution to a problem is desired, a judicial action may be helpful to ensure proper supervision of the schedule for return to compliance. They also may provide stronger deterrence to noncompliance than an administrative action, because judges tend to order higher penalties than ALJs.

RCRA provides EPA the authority for filing four different types of civil actions:

- Compliance action—Under §3008(a), the federal government can file suit to force a person to comply with any applicable RCRA regulations. The court can order specific actions by the facility to return to compliance. In federal actions, the court can impose a penalty of up to $32,500 per day per violation for noncompliance.
- Corrective action—In a situation where there has been a release of hazardous waste or hazardous constituents from a facility, the federal government can sue to require the facility to take any necessary response measures under §3008(h). The court can also suspend or revoke a facility's interim status as a part of its order (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination).
- Injunctions to conduct monitoring, testing, and analysis—If EPA has issued a monitoring and analysis order under §3013 of RCRA and the person to whom the order was issued fails to comply, the federal government can sue to require compliance with the order. In this type of case, the court can assess a penalty of up to $6,500 per day of noncompliance with these orders.
- Injunctions to address substantial endangerment—As with a §7003 administrative order, when any person has contributed or is contributing to conditions which may present an imminent and substantial endangerment to human health or the environment, the federal government can sue the person to require action to remove the hazard or remedy the problem. If the Agency first issued an administrative

CIVIL ENFORCEMENT ACTIONS: A CASE STUDY

EPA filed a complaint with a U.S. District Court against a repeat violator, alleging noncompliance with RCRA hazardous waste storage standards. The violator, subject to a prior enforcement action, had ignored a final administrative order issued by EPA. That order required immediate compliance with RCRA regulatory obligations and the payment of $74,105 in civil penalties. Since the issuance of the final order, the violator not only failed to pay any of the assessed civil penalty, but continued to violate the RCRA regulations. EPA sued the violator for collection of the past due amount under the administrative order, plus interest and costs, and a further civil penalty for continuing and additional violations. The federal judge in the case ordered the violator to pay past administrative penalties, and to pay an additional fine for violating the past order.

order, the court can also impose a penalty of up to $6,500 for each day of noncompliance with that order (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination).

In a major multi-statute enforcement case, an international business agreed to resolve charges that it violated clean air, clean water and hazardous waste laws at its Mississippi facility under a civil settlement and criminal plea agreement with EPA. This company paid a $20 million penalty and will spend up to $16 million on projects to enhance the environment.

Frequently, several of the civil authorities will be used together in the same lawsuit. This is particularly likely to happen where a facility has been issued an administrative order for violating a regulatory requirement, has ignored the order, and is in continued noncompliance. In this circumstance, a lawsuit can be filed that seeks penalties for violating the regulations, penalties for violating the order, and a judge's order requiring future compliance with the regulations and the administrative order.

■ Criminal Actions

In addition to civil actions, EPA may also enforce against a facility through a **criminal action**, depending on the nature and severity of the violation. Criminal actions are usually reserved for only the most serious violations. A criminal action initiated by the federal government or a state can result in the imposition of fines or imprisonment. In FY 2010, EPA initiated 346 cases, and 289 defendants were charged. The guilty paid nearly $41 million in fines and restitution and were sentenced to 72 years in prison. RCRA §3008 identifies seven activities that can trigger criminal action and carry criminal penalties.

Six of the seven criminal acts carry a penalty of up to $50,000 per day and up to five years in jail. Stated briefly, these acts are knowingly:

- Transporting waste to a nonpermitted facility
- Treating, storing, or disposing of waste without a permit or in violation of a material condition of a permit or interim status standard

CRIMINAL ENFORCEMENT ACTIONS: A CASE STUDY

A warehouse worker employed by a chemical manufacturer was instructed by the president of the company to dispose of unwanted hazardous chemicals. The worker loaded the hazardous waste in his pickup truck and dumped it in a dumpster located in a low-income community. The president of the chemical company later paid the worker $400 for disposing of the chemicals. Upon discovery of the hazardous waste, the residents of three nearby apartment buildings had to be evacuated. The company president was sentenced by a U.S. District Court to five years probation, 200 hours of community service, and more than $5,000 restitution for the unlawful disposal of hazardous waste. The warehouse worker was sentenced to five years probation, six months of home detention, and more than $5,000 in restitution. As part of the plea agreement, the company was forced to pay $43,984 in restitution.

- Omitting important information from, or making a false statement in a label, manifest, report, permit, or interim status standard
- Generating, storing, treating, or disposing of waste without complying with RCRA's recordkeeping and reporting requirements
- Transporting waste without a manifest
- Exporting a waste without the consent of the receiving country.

The seventh criminal act is the knowing transportation, treatment, storage, disposal, or export of any hazardous waste in such a way that another person is placed in imminent danger of death or serious bodily injury. This act carries a possible penalty of up to $250,000 or 15 years in prison for an individual, or a $1 million fine for corporate entities.

RCRA CIVIL PENALTY POLICY

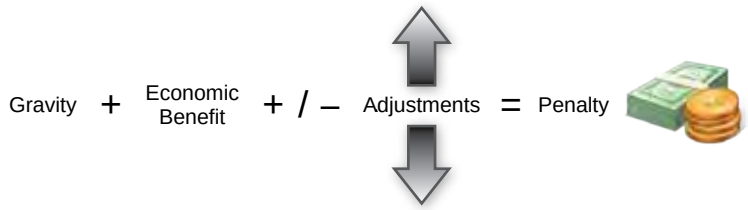
EPA's *RCRA Civil Penalty Policy* is designed to provide guidance and consistency in assessing noncriminal penalty amounts for administrative actions and in settlements of civil judicial enforcement actions. The policy serves many purposes, including ensuring that:

- Penalties are assessed in a fair and consistent manner

- Penalties are appropriate for the seriousness of the violation
- Economic incentives for noncompliance are eliminated
- Penalties are sufficient to deter persons from committing RCRA violations
- Compliance is expeditiously achieved and maintained.

EPA's RCRA penalty policy utilizes a calculation system to determine the amount of a penalty, based on four components. These components include: 1) the gravity (i.e., severity) of the particular violation; 2) the duration of the violation; 3) the economic benefit gained through noncompliance; and 4) any site-specific adjustments (see Figure III-36).

Figure III-36: Civil Penalty Calculation



One type of site-specific adjustment that can be applied to mitigate penalties is called a **supplemental environmental project** (SEP). The Office of Enforcement and Compliance Assurance (OECA) issued its *Final EPA Supplemental Environmental Projects Policy* in 1998. These are environmentally beneficial projects which a defendant or respondent agrees to undertake in the settlement of a civil or administrative enforcement action, but which the defendant is not otherwise legally required to perform. For example, a violator may agree to restore and protect a wetland or an endangered species habitat. In appropriate circumstances, EPA may adjust the final settlement penalty for a violator who agrees to perform a project so that it is lower compared to that of a violator who does not agree to perform such a project. In 2010, 119 enforcement cases had SEPs. More information about SEPs is available at www.epa.gov/compliance/civil/seps.

ENFORCEMENT AT FEDERAL FACILITIES

In 1992, the Federal Facilities Compliance Act (FFCA) was passed. Among other things, the FFCA amended RCRA to clarify that the federal government's sovereign immunity was waived and to confirm that federal agencies shall comply with all hazardous waste requirements in the same manner, and to the same extent, as any other person. Thus, federal agencies are subject to judicial and administrative orders and the assessment of fines and penalties. FFCA grants explicit authority to EPA to use the enforcement authorities provided in RCRA against any department, agency, or instrumentality of the executive, legislative or judicial branch of the federal government that is in violation of RCRA. The FFCA also confirmed that federal employees are personally liable for RCRA criminal violations.

The *Final Enforcement Guidance on Implementation of the Federal Facility Compliance Act* (Office of Enforcement, July 6, 1993) provides guidance on the use of EPA's authority to issue compliance orders to federal agencies. The guidance clarifies that: 1) federal agencies have the same opportunity to challenge an EPA complaint using the 40 CFR Part 22 procedures; 2) settlement is encouraged in the same circumstances as with a private party; and 3) FFCA's "opportunity to confer" is satisfied by providing an opportunity to confer with an appropriate Regional officer or with the

Administrator upon conclusion of the 40 CFR Part 22 procedures. The guidance is available at www.epa.gov/compliance/resources/policies/civil/federal/ffcaguide.pdf.

Additional information about enforcement at federal facilities can be found at www.epa.gov/compliance/federalfacilities/enforcement.

COMPLIANCE ASSISTANCE AND INCENTIVES

Over the past few years, EPA has issued numerous policies to provide compliance assistance and incentives to the regulated community. By helping businesses understand the regulations, and by providing certain incentives for compliance, EPA hopes to move closer to its goal of ensuring compliance with all RCRA requirements. Three policies were developed to help achieve this goal. They are the *Final Policy on Compliance Incentives for Small Businesses*, *Interim Approach to Applying the Audit Policy to New Owners* (also known as the Interim Approach), and *Incentives for Self- Policing: Discovery, Disclosure, Correction and Prevention of Violations* (also known as the EPA Audit Policy). Additionally, the Agency has developed audit protocols and sector notebooks to assist businesses to understand requirements that may apply to their operators.

■ Small Business Compliance Incentives and Assistance

The *Final Policy on Compliance Incentives for Small Businesses* is intended to promote environmental compliance among small businesses by providing incentives to participate in compliance assistance programs, conduct compliance audits, and promptly correct violations. A small business is defined in this policy as a person, corporation, partnership, or other entity that employs 100 or fewer individuals, across all facilities and operations owned by the entity. The policy sets guidelines for EPA and the states on reducing or waiving penalties for small businesses that make good faith efforts to correct violations.

Under this policy, EPA may eliminate or mitigate its settlement penalties based on certain criteria. The small business needs to make a good faith effort to comply with applicable environmental requirements by either detecting a violation during on-site compliance assistance from a government or government-supported program, or by conducting an internal audit and promptly disclosing in writing all violations discovered as part of the audit. The violation should also be the first for the small business, and this policy does not apply to businesses that have been subject to warning letters or any other type of enforcement action. The small business also needs to correct the violation within the time period allowed, which in most cases is 180 days. For the policy to apply, the violation cannot be one that has caused actual serious harm to human health or the environment, nor one that involves criminal conduct.

To assist businesses in complying with the regulations, OECA, in conjunction with industry, academic institutions, environmental groups, and other agencies, has opened compliance assistance centers. These centers provide comprehensive compliance information for specific industry and government sectors. Many of these centers, such as the printing, metal finishing, automotive services and repair, and agricultural centers are sectors heavily populated by small businesses. More information about compliance assistance centers is available at www.epa.gov/compliance/assistance/centers.

■ Self-Audit Policy

EPA's policy regarding *Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations* (Audit Policy) encourages all regulated entities to implement environmental auditing or management systems designed to uncover violations of environmental requirements and disclose them to EPA. This policy is designed to achieve maximum compliance through active efforts by the regulated community.

Under the Audit Policy, EPA will waive the gravity-based portion of the penalty for disclosing entities that meet the nine Policy conditions, including "systematic discovery" of the violation, through an environmental audit or a compliance management system. Entities that meet all of the conditions except for "systematic discovery" of violations are

eligible for 75 percent penalty mitigation of the gravity-based penalties.

The policy has certain limitations. As with the small business policy, companies may not be able to gain relief under this policy for repeated violations, violations that present a serious or imminent harm to human health or the environment, or violations that involve criminal activity. To receive the penalty mitigation, the regulated entity should correct the violation within 60 days, unless written agreement is provided indicating a longer time frame, and needs to certify in writing that the violations have been corrected. Finally, the regulated entity needs to take steps to prevent a recurrence of the violation. Thus far, over 4,500 companies have disclosed and corrected violations under the audit policy at nearly 13,000 facilities.

Additional information about the audit policy can be found at www.epa.gov/compliance/incentives/auditing.

■ Tailored Incentives for New Owners

On August 1, 2008, EPA published its *Interim Approach to Applying the Audit Policy to New Owners* (Interim Approach), which describes Audit Policy incentives tailored for new owners that want to make a "clean start" at their recently acquired facilities by addressing environmental noncompliance that began prior to acquisition.

The Interim Approach is designed to motivate new owners to audit their facilities and to encourage self-disclosures of violations that will, once corrected, yield significant pollutant reductions and benefits to the environment. The incentives tailored for new owners include clearly defined penalty mitigation beyond what is offered by the Audit Policy, as well as the modification of certain Audit Policy conditions that will allow more violations to be eligible for the Policy.

Additional information about the Interim Approach can be found at www.epa.gov/compliance/incentives/auditing/newowners-incentives.html.

■ Audit Protocols

EPA has developed audit protocols to assist and encourage businesses and organizations to perform environmental audits and disclose violations in accordance with EPA's audit policy. The audit protocols are intended to promote consistency among regulated entities when conducting environmental audits and to ensure that audits are conducted in a thorough and comprehensive manner. EPA has developed audit protocols for the following RCRA facilities:

- Hazardous waste generators
- Hazardous waste TSDFs
- Used oil and universal waste generators
- Hazardous waste storage tanks
- Federal facilities
- Subtitle D facilities.

■ Sector Notebooks

EPA has developed tools to enhance compliance with environmental laws on an industry by industry basis. Sector Notebooks are industry sector profiles, which help owners and operators of regulated industries understand regulations that may apply to their operation through comprehensive plain-English guides. These Notebooks are available on the Internet at www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks.

AGENCY FUNCTIONS

Responsibility for the various components that make up the RCRA enforcement program is divided among different EPA Headquarters offices, the EPA Regions, and state agencies. EPA Headquarters is responsible for setting nationwide policy, monitoring regional and state activities, and providing technical support. The EPA Regions perform federal inspections, issue administrative orders, prepare civil actions, monitor compliance with administrative and judicial orders, and support DOJ in ongoing lawsuits. As with many other aspects of the RCRA program, responsibility for enforcement is largely decentralized. Authorized states take primary responsibility for enforcement in close cooperation with their respective EPA Region. EPA, however, retains its authority to take enforcement actions in authorized states if the state fails to do so, does not obtain acceptable results, or requests EPA assistance.

SUMMARY

There are three essential elements to the RCRA enforcement program: compliance monitoring, enforcement actions, and compliance assistance and incentives.

Compliance monitoring is used to determine a facility's level of compliance with RCRA's regulatory requirements. The primary method of collecting compliance monitoring data is through an inspection.

Either EPA or an authorized state may lead inspections. Inspections must be conducted annually at all federal- or state-operated facilities and at least once every two years at each TSDF. The six types of inspections conducted under the RCRA program are:

- Compliance evaluation inspection
- Case development inspection
- Comprehensive ground water monitoring evaluation
- Compliance sampling inspection
- Operations and maintenance inspection
- Laboratory audit.

The primary goal of enforcement actions is to bring facilities into compliance and ensure future compliance. The enforcement options available under RCRA are:

- Administrative actions, including informal and formal actions
- Civil judicial actions
- Criminal actions.

EPA uses the guidelines in the *RCRA Civil Penalty Policy* for assessing penalty amounts and uses the *Final EPA Supplemental Environmental Projects Policy* to allow for flexibility in assessing penalties.

Enforcement of RCRA at federal facilities is now similar to enforcement at TSDFs, as a result of the Federal Facility Compliance Act of 1992.

To achieve greater compliance, EPA also offers compliance assistance and incentives through numerous policies, including *Final Policy on Compliance Incentives for Small Businesses* and *Incentives for Self-Policing: Discovery, Disclosure, Correction and Prevention of Violations.*

The responsibility for enforcement is divided among different EPA Headquarters offices, EPA Regions, and authorized state agencies.

ADDITIONAL RESOURCES

Additional information about RCRA enforcement can be found at www.epa.gov/compliance.

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OVERVIEW

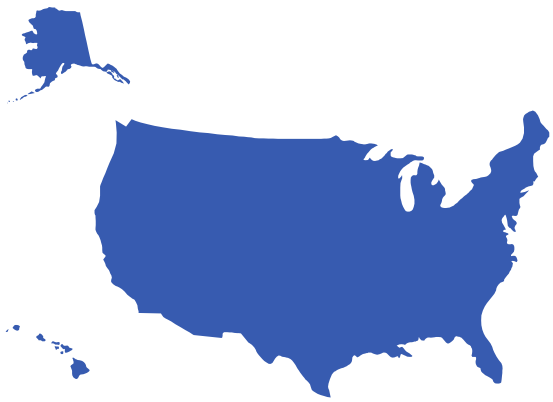
When RCRA was written, it was Congress' intent for the states to assume primary responsibility for implementing the hazardous waste regulations, with oversight from the federal government. Congress felt the states' familiarity with the regulated community, and state and local needs would allow them to administer the hazardous waste program in the most effective manner.

In order for a state to assume the regulatory lead as the implementing agency, it must be authorized by EPA to do so. RCRA requires authorization to ensure state programs are at least equivalent to and consistent with the federal rules. Through state authorization, EPA establishes minimum federal standards to prevent less stringent state regulatory programs. A state that has received final authorization, known as an **authorized state**, implements and enforces its hazardous waste regulations. Authorized state regulations act "in lieu of" federal regulations.

DEVELOPING A STATE HAZARDOUS WASTE PROGRAM

■ Final Authorization

For a state to receive **final authorization**, it must be fully equivalent to, no less stringent than, and consistent with the federal program. However, states may impose requirements that are more stringent or broader in scope than the federal requirements. Some examples of rules that are more stringent are the decision by some states to not recognize the conditionally exempt small quantity



generator (CESQG) exemption, or to require annual (rather than biennial) reports. An example of a rule that is broader in scope is the regulation of antifreeze as a listed waste in some states. In addition, the state's program must provide adequate enforcement authority to carry out its provisions, provide for public notice and hearing in the permitting process, and provide for public availability of information in "substantially the same manner and to the same degree" as the federal program.

As an initial step toward obtaining final authorization, a state typically adopts the federal rules in some manner. Adopting the federal program means either incorporating federal rules into the state's rules, or creating and adopting state rules that are equivalent to federal rules. Many states simply incorporate the federal rules by reference (this is known as **incorporation by reference**). This is when the regulatory language in a state's regulations actually cites, or refers to, the federal regulations. A state may also choose to create an analogous set of state regulations through the state legislative process. Even though a state may have adopted the federal program and its hazardous waste program is similar or identical to the federal program, it still does not have primacy for implementing and enforcing the hazardous waste regulations. To assume this role, the state must first be granted final authorization by EPA. As of August 2008, all states, with the exception of Alaska and Iowa, are authorized to implement the RCRA hazardous waste program.

Any state that seeks final authorization for its hazardous waste program must submit an application to the EPA Administrator containing the following elements:

- A letter from the governor requesting program authorization
- A complete description of the state hazardous waste program
- An attorney general's statement
- A memorandum of agreement (MOA)
- Copies of all applicable state statutes and regulations, including those governing state administrative procedures
- Documentation of public participation activities.

ADOPTING FEDERAL REGULATIONS

As an initial step toward obtaining final authorization, a state typically adopts the federal rules in some manner. Adopting the federal program means either incorporating federal rules into the state's rules, or creating state rules that are equivalent to federal rules.

Governor's Letter

This is simply a letter, signed by the governor, formally requesting the EPA Administrator to authorize the state's hazardous waste program which will be implemented in lieu of the federal program.

Program Description

The program description describes how the state intends to administer the hazardous waste program in place of the federal program. It includes the following:

- A narrative description of the scope, structure, coverage, and processes of the state program
- A description of the state agency or agencies responsible for running the program, including a description of state-level staff who will carry out the program
- A description of applicable state procedures, including permitting procedures and any state administrative or judicial review procedures
- A description of the state's manifest tracking system
- Copies of any forms used to administer the program under state law
- A complete description of the state's compliance tracking and enforcement program.
- In addition, the program description must include estimates of:
  - Costs involved in running the program and an itemization of the sources and amounts of funding available to support the program's operation
  - The number of generators, transporters, and on- site and off-site disposal facilities (along with a brief description of the types of facilities and an indication of the permit status of these facilities)

- The annual quantities of hazardous waste generated within the state, transported into and out of the state, and stored, treated, or disposed of within the state (if available).

If the state chooses to develop a program that is more stringent or broader in scope (or both) than the one required by federal law, the program description should address those parts of the program that go above and beyond what is required under RCRA Subtitle C.

Attorney General's Statement

The attorney general's statement identifies the legal authorities—statutes, regulations, and where appropriate, case law—upon which the state is relying to demonstrate equivalence with the federal program. The statement must include citations to specific statutes, administrative regulations, and judicial decisions which demonstrate adequate authority. When differences from federal authorities exist in the state's program, the statement provides an explanation. The statement must be signed by the attorney general or an independent legal counsel authorized to represent the state agency in court. State statutes and regulations cited in the attorney general's statement must be lawfully adopted and fully effective at the time the program is authorized.

Memorandum of Agreement

Although a state with an authorized program assumes primary responsibility for administering Subtitle C hazardous waste regulations, EPA still retains enforcement authority and oversight responsibilities. In these instances, since the authorized state and EPA both possess regulatory authority to administer the regulations, there is a potential for problems or conflicts, such as dual permitting or dual enforcement of the regulations. The **memorandum of agreement** between the state Director and the EPA Regional Administrator outlines the nature of these responsibilities and oversight powers, and defines the level of coordination between the state and the EPA in implementing the program. While each MOA will contain provisions unique to each individual state's program, several provisions are common to all MOAs. These include provisions for:

SAMPLE MEMORANDUM OF AGREEMENT

This memorandum of agreement (hereinafter "Agreement") establishes policies, responsibilities, and procedures pursuant to 40 CFR §271.8 for the State of _____Hazardous Waste Program (hereinafter "State Program") authorized under Section 3006 of the Resource Conservation and Recovery Act (hereinafter "RCRA" or "the Act") of 1976 (Public Law 94-580, 42 USC §6901 et seq.) and the United States Environmental Protection Agency (hereinafter EPA) Regional Office for Region _____. This Agreement further sets forth the manner in which the State and EPA will coordinate in the State's administration of the State program.

- Establishing state procedures for assigning EPA identification numbers
- Specifying the frequency and content of reports that the state must submit to EPA
- Coordinating compliance monitoring and enforcement activities between the state and EPA.
- Allowing EPA to conduct compliance inspections of the regulated community in the authorized state
- Joint processing of permits for those facilities that require a permit from both the state and EPA
- Specifying the types of permit applications that will be sent to the EPA Regional Administrator for review and comment
- Transferring permitting responsibilities upon authorization.

State Statutes and Regulations

The state must submit copies of its statutes and regulations that are expected to act in lieu of the federal RCRA regulations. Where states adopt the federal regulations by reference, a document may be included outlining where in the state rules the federal rules are incorporated.

Documentation of Public Participation

A state must demonstrate that the public was allowed to participate in the state's decision to seek final authorization. Prior to submitting the application to the Administrator, a state must have given public notice of its intent to apply for authorization. Public notice must take the form of

publishing the announcement in major newspapers, sending information to individuals on the state agency mailing list, and allowing for a 30-day comment period. Proof of public participation may include copies of comments submitted by the public during the comment period, and transcripts, recordings, or summaries of any public hearings concerning state authorization.

REVIEW OF THE PROPOSED STATE PROGRAM

Once the state has submitted a complete application for final authorization to EPA, the EPA Regional Administrator determines whether or not the state's program should be authorized.

The EPA Regional Administrator makes this determination according to the following steps:

- Tentative determination—The EPA Regional Administrator must tentatively approve or disapprove the state's application. The tentative determination is published in the *Federal Register.*
- Public comment—The public is given an opportunity to comment on the state's application and the EPA Regional Administrator's tentative determination. The Agency places a newspaper notice to inform the public of this opportunity, and a public hearing will be held after the notice of the tentative determination is published in the *Federal Register.*
- Final determination—After the notice of the tentative determination is published in the *Federal Register*, the EPA Regional Administrator must decide whether or not to authorize the state's program, taking into account all comments submitted. This final determination is then published in the *Federal Register.*

REVISING AUTHORIZED STATE PROGRAMS

Once a state has gained final authorization, it must continually amend and revise its program to maintain its authorized status. Forty-eight states and two territories have final authorization. As RCRA continues to evolve through new federal rulemakings, an authorized state is required to revise its program to reflect the changes in the federal program. An authorized state may also have to revise its program in order to incorporate any state statutory or regulatory changes that affect the state's hazardous waste program. Most of the current authorization activity involves revisions to authorized state programs rather than the authorization of new states.

All program revisions may be initiated by either EPA or the authorized state. To revise its authorized program, a state must submit copies of its regulations and may submit a modified program description, attorney general's statement, MOA, or other documents deemed necessary by EPA. EPA reviews the state's proposed modifications by applying the same standards used to review the state's initial program application. EPA provides rule checklists to help states revise their programs. The state's program revisions are effective once approved by EPA. Notice of all state program revisions are then published in the *Federal Register*.

A state with final authorization must modify its program on a yearly basis to reflect changes to the federal program resulting from the promulgation of new rules. New federal rules are grouped into annual clusters, and a state revises its program by adopting and becoming authorized for the entire cluster. A cluster begins on July 1 of each year and ends on June 30 of the following year. By July 1 of each year, an authorized state must adopt the cluster, which includes all changes to the federal program, that occurred during the 12 months preceding the previous July 1 (e.g., states must modify their programs by July 1, 2014, to reflect all changes made between July 1, 2012, and June 30, 2013). The deadlines for program modifications may also be extended for one year if state statutory amendments are necessary.

■ Withdrawing State Program Authorization

Authorized state programs are continually subject to review. If the EPA Administrator determines that a state's authorized program no longer complies with

the appropriate regulatory requirements and the state fails to amend its program accordingly, authorization may be withdrawn. An authorized state's program may be considered out of compliance for many reasons. One reason could be failure to promulgate or enact required regulations, leaving the state without the legal authority to implement or enforce its program. Also, the state legislature could limit or strike down the state's authority to enforce its program. A state could also be out of compliance by failing to issue required permits, or by continually issuing bad permits. If an authorized state fails to enforce its authorized program properly, does not act on violations, fails to assess proper penalties or fines, or fails to inspect and monitor properly, it may also be considered out of compliance. Finally, if the state fails to comply with the requirements of the MOA, the EPA Administrator may determine the state is out of compliance and may begin program withdrawal procedures. If program authorization is withdrawn, responsibility for administering and enforcing RCRA Subtitle C reverts back to EPA.

Although EPA can withdraw hazardous waste program authorization for a state that fails to enforce its authorized program properly or take timely and appropriate action, the Agency can take other action without officially withdrawing authorization. In such instances, EPA may take independent enforcement action by **overfiling**, or enforcing a provision for which a particular state has authorization. EPA may also overfile if the state requests EPA to do so and provides justification based on unique, case-specific circumstances, or if a case could establish a legal precedent. In order to overfile, EPA must notify the state 30 days prior to issuing a compliance order or starting a civil action within that state.

■ Transferring Program Responsibility Back to EPA

A state with an authorized program may voluntarily transfer the program back to EPA. To do this, the state must give the EPA Administrator 180 days notice and submit a plan for the orderly transfer to EPA of all relevant program information necessary for administering the program (e.g., permits and permit files, compliance records, permit applications, reports).

GRANTS AND OVERSIGHT

While authorized states bear the primary responsibility for implementing the RCRA Subtitle C program, EPA still plays a role by offering financial assistance to states to help them develop and implement their hazardous waste programs, establishing broad national priorities, and ensuring that states properly carry out the RCRA program.

■ State Grants

EPA provides grants to states to assist them in developing or implementing authorized hazardous waste management programs. Each EPA Regional Office receives an allotment based upon multiple factors, such as population and the number of various types of waste management facilities in each state within the EPA Region. States then submit proposed work plans that outline planned activities in the upcoming year, including permitting, enforcement, and program management. EPA Regions then negotiate with each state over the specific work to be accomplished with these grant funds.

■ Priority Setting

EPA also sets RCRA national goals and priority program activities on an annual basis. Each year, in the National Program Managers Guidance, EPA identifies the national priorities for implementing all of its programs, including the RCRA Subtitle C and D programs. These priorities form the basis for EPA regional and state workload negotiations for the upcoming year.

■ State Oversight

Ensuring that states properly implement their hazardous waste management programs is also an important EPA responsibility. As a result, EPA regional staff have oversight responsibilities to:

- Promote national consistency in RCRA implementation
- Encourage coordination and agreement between EPA and states on technical and management issues

- Ensure proper enforcement by the state
- Ensure appropriate expenditure of federal grant funds.

INFORMATION MANAGEMENT

Several RCRA provisions require the regulated community to report hazardous waste management information to EPA and states. For example, biennial reporting provisions require large quantity generators and TSDFs to submit waste management information to EPA by March 1 of every even-numbered year. EPA and states, in turn, collect and track such information to ensure that the hazardous waste program is adequately managed at the EPA Headquarters, EPA regional, and state levels, and to provide accurate and up-to-date information to both Congress and the general public. In order to achieve this goal, EPA compiles such data in the RCRAInfo database. EPA also maintains the State Authorization Tracking System, which it uses to track whether states have been authorized to implement or have adopted federal hazardous waste rulemakings.

■ RCRAInfo

In September 2000, EPA began managing data supporting the Subtitle C program in its information system known as **RCRAInfo**. RCRAInfo consolidated EPA's former information systems into one national system. RCRAInfo is a national program management and inventory system of RCRA hazardous waste handlers, including generators, transporters, and treatment, storage, and disposal facilities (TSDFs). The information system captures identification, regulatory compliance status and cleanup activity data for all handlers, and tracks the permit and closure status of TSDFs. Additionally, RCRAInfo tracks state-collected data on the generation and management of RCRA hazardous waste from large quantity generators (LQGs) and TSDFs.

■ State Authorization Tracking System

The **State Authorization Tracking System** (StATS) is a tool used by EPA to chart the states that have been authorized to implement the RCRA hazardous waste program. By looking at StATS reports, an individual can determine if a particular state has been authorized to implement a specific rule. The reports also list the *Federal Register* citations for final authorization decisions for each state and rule.

SUMMARY

Congress intended states to assume responsibility for implementing RCRA, with oversight from the federal government. In order for a state to receive authorization to implement and enforce the hazardous waste regulations in lieu of federal EPA, the state must demonstrate that its program:

- Is equivalent to, no less stringent than, and consistent with the federal program (state requirements may be more stringent or broader in scope)
- Provides adequate enforcement authority
- Provides for public availability of information in substantially the same manner and to the same degree as the federal program.

Any state that seeks final authorization for its hazardous waste program must submit an application to the EPA Administrator containing the following elements:

- A letter from the governor requesting program authorization
- A complete program description
- An attorney general's statement
- An MOA
- Copies of all applicable state statutes and regulations
- Documentation of public participation activities.

Once a state's program has been authorized, it must revise its program, on an annual basis, to reflect both changes in the federal program, and state statutory or regulatory changes. State programs are also subject to review by EPA, and

a state's authorized status can be withdrawn if the program does not comply with appropriate regulatory requirements. Without officially withdrawing authorization, EPA may take independent enforcement action by overfiling, or enforcing a provision for which a particular state has authorization. States may also choose to transfer program responsibility back to EPA.

EPA works closely with states in implementing the hazardous waste management program by providing grants to states, setting national goals and priorities, and conducting program oversight.

EPA Headquarters, EPA regions, and states collect, compile, and track information on the RCRA hazardous waste program through RCRAInfo.

ADDITIONAL RESOURCES

Additional information about state authorization can be found at www.epa.gov/epawaste/laws-regs/state.

CHAPTER IV

MOVING FORWARD: MATERIALS MANAGEMENT AND RESOURCE CONSERVATION

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OVERVIEW

At the turn of the new century, the United States completed two decades of managing wastes under RCRA. In the past 20 years, waste management practices have improved tremendously. This success, while impressive, must be viewed in light of remaining challenges. Solid and hazardous waste continues to be generated in large amounts. Year-to-year increases in recycling rates have slowed.

After two decades of experience with the current system, it is time to look forward and to examine how the program should evolve to meet the challenges and opportunities of the new century. In order to do so, it is essential to redefine the specific goals that will guide a future program and to develop new tools and strategies to achieve those goals.

TRENDS AND FUTURE DIRECTIONS

In developing a vision for the future of RCRA, it is necessary to make certain projections and assumptions as to the "landscape" (i.e., the economic, technological, and societal setting) in which the program might operate in the future. Looking to the year 2020, these projections can be organized into six broad categories: resources, health and risk, industry, information, globalization, and society and government.

■ Resources

Worldwide demand for basic resources (e.g., fresh water, minerals, energy sources, fibers, and

agricultural land) will continue to increase as the world's population grows and as the global economy expands. Technological advancements will also affect the availability of resources and the way resources are used. For example, technological innovations could improve the efficiency with which resources are used or reduce the use of fossil fuels.

■ Health and Risk

The number of synthetic chemicals that are produced, used, and eventually discarded will continue to dramatically increase. While many of these products may represent important improvements, some of the new substances may have the potential to cause harm to human health and the environment, and knowledge of the risks posed by the new chemicals may not keep pace with their development. However, the effects of existing chemicals may become better understood as scientific advances are made.

■ Industry

Over the next few decades as resources become scarce, the economic value of certain basic materials and resources may increase – thus, market forces will create greater incentives for industry to use material more efficiently and to be less wasteful. Technologies for the reuse and recycling of material will likely increase over time, thus lowering the rate at which such materials are wasted.

Although industry may become more efficient, some industrial residuals will continue to have very low potential for productive reuse or recycling and will need to be managed as wastes. The existence of wastes and the need to manage them safely should promote technological progress that will broaden and improve treatment and disposal options.

■ Information

Over the next few decades, the amount of available information and the ability to share it will dramatically increase. This enhanced flow of information will result in a greater awareness and knowledge of environmental issues and concerns on the part of individuals, businesses, and other institutions. For example, more efficient information exchange should stimulate the business of buying and trading recyclable materials.

■ Globalization

The trend toward an increasingly globalized economic system and the rising worldwide demand for material goods will result in the need for more capacity in manufacturing and extracting industries, which are likely to become more globally dispersed. Furthermore, potentially hazardous wastes can be easily moved between those countries that have strict environmental protections and those that do not. Therefore, environmental protections will need to be more internationalized in order to address these global issues.

■ Society and Government

By the year 2020, it is expected that developments in information and telecommunications technologies will have created much stronger links between individuals and the governmental institutions that serve them. As a result, individuals may be empowered to more directly and effectively influence governmental decisions on environmental issues. These issues may focus on resources and local, regional, or global environmental problems that have not been adequately addressed. Moreover, the need to live in a relatively clean environment will continue to gain currency in this country as a basic civil and human right through both laws and societal attitudes. This trend will likely influence the future siting and operation of manufacturing and waste management facilities.

GOALS

With two decades of experience, it makes sense at this time to examine how waste and materials management should evolve to meet future challenges and opportunities. Based on past experience and the projections of future circumstances, EPA developed three goals for a future waste management system:

- Reduce waste and increase the efficient and sustainable use of resources
- Prevent exposures to humans and ecosystems from the use of hazardous chemicals

- Manage wastes and clean up chemical releases in a safe, environmentally sound manner.

Reduce Waste and Increase the Efficient and Sustainable Use of Resources

Over the next few decades, the human population will continue to grow, as will the material aspirations of large numbers of people in many parts of the world. Many believe that the resulting increased demand for resources cannot be sustained without the wide-scale degradation of the global environment unless those resources are used with greater efficiency. Therefore, this goal is centered on two objectives that call for using resources more efficiently.

The first objective is to reduce the overall volume of waste that needs to be disposed of in this country, regardless of the source or composition. This includes all wastes–whether it is municipal solid waste, industrial residues, or hazardous waste that is produced by individuals or industry.

The second objective is to reduce the amount of material used to make products or to perform services. Extending the useful life of products would help achieve this objective, as would increased materials reuse and recycling. A key aspect of achieving this objective will be to design products and manufacturing processes with the environment in mind. The design process would seek to minimize the use of raw materials and to extend product lifespans to maximize the ease and frequency of subsequent product disassembly, recycling, and/or transformation for reuse. Such continuous utilization processes (from cradle to cradle) are critical both to reducing waste and increasing the sustainable use of resources.

Creating a system truly oriented towards the efficient use of resources could also require fundamental changes in the waste versus non-waste regulatory construct embedded in the current RCRA system, allowing materials now considered wastes to be seen, whenever possible, as commodities with potential uses.

The most effective means to fulfill these objectives are likely to be those that use economic incentives to promote more efficient resource use and reduce waste generation. In addition, technological innovations and informational tools, such as investments in public education to enhance awareness of resource use, could play an important role. Regulatory mechanisms that focus on resource use and reuse will most likely be necessary as well.

Prevent Exposures to Humans and Ecosystems from the Use of Hazardous Chemicals

Hazardous chemicals will still be features of our everyday lives. While some of these chemicals have resulted in significant benefits for society, exposures to materials that contain hazardous chemicals can present risks to individuals and to the environment. These risks can occur at any point in a chemical's life cycle, regardless of whether the chemical is considered a product, raw material, or waste. Therefore, a truly integrated management system will need to appropriately control risks from: chemicals as they are produced, transported, and used in product manufacture; the use and reuse of those products; and unwanted harmful properties of those products when they become waste.

Currently, managing risks from potentially harmful chemicals in the United States is accomplished through a network of federal, state, and local regulatory controls, voluntary industry standards, liability incentives, public education efforts, and emergency response services. In many respects, this current system works reasonably well. However, there are inherent gaps and inconsistencies regarding which chemicals and which types of exposures are regulated, under what circumstances, and what types of risk mitigation measures are employed. A more coherent and consistent system for identifying, reducing, and controlling chemical risks could benefit human health and the environment and could be equally advantageous to industry.

More information regarding the impacts of chemicals on human health and the environment needs to be gathered so that consumers can make informed purchasing decisions and create market incentives to manufacture lower-risk products. Economic initiatives might be useful in furthering this goal, such as making it more costly to use high-risk chemicals. Regulatory controls could

also reduce the use of dangerous materials and may have more favorable outcomes if they are performance-based.

■ Manage Wastes and Clean Up Chemical Releases in a Safe, Environmentally Sound Manner

A broader waste prevention and materials management system will need to address at what point a material is considered a waste and whether the material would not be classified as a waste until the point at which it is clearly destined for disposal. Under an integrated waste and material management system, the current "cradle-to-grave" approach to waste management would be supplanted by a program under which a material that is now considered to be a waste will instead be presumed to be a valuable material until its useful life is expended, resulting in a "retirement-to-grave" rather than a "cradle-to-grave" system.

Under an integrated materials management system, all hazardous materials would be subject to essentially the same controls and incentives. Thus, the concept of hazardous waste management will be reduced from the current RCRA program to controls over the transportation, landfill design, operation and monitoring, and any required treatment of wastes prior to disposal.

By the year 2020, most of the existing contamination at RCRA-regulated hazardous waste facilities will hopefully be cleaned up, but some long-term remediation work may still be ongoing. Furthermore, preventing future releases of contamination to ground water and to other environmental media will remain key objectives. Opportunities may also remain to further revitalize idled or under-used properties, currently referred to as brownfields, and to increase the conservation of open spaces and greenfields.

Regulations will help to accomplish this goal by requiring the safe management and disposal of hazardous waste and by ensuring that future releases are remediated. However, other tools may diminish the need for regulatory controls. Fiscal policies, such as tax credits for waste reduction or a tax on waste generation, can promote waste minimization. Additionally, public disclosure of facilities' hazardous waste management practices could generate pressure on companies to manage wastes safely.

WHAT WORK IS NEEDED

Achieving these goals for a future waste management system will require action by all. EPA and states must act to maintain the protectiveness of basic waste management programs and must focus new efforts where they can achieve the greatest and most measurable improvements. EPA also needs to develop collaborative relationships with industry, academia, environmental communities, and individual consumers.

In 2002, EPA published *Beyond RCRA: Prospects for Waste and Materials Management in the Year 2020* (2020 Vision). In the 2020 Vision, EPA and state environmental officials initiated discussion on the direction of waste and materials management in the United States over the next twenty years. The 2020 Vision examined trends and future directions in materials use and technology use. It identified three overarching goals:

- Reduce waste and increase the efficient and sustainable use of resources
- Prevent exposures to humans and ecosystems from the use of hazardous chemicals
- Manage wastes and clean up chemical releases in a safe, environmentally sound manner.

The 2020 Vision presented an opportunity to define new, more collaborative roles for government and to inspire and facilitate change. EPA also identified specific actions that government could take to achieve the 2020 Vision.

Building on the initial 2020 Vision, in January 2007, the directors of EPA's waste and chemical programs convened the present 2020 Vision Workgroup to develop a roadmap to accelerate the move toward sustainable materials management. In June 2009, EPA published *Sustainable Materials Management: The Road Ahead*, a product of the EPA-State 2020 Vision Workgroup. This report suggests a roadmap for the future based on materials management—fulfilling human needs and prospering, while using fewer materials, reducing toxics and recovering more of the materials used.

EPA and the states are already doing considerable work along the lines recommended in the report—but taken as a whole, this strategy would be an important shift of emphasis from waste management to materials management. Shifting to a materials management approach will refocus the way our economy uses and manages materials and products.

The 2020 Vision and *Sustainable Materials Management: The Road Ahead* are available at www.epa.gov/epawaste/inforesources/pubs/vision.htm.

Furthermore, EPA is developing a Pollution Prevention (P2) Vision to provide strategic focus and identify current P2 priorities. The P2 Vision frames three broad strategic categories:

- Greening supply and demand
- P2 integration
- Delivery of P2 services.

THE RESOURCE CONSERVATION CHALLENGE

EPA is now charting its direction, building on the 2020 and P2 Visions. In late 2002, bringing new focus to the resource conservation aspect of RCRA, EPA launched the **Resource Conservation Challenge** (RCC).

The RCC is a way to implement the 2020 and P2 Visions and achieve a future where waste is a concept of the past. The RCC's goals are to reduce what comes into the waste management cycle, using pollution prevention, waste minimization, source reduction, and manufacturing process and/or product design changes. Moving to an efficient and safe materials flow is central to the RCC. EPA acknowledges industry's progress and willingness to move forward with this shift in focus toward resource conservation. EPA also acknowledges that some waste disposal will always continue to be a necessary, yet less desirable, option.

The Agency Strategic Plan and the 2020 and P2 Visions call for a transformation of the nation's current waste-handling system to more of a materials management system. The RCC – in partnership with the states – aims to achieve this transformation. EPA Headquarters and all ten regional offices are jointly engaged in the RCC.

The RCC is a major national effort to find flexible, yet protective, ways to conserve our national resources through waste reduction and energy recovery. The goals of the RCC are to prevent pollution and promote recycling and reuse of materials; reduce the use of priority chemicals at all product life-cycle stages; and conserve energy and materials.

To achieve these goals, EPA established collaborative partnership programs, as well as education and outreach programs, to encourage American individuals, institutions, and businesses to make smarter purchasing and disposal decisions. Ultimately, EPA is moving from a cradle-to-grave approach to waste management, where the cradle is the generation of waste and the grave is the ultimate safe disposal of waste, to a cradle-to-cradle approach through the RCC. This system of efficient materials management identifies waste materials that can be safely recycled and reused as material inputs and examines inputs to processes that create waste in an effort to eliminate inefficiencies and toxic materials altogether.

RCC NATIONAL PRIORITY AREAS

The RCC has made a lot of progress towards its goals of increasing recycling, reducing waste and toxic chemical use, and conserving energy. However, there is still much work to be done. EPA initiated integrated planning to determine the future direction of the RCC. The following sections describe the RCC Strategic Plan, the national priority areas of the RCC, and the action plans for the priority areas.

■ RCC Strategic Plan

EPA developed a strategic plan that describes the RCC's direction, focus, vision, and broad goals for the next five to ten years. To complement the RCC Strategic Plan, EPA identified four key areas for national focus, which are described in the following section. EPA developed a national action plan for results in each of these four areas that describes specific goals and actions needed to move toward the overall goals of the RCC. The action plans are described in more detail below in the next section.

The RCC Strategic Plan, with its focus on waste and toxics, aligns internal EPA and state projects, goals, and strategies. In the short term, the RCC will focus primarily on solid waste and pollution prevention. Ultimately, the RCC challenges us to put resource conservation and recovery into the design and manufacturing of products or recycling options and purchasing decisions.

To establish a strong foundation for the RCC, the program will harmonize the work of ORCR and the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) to attain waste and toxic substance reduction goals.

The RCC Strategic Plan is the key to establishing the path along which the RCC will continue to grow. The RCC will grow from a collection of individual, ambitious projects and achievements into a cohesive set of robust programs. These programs identify opportunities for, and ways to achieve, pollution prevention, recycling, reuse, toxics reduction, and energy and materials conservation. The strategy is dynamic, gaining greater specificity as the RCC identifies areas of national focus, further identifies goals and measures specific to different areas, and develops specific action plans. The goals of the RCC Strategy are to:

- Coordinate ORCR and OPPTS waste and toxics reduction programs and projects
- Better align EPA and state focus to attain effective materials management
- Build on current partnerships and attract new partners
- Describe the measures used to track success for future projects.

The RCC Strategic Plan is available at www.epa.gov/rcc.

■ Selection of National Priority Areas

After completing the strategic plan development, EPA focused on the identification of national priority areas and the development of accompanying action plans. This is a critical step because all regions and EPA Headquarters offices are expected to commit resources to achieving the stated objectives and targets for each area. Only by coordinating efforts across the country will EPA begin to move forward in achieving effective materials management. To accomplish this goal, ORCR held a series of meetings with OPPTS and regional waste management and P2/Toxics staff to discuss possible areas of national focus. At the conclusion of these meetings, four national priority areas were selected:

- Achieving the national 35 percent recycling rate for municipal solid waste (MSW)
- Reuse and recycling of industrial materials
- Priority and toxic chemical reductions
- Green initiatives – electronics.

These areas were initially identified as priorities in the RCC 2005 Action Plan. These priority areas may be amended or changed as necessary to achieve the ultimate goals of the RCC.

In selecting these areas, EPA considered several factors:

- Current and future Government Performance and Results Act (GPRA) goals in the EPA Strategic Plan
- Areas of significant partnerships with government and non-government stakeholders
- Existing coordinated efforts by EPA regions and states
- Areas of high potential positive environmental impact or benefits
- Current and emerging large-quantity waste streams.

From these criteria and based on current resources, EPA determined that the four areas would be the national focus of the RCC. These areas do not define the sum of all activities going on within the RCC, as much of the important on-going work being accomplished by the EPA and the states will continue. However, the above four areas will be the RCC's national core priorities. In each of the national priority areas, measurement is a major focus, allowing the Agency to demonstrate progress resulting from its investment of resources. The following sections discuss the development of action plans for each of the priority areas in detail.

Action Plans

Once the national priority areas were identified, participants established workgroups to draft an action plan for each area. Each workgroup consisted of a small number of headquarters and regional RCRA and OPPTS program experts with a focus on pollution prevention, risk reduction, and resource conservation. For each plan, the groups were asked to identify the scope or breadth of their area, key objectives to be achieved, measurable environmental targets or outcomes, and the means and strategies that would lead to success.

From these drafts, EPA gathered input from a broad group of RCRA and P2/Toxics managers and staff from EPA and states. This input brought a national perspective to the areas and helped shape the action plans for successful implementation. The action plans identify specific on-going and new activities, and associated means, benefits, measures, and outcomes, and outlines the implementation priorities and responsibilities of participating EPA offices and key stakeholders. These plans are consolidated in the RCC 2005 Action Plan. This document is a living document that will be amended as the RCC reaches key milestones and identifies new objectives and targets that will help to achieve the ultimate RCC goals.

The RCC 2005 Action Plan is available at www.epa.gov/rcc.

Municipal Solid Waste Recycling

Municipal solid waste (MSW) recycling is the first national focus area of the RCC. The objective is to increase recycling to attain EPA's GPRA goal for the nation to recycle at least 35 percent of MSW by 2008. The municipal solid waste recycling initiative targets specific components of MSW based on generation and recovery rates and the potential for increased recovery. Currently, this initiative encompasses the following MSW components: paper and paperboard, organic waste, and packaging/containers.

In the future, EPA will decide whether to target additional MSW components or to increase goals and targets for the three current target components.

EPA has decided to focus municipal solid waste recycling initiatives on a select group of business sectors. These sectors were selected for inclusion because they generate more than one of the targeted components, present opportunities for recycling, and have the availability of established partnerships or viable potential partners. Based on these criteria, EPA selected the following focus sectors:

- Schools
- Office buildings
- Landscapers
- Food service industry
- Hospitality industry
- Recycling on the go venues (shopping centers, ball parks, special events, convenience stores, health clubs, recreation centers, and parks)
- Federal government facilities.

More broadly, EPA will work at the national and regional levels to enhance public commitment to recycling, increase public access to recycling opportunities, and engage national stakeholders in the national recycling goal. In doing so, the Agency will work closely with states and local governments and target efforts strategically toward the MSW components identified and toward the commercial and government sectors that provide the greatest opportunities for success.

EPA will measure results towards the municipal solid waste recycling priority area using the measurement methodology from EPA's Waste Characterization Report. The report has been the primary source of municipal solid waste generation and recycling rates, although EPA will also use data from the Hospitals for a Healthy Environment (H2E) program, Performance Track data, and Supplemental Environmental Projects (SEPs). In addition, EPA will analyze and compare state data, as well as other measurement methodologies and data sources, such as "BioCycle", to better understand trends.

Industrial Materials Recycling (IMR)

The vision of IMR is a future where industries generate less waste and recycle residual materials to beneficial uses through environmentally sound practices. Currently, over 7.6 billion tons

of industrial waste are generated each year. The objective is to achieve the economic and environmental benefits of using the by-products of industrial processes as inputs to new products, thereby extending the useful life of landfills, conserving virgin materials, and reducing energy use and associated greenhouse gas emissions.

While other materials will be considered in the future, the following materials have been identified for immediate focus:

- Coal combustion products (CCPs), including fly ash, bottom ash, flue gas desulfurization (FGD) gypsum and wet and dry scrubber materials, boiler slag, and fluidized bed combustion (FBC) ash
- "Green" foundry sand, a molding material byproduct from the production of ferrous and nonferrous metal castings
- Construction and demolition debris (C&D debris), including materials generated from the construction, demolition, and renovation of buildings and infrastructure such as roads, bridges and runways, and land clearing.

EPA is pursuing four broad strategies in increasing the beneficial reuse of these materials: analyzing and characterizing the target materials; identifying environmentally safe and beneficial practices; identifying incentives and barriers to beneficial reuse; and increasing outreach and education on the benefits of source reduction and recycling industrial materials. To achieve the goals of this priority area, EPA is forming partnerships with industries, states, academia, and other federal agencies.

■ Priority and Toxic Chemical Reductions

The use of chemicals in industrialized nations has brought about tremendous advancements in technology and improved virtually every aspect of society. Although useful, certain chemicals in use today are highly toxic, do not break down when released into the environment, and can be dangerous even in small quantities. EPA has identified thirty-one priority chemicals that meet these criteria. While this list represents the EPA's priority for reduction, it is certainly not exhaustive and other candidates for national attention are likely to be identified. Considerations in selecting other toxic chemicals of national concern may include: increased or widespread use, significant production volumes, availability of safer or greener alternatives, presence in common products that contribute to the wastestreams, frequent findings that the substance has created environmental cleanup problems, interest to more than one EPA program, existence of available or likely solutions, and other factors such as presence in humans or the environment indicating potential significant exposure, release, or risk.

EPA plans to eliminate or reduce priority chemicals and other chemicals of national concern from commercial products, wastestreams, and industrial releases through pollution prevention, waste minimization, and recycling/reuse.

These chemical reduction goals have resulted in five basic operating principles:

- Substituting priority and other toxic chemicals with safer alternatives whenever possible
- Minimizing the amount of toxics used whenever substitution is not possible
- Maximizing recycling whenever minimization or substitution is not possible
- Emphasizing cradle-to-cradle chemical management
- Minimizing exposures to toxics and the volume and toxicity of waste through better product and manufacturing process design.

EPA will establish a process with relevant manufacturers, processors, users, and other stakeholders to identify, implement, and realize toxic chemical reduction opportunities.

■ Green Initiatives – Electronics

In 2009, 438 million new electronic products were sold; 5 million short tons of electronic products were in storage; 2.37 million short tons of electronic products were ready for end-of-life management; and 25 percent of these tons were collected for recycling. The electronics priority area will work to reduce the potential adverse effects of these discarded products by applying a life cycle approach to the problem. The RCC addresses environmental

concerns along the entire life cycle of electronics, including design, operation, reuse, recycling, and disposal of equipment. The electronics initiative will focus initially on computers (PCs), televisions, and cell phones, but may add other electronic wastes in the future.

The RCC aims to meet three electronic waste objectives:

- Foster environmentally conscious design and manufacturing, including reducing or eliminating higher-risk materials (e.g., priority and toxic chemicals of national concern) in electronics products at the source
- Increase purchasing and use of more environmentally sustainable electronics
- Increase safe, environmentally sound reuse and recycling of used electronics.

These green initiatives depend on partnership programs, such as Design for the Environment, the Federal Electronics Challenge (FEC), and Plug-in to eCycling, for success. In addition, EPA plans to broaden the utilization of the Electronics Product Environmental Assessment Tool (EPAT), an environmental procurement tool designed to help institutional purchasers in the public and private sectors evaluate, compare, and select desktop computers, laptops, and monitors based on environmental attributes.

■ RCC Relationship to GPRA Goals and EPA Strategic Plan

The 1993 Government Performance and Results Act (GPRA) holds federal agencies accountable for using resources wisely and achieving measurable program results. GPRA requires agencies to develop goals and plans for what they intend to accomplish, measure how well they are doing, make appropriate decisions based on the information they have gathered, and communicate information about their performance to Congress and to the public.

GPRA requires agencies to develop a five-year Strategic Plan, which includes a mission statement and sets out long-term goals and objectives; Annual Performance Plans, which provide annual performance commitments toward achieving the goals and objectives presented in the Strategic Plan; and Annual Performance Reports, which evaluate an agency's progress toward achieving performance commitments.

GPRA requirements – a long-range Strategic Plan, Annual Performance Plans, and Annual Performance Reports – forge links among several activities:

- Planning, to achieve goals and objectives
- Budgeting, to ensure that resources are available to carry out plans
- Measuring, to assess progress and link resources actually used to results achieved
- Reporting, to present progress achieved and impacts on future efforts.

To comply with GPRA requirements and further enable the Agency to manage for results, EPA has built a framework that aligns planning, budgeting, and accountability in an integrated system. EPA continues to look for ways to improve planning and priority-setting – both in terms of annual planning and budgeting and longer-range strategic planning.

EPA's 2006 Strategic Plan serves as the road map for the next five years by establishing five long-term Agency goals. It also helps to establish annual goals, measure progress towards achieving those goals, and recognize where approaches or directions need to be adjusted to achieve better results. Finally, it will provide a basis from which EPA's managers can focus on the environmental issues with the highest priority and ensure effective use of taxpayer dollars.

The Strategic Plan is built around five goals, centered on the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship. These themes reflect EPA's mission, "To protect human health and the natural environment."

In selecting the National Priorities for the RCC, EPA considered current and future GPRA goals in the Strategic Plan. The RCC's three goals are drawn from the EPA's overall strategic goals and direction. Specific goals and strategies have been identified in the RCC action plans to support the goals and commitments of EPA's Strategic Plan.

The RCC is currently a part of both Goal 3 and Goal 5 of the Agency goals. Goal 3 relates to land preservation and restoration, and Goal 5 relates to compliance and environmental stewardship. Within

the RCC, measurement is a key element, with the objective of demonstrating progress on both GPRA goals. The focus of measurement is environmental outcomes, rather than procedural or administrative outputs. The RCC is working on projects that also support EPA Goals 2 and 4. Goal 2 promotes clean and safe water, and Goal 4 addresses healthy communities and ecosystems. During each cycle of the Agency's Annual Performance Plan, the RCC will add specific targets and measures that support the goals established by EPA's Strategic Plan.

COLLABORATIVE PARTNERSHIP PROGRAMS

EPA, both Headquarters and Regional Offices, is relying on collaborative partnerships and projects to meet the goals of the Resource Conservation Challenge. EPA works collaboratively with members of industry, trade associations, universities, public interest groups, tribes, and state, local, and federal agencies to increase recycling, reduce the use of toxic chemicals, and eliminate waste. These partnerships are designed to provide smarter, faster, and acceptable solutions that provide measurable progress in safeguarding our environment.

EPA is striving for environmentally sound solutions that improve public health or the environment and have measurable results. The most desirable solutions will likely be flexible, non-regulatory, ambitious, sustainable, and approached on a life cycle basis. Solutions that prevent the creation of pollutants and waste, and produce durable, recyclable, and less hazardous goods are preferred.

EPA and partners collaborate to identify and pursue the necessary tools, drivers, and incentives to produce the desired change. Potential barriers are identified and environmentally sound remedies proposed. Working together, EPA and partners define how success is to be determined and agree on an overall measurable environmental objective, sub-objectives, and targets.

A short description for each of the existing formal partnerships is provided in the following sections. Additional information on any of the partnership programs below can be found at www.epa.gov/epawaste/partnerships.

■ The Plug-In to eCycling Program

In the past decade, our growing reliance on electronics has given rise to a new environmental challenge – the safe and resource-wise management of electronic waste. Approximately 300,000 units of consumer electronics are disposed of annually. The Plug-In To eCycling Partnership Programs aims to increase the safe recycling of used electronic products by providing recognition and other incentives to partners. Plug-In To eCycling partners include manufacturers, retailers, government agencies, or nonprofit businesses, all of which participate in the collection, reuse, recycling, or refurbishing of old electronic equipment. Initiatives developed under the Plug-In To eCycling Program are not exclusive to partners; EPA encourages everyone who handles used electronic equipment to maximize reuse, refurbishment, and recycling activities. EPA also encourages other organizations to recycle electronics by participating in the Federal Electronics Challenge, a voluntary partnership program that encourages federal agencies and facilities to purchase greener electronic products, reduce impacts of electronic products during use, and manage obsolete electronics in an environmentally safe way.

Additional information on the Plug-In to eCycling Partnership Program can be found at www.epa.gov/plugin.

■ Product Stewardship Partnerships

Product Stewardship Partnerships involve efforts to reduce the life-cycle impacts of products through product stewardship partnerships with manufacturers, retailers, other governments, and non-government organizations. Product stewardship is a product-centered approach to environmental protection. Also known as extended product responsibility, product stewardship calls on those in the product life cycle, including manufacturers, retailers, users, and disposers to share the

responsibility for reducing the environmental impacts of products.

Product stewardship recognizes that product manufacturers can and must take on new responsibilities to reduce the environmental impact of their products. Without serious producer commitment, significant progress toward improved resource conservation and a sustainable economy cannot be made. However, real change cannot always be achieved by producers acting alone; retailers, consumers, and the existing waste management infrastructure must also pitch in for product stewardship to be successful.

Additional information on the Product Stewardship Partnership Program can be found at www.epa.gov/epawaste/partnerships/stewardship.

■ WasteWise

Many companies, institutions, and governments have demonstrated that they can save money by reducing waste and recycling material that would otherwise be disposed. The WasteWise Partnership Program is designed to assist companies, states, local governments, Native American tribes, and other institutions in developing cost-effective practices to reduce municipal solid waste. These partners set and achieve goals within three areas: waste prevention, recycling collection, and buying or manufacturing recycled products. Participation as a WasteWise partner offers several advantages including technical assistance, publications, recognition, and program updates. Successful waste reduction efforts are highlighted in EPA documents, magazines, and trade publications. Participating organizations can also use the WasteWise logo to promote their participation, and each year the top-reporting partners are honored at a national awards ceremony. These benefits, along with the direct financial savings that result from waste prevention and recycling activities, are helping to improve waste management and resource efficiency. Since its inception in 1994, WasteWise has grown to include more than 2,700 corporations, government agencies, universities, hospitals, and other organizations committed to cutting costs and conserving natural resources through solid waste reduction. WasteWise partners have reported more than 120 million tons of waste reduced and made significant achievements reducing their impact on global climate change. Additional information on the WasteWise program is found at www.epa.gov/wastewise.

■ Education and Outreach Programs

EPA is not focusing only on industry, but is challenging everyone to improve their waste management practices, and to accept responsibility for improving our environment. In order to accomplish this goal, everyone needs to change practices and processes. Businesses, consumers, and governments must work together to make changes across the whole supply chain to include recycled materials and better product designs and to make products easier to reuse and recycle. Manufacturers can make products less toxic and more recyclable; however, those products need to be purchased by consumers. Finally, individuals, businesses, and agencies need to change their buying and disposal habits.

EPA provides general resources through the RCC for all citizens to learn how to reduce, reuse, and recycle materials and how to get involved and make a difference in their community. The RCC also provides a forum for sharing information and educating partners on various innovative technologies and methods for efficient materials management.

SUMMARY

It is certain that in the future waste and materials management will be very different. EPA is leading the nation in moving toward that future now by:

- Reducing waste, increasing recycling, and increasing the efficient and sustainable use of resources
- Preventing exposures to humans and ecosystems from the use of hazardous chemicals, and
- Managing wastes and cleaning up chemical releases in a safe, environmentally sound manner.

Sustainability is a critical environmental, economic, and quality of life issue that America and Americans will need to confront over the next decades. Since the U.S. is by far the world's largest consumer of goods and services, it has the responsibility to act with serious purpose to use resources more efficiently, and to work toward a more sustainable national and global economy. Developing new approaches for conserving resources, reducing the amount of toxics in the environment, and managing wastes properly can, and should be, an important part of making a more sustainable world. Promoting resource conservation along with economic growth will require a wide range of innovative tools that are well beyond the current scope of RCRA.

EPA helped develop and implement new initiatives and programs that aid industry, businesses, states, local governments, and communities in implementing effective materials management programs. The RCC focuses on the environmental and economic benefits of source reduction and recycling through collaborative partnership programs. Formal programs include:

- The Plug-In to eCycling Program
- The Product Stewardship Program
- WasteWise.

ADDITIONAL RESOURCES

Additional information about a future waste management system can be found at www.epa.gov/epawaste/inforesources/pubs/vision.htm. Additional information about the Resource Conservation Challenge can be found at www.epa.gov/rcc.

CHAPTER V

MISCELLANEOUS STATUTORY REQUIREMENTS

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OVERVIEW

All RCRA provisions do not fit neatly into the solid waste, hazardous waste, and underground storage tank (UST) regulatory frameworks. The Statute established additional miscellaneous provisions to further the goals of the waste management program, and to address materials that were not covered by Subtitles C, D, or I.

The first set of these miscellaneous statutory provisions focuses on promoting recycling and developing a market for products with recycled content: the federal procurement requirements.

The second set of miscellaneous statutory provisions focuses on certain materials that were not covered by Subtitles C, D, or I: namely, medical wastes. These requirements imposed a tracking system to ensure the safe and protective management of potentially harmful wastes.

This chapter consists of two sections:

- Federal Procurement Requirements—To promote recycling, encourage the development of recycling technologies, and develop the market for products with recycled content, RCRA contains specific federal procurement requirements.
- Medical Waste Regulations—To ensure the tracking and safe management of medical waste, RCRA established a medical waste demonstration program.

PROMOTION OF RECYCLING AND FEDERAL PROCUREMENT REQUIREMENTS FOR RECOVERED CONTENT PRODUCTS

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OVERVIEW

The purpose of RCRA is not merely to control waste generation, waste management, or waste disposal. The title of the Act itself clearly reveals a major focus and intent – resource conservation and recovery. As discussed in chapter I, a major goal of RCRA is energy and natural resource conservation through reducing the depletion of our natural resources and to protect those resources from hazardous constituents. Another major goal of RCRA is resource recovery through extracting usable resources from materials that are unintentionally created (i.e., wastes).

Resource recovery or recycling requires separating and collecting wastes for their subsequent transformation or remanufacture into usable products and materials. Resource recovery is a major component of the RCRA program because it diverts large amounts of solid waste from landfills and incinerators, conserves space in landfills, recovers the precious raw materials that are often found in solid waste, and preserves natural resources that would otherwise be used to produce virgin products and materials.

To further this waste management approach, RCRA established specific provisions to promote the development of recycling capabilities and technologies, and develop a market for recyclable materials. As a result, the Statute contains provisions for technology and market development activities, as well as federal procurement requirements intended to bolster the demand for products containing recycled materials.

PROMOTION OF RECYCLING

When the Statute was enacted, the waste management and recycling industries were unable to maintain and promote substantial resource conservation and recovery of a wide range of materials. While specific industries, such as metals and glass recycling, were mature and developed, recycling of other commodities, such as old newspapers was not as advanced. While recycling was a major component of the regulatory program, there was neither the technology to recycle nor a market in which to sell and purchase such commodities. Without a market to sell or a demand to purchase recycled products, there was no incentive to perform recycling activities in the first place. Congress recognized this opportunity within the recycling industry and sought ways to promote both recycling activities and market development. As a result, RCRA includes provisions requiring EPA to take steps to identify markets for recovered materials, identify economic and technical barriers to the use of recovered materials, encourage the

development of new uses for recovered materials, and promote recycling technologies. In addition, RCRA requires the National Institutes of Standards and Technology to develop specifications for recycled materials to facilitate their reuse in replacing virgin materials in various industrial and commercial products.

FEDERAL PROCUREMENT REQUIREMENTS FOR RECOVERED CONTENT PRODUCTS

Realizing that recycling is not only the collection of materials for remanufacture, but also the purchase of products with recovered content by consumers, Congress sought ways to stimulate market demand for recycled materials. Congress realized that the purchasing power of the federal government, if focused on procuring products with recovered content, could create a significant demand for recycled materials thus stimulating the market. Increased demand by the federal government for products with recovered content would boost manufacturing of such items and encourage the private sector to purchase such goods as well. As a result, RCRA §6002 established a requirement for EPA to issue guidelines for the federal procurement of products containing recovered materials.

RCRA §6002 also requires procuring agencies to purchase those items composed of the highest percentage of recovered materials practicable. In short, it is the government's "buy-recycled" program.

Procuring agencies are defined as:

- Federal government departments or agencies
- State government agencies that use appropriated federal funds for procurement of a designated item
- Local government agencies that use appropriated federal funds for procurement of a designated item
- Government contractors that work on a project funded by appropriated federal funds, with respect to work performed under the contract.

Only procuring agencies that purchase $10,000 or more worth of a designated item during the course of their fiscal year, or that purchased at least $10,000 worth of a procurement item during the preceding fiscal year, are subject to these procurement requirements.

The Statute requires EPA to designate products that are or can be made from recovered materials, and to make recommendations concerning the procurement of items containing recovered materials. Procuring agencies can use these guidelines to meet these statutory requirements.

■ Comprehensive Procurement Guidelines

EPA designates items in a Comprehensive Procurement Guideline (CPG), which is updated periodically. Currently, there are 59 items designated within 8 product categories (see Figure V-1). These product categories are:

- Paper and Paper Products
- Vehicular Products
- Construction Products
- Transportation Products
- Park and Recreation Products
- Landscaping Products
- Nonpaper Office Products
- Miscellaneous Products.

■ Recovered Materials Advisory Notice

For each item designated in the CPG, EPA also publishes corresponding and guidance in a **Recovered Materials Advisory Notice** (RMAN) (see Figure V-2). EPA recommends recovered content levels and provides information on specifications for purchasing a particular item and other pertinent purchasing information.

■ Affirmative Procurement Program

If an agency meets the definition of a procuring agency and is purchasing a certain dollar amount of a designated item, that agency is required to purchase items with the highest levels of recovered

Figure V-1: Designated Procurement Items

Paper and Paper Products
- Commercial/industrial sanitary tissue products
- Miscellaneous papers
- Newsprint
- Paperboard and packaging products
- Printing and writing papers

Vehicular Products
- Engine coolants
- Rebuilt vehicular parts
- Re-refined lubricating oils
- Retread tires

Construction Products
- Building insulation products
- Carpet
- Carpet cushion
- Cement and concrete containing coal fly ash, ground granulated blast furnace slag, cenospheres, silica fume
- Consolidated and reprocessed latex paint
- Floor tiles
- Flowable fill
- Laminated paperboard
- Modular threshold ramps
- Nonpressure pipe
- Patio blocks
- Railroad grade crossing surfaces
- Roofing materials
- Shower and restroom dividers/partitions
- Structural fiberboard

Transportation Products
- Channelizers
- Delineators
- Flexible delineators
- Parking stops
- Traffic barricades
- Traffic cones

Parks and Recreation Products
- Park benches and picnic tables
- Plastic fencing
- Playground equipment
- Playground surfaces
- Running tracks

Landscaping Products
- Compost made from recovered organic materials
- Fertilizer made from recovered organic materials
- Garden and soaker hoses
- Hydraulic mulch
- Lawn and garden edging
- Plastic lumber landscaping timbers and posts

Non-paper Office Products
- Binders, clipboards, file folders, clip portfolios, and presentation folders
- Office furniture
- Office recycling containers
- Office waste receptacles
- Plastic desktop accessories
- Plastic envelopes
- Plastic trash bags
- Printer ribbons
- Toner cartridges

Miscellaneous Products
- Awards and plaques
- Bike racks
- Blasting grit
- Industrial drums
- Manual-grade strapping
- Mats
- Pallets
- Signage
- Sorbents

content practicable. An agency may elect not to purchase designated items only when the cost is unreasonable, items are not available within a reasonable period of time, or items do not meet the agency's reasonable performance specifications. Within one year after EPA designates an item, procuring agencies must revise their product specifications to require the use of recovered materials and to eliminate administrative barriers to the use of materials with recovered content, such as removing purchasing provisions that prohibit the use of recovered materials or require the exclusive use of virgin materials.

Within one year after EPA designates an item, each procuring agency must develop an affirmative procurement program for each designated item, setting forth the agency's policies and procedures for implementing the requirements.

The affirmative procurement program consists of four parts:

- Preference program
- Promotion program
- Estimation, certification, and verification provisions
- Monitoring and review program.

Preference Program

The preference program is a means by which an agency shows its preference for products made with recovered materials. It may consist of established minimum content standards, a case-by-case approach when the minimum content standard is inappropriate, or an equivalent alternative. Minimum content standards specify the minimum amount of recovered materials that designated items should contain. Agencies can adopt these standards on an agency-wide basis for all procurement actions. Case-by-case policy development allows the procuring agency to establish a separate recovered materials content requirement for a specific procurement action, while still enabling the agency to procure other designated products with the highest amount of recovered materials practicable. The procuring agency can also choose an alternative that is equivalent to either of these options, such as contracting for recycling of spent engine coolant.

Promotion Program

Through the promotion program, the agency must actively promote its desire to buy recycled products, both internally within the agency and externally to product vendors. Internal promotion usually is a broad-based employee education program that affirms an agency's procurement policy through advertising, workshops, agency newsletters, and technical and staff manuals. Examples of external

Figure V-2: Sample Recovered Materials Advisory Notice Content Level Specification

Postconsumer materials are materials or finished products that have served their intended uses and have been discarded for disposal or recovery having completed their lives as consumer items. For example, EPA recommends that procuring agencies purchase plastic fencing that contains 60–100% postconsumer plastic.

Total recovered materials content refers to the total percentage of recovered materials that EPA recommends for a designated item. For example, EPA recommends that procuring agencies purchase plastic fencing that contains 90–100% recovered plastic.

Recommended Recovered Materials Postconsumer Content Levels for Fencing Containing Recovered Plastic

Material	Postconsumer content (%)	Total recovered materials content (%)
Plastic	60–100	90–100

promotion include publishing articles in trade journals, participating in vendor shows or trade fairs, placing statements in bid solicitations, and discussing an agency's procurement policy at bidders' conferences.

Estimation, Certification, and Verification Provisions

Agencies should use standard contract provisions to estimate, certify, and, where appropriate, reasonably verify the recovered materials content in a product procured by an agency.

Monitoring and Review Program

The monitoring and review program requires agencies to monitor affirmative procurement programs to ensure that they are fulfilling their obligation to purchase items composed of recovered materials.

■ Compliance

Once EPA designates an item in the CPG, the responsibility for complying with the procurement program rests with the procuring agency. There are no provisions in the Statute for federal enforcement of the guidelines. On the other hand, RCRA §7002 citizen suit provisions allow citizens to sue in U.S. District Court to seek relief against any person alleged to be in violation of the requirements of the Act, including the procurement requirements. (Citizen suit provisions are fully discussed in Chapter III, Enforcement of Hazardous Waste Regulations).

SUMMARY

In order to further RCRA's resource, conservation, and recovery goals, the Statute includes provisions to promote recycling and market development. RCRA created federal procurement requirements to create a significant demand for products with recovered content, boost manufacturing of such products, and encourage the private sector to purchase such goods as well.

The procurement requirements apply to procuring agencies that purchase $10,000 or more worth of a designated item during the course of their fiscal year, or that purchased at least $10,000 worth of a procurement item during the preceding fiscal year.

Procuring agencies are defined as:

- Federal government departments or agencies
- State government agencies that use appropriated federal funds for procurement of a designated item
- Local government agencies that use appropriated federal funds for procurement of a designated item
- Government contractors that work on a project funded by appropriated federal funds, with respect to work performed under the contract.

RCRA §6002 requires procuring agencies to purchase designated recycled-content items of the highest percentage or recovered content practicable.

Each procuring agency must develop an affirmative procurement program for each designated item, setting forth the agency's policies and procedures for implementing the requirements. This program consists of four parts:

- Preference program
- Promotion program
- Estimation, certification, and verification program
- Monitoring and review program.

ADDITIONAL RESOURCES

Additional information about the topics covered in this chapter can be found at www.epa.gov/cpg.

MEDICAL WASTE REGULATIONS

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OVERVIEW

During the summer of 1988, syringes and other used medical materials washed up on beaches along the Atlantic seaboard. In response to public concern about this problem, Congress enacted the Medical Waste Tracking Act in November 1988, which added medical waste tracking provisions in RCRA Subtitle J. The Medical Waste Tracking Act directed EPA to establish a two-year demonstration program for the tracking and management of medical waste. Under this statutory authority, EPA codified regulations in 40 CFR Part 259 identifying the medical wastes to be tracked and creating management standards for handlers of medical waste. The States of Connecticut, New Jersey, New York, Rhode Island, and the Commonwealth of Puerto Rico all participated in the two-year tracking program. For purposes of this program, they were known as **covered states**. This demonstration program began June 22, 1989, and ended June 22, 1991. Two interim reports were submitted to Congress in 1990. Currently, the program is expired and no federal medical waste tracking and management regulations are in effect. As a result, the provisions in Part 259 have been removed from the CFR. States, however, have become active in managing medical waste and a majority has developed programs similar to the federal model. This chapter will discuss what was considered medical waste under the two-year demonstration program.

WHAT WAS REGULATED MEDICAL WASTE?

Regulated Medical waste included:

- Cultures and stocks of infectious agents
- Human pathological wastes (e.g., tissues, body parts)
- Human blood and blood products
- Used sharps (e.g., hypodermic needles and syringes used in animal or human patient care)
- Certain animal wastes
- Certain isolation wastes (e.g., wastes from patients with highly communicable diseases)
- Unused sharps (e.g., suture needles, scalpel blades, hypodermic needles).

For purposes of the demonstration program, the definition of medical waste excluded household waste. In addition, residues from treatment and destruction processes, or from the incineration of regulated medical wastes, were not considered medical waste, nor were human remains intended to be buried or cremated. Etiologic agents (i.e., infectious substances) being shipped pursuant to other federal regulations, and samples of medical waste that were shipped for

enforcement purposes were exempt from the 40 CFR Part 259 requirements.MEDICAL WASTE VS. HAZARDOUS WASTE

Because medical wastes met the RCRA regulatory definition of solid waste, these wastes were also subject to the Subtitle C hazardous waste characterization. In other words, once a facility identified a waste as a medical waste, it then had to determine if this waste was also listed or characteristic. (The hazardous waste identification process is fully discussed in Chapter III, Hazardous Waste Identification). If medical waste was a hazardous waste, it was subject to the Subtitle C hazardous waste requirements. When the Subtitle J medical waste tracking standards were in place, such hazardous medical wastes were excluded from the tracking requirements and were subject to those requirements in RCRA Subtitle C.

THE DEMONSTRATION PROGRAM

The medical waste tracking demonstration program set up provisions for tracking medical waste from the generator to the disposal site, similar to Subtitle C's hazardous waste manifest system. The program was designed to ensure proper handling, tracking, and disposal of medical waste. The system required that a tracking form accompany the waste and a signed copy be retained by the generator, each transporter, transfer station, and the treatment, destruction, and disposal facility that handled the waste. When the final disposal facility accepted the waste, a copy of the signed tracking form was returned to the generator. Through this process, the generator was assured that the waste was actually received for disposal. The tracking program also included exception and discrepancy reporting to alert EPA and the states if wastes were not being handled properly.

To minimize contact with medical wastes by workers, handlers, and the public, the program also included specific requirements for segregation, packaging, labeling, marking, and storing of medical wastes before they were shipped to another site for treatment, destruction, or disposal.

The demonstration program focused on three groups of medical waste handlers:

- Generators
- Transporters
- Treatment, destruction, and disposal facilities.

■ Generators

A medical waste **generator** was any person whose act or processes produced medical waste or caused medical waste to become subject to regulation. These tracking provisions applied to persons or facilities that generated 50 pounds or more of medical waste in a month and shipped such waste off site. These generators were required to separate, package, label, mark, and track medical wastes according to the regulations. Generators producing and shipping less than 50 pounds a month were required to prepare their wastes properly for shipment, but could use a log to account for wastes instead of a tracking form.

With the exception of medical waste burned in on-site incinerators, generators who disposed of medical wastes on site or in a sewer system were not covered by the tracking requirements of this program. Similarly, wastes that were treated and destroyed or disposed of on site or in sewers were not counted as part of the 50-pound monthly total. Generators burning waste in on-site incinerators were required to report the volume of waste burned. All medical wastes, even those that were to be treated, destroyed, and disposed of on site, were required to be stored properly.

These provisions applied to medical wastes generated by federal facilities in covered states. These provisions also applied to ships and ocean vessels that brought medical wastes to shore by docking in a covered state.

■ Transporters

A medical waste transporter was any person engaged in the off-site transportation of medical waste by air, rail, highway, or water. Transporters were required to notify EPA of their intent to comply with the tracking program before they could accept medical waste for transport. Transporters were

required to follow rules governing the transport, tracking, recordkeeping, and reporting of waste shipments. They were also required to make sure that the wastes they accepted for transport had been properly prepared for shipping and that the tracking form was accurate.

■ Treatment, Destruction, and Disposal Facilities

Treatment facilities were facilities that changed the biological character or composition of medical waste to substantially reduce or eliminate its potential for causing disease. Destruction facilities were facilities that destroyed medical waste by mutilating it, or tearing it apart to render it less infectious and unrecognizable as medical waste. Once medical waste was properly treated and destroyed, it no longer needed to be tracked. These treatment and destruction facilities included incinerators and treatment operations that ground, steam-sterilized, or treated the waste with chemicals, heat, or radiation. Disposal facilities were facilities where medical waste was placed in or on the land (e.g., landfills).

The demonstration program did not regulate the operation of these treatment, destruction, and disposal processes, but rather required tracking from generation to disposal and recordkeeping. When the wastes were accepted for disposal, these facilities had to send a signed copy of the tracking form back to the generator or initiator of the tracking form. The facility owners and operators were required to investigate any discrepancies between the accompanying papers and the shipments they received. If after investigation there was still a discrepancy, they were required to report to EPA and the generator's state agency. Once treated and destroyed, however, such wastes were no longer subject to the tracking requirements.

INTERSTATE SHIPMENTS

While only the States of Connecticut, New Jersey, New York, Rhode Island, and the Commonwealth of Puerto Rico participated in the tracking program, the medical waste tracking provisions also applied when shipments originating in these covered states were transported to states that did not participate in the program.

According to the provisions of the tracking program, if medical waste was generated in a covered state, any subsequent handling by a transporter or treatment, destruction, and disposal facility in that state, another covered state, or a noncovered state was subject to the tracking provisions. For example, if a medical waste was generated in New Jersey (a covered state) and transported by truck to Pennsylvania (a noncovered state) for treatment and disposal, the waste would still be subject to the medical waste tracking provisions since the waste was originally generated in a covered state.

CURRENT REQUIREMENTS

While medical waste is not regulated under the current federal RCRA regulations, there are federal requirements for medical waste under the Clean Air Act (CAA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

In 1997, under CAA, EPA established new source performance standards (NSPS) and emissions guidelines to reduce air emissions from new and existing hospital, infectious, and medical waste incinerators. These guidelines also established standards for incinerator operator training and qualification, equipment inspections, and siting EPA estimates that as of September 2009, there are approximately 57 such incinerators in operation in the United States that combust medical and infectious waste annually.

SHIPMENTS TO STATES NOT PARTICIPATING IN THE DEMONSTRATION PROGRAM

While only the Commonwealth of Puerto Rico and the States of Connecticut, New Jersey, New York, and Rhode Island participated in the tracking program, the medical waste tracking provisions also applied when shipments originating in these covered states were transported to states that did not participate in the program.

Under FIFRA, antimicrobial pesticides and chemicals used in medical waste treatment technologies must be registered with EPA.

SUMMARY

Congress enacted the Medical Waste Tracking Act in November 1988, which added medical waste tracking provisions to RCRA Subtitle J. The Act directed EPA to establish a two-year demonstration program for the tracking of medical waste. The States of Connecticut, New Jersey, New York, Rhode Island, and the Commonwealth of Puerto Rico all participated in the tracking program. This demonstration program began June 22, 1989, and ended June 22, 1991. Currently, the program is expired and no federal tracking regulations are in effect. States, however, have become active in managing medical waste and many have developed programs similar to the federal model.

Medical wastes included:

- Cultures and stocks of infectious agents
- Human pathological wastes (e.g., tissues, body parts)
- Human blood and blood products
- Used sharps (e.g., hypodermic needles and syringes used in animal or human patient care)
- Certain animal wastes
- Certain isolation wastes (e.g., wastes from patients with highly communicable diseases)
- Unused sharps (e.g., suture needles, scalpel blades, hypodermic needles).

The medical waste demonstration program set up provisions for tracking the waste from the generator to the disposal site, similar to Subtitle C's hazardous waste manifest system.

The demonstration program focused on three groups of medical waste handlers:

- Generators
- Transporters
- Treatment, destruction, and disposal facilities.

The medical waste tracking provisions also applied when shipments originating in states covered by the program were transported to states that did not participate in the program.

While medical waste is not regulated under the current federal RCRA regulations, there are federal requirements for medical waste under the Clean Air Act (CAA) for medical waste incinerators and under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) for pesticides and chemicals used in medical waste treatment technologies.

ADDITIONAL RESOURCES

Additional information about medical waste regulations can be found at www.epa.gov/epawaste/nonhaz/industrial/medical.

CHAPTER VI

OTHER ENVIRONMENTAL STATUTES

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OVERVIEW

Congress has passed many environmental laws to address releases, or threats of releases, of hazardous constituents. An understanding of these laws is necessary to understand how RCRA fits into the national environmental protection system. Each environmental statute has its own particular focus, whether it is controlling the levels of pollutants introduced into a single environmental medium (i.e., air, soil, or water) or addressing a specific area of concern, such as pesticides or waste cleanup.

The media-, practice-, and chemical-specific boundaries established in the nation's environmental statutes are often arbitrary. Many different types of practices may be responsible for the release into the environment of the same contaminant. Moreover, individual contaminants are not confined to specific media. Volatile organic compounds, such as benzene or toluene, can be released into and contaminate the air, soil, and water. Additionally, uncontrolled pollutants may travel long distances by natural means, and they may change physically, affecting multiple media. Therefore, a media- or contaminant-specific approach cannot fully address the magnitude and complexities of the waste management problem. This section introduces each of these environmental protection statutes and highlights their differences from RCRA.

Many of these statutes interact closely and even overlap with RCRA. In order to avoid overregulation of industry and coordinate environmental protection laws, Congress required that EPA, when promulgating environmental regulations, ensure consistency with and avoid duplication of regulatory provisions promulgated under other environmental statutes.

One statute in particular, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Superfund, is closely aligned with RCRA. Both programs are similar in that their primary purpose is to protect human health and the environment from the dangers of hazardous waste. However, these statutes address the hazardous waste problem from two fundamentally different approaches:

- RCRA has a pollution prevention regulatory focus which encourages waste reduction and controls waste from the moment of generation until final disposal
- CERCLA has a response focus. Whenever there has been a breakdown in the waste management system (e.g., a release or a potential threat of a release of a hazardous substance, pollutant, or contaminant), CERCLA authorizes cleanup actions.

Considering the close relationship and similarities between RCRA and CERCLA, this chapter examines the CERCLA regulatory program and its interaction with RCRA.

This chapter consists of two parts:

- Legislative Framework for Addressing Hazardous Waste Problems—Outlines the environmental statutes designed to protect human health and the environment from exposure to hazardous waste and contaminants and highlights their major interactions with RCRA
- Superfund: The Hazardous Waste Cleanup Program—Focuses on one crucial aspect of this legislative framework, the CERCLA hazardous waste cleanup program and its interactions with RCRA.

LEGISLATIVE FRAMEWORK FOR ADDRESSING HAZARDOUS WASTE PROBLEMS

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OVERVIEW

The legislation that serves as the basis for managing hazardous wastes can be divided into two categories:

- Media-specific statutes that limit and monitor the amount of pollutants introduced into the air, waterways, oceans, and drinking water
- Other statutes that directly limit the production, rather than the release, of chemical substances and products that may contribute to the nation's wastes.

ENVIRONMENTAL STATUTES

In order to adequately protect human health and the environment from exposure to hazardous waste and contaminants, Congress enacted several regulatory programs to protect the nation's air and water resources, as well as ensure the safety of public health.

■ Clean Air Act

The Clean Air Act limits the emission of pollutants into the atmosphere. Such pollutants include: sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide, ozone, and lead. EPA established the **National Ambient Air Quality Standards** (NAAQS). Congress also mandated that CAA control emissions from specific industrial sources. Using this statutory authority, EPA designated hazardous air pollutants and set **National Emission Standards for Hazardous Air Pollutants** (NESHAPs). The states have primary responsibility for implementing both the NAAQS and NESHAPs requirements.

■ Clean Water Act

The **Clean Water Act** (CWA) imposes pollutant limitations for all discharges of wastewater from identifiable ("point") sources into the nation's waterways. These discharges are defined as either direct discharges, indirect discharges, or zero discharges.

Direct discharges are discharges from "point sources" into surface water pursuant to a National Pollutant Discharge Elimination System (NPDES)

permit. NPDES permits limit the permissible concentration of toxic constituents or conventional pollutants in effluents discharged to a waterway.

Under **indirect discharges**, the wastewater is first sent to a publicly owned treatment works (POTW), and then after treatment by the POTW, discharged pursuant to an NPDES permit. Under these requirements, the generator of the wastes cannot simply transfer the waste materials to a POTW. Rather, the wastes must satisfy applicable treatment and toxic control requirements known as pretreatment standards, where they exist. POTWs that receive hazardous wastes for treatment are also subject to certain RCRA permit-by-rule requirements (as discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities), and remain subject to RCRA corrective action.

Zero discharges mean that the wastewater is not being discharged to a navigable water, but rather is being land disposed (e.g., through spray irrigation) or disposed by underground injection. Zero discharge facilities are subject to federal or state regulatory limitations that are as strict as those that apply to direct and indirect dischargers.

CWA also includes provisions intended to prevent oil spills into the navigable waters of the United States. These **Spill Prevention, Control, and Countermeasures** (SPCC) regulations establish spill prevention procedures and equipment requirements for nontransportation-related facilities with certain aboveground or underground oil storage capacities that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines.

■ Safe Drinking Water Act

The **Safe Drinking Water Act** (SDWA) protects the nation's drinking water supply by establishing national drinking water standards (maximum contaminant levels (MCLs) or specific treatment techniques), and by regulating underground injection control (UIC) wells. The UIC program bans some types of underground disposal of RCRA hazardous wastes. With some exceptions, other materials cannot be injected underground without a UIC permit.

■ Emergency Planning and Community Right-to-Know Act

Congress amended CERCLA in 1986 with the enactment of the **Superfund Amendments and Reauthorization Act** (SARA). These amendments improved the Superfund program and added an important section that focused on strengthening the rights of citizens and communities in the face of potential hazardous substance emergencies. This section, SARA Title III, or the **Emergency Planning and Community Right-to-Know Act** (EPCRA), was enacted in response to the more than 2,000 deaths caused by the release of a toxic chemical in Bhopal, India.

EPCRA is intended to help communities prepare to respond in the event of a chemical emergency, and to increase the public's knowledge of the presence and threat of hazardous chemicals. To this end, EPCRA requires the establishment of state and local committees to prepare communities for potential chemical emergencies. The focus of the preparation is a community emergency response plan that must: 1) identify the sources of potential emergencies; 2) develop procedures for responding to emergencies; and 3) designate who will coordinate the emergency response.

EPCRA also requires facilities to notify the appropriate state and local authorities if releases of certain chemicals occur. Facilities must also compile specific information about hazardous chemicals they have on site and the threats posed by those substances. Some of this information must be provided to state and local authorities. More specific data must be made available upon request from those authorities or from the general public.

■ Federal Insecticide, Fungicide, and Rodenticide Act

The **Federal Insecticide, Fungicide, and Rodenticide Act** (FIFRA) provides procedures for the registration of pesticide products to control their introduction into the marketplace. As such, its regulatory focus is different from most of the statutes discussed in this chapter. While the other statutes attempt to minimize and manage waste by-products at the end of the industrial process, FIFRA

controls whether (and how) certain products are manufactured or sold in the first place.

FIFRA imposes a system of pesticide product registrations. Such requirements include pre-market review of potential health and environmental effects before a pesticide can be introduced in the United States, reregistration of products introduced prior to the enactment of FIFRA to assess their safety in light of current standards, and classification of pesticides for restricted or general use. Restricted products can be used only by those whose competence has been certified by a state program.

■ Toxic Substances Control Act

The primary focus of the **Toxic Substances Control Act** (TSCA) is similar to that of FIFRA in that the statute provides authorities to control the manufacture and sale of certain chemical substances. These requirements include testing of chemicals that are currently in commercial production or use, pre-market screening and regulatory tracking of new chemical products, and controlling unreasonable risks once a chemical substance is determined to have an adverse effect on health or the environment. TSCA controls on such unreasonable risks includes prohibiting the manufacture or certain uses of the chemical, requiring labeling, limiting volume of production or concentration, requiring replacement or repurchase of products, and controlling disposal methods.

■ Polychlorinated Biphenyls (PCBs)

The 40 CFR Part 761 regulations define polychlorinated biphenyls (PCBs) as any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of PCB-containing substances. PCBs have been demonstrated to cause a variety of adverse health effects. As a result, EPA has developed regulations for the proper use, cleanup, and disposal of PCBs pursuant to TSCA. The management of the TSCA regulations for PCBs has historically been handled by the EPA Office of Prevention, Pesticides and Toxic Substances (OPPTS). However, EPA has transferred the management of the PCB cleanup and disposal program from its current location in OPPTS to the Office of Solid Waste and Emergency Response (OSWER). This transfer was effective on October 1, 2007.

In general, all of the sections of the PCB regulations at Part 761 relating to cleanup and disposal will be administered by OSWER. These regulations include general requirements for the cleanup and disposal of PCBs, as well as specific requirements for managing PCB remediation waste, disposal of PCB bulk product waste, storage and disposal of PCB household waste, and disposal of PCB-containing waste generated during and as a result of research and development activities.

The TSCA PCB disposal regulations set forth a number of basic principles. First, all allowed uses must be disposed at the end of their useful life, and all waste coming out of use must be disposed within one year. Liquids are stringently regulated; non-liquids are less stringently regulated. Some disposal requirements are performance-based and some are risk-based. The risk standard is “no unreasonable risk of injury to health or the environment.” All required disposal must be at facilities approved in the regulations or by EPA. Finally, as with RCRA, states may require more stringent disposal.

Specific requirements for PCB cleanup and disposal that will be administered by OSWER include the following:

- Marking of waste containers, equipment stored for reuse or disposal, and areas used to store PCBs for disposal
- Storage of PCBs for disposal, including a time limitation, criteria for storage facilities, and closure requirements
- Incineration of PCBs, including combustion efficiency criteria, monitoring, procedures for waivers, and notification
- Requirements for high efficiency boilers, scrap metal recovery ovens, and chemical waste landfills
- Coordinated approval for PCB waste management

- Decontamination standards and procedures
- Requirements for import or export for disposal
- PCB spill cleanup policy
- General recordkeeping and reporting requirements, such as annual reports and manifests
- PCB waste disposal records and reports
- Sampling requirements and procedures

Updates and information will be posted as they become available at www.epa.gov/pcb.

In recent years, EPA has learned that caulk containing potentially harmful PCBs was used in many buildings, including schools, in the 1950s through the 1970s. In general, schools and buildings built after 1978 do not contain PCBs in caulk. On September 25, 2009, EPA announced new guidance for school administrators and building managers with important information about managing PCBs in caulk and tools to help minimize possible exposure. EPA also announced additional research into this issue. There are several unresolved scientific questions that must be better understood to assess the magnitude of the problem and identify the best long-term solutions. For example, the link between the concentrations of PCBs in caulk and PCBs in the air or dust is not well understood. The Agency is doing research to determine the sources and levels of PCBs in schools and to evaluate different strategies to reduce exposures. The results of this research will be used to provide further guidance to schools and building owners as they develop and implement long-term solutions.

Additional information about PCBs in caulk can be found at www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk.

■ Marine Protection, Research, and Sanctuaries Act

The **Marine Protection, Research, and Sanctuaries Act** (MPRSA) requires a permit for any material that is transported from a U.S. port or by a U.S. vessel for deposition at sea.

There are two major areas of overlap between MPRSA and RCRA. MPRSA prevents waste from a RCRA generator or TSDF from being deposited into the ocean, except in accordance with a separate MPRSA permit. In addition, dredged materials subject to the requirement of a MPRSA §103 permit are not considered hazardous wastes under RCRA.

■ Occupational Safety and Health Act

The mission of the **Occupational Safety and Health Act** (OSHA) is to save lives, prevent injuries, and protect the health of employees in the workplace. OSHA accomplishes these goals through several regulatory requirements including the **Hazard Communication Standard** (HCS), and the **Hazardous Waste Operations and Emergency Response Worker Protection Standard** (HAZWOPER).

The HCS was promulgated to provide workers with access to information about the hazards and identities of the chemicals they are exposed to while working, as well as the measures they can take to protect themselves. OSHA's HCS requires employers to establish hazard communication programs to transmit information on the hazards of chemicals to their employees by means of labels on containers, material safety data sheets, and training programs.

The HAZWOPER was developed to protect the health and safety of workers engaged in operations at hazardous waste sites, hazardous waste treatment facilities, and emergency response locations. HAZWOPER covers issues such as training, medical surveillance, and maximum exposure limits.

SUMMARY

Several major environmental statutes work together to address hazardous waste problems. These include media-specific statutes that limit the amount of waste released into a particular environmental medium, and other statutes that directly control the

production of certain products, and protect workers managing hazardous wastes. These statutes are:

- Clean Air Act
- Clean Water Act
- Safe Drinking Water Act
- Emergency Planning and Community Right-to-Know Act
- Federal Insecticide, Fungicide, and Rodenticide Act
- Toxic Substances Control Act
- Marine Protection, Research, and Sanctuaries Act
- Occupational Safety and Health Act.

ADDITIONAL RESOURCES

Full-text versions of the major environmental laws administered by EPA can be found at www.epa.gov/lawsregs/laws/index.html.

CERCLA: THE HAZARDOUS WASTE CLEANUP PROGRAM

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OVERVIEW

This chapter focuses on the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA), which is a central part of the legislative framework for environmental protection. CERCLA is also commonly known as **Superfund**.

Whereas RCRA is a proactive program that regulates how wastes should be managed to avoid potential threats to human health and the environment, CERCLA is designed to remedy threats to human health and the environment from unexpected releases and historical mistakes in hazardous waste management. More specifically, RCRA authorizes a general regulatory program to manage all hazardous wastes from cradle to grave (i.e., from generation to ultimate disposal), while CERCLA authorizes a number of government actions to remedy the conditions that could result in a release or the effects of a release itself. Both RCRA and CERCLA authorize EPA to act in the event of an imminent hazard.

This chapter discusses why CERCLA was enacted, summarizes the Law, and examines the major areas where the CERCLA and RCRA programs interact.

RCRA VS. CERCLA

RCRA regulates how wastes should be managed to avoid potential threats to human health and the environment. CERCLA, on the other hand, comes into play when mismanagement occurs or has occurred (i.e., when there has been a release or a substantial threat of a release in the environment of a hazardous substance or of a pollutant or contaminant that presents an imminent and substantial threat to human health).

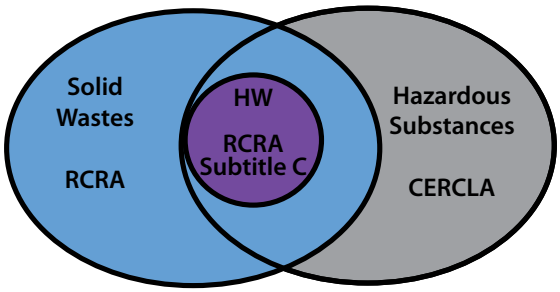
DEFINITIONS

RCRA and CERCLA both address hazards to the environment. However, CERCLA is a more comprehensive statute. CERCLA hazardous substances encompass RCRA hazardous wastes, as well as other toxic pollutants regulated by the Clean Air Act (CAA), the Clean Water Act (CWA), and the Toxic Substances Control Act (TSCA). Thus, all RCRA hazardous wastes are regulated as CERCLA hazardous substances, and releases of hazardous wastes may trigger CERCLA release notification requirements or response actions. RCRA nonhazardous solid wastes, on the other hand, do not trigger CERCLA response actions unless they contain another hazardous substance or present an

imminent and substantial danger as pollutants or contaminants (see Figure VI-1).

In addition to hazardous substances, CERCLA authorizes EPA to respond to releases and potential releases of **pollutants or contaminants**, which are broadly defined to include any substance that is reasonably anticipated to cause illness or deformation in any organism. All three definitions specifically exclude petroleum and natural gas.

Figure VI-1: Relationship Between CERCLA Hazardous Substances and RCRA Hazardous Wastes



CERCLA hazardous substances encompass RCRA hazardous wastes as well as other toxic pollutants regulated by CAA, CWA, and TSCA. RCRA nonhazardous solid wastes do not trigger CERCLA response actions unless they contain another hazardous substance or present an imminent and substantial danger to human health and the environment as pollutants or contaminants.

HISTORY AND PURPOSE OF CERCLA

CERCLA was established in response to the discovery, in the late 1970s, of a large number of abandoned, leaking, hazardous waste dumps that were a threat to human health and the environment. One of the best known examples is Love Canal (Niagara Falls, New York), where a chemical company buried large amounts of hazardous waste in an abandoned canal. In the mid-1950s, the company capped the canal with clay and soil and sold the land to the city of Niagara Falls for development.

In the 1970s, an unusual number of community residents developed serious health problems. Moreover, the residents complained of noxious fumes and chemicals oozing out of the ground. Subsequent government investigations found extensive contamination of the area, including groundwater supplies. In 1978, President Carter declared Love Canal a federal disaster area, and most of the residents in the area around the site were relocated.

At the time, declaring the site a federal disaster area was the only viable option available to the federal government. RCRA could not provide relief because the problem did not involve the current or future management of wastes. Legal actions against the responsible parties could not offer a timely solution because such action was time consuming and costly. In addition, subsequent investigations indicated that the scope of the historical contamination problem went far beyond Love Canal, making the federal disaster relief option impractical. In December of 1980, Congress passed CERCLA to address uncontrollable hazardous waste sites throughout the country.

CERCLA amended the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to provide a regulatory blueprint for federal response to releases of hazardous substances, pollutants, and contaminants (40 CFR Part 300). The primary objectives of the Superfund program include the following:

- Identify those sites where releases of hazardous substances have already occurred or might occur and posed a serious threat to human health, welfare, or the environment
- Take appropriate action to remedy the releases
- Force those parties responsible for the release to pay for the cleanup actions.

To accomplish these tasks, CERCLA provided the federal government with new response authority, created a $1.6 billion trust fund to pay for federal response actions, and imposed cleanup liability on **potentially responsible parties** (PRPs). The “Super Fund” was established primarily by tax assessments on oil and designated chemicals.

Unfortunately, it became apparent that the problem of abandoned hazardous waste sites was more extensive than originally thought and its solution would be more complex and time consuming. Unlike RCRA response actions where the owner and operator of a site are known, CERCLA may deal with environmental threats due to historical activities and, thus, the responsible party may be unknown,

SUPERFUND REAUTHORIZATION AND TAXING AUTHORITY

The Superfund Amendments and Reauthorization Act (SARA) not only reauthorized the Superfund program for another five years, but it also increased the Fund from $1.6 billion to $8.5 billion. The taxing authority of SARA was to expire on December 31, 1991; however, the Omnibus Reconciliation Act of 1990 extended the taxes without modification for another four years, through December 31, 1995. Separately, the Superfund program was reauthorized, without changes to the text of the Statute, until September 30, 1994, a three-year extension from the expiration date of the SARA authorization in 1991. Congress failed to reauthorize the Superfund program before September 30, 1994 (the end of the fiscal year); however, the program is still operating because Congress continues to appropriate funds to the Superfund program.

no longer in existence (e.g., a defunct company), or unable to pay. To address these additional concerns, Congress passed the Superfund Amendments and Reauthorization Act (SARA) of 1986. SARA not only reauthorized the Superfund program for another five years, but it also increased the fund from a total of $1.6 billion to $8.5 billion. In addition, SARA established new standards and schedules for site cleanup, created new programs for informing the public of risks from hazardous substances in their community, and helped prepare communities for hazardous substance emergencies.

TRIGGER FOR STATUTORY RESPONSE

CERCLA response authorities are triggered by a release or a substantial threat of release of dangerous substances into the environment (e.g., a chemical spill from a tank truck accident or a leak from a damaged drum). The release must involve either:

- A hazardous substance, or
- A pollutant or contaminant.

In addition, a release must pose an imminent or substantial threat to the public health or welfare.

TYPES OF RESPONSE ACTIONS

Once a potential release has been identified, the information is entered into the **Comprehensive Environmental Response, Compensation, and Liability Information System** (CERCLIS), a computerized database used to track hazardous substance sites. After being entered into CERCLIS, each site undergoes a **preliminary assessment** (PA) to determine if the site poses a potential hazard and whether further action is necessary. If the threat is immediate, a **removal action** may be conducted.

Removal actions are short-term cleanup actions that address immediate threats at a site. They are conducted in response to an emergency situation (e.g., to avert an explosion, to cleanup a hazardous waste spill, or to stabilize a site until a permanent remedy can be found). Removal actions are limited to 12 months duration or $2 million in expenditures, although in certain cases these limits may be extended. Removals may occur at any point in time after the PA has been conducted and may be conducted in addition to remedial actions.

R**emedial actions** are response actions that ultimately represent the final remedy for a site and generally are more expensive and of a longer duration than removals. In the event that long-term cleanup is necessary, the site is referred to the remedial program for further investigation and assessment.

If the PA reveals that a remedial action is necessary, EPA will conduct a more involved study of the site during a **site inspection** (SI). Based on data collected during the PA and the SI, EPA will evaluate the site using the **Hazard Ranking System** (HRS), a scoring system that determines the relative risk to public health and the environment posed by hazardous substances in ground water, surface water, air, and soil. Only those sites with a score of 28.5 (on a scale from 0 to 100) are eligible for placement on the **National Priorities List** (NPL), EPA's list of priority hazardous substance sites for cleanup. Fund monies are only available for remedial actions at (non-federal facility) hazardous waste sites on the NPL. As of June 2011, there are over 1,350 sites either on the NPL or proposed for inclusion. The majority of sites are placed on the NPL based on their HRS score. Under some circumstances, sites may also be placed on the NPL by the state in which the site is located or by the Agency for Toxic Substances and Disease Registry (ATSDR) in accordance with EPA.

Once a site is placed on the NPL, the remedial process begins. A remedial action has two main phases. The first phase, the **remedial investigation/ feasibility study** (RI/FS), involves evaluating conditions at the site, defining any problems, and comparing alternative site cleanup methods. After the remedy has been selected, the decision is documented in the **record of decision** (ROD). The second phase, the **remedial design/remedial action** (RD/RA), involves designing the chosen cleanup and beginning construction.

Following the implementation of the remedy, the state or the PRP assumes responsibility for the **operation and maintenance** (O&M) of the site, which may include such activities as ground water pump and treat and cap maintenance. Once EPA has determined that all appropriate response actions have been taken and cleanup goals have been achieved, the site is deleted from the NPL through a formal rulemaking process.

EPA is committed to early and meaningful community participation during Superfund response actions. CERCLA, as implemented by the NCP, requires specific community involvement activities that must occur at certain points throughout the Superfund process. These activities include, but are not limited to, public meetings, requests for public comment, and availability of Superfund decision documents. In addition, most sites deleted from the NPL are still subject to **five-year reviews** to ensure the remedy continues to be protective of human health and the environment.

RCRA AND REMEDY SELECTION UNDER CERCLA

Rather than establishing individual cleanup standards, CERCLA assures that remedies are based on cleanup standards and criteria established by other laws (e.g., CAA, CWA, and RCRA) in conjunction with site-specific risk factors. CERCLA specifically requires that remedies attain any legally **applicable or relevant and appropriate requirements** (ARARs) (i.e., standards, criteria, or limitations under federal or more stringent state environmental laws). For example, whenever a remedial action involves on-site treatment, storage, or disposal of hazardous waste, the action must meet RCRA's technical standards for such treatment, storage, or disposal (as discussed in Chapter III, Regulations Governing Treatment, Storage, and Disposal Facilities).

Once hazardous wastes are transported from a CERCLA site, they are subject to full RCRA regulation. Therefore, all transportation and treatment, storage, and disposal facility (TSDF) requirements under RCRA must be followed. This means that off-site shipments must be accompanied by a manifest. In particular, the off-site disposal of hazardous wastes can occur only at a RCRA facility in a unit in full compliance with the Subtitle C equirements.

For off-site land disposal of wastes resulting from a CERCLA activity, the program requires the following: First, the unit in which the wastes are to be disposed must not be releasing hazardous wastes or constituents into ground water, surface water, or soil. Second, any releases from other units of the facility must be under an approved RCRA corrective action program. This policy assures that wastes shipped off site from CERCLA sites are sent to environmentally sound waste management facilities.

Finally, EPA may not take or fund remedial actions in a state unless the state ensures the availability of hazardous waste treatment and disposal capacity by submitting a **capacity assurance plan** (CAP) to EPA. Under a CAP, a state assures the availability of treatment or disposal facilities that meet the following requirements: First, the treatment and disposal facilities must be in compliance with RCRA Subtitle C requirements. Second, the facilities must have the capacity to adequately manage hazardous wastes projected to be generated within the state over 20 years. This requirement limits and manages the amount of hazardous waste generated in the

WHAT ARE ARARS?

CERCLA specifically requires that remedies attain any legally applicable or relevant and appropriate requirements (ARARs) (i.e., standards, criteria, or limitations under federal or more stringent state environmental laws). For example, whenever a remedial action involves on-site treatment, storage, or disposal of hazardous waste, the action must meet RCRA's technical standards for such treatment, storage, or disposal. The NCP details the application of ARARs to Superfund remedial actions.

United States by encouraging waste minimization and recycling, interstate agreements, and efficient and realistic hazardous waste management systems. Currently, every state in the nation has submitted a CAP to EPA.

RCRA CORRECTIVE ACTION VS. CERCLA RESPONSE

The cleanup of a site with hazardous waste contamination may be handled under either CERCLA, as described above, or RCRA. RCRA authorizes EPA to require corrective action (under an enforcement order or as part of a permit) whenever there is, or has been, a release of hazardous waste or constituents at TSDFs. RCRA also provides similar corrective action authority in response to releases at interim status facilities. Further, RCRA allows EPA to require corrective action beyond the facility boundary. EPA interprets the term corrective action (as discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination) to cover the full range of possible actions, from studies and interim measures to full cleanups.

RCRA and CERCLA cleanup programs have roughly the same approach to cleanups. In both, examinations of available data are made after discovery of a release to determine if an emergency action is warranted. Both programs authorize short-term measures to abate immediate adverse effects of a release. In addition, once an emergency has been addressed, both programs provide for appropriate investigation to establish long-term cleanup options. One major difference between the two programs involves funding. CERCLA allows for the expenditure of Fund monies for removal actions and remedial actions at NPL sites (non-federal facility), in addition to strong liability provisions to ensure that the polluter pays whenever possible. There is no comparable fund under the RCRA corrective action program because the owner or operator of the site is responsible for the cost of the cleanup in all instances.

Another difference between the two programs is the implementation. The facility owner or operator implements RCRA corrective action. On the other hand, a number of different parties can implement a CERCLA remedial action in a number of different ways. For example, agreements may be reached that allow PRPs, the state, or the federal government to assume the lead for certain portions of a response action.

Generally, cleanups conducted solely under RCRA corrective action or CERCLA response authority will substantively satisfy the requirements of both programs. It is EPA's general policy for facilities subject to both CERCLA and RCRA to be deferred to RCRA authority. In some cases, however, it may be more appropriate to use both RCRA and CERCLA authorities. EPA has many procedures in place to facilitate coordination between RCRA and CERCLA programs.

IMMINENT HAZARDS UNDER RCRA AND CERCLA

Both RCRA and CERCLA contain provisions that allow EPA to require persons contributing to an imminent hazard to take the necessary actions to clean up releases. RCRA's §7003 imminent and substantial endangerment provision addresses nonhazardous as well as hazardous solid waste releases. The authority under CERCLA §106 is essentially the same, except that CERCLA's authority to force abatement of an imminent or substantial danger to public health or the environment is limited to hazardous substance releases. In an enforcement action, the RCRA and CERCLA imminent hazard provisions may be used in tandem to ensure adequate protection of human health and the environment.

SUMMARY

CERCLA authorizes cleanup responses whenever there is a release, or a substantial threat of a release, of a hazardous substance, a pollutant, or a contaminant, that presents an imminent and substantial danger to human health or the environment. After the discovery of a potential release, the site is entered into CERCLIS, and undergoes a PA. If there is an immediate hazard, EPA may require a removal action. If long-term remediation is necessary, EPA will conduct an SI, evaluate the site using the HRS, and possibly place the site on the NPL. After NPL listing, a site

undergoes further investigation (RI/FS) and remedial alternatives are evaluated. After a remedy has been selected, the decision is documented in the ROD, the RD/RA is implemented, and the state or PRP assumes responsibility for O & M of the site. When all appropriate remedial actions have been taken and the cleanup goals have been achieved, the site is deleted from the NPL, although if waste remains on site, the action is subject to five-year reviews to ensure that the remedy remains protective of human health and the environment.

In general, RCRA authorizes the safe and protective management of wastes, while CERCLA authorizes cleanup responses whenever there is a release of hazardous substances, pollutants, or contaminants (e.g., hazardous wastes). However, the two programs do contain common elements. For example, RCRA standards may be considered ARARs and can be important in selecting remedies under CERCLA. Moreover, RCRA's corrective action and CERCLA's remedial action use parallel, but not identical, procedures. Finally, both statutes authorize EPA to act in the event of an imminent hazard.

ADDITIONAL RESOURCES

Additional information about the topics covered in this chapter can be found at www.epa.gov/ superfund. Further information about EPA cleanup programs can be found at www.epa.gov/oswer/cleanup.

CHAPTER VII

PUBLIC PARTICIPATION

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OVERVIEW

EPA is committed to involving the public in the development and implementation of the solid and hazardous waste environmental decision-making. One of the Agency's central goals is to provide equal access to information and an equal opportunity to participate. EPA regards public participation as an important activity that empowers communities to become involved in local RCRA-related activities.

Through RCRA, Congress gave EPA broad authority to provide for public participation in the regulatory program. RCRA §7004(b) directs EPA to provide for, encourage, and assist public participation in the development, revision, implementation, and enforcement of any regulation, guideline, information, or program under the Act.

The RCRA public participation requirements bring government, private industry, public interest groups, and citizens together to make important decisions about hazardous and solid waste facilities. Specifically, these groups and individuals have a stake in RCRA's hazardous waste management program, such as treatment, storage, and disposal facility (TSDF) permitting, corrective action, and state authorization. On a broader level, the public also has tremendous interest in EPA's rulemaking process and environmental justice.

Public involvement in the RCRA program presents unique needs and opportunities. While the Agency is firmly committed to promoting broad and equitable public participation, EPA also seeks to ensure the flexibility for individual permit writers, facilities, and communities to adopt the most appropriate, site-specific approach consistent

with the principles of fairness and openness. As a result, in many instances, EPA references guidance, instead of codified regulatory language, to encourage all stakeholders, such as facilities, permitting agencies, and the public, to strive toward public involvement goals, while at the same time maintaining the flexibility consistent with a national regulatory approach.

EPA views public outreach as an essential element of public participation. Public outreach educates people about hazardous waste issues and the RCRA decision-making process. Public outreach also creates informal opportunities for public input and dialogue. To expand public participation, the Agency actively engages in extensive public outreach activities.

PERMITTING

A focus of RCRA public participation is the involvement of the public in the hazardous waste TSDF permitting process. (Permitting is fully discussed in Chapter III, Permitting of Treatment, Storage, and Disposal Facilities). TSDF owners and operators handle large quantities of waste that present potential risk to human health and the environment. Public participation informs the public of the types of wastes and management methods that the TSDF owner and operator intends to employ and allows the public an opportunity to discuss the facility's anticipated waste management activities with the owner and operator. Communities may provide information that facility owners and operators may not otherwise have access to and which may impact some of the facility plans (e.g., information on day-care locations that might impact transportation routes to and from the facility). Public participation also benefits the TSDF owner and operator because it fosters community relations and can help to avoid delays and future litigation by addressing public concerns up front.

From the permitting agency's point of view, the public can contribute valuable information and ideas that can improve the quality of agency decisions and permit applications. With public input, permitting decisions are influenced by local circumstances that technical staff alone cannot provide.

THE IMPORTANCE OF PUBLIC PARTICIPATION

Public participation informs the public of the types of wastes and management methods that a TSDF owner and operator intends to employ and allows the public an opportunity to voice its concerns about these risks. Public participation also benefits the TSDF owner and operator because it fosters community relations and can help to avoid delays and future litigation by addressing public concerns up front.

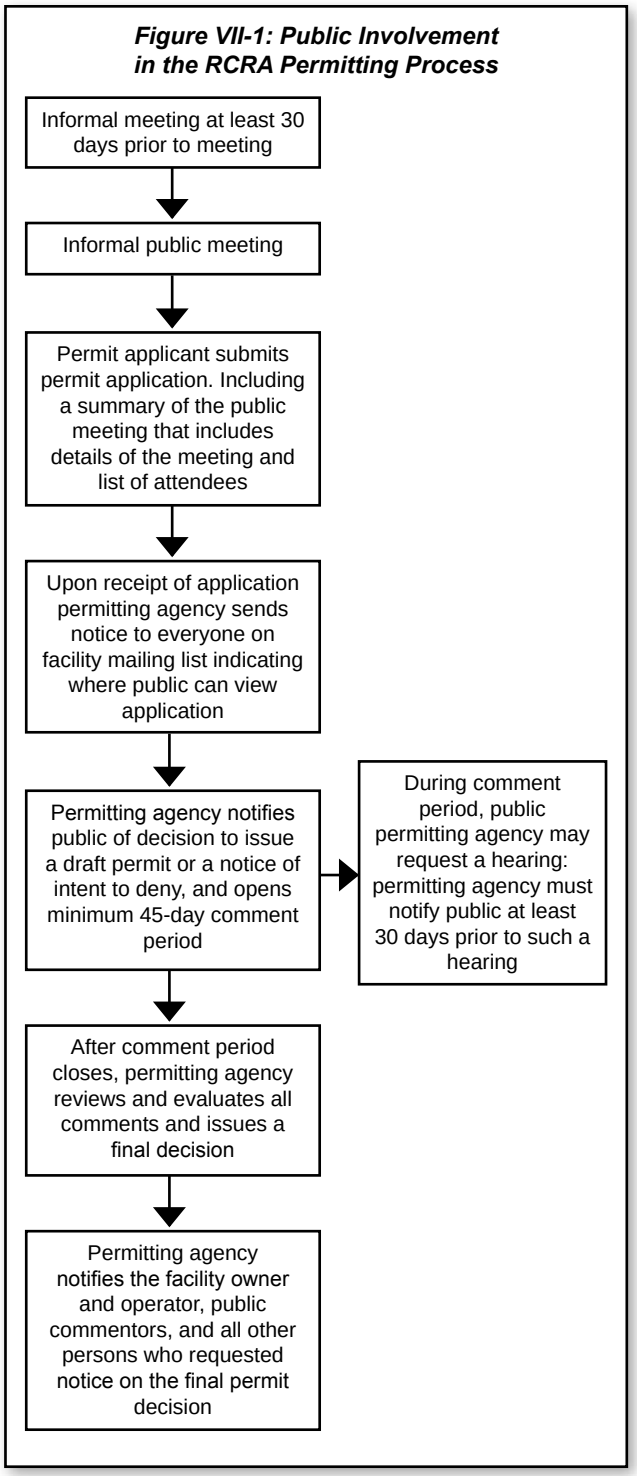
The permitting process serves as an appropriate mechanism for public participation requirements because the permit serves as the set of requirements against which compliance will be measured. Public interaction in the process serves both to educate the public and to allow the public to express concerns to the facility and the permitting agency. Each step in the RCRA permit decision process is accompanied by public participation requirements (see Figure VII-1). EPA promulgated regulations in 40 CFR Parts 25, 124, and 270 to create opportunities for the public to learn about RCRA activities and provide input during the permitting process. These requirements may not be sufficient in all cases. Permitting agencies and facilities should consider going beyond the regulatory requirements, as necessary, to provide for meaningful and equitable public participation.

Public interaction occurs during pre-application meetings, public comment and response periods, and public hearings. Through all of these steps, the public can engage facility owners and operators and regulators in a dialogue. This dialogue is crucial because a successful public participation program requires the flow of information among all stakeholders.

EPA encourages public participation activities that occur outside the formal permitting process. Citizens can contact environmental, public interest, civic, and community groups that have an interest in the facility and become involved in their activities. The permit applicant may also create informal opportunities for public input and dialogue.

■ Pre-Application Meeting

The public participation provisions require prospective applicants to hold an informal public meeting before submitting an application for a



RCRA permit. The permit applicant should select a meeting time, date, and place that are convenient to the public. The permit applicant must provide notice of the pre-application meeting at least 30 days prior to the meeting in a manner that is likely to reach all members of the affected community. The applicant must advertise the meeting in the newspaper, through a broadcast announcement, and on a sign posted at or near the property. The meeting will provide a chance for the community to interact with and provide input to an owner and operator before the submission of the permit application. At the meeting, the owner and operator should describe the facility in the level of detail that is practical at the time of the meeting to give the public enough information to understand the facility operations and potential impacts to human health and the environment. The permit applicant must submit with the permit application a summary of the meeting and a list of all attendees. Upon receipt of the permit application, the permitting agency must send a notice to everyone on the facility mailing list specifying where the public can examine the application. Thus, the public may begin reviewing the application at the same time as the permitting agency.

■ The Draft Permit, Public Comment Period, and Public Hearing

Once the permit application is complete, the permitting agency will decide whether to issue a draft permit or a notice of intent to deny. In either case, the permitting agency notifies the public of its decision and announces the opening of a minimum 45-day public comment period. The permitting agency prints the notice in a local paper, broadcasts the notice over a local radio station, and sends a copy to the mailing list recipients and relevant agencies. The permitting agency also prepares a fact sheet or statement of basis regarding its decision. The fact sheet (or statement of basis) explains the factual, legal, methodological, and policy questions considered in making the decision to issue or deny the permit.

Any person may request a public hearing during the comment period. The permitting agency holds a hearing if someone submits a written notice of opposition to the draft permit and a request for a hearing, or if the permitting agency finds a significant degree of interest in the draft permit. The permitting agency may also hold a public hearing at its own discretion. The permitting agency must notify the public at least 30 days prior to the hearing.

The comment period on the draft permit allows public submission of written concerns and suggestions to the permitting agency in writing. The permitting agency describes and responds to all significant comments raised during the comment period.

After the public comment period closes, the permitting agency will review and evaluate all comments and issue a final permit decision. The agency sends a notice of decision to the facility and any person who submitted comments or requested notice on the final permit decision.

■ Permit Modifications

As with the initial permit process, permit modifications can raise public concerns that must be addressed through public participation. Public participation responsibilities and activities vary depending on who initiated the modification and the degree to which the modification changes the facility permit. When a modification is proposed, only the permit conditions subject to modification are reopened for public comment.

Permitting agencies may initiate a permit modification if there are substantial alterations or additions to the facility, if new information is received by the permitting agency that was not available at the time of permit issuance, or if new regulations or judicial decisions affect the conditions of the permit. Agency-requested permit modifications are subject to the same public participation requirements that are required during the permitting process.

Permit modifications initiated by the facility owner and operator are categorized as Class 1, 2, or 3 according to how substantively they change the original permit. The only public involvement requirement for Class 1 modifications is that within 90 days of implementing a change the facility must send a notice to all parties on the mailing list compiled by the permitting agency.

The Class 2 modifications are more stringent than Class 1 modifications and involve public notice in a local newspaper, a 60-day comment period, and a public meeting held no earlier than 15 days into the comment period and no later than 15 days before it ends. At any time during the Class 2 procedures, the permitting agency may reclassify the request as a Class 3 modification if there is significant public concern or if the agency determines the modification is too complex for the Class 2 procedures.

PUBLIC PARTICIPATION DURING PERMIT MODIFICATIONS

Public participation requirements during permit modifications vary depending on the extent of the modification. Class 1 permit modifications require that within 90 days of implementing a change, the facility must send a notice to all parties on the mailing list compiled by the permitting agency. Class 2 permit modifications involve public notice in a local newspaper, a 60-day comment period, and a public meeting held no earlier than 15 days into the comment period and no later than 15 days before it ends. While Class 3 modifications are subject to the same requirements as Class 2 modifications, such modifications require the permitting agency to provide the public with additional opportunities to participate in the process.

Class 3 modifications address changes that substantially alter a facility or its operations and often raise significant public concern. While these modifications are subject to the same public participation provisions as Class 2 modifications, Class 3 modifications require the permitting agency to provide the public with additional opportunities to participate in the process. For example, the permitting agency must issue a public notice of the agency's draft permit decision, allow for a 45-day public comment period on the decision, develop a fact sheet or statement of basis, and hold a public meeting (if requested) with 30-day advance notice.

■ Permit Renewals

A facility owner and operator who makes a significant change during the renewal of their permit is also subject to the pre-application meeting and notice requirements. A significant change in facility operations is a change that is equivalent to a Class 3 modification. This requirement ensures that if during permit renewal a facility makes significant changes to an already publicly reviewed and approved permit, the public will have an opportunity to participate in the permit review and approval process.

■ Trial Burn Notices

Owners and operators of new hazardous waste combustion facilities may not commence a trial burn until after the permitting agency has issued the required notice. EPA anticipates that permitting agencies will typically notify the public at least 30 days prior to the trial burn. The notice requirement applies only to the initial trial burn, and not to subsequent burns that may be conducted as part of a permit modification. For interim status combustion units, the permitting agency must also provide public notice of the intent to approve a trial burn plan.

■ Interim Status Facilities

In general, interim status facilities are not required to follow any standardized public participation procedures until the facility owner and operator applies for a permit. Implementing agencies may need to use innovative techniques to communicate with the public about interim status facilities. EPA acknowledges that each situation will require a different type and level of community involvement in order to address public concerns.

■ Post-Closure Permits

Owners and operators who submit a permit application for the purpose of conducting post-closure activities are not subject to the pre-application meeting and notice requirements. EPA's experience is that the public has usually been concerned with permit decisions related to active hazardous waste management operations rather than closed facilities. Post-closure activities are subject to the public notice and comment period at the draft permit stage.

■ Post-Closure Alternatives to Permits

Owners and operators who are conducting post-closure activities using non-permit alternatives, such as enforceable documents, are also subject to public participation requirements. The public participation provisions for these alternatives include public notice and comment.

EPA encourages early, meaningful, and continuous involvement of the public, including regularly updating the community on the progress made at the facility. Meaningful public participation is achieved when all impacted and affected parties have ample time to participate in the facility cleanup decisions.

■ Information Repositories

In certain instances, RCRA permits can be the subject of intense debate. When public interest is strong, the demand for information increases. The public participation requirements allow the permitting agency to require a permit applicant to set up an information repository at any time after submittal of the permit application and during the life of the permit. The repository will hold all information and documents that the permitting agency decides are necessary to adequately inform and educate the public. EPA intended for permitting agencies to use the information repository requirement sparingly on a case-by-case basis when a significant amount of public concern has surfaced or where the community has unique information needs.

CORRECTIVE ACTION

Corrective action investigations and remedial actions at hazardous waste facilities also create strong community interest because contamination can directly affect and impact communities. (Corrective action is fully discussed in Chapter III, Corrective Action to Clean Up Hazardous Waste Contamination). The community may seek information related to current or potential contamination, including levels of contamination, the extent of health and environmental risks, and the potential for future risks. The public may also seek additional opportunities to provide input to the overseeing agency or the facility about the cleanup of the contamination.

More than 6,500 facilities are subject to RCRA corrective action. The necessary degree of cleanup at these sites varies significantly. Program implementors are granted latitude in structuring the corrective action process, developing cleanup objectives, and selecting remedies appropriate to site-specific circumstances. Similar latitude is allowed in determining the best approach to public participation, in order to provide

opportunities appropriate for the level of interest of the community.

Public participation requirements during corrective action are established in regulations; further recommendations are set out in guidance. The regulations set requirements that facilities and implementing agencies must meet when a permit is issued or modified to incorporate corrective action provisions.

In the absence of final regulations specifically addressing public participation during corrective action, program implementors and facility owners and operators should develop public participation strategies on a site-specific basis, consistent with existing public participation requirements and the program goal of full, fair, and equitable public participation. Permitting agencies and facilities should make all reasonable efforts to provide for early public participation because important corrective action decisions are made during the site investigation and characterization. At a minimum, information regarding corrective action activities should be available to the public and the public should be given an opportunity to review and comment on proposed corrective action remedies.

■ Corrective Action Permits

When corrective action is part of the RCRA permitting process, it follows the public participation requirements associated with permitting. Thus, the corrective action provisions in any permit application are available for public review throughout the permitting process and the public can comment on them at the draft permit stage.

■ Corrective Action Orders

EPA regulations do not require that corrective action activities that are imposed or overseen through an order include public participation. However, EPA's policy is that the same level of public participation requirements imposed under a permit should generally apply under a corrective action order. There may be limitations on the implementing agency's ability to release or discuss certain information when using an order, but if public interest in the facility is high, the agency should address concerns without breaching the confidentiality of the owner's and operator's case by at least discussing why limitations are necessary, and if and when they will be lifted.

PUBLIC PARTICIPATION DURING CORRECTIVE ACTION

When corrective action is part of the RCRA permitting process, it follows the public participation requirements associated with permitting. While EPA regulations do not require public participation for corrective action activities that are imposed or overseen through an order, EPA's policy is that the same level of public participation requirements imposed under a permit should generally apply under a corrective action order.

EPA has clarified various issues in reference to public participation activities during RCRA §7003 imminent hazard cleanups. Specifically, §7003 orders should involve public participation to the maximum extent possible. During these cleanups, EPA should provide public notice and an opportunity to comment when the Agency issues the order, during the remedy selection process, and upon Agency determination that the cleanup has been completed. When situations prevent public participation from occurring, the Agency should involve the public at the earliest opportunity. The Agency may also consider holding public meetings to address concerns if the site has attracted significant attention.

■ Remedial Action Plans

Public participation for Remedial Action Plans (RAPs) includes public notice and comment of the draft RAP or the notice of intent to deny. An informal public hearing may also be requested under the public participation provisions for RAPs.

■ Voluntary Corrective Action

Although EPA typically has less control over public participation during voluntary corrective action, the Agency encourages the use of public participation and will generally take into account the level of public participation conducted by the facility owner and operator when evaluating the acceptability of voluntary actions.

STATE AUTHORIZATION

RCRA also requires public involvement when EPA authorizes states to implement the hazardous waste regulations. Such public involvement is intended to allow the public to voice their concerns regarding the change in implementing agency. Specifically, during the state authorization process, a state must provide public notice and an opportunity for public hearing before submitting its application for final authorization. The Statute also requires that EPA provide opportunity for public hearing before it decides to grant or deny a state's authorization and before EPA withdraws a state's authorization. (State authorization is fully discussed in Chapter III, Authorizing States to Implement RCRA).

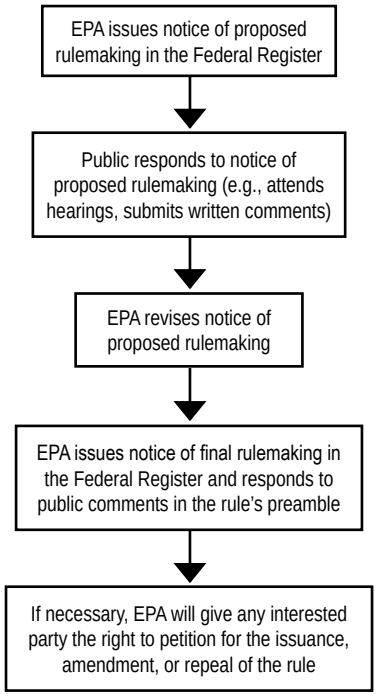
THE RULEMAKING PROCESS

Besides facilitating public participation during hazardous waste TSDF permitting, corrective action, and state authorization under the RCRA Subtitle C program, EPA proactively initiates public involvement activities as part of all formal RCRA rulemakings. Congress, through the Administrative Procedures Act (APA) (5 U.S.C. Sections 551-559), established the legal requirement that federal agencies provide the public with notice and an opportunity to comment on rulemakings. The Act addresses rulemaking procedures as well as site-specific licensing procedures, access to agency information, and procedures and standards for judicial review of agency actions. All environmental rulemakings proposed and finalized by EPA include public participation throughout the process (see Figure VII-2).

■ Proposed Rulemakings

The first step in the rulemaking process is the issuance of the notice of proposed rulemaking by EPA. The forum for providing the public with notice of a proposed rule is the Federal Register. The notice must include a statement of the time, place, and nature of the rulemaking, a reference to the legal authority under which the rule is proposed, and the terms of the proposed rule.

Figure VII-2: The Rulemaking Process



■ Public Comment

After notice is given, EPA must provide interested persons an opportunity to participate in the rulemaking through submission of written data, views, or arguments. This process not only educates the public, but also provides valuable information to EPA during the regulatory development process. Up-front participation reduces the likelihood of litigation challenging subsequent regulations. Public participation can take many forms, including opportunity for a hearing, opportunity for access to EPA materials, and opportunity for written comments on proposals. EPA has made the public comment process easier by allowing the public to submit comments online through Regulations.gov. Regulations.gov is available at www.regulations.gov.

■ Final Rulemakings

Once public comments are considered, EPA will revise the proposed rulemaking. The rule will often change between its proposal and finalization as a result of public comments. The final rule is published in the Federal Register, and EPA will respond to public comments in the rule's preamble. After final promulgation, EPA must give any

interested party the right to petition for the issuance, amendment, or repeal of the rule.

■ Rulemaking Information

EPA evaluates a variety of background information, as well as public comments, in the development of a particular rulemaking. Each Federal Register lists a background docket that is available for public viewing. This docket contains all the background documents, including scientific studies, risk assessments, public comments, and EPA responses, that were used for that particular rulemaking.

In addition to the background docket, the Federal Register also contains regulatory impact analyses. These are analyses of a particular rulemaking's effects on other environmental regulations and economic impact on the regulated community.

In these analyses, EPA evaluates the effects a rule will have on other environmental regulations, such as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Clean Water Act (CWA), and publishes the expected impacts in the Federal Register. In addition, EPA studies the economic effects of a particular rule on the regulated community to determine compliance costs. As required by the Regulatory Flexibility Act of 1980, the Agency also evaluates the impacts of the rulemaking on small businesses, small organizations, and small governmental jurisdictions.

ENVIRONMENTAL JUSTICE

Environmental justice refers to the fair distribution of environmental risks across socioeconomic and racial groups. On February 11, 1994, President Clinton issued Executive Order 12898, directing federal agencies to identify and address environmental concerns and issues of minority and low-income communities. EPA is committed to equal protection in the implementation and enforcement of the nation's environmental laws. EPA believes that environmental justice issues should be addressed on a local level and on a site-specific basis. EPA encourages permitting agencies and facilities to use all reasonable means to ensure that all segments of the population have an equal opportunity to participate in the permitting process and have equal access to information in the process. These means may include, but are not limited to, multilingual notices and fact sheets, as well as translators, in areas where the affected community contains significant numbers of people who do not speak English as a first language.

OUTREACH AND PUBLIC ASSISTANCE

A number of opportunities exist for the public to obtain RCRA program information and assistance. These include grants, the Freedom of Information Act, the Ombudsman function, the EPA Docket Center, Regulations.gov, and RCRA Online.

■ Grants

Under RCRA §7007, EPA has the authority to provide grants to states, municipalities, educational institutions, or any other organization to help these groups effectively implement training programs that demonstrate solid waste management and resource recovery operations. Such grants provide governments and nonprofit organizations with the opportunity to further the goals of the Act through public outreach.

■ Freedom of Information Act

The Freedom of Information Act (FOIA) provides private parties with the right to obtain information in the possession of the government. Unless materials are promptly published and copies are offered for sale, each agency must make information available for public inspection and copying. FOIA requires each agency to establish procedures for handling requests regarding government statutes, regulations, standards, permit conditions, requirements, orders, and policies.

There are certain materials which are not subject to FOIA. These include:

- Draft materials
- Matters of national defense or foreign policy
- Material related solely to internal personnel rules and practices

- Trade secrets and privileged commercial or financial information
- Investigation material collected for enforcement purposes
- Geological and geophysical information and data.

EPA has pursued a policy of fully disclosing its records to the public, consistent with the rights of individuals to privacy, the rights of persons entitled to protection under confidential business information (CBI) provisions, and the need for EPA to promote internal policy deliberations. EPA will disclose information to any requester to the fullest extent possible without unjustifiable expense or unnecessary delay.

■ EPA Docket Center

Each time a rulemaking process is announced, a docket is established to store materials (e.g., Federal Registers, supporting documentation, and public comments) throughout the rulemaking process.

Paper dockets, electronic dockets, and information centers serve as the repository for this information. In September 2002, EPA consolidated many of the docket facilities located in the Metropolitan Washington area into one combined docket facility. The new docket facility, the EPA Docket Center, supports several EPA programs, including the Resource Conservation and Recovery Act (RCRA), CERCLA, the Oil Pollution Act (OPA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), the Toxic Release Inventory (TRI), the Safe Drinking Act (SDWA), and CWA. The EPA Docket Center is located at:

EPA West Building
Room 3334
1301 Constitution Avenue, NW
Washington, DC 20004
(202) 566-1744
www.epa.gov/dockets

Hours of operation are 8:30 a.m. to 4:30 p.m., EST, Monday through Friday, excluding federal holidays.

In addition to the EPA Docket Center, EPA participates in a federal government-wide, centralized electronic docket system, known as Regulations.gov. Regulations.gov provides one-stop, electronic access to every rule published and open for comment. It allows an individual to search, download, and print documents in a docket, as well as submit comments online. This system is available at www.regulations.gov.

■ RCRA Online

RCRA Online is an electronic database that is designed to enable users to locate documents, including memoranda, questions and answers, publications, and other outreach materials that cover a wide range of RCRA issues and topics concerning the management of hazardous and non-hazardous waste. To keep this information timely and accurate, RCRA Online is updated on a monthly basis. RCRA Online allows users to locate documents though topical, full text, and advanced search functions. Using the topic search function is the simplest way to locate documents in the database. RCRA Online is available at www.epa.gov/rcraonline.

SUMMARY

EPA is committed to involving the public in the development and implementation of the solid and hazardous waste regulations and seeks to empower communities to become involved in local RCRA-related activities. To achieve these goals, the RCRA public participation requirements bring government, private industry, public interest groups, and citizens together to make important decisions about hazardous waste management facilities.

A focus of RCRA public participation is the involvement of the public in the hazardous waste TSDF permitting process. The public interaction occurs during pre-application meetings, public comment and response periods, and public hearings. RCRA includes specific provisions to involve the public in all stages of the hazardous waste TSDF permitting process: prior to the initial permit application; after draft permit issuance; and during permit modifications, permit renewals, post-closure permits, and trial burns.

In addition, RCRA requires public involvement during Subtitle C corrective action, whether such

cleanups are instituted through a permit or order, or conducted voluntarily. RCRA also requires public involvement when EPA authorizes states to implement the hazardous waste regulations.

While RCRA's initiatives to facilitate public participation during hazardous waste TSDF permitting, corrective action, and state authorization are limited to the RCRA Subtitle C program, EPA is required to comply with the public involvement provisions under APA for all formal rulemakings under all RCRA subtitles.

Consistent with Executive Order 12898, directing federal agencies to identify and address environmental concerns and issues of minority and low-income communities, EPA encourages allowing all segments of the population equal access to information pertaining to the RCRA program.

To assist in disseminating information and promoting public education about the RCRA program, EPA engages in several outreach and public assistance mechanisms. The Agency provides training grants, allows access to information through the Freedom of Information Act, and provides program information through the Ombudsman function, the EPA Docket Center, Regulations.gov, and RCRA Online.

ADDITIONAL RESOURCES

Additional information about the topics covered in this chapter can be found at www.epa.gov/epawaste/hazard/tsd/permit/pubpart.

APPENDIX A

HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number
2. Page 1 of
3. Emergency Response Phone
4. Manifest Tracking Number

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

GENERATOR

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

INT'L

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

TRANSPORTER

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

VOID

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)

21. Generator ID Number

22. Page

23. Manifest Tracking Number

GENERATOR

24. Generator's Name

25. Transporter _____ Company Name — U.S. EPA ID Number

26. Transporter _____ Company Name — U.S. EPA ID Number

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers No.	28. Containers Type	29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes		

32. Special Handling Instructions and Additional Information

TRANSPORTER

33. Transporter _____ Acknowledgment of Receipt of Materials

Printed/Typed Name — Signature — Month — Day — Year

34. Transporter _____ Acknowledgment of Receipt of Materials

Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

35. Discrepancy

36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

EPA Form 8700-22A (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

VOID

APPENDIX B

LAND DISPOSAL RESTRICTIONS NOTIFICATION REQUIREMENTS

Generators: Generators must send a notification with the initial shipment of every waste to a TSDF. If the waste, process, or receiving facility changes, another notification is required. The information that the notification must include varies according to the status of the waste. Waste that needs treatment before it can be disposed of will have different information than waste that can be disposed of without treatment. Below is a table that details the required elements for LDR notifications.

Required Notification Information	Waste Needs to Meet Treatment Standard	Waste Meets Treatment Standard	Waste Is Not Subject to Treatment Standard	Waste Is in Lab Packs
1. EPA hazardous waste and manifest numbers of first shipment	✓	✓	✓	✓
2. Statement: This waste is subject to LDR	✓	✓		
3. Statement: This waste is not prohibited from land disposal			✓	
4. The constituents of concern and any underlying hazardous constituents (if applicable)	✓	✓		
5. Indication whether it is wastewater or nonwastewater	✓	✓		
6. Waste analysis data (when available)	✓	✓	✓	
7. Date the waste will be prohibited from land disposal			✓	
8. For hazardous debris, when treating with the alternative treatment technologies, list the contaminants subject to treatment	✓		✓	
9. For contaminated soil, list the constituents subject to treatment and state whether the soil contains hazardous waste and meets the treatment standard	✓	✓		
10. A certification is needed (see applicable section for exact wording)		✓		✓

Treatment Facilities: Treatment facilities have to send similar notifications along with the shipment of treated wastes to disposal facilities. A certification must be included stating that the waste meets the treatment standards and may be land disposed. Below is a table detailing the information required for treatment facility notifications.

Required Notification Information	Waste Is Treated and Sent for Disposal
1. EPA hazardous waste and manifest number of first shipment	✓
2. Statement that the waste is subject to LDR	✓
3. The constituents of concern and any underlying hazardous constituents (if applicable)	✓
4. indication whether it is wastewater or nonwastewater	✓
5. Waste analysis data (when available)	✓
6. For contaminated soil, list the constituents subject to treatment and state whether the soil contains hazardous waste and meets the treatment standard	✓
10. A certification statement is needed (see applicable section for exact wording)	✓

APPENDIX C

GLOSSARY

The terms below are defined as they pertain to the Resource Conservation and Recovery Act.

Abandoned For purposes of defining a material as a solid waste under RCRA Subtitle C, a material that is disposed of, burned, or incinerated.

Accumulated Speculatively Storage of a material in lieu of expeditious recycling. Materials are usually accumulated speculatively if the waste being stored has no viable market or if a facility cannot demonstrate that at least 75 percent of the material has been recycled in a calendar year.

Acknowledgment of Consent Notice sent by EPA to an exporter of hazardous waste, indicating that the importing country has agreed to accept such waste.

Administrative Action Enforcement action taken by EPA or a state under its own authority, without involving a judicial court process.

Administrative Procedures Act The Act that establishes rulemaking procedures as well as site-specific licensing procedures, access to agency information, and procedures and standards for judicial review of agency actions. All environmental rulemakings proposed and finalized by EPA include public participation throughout the process.

Aggregation Points Centers that accept used oil only from places owned by the same owner and operator as the aggregation point, or from do-it-yourselfers.

Alternative Concentration Limits For purposes of TSDF ground water monitoring, hazardous constituent limits established by the EPA Regional Administrator that are allowed to be present in ground water.

Applicable or Relevant and Appropriate Requirements Standards, criteria, or limitations under federal or more stringent state environmental laws, including RCRA, that may be required during a Superfund remedial action, unless site-specific waivers are obtained.

Authorized State A state that has been delegated the authority by EPA to implement and enforce its own regulations for hazardous waste management under RCRA. The state program must be at least as stringent as the federal standards.

Basel Convention The international treaty that establishes standards for global trade of hazardous waste, municipal waste, and municipal incinerator ash. Because the United States is not a party to the convention, U.S. businesses can only export waste to those countries with which the U.S. government has negotiated a separate waste trade agreement.

Bentsen Wastes Geothermal exploration, development, and production waste exempt from RCRA Subtitle C regulation.

Best Demonstrated Available Technology The technology that best minimizes the mobility or toxicity (or both) of the hazardous constituents for a particular waste.

Bevill Wastes Fossil fuel combustion wastes, mining and mineral processing wastes, and cement kiln dust wastes exempt from RCRA Subtitle C regulation.

Biennial Report A report submitted by hazardous waste LQGs and TSDFs to enable EPA and the states

to track the quantities of hazardous waste generated and the movements of those hazardous wastes.

Boiler An enclosed device that uses controlled flame combustion to recover and deliver energy in the form of steam, heated fluid, or heated gases.

Bottom Ash Ash that collects at the bottom of a combustion chamber.

Burners Handlers who burn used oil for energy recovery in boilers, industrial furnaces, or hazardous waste incinerators.

Burning for Energy Recovery Burning hazardous waste for its heating value as a fuel, and using wastes to produce fuels or as ingredients in fuels.

By-Products Materials that are not one of the intended products of a production process and includes most wastes that are not spent materials or sludges.

California List Interim LDR treatment standards that ensured adequate protection of human health and the environment during the time EPA was promulgating final LDR treatment standards.

Capacity Assurance Plan A written statement which ensures that a state has hazardous waste treatment and disposal capacity. This capacity must be for facilities that are in compliance with RCRA Subtitle C requirements and must be adequate to manage hazardous wastes projected to be generated within the state over 20 years.

Cathode Ray Tubes Vacuum tubes, made primarily of glass, which constitute the video display component of televisions and computer monitors. These tubes are generally hazardous for lead.

Cement Kiln Type of industrial furnace that receives hazardous waste to burn as fuel to run its cement process. Cement is produced by heating mixtures of limestone and other minerals or additives at high temperatures in a rotary kiln, followed by cooling, grinding, and finish mixing.

Characteristic Waste Waste that is considered hazardous under RCRA because it exhibits any of four different properties: ignitability, corrosivity, reactivity, and toxicity.

Civil Action A formal lawsuit, filed in court, against a person who has either failed to comply with a statutory or regulatory requirement or an administrative order, or against a person who has contributed to a release of hazardous waste or hazardous constituents.

Clean Air Act The Act that regulates air emissions from area, stationary, and mobile sources. CAA limits the emission of pollutants into the atmosphere in order to protect human health and the environment from the effects of airborne pollution.

Clean Closure The process of completely removing all waste that was treated, stored, or disposed in a hazardous waste unit.

Clean Water Act The Act that sets the basic structure for regulating discharges of pollutants to surface waters of the United States. CWA imposes contaminant limitations or guidelines for all discharges of wastewater into the nation's waterways.

Closure The procedure that a solid or hazardous waste management facility undergoes to cease operations and ensure protection of human health and the environment in the future.

Codification The process by which final regulations are incorporated into the CFR, which is published annually.

Collection Centers Centers that accept used oil from multiple sources, including both businesses and private citizens.

Combustion The controlled burning in an enclosed area as a means of treating or disposing of hazardous waste.

Commercial Chemical Products Unused or off-specification chemicals, spill or container residues, and other unused manufactured products that are not typically considered chemicals. For the purposes of hazardous waste listings, CCPs include only unused, pure chemical products and formulations.

Compliance Monitoring For purposes of RCRA TSDF ground water monitoring, a program that seeks to ensure that the amount of hazardous waste that has leaked into the uppermost aquifer does not exceed acceptable levels.

Composting Processes designed to optimize the natural decomposition or decay of organic matter, such as leaves and food. The end product of composting is a humus-like material that can be added to soils to increase soil fertility, aeration, and nutrient retention.

Comprehensive Environmental Response, Compensation, and Liability Act The Act that authorizes EPA to clean up uncontrolled or abandoned hazardous waste sites and respond to accidents, spills, and other emergency releases of hazardous substances. CERCLA provides EPA with enforcement authority to ensure that responsible parties pay the cleanup costs of remediating a site contaminated with hazardous substances.

Comprehensive Environmental Response, Compensation, and Liability Information System A computerized database used to track hazardous substance sites.

Comprehensive Performance Testing The initial and periodic evaluation procedure for demonstrating compliance with the national emission standards for hazardous air pollutants and establishing revised operating limits for hazardous waste combustors.

Comprehensive Procurement Guidelines A list, updated every two years, which designates items with recycled content that procuring agencies should aim to purchase. This list currently contains 59 items within 8 product categories.

Concentration Limits For purposes of TSDF ground water monitoring, the maximum levels of hazardous constituents allowed to be present in the ground water.

Conditionally Exempt Small Quantity Generators Facilities that produce less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste, per calendar month. A CESQG may only accumulate less than 1,000 kg of hazardous waste, 1 kg of acutely hazardous waste, or 100 kg of spill residue from acutely hazardous waste at any one time.

Construction Quality Assurance A program required by EPA to ensure that a landfill, surface impoundment, or waste pile meets all of the technological requirements.

Contained-In Policy An EPA policy that determines the health threats posed by contaminated environmental media and debris, and whether such materials must be managed as RCRA hazardous wastes.

Containers Portable devices in which a material is stored, transported, treated, or otherwise handled.

Containment Building A completely enclosed structure used to store or treat noncontainerized waste.

Continuous Emission Monitoring Systems A system that directly and continuously measures one or more pollutants exiting a combustion unit.

Continuous Monitoring Systems A device which continuously samples the regulated parameter without interruption, evaluates the detector response at least once every 15 seconds, and computes and records the average value at least every 60 seconds.

Corporate Guarantee The demonstration that a corporate grandparent, corporate parent, or sibling corporation can meet financial assurance requirements on behalf of a TSDF owner and operator. Firms with a “substantial business relationship” with a TSDF owner and operator can also make this demonstration.

Corrective Action An EPA program to address the investigation and cleanup of contamination from solid and hazardous waste facilities.

Corrective Action Management Unit A physical, geographical area designated by EPA or states for managing remediation wastes during corrective action.

Corrosivity Characteristic The characteristic which identifies wastes that are acidic or alkaline (basic) and can readily corrode or dissolve flesh, metal, or other materials.

Counting Totaling the hazardous wastes at a given facility for a particular month in order to determine hazardous waste generator status.

Covered States States that participated in EPA’s medical waste tracking program from June 22, 1989 to June 22, 1991, which included Connecticut,

New Jersey, New York, Rhode Island, and the Commonwealth of Puerto Rico.

Cradle to Grave The time period from the initial generation of hazardous waste to its ultimate disposal.

Criminal Action Enforcement action reserved for the most serious violations, which can result in fines or imprisonment.

De minimis Very small amounts of hazardous waste that are discharged to wastewater treatment facilities and thus, are exempt from the mixture rule.

Debris A broad category of large manufactured and naturally occurring objects that are commonly discarded (e.g., construction materials, decommissioned industrial equipment, discarded manufactured objects, tree trunks, boulders).

Delisting A site-specific petition process whereby a handler can demonstrate to EPA that a particular wastestream generated at its facility that meets a listing description does not pose sufficient hazard to warrant RCRA regulation. Owners and operators can also use the delisting process for wastes that are hazardous under the mixture and derived-from rules that pose minimal hazard to human health and the environment.

Derived-From Rule A rule that regulates residues from the treatment of listed hazardous wastes.

Designated Facility A hazardous waste treatment, storage, or disposal facility which has received a RCRA permit (or interim status), or is a recycling facility regulated under 40 CFR Section 261.2(c)(2) or Part 266, Subpart F, and has been designated on the manifest by the generator.

Destination Facilities Facilities that treat, dispose of, or recycle a particular category of universal waste.

Destruction and Removal Efficiency Standard which verifies that a combustion unit is destroying the organic components found in hazardous waste.

Detection Monitoring For purposes of RCRA TSDF ground water monitoring, the first step of monitoring at land disposal units, where the owner and operator monitors for indication of a leak from the unit, looking for potential changes in the ground water quality from normal (background) levels.

Dilution Prohibition The LDR requirement that prohibits the addition of soil or water to waste in order to reduce the concentrations of hazardous constituents instead of treatment by the appropriate LDR treatment standards.

Direct Discharges Discharges from point sources into surface water pursuant to a CWA NPDES permit.

Disposal The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on or in the land or water.

Disposal Prohibition The LDR requirement that prohibits the land disposal of hazardous waste that has not been adequately treated to reduce the threat posed by such waste.

Distillation Bottoms Residues that form at the bottom of a distillation unit.

Do-it-Yourselfers Individuals who generate used oil through the maintenance of their own personal vehicles and equipment and are not considered used oil generators.

Drip Pads Engineering structures consisting of a curbed, free-draining base, constructed of non-earthen materials, and designed to convey wood preservative chemical drippage from treated wood, precipitation, and surface water run-on to an associated collection system at wood preserving plants.

Elementary Neutralization Units Containers, tanks, tank systems, transportation vehicles, or vessels which neutralize wastes that are hazardous only for exhibiting the characteristic of corrosivity.

Eligible Academic Entities For Purposes of the Academic Laboratories Rule, a college or university, or a non-profit research institute that is owned by or has a formal written affiliation agreement with a college or university, or a teaching hospital that is owned by or has a formal written affiliation agreement with a college or university.

Emergency Planning and Community Right-to-Know Act The Act designed to help communities

prepare to respond in the event of a chemical emergency and to increase the public's knowledge of the presence and threat of hazardous chemicals.

Environmental Justice The fair distribution of environmental risks across socioeconomic and racial groups.

Environmental Media Materials such as soil, surface water, ground water, and sediment.

EPA Identification Number A unique number assigned by EPA to each hazardous waste generator, transporter, or treatment, storage, and disposal facility.

Episodic Generation The situation in which a generator's status changes from one month to the next, as determined by the amount of waste generated in a particular month. If a generator's status does in fact change, the generator is required to comply with the respective regulatory requirements for that class of generators for the waste generated in that particular month.

Equipment Each valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange or other connector, and any other control devices or systems.

Exception Report A report, submitted by LQGs and SQGs, detailing efforts to locate wastes when a signed copy of the manifest has not been received.

Federal Insecticide, Fungicide, and Rodenticide Act The Act that provides procedures for the registration of pesticide products to control their introduction into the marketplace.

Federal Procurement Program A program that sets minimum recycled content standards for certain designated items and requires procuring agencies to purchase those items composed of the highest percentage of recovered materials practicable.

Final Authorization Authorization by EPA that indicates that a state's program is equivalent to, or no less stringent than, as well as consistent with, federal hazardous waste regulations.

Financial Assurance Under RCRA Subtitle C, the requirements designed to ensure that TSDF owners and operators will have the financial resources to pay for closure, post-closure, and liability costs. Under RCRA Subtitle D, the requirements designed to ensure that MSWLF owners and operators will have the financial resources to pay for closure, post-closure, and corrective action costs.

Financial Test A test of self-insurance which demonstrates that an owner and operator has sufficient financial strength to satisfy the TSDF financial assurance requirement.

Float The lighter materials present in petroleum refinery wastewater. As components of oily waste, float rises to the surface in the first step of wastewater treatment.

Fly Ash Particles of ash, such as particulate matter which may also have metals attached to them, that are carried up the stack of a combustion unit with gases during combustion.

Formal Administrative Action An enforcement action that is taken when a serious violation is detected, or when the owner and operator does not respond to an informal administrative action.

Freedom of Information Act The Act that grants private parties the right to obtain information in the government's possession. FOIA requires each federal agency to establish procedures for handling requests regarding government statutes, regulations, standards, permit conditions, requirements, orders, and policies.

Generator Any person, by site, whose act first creates or produces a hazardous waste, used oil, or medical waste, or first brings such materials into RCRA regulation.

Ground Water Monitoring Sampling and analysis of ground water for the purpose of detecting the release of contamination from a solid or hazardous waste land-based unit.

Hammer Provisions Requirements written directly into RCRA by Congress, as in the case of the Hazardous and Solid Waste Amendments of 1984, that would automatically become regulations if EPA failed to issue its own regulations by certain dates.

Hazard Communication Standard The OSHA standard that provides workers with access to information about the hazards and identities

of the chemicals they are exposed to while working, as well as the measures they can take to protect themselves.

Hazard Ranking System A model devised under CERCLA that determines the relative risk to public health and the environment posed by hazardous substances in ground water, surface water, air, and soil. Only those sites with a score of 28.5 (on a scale of 0 to 100) are eligible for placement on the NPL.

Hazardous Constituents For purposes of RCRA TSDF ground water monitoring, those constituents that have been detected in the uppermost aquifer and are reasonably expected to be in or derived from the waste contained in the unit.

Hazardous Substance A comprehensive designation under CERCLA for RCRA hazardous wastes as well as other toxic pollutants regulated by CAA, CWA, and TSCA. EPA has the authority under CERCLA to designate any additional element, compound, mixture, or solution as a hazardous substance. The definition of hazardous substance specifically excludes petroleum and natural gas.

Hazardous Waste A waste with properties that make it dangerous or capable of having a harmful effect on human health and the environment. Under the RCRA program, hazardous wastes are specifically defined as wastes that meet a particular listing description or that exhibit a characteristic of hazardous waste.

Hazardous Waste Operations and Emergency Response Worker Protection Standard The OSHA standard that protects the health and safety of workers engaged in operations at hazardous waste sites, hazardous waste treatment facilities, and emergency response locations.

Ignitability characteristic The characteristic which identifies wastes that can readily catch fire and sustain combustion.

Incinerator An enclosed device that uses controlled flame combustion and does not meet the criteria for classification as a boiler, industrial furnace, sludge dryer (a unit that dehydrates hazardous sludge), or carbon regeneration unit (a unit that regenerates spent activated carbon). Incinerators also include infrared incinerators (units that use electric heat followed by a controlled flame afterburner) and plasma arc incinerators (units that use electrical discharge followed by a controlled flame afterburner).

Incorporation by Reference This occurs when the regulatory language in a state's regulation actually cite, or refer to, the federal regulations.

Indirect Discharges Wastewater that is first sent to a POTW, and then after treatment by the POTW, discharged pursuant to a NPDES permit.

Industrial Furnace An enclosed unit that is an integral part of a manufacturing process and uses thermal treatment to recover materials or energy from hazardous waste.

Informal Administrative Action Any communication from EPA or a state agency that notifies the handler of a problem.

Inherently Waste-Like For purposes of defining a material as a solid waste under RCRA Subtitle C, a material, such as dioxin-containing wastes, that is always considered a solid waste because of its intrinsic threat to human health and the environment.

Insurance A policy to cover the TSDF financial assurance requirement.

Interim Authorization A temporary mechanism that is intended to promote continued state participation in hazardous waste management while encouraging states to develop programs that are fully equivalent to the federal program and will qualify for final authorization.

Interim Measures Under RCRA Subtitle C corrective action, short-term actions to control ongoing risks while site characterization is underway or before a final remedy is selected.

Interim Status Facilities TSDFs that were already in operation when the RCRA standards were established and that are operating under less stringent standards until they receive a permit.

Lab Packs Drums filled with many small containers packed in nonbiodegradable absorbent materials.

Land Disposal For purposes of RCRA Subtitle C regulation, placement in or on the land, except

in a corrective action unit of hazardous waste, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes.

Land Treatment Units Also known as land farms, land treatment units involve the application of hazardous waste on the soil surface, or the incorporation of waste into the upper layers of the soil in order to degrade, transform, or immobilize hazardous constituents present in hazardous waste.

Landfill For purposes of RCRA Subtitle C, a disposal unit where nonliquid hazardous waste is placed in or on the land.

Large Quantity Generators Facilities that generate more than 1,000 kg of hazardous waste per calendar month, or more than 1 kg of acutely hazardous waste per calendar month.

Large Quantity Handlers of Universal Waste Handlers that accumulate a total of 5000 kg or more of universal waste at any one time.

Leachate Any liquid, including any suspended components in the liquid, that has percolated through or drained from waste.

Letter of Credit A credit document issued to an owner and operator to cover the TSDF financial assurance requirement.

Liabilities Damages that may result from an unexpected release of contaminants into the environment.

Lightweight Aggregate Kiln Type of industrial furnace that produces lightweight aggregate and burns liquid hazardous waste as fuel to run its process. Lightweight aggregate refers to a wide variety of raw materials (such as clay, shale, or slate) which, after thermal processing, can be combined with cement to form concrete products. Lightweight aggregate is produced either for structural or thermal insulation purposes.

Listed Wastes Wastes that are considered hazardous under RCRA because they meet specific listing descriptions.

Manifest Paperwork that accompanies hazardous waste from the point of generation to the point of ultimate treatment, storage, or disposal. Each party involved in the waste's management retains a copy of the RCRA manifest, which contains specific information about the waste.

Marine Protection, Research, and Sanctuaries Act This Act requires a permit for any material that is transported from a U.S. port or by a U.S. vessel for disposition at sea.

Marketers Used oil handlers who either 1) direct shipments of used oil to be burned as fuel in regulated devices, or 2) claim that used oil to be burned for energy recovery is on-specification.

Maximum Achievable Control Technology Process Technology-based concentration limits developed under CAA to limit emissions of individual constituents from hazardous waste combustion units.

Maximum Contaminant Levels For purposes of RCRA ground water monitoring, contaminant-specific levels borrowed from SDWA that are the maximum levels of hazardous waste or hazardous constituents allowed to be present in the groundwater.

Medical Waste Culture and stocks of infectious agents, human pathological wastes, human blood and blood products, used sharps, certain animal wastes, certain isolation wastes, and unused sharps.

Memorandum of Agreement An agreement between a state's director and its EPA Regional Administrator outlining the nature of the responsibilities to enforce a regulatory program and defining the level of coordination and oversight between EPA and the state agency.

Military Munitions For purposes of defining a material as a solid waste under RCRA Subtitle C, ammunition products and components produced for or used by the military for national defense and security.

Miscellaneous Units Hazardous waste treatment, storage, or disposal units regulated under RCRA that do not meet any of the other definitions of regulated units.

Mixed Waste Radioactive waste that is also a hazardous waste under RCRA. Such wastes are jointly regulated by RCRA and Atomic Energy Act.

Mixture Rule A rule that is intended to ensure the regulation of mixtures of listed wastes with nonhazardous solid wastes.

Municipal Solid Waste Durable goods (e.g., appliances, tires, batteries), nondurable goods (e.g., newspapers, books, magazines), containers and packaging, food wastes, yard trimmings, and miscellaneous organic wastes from residential, commercial, and industrial nonprocess sources.

Municipal Solid Waste Landfill A discrete area of land or excavation that receives municipal solid waste.

National Ambient Air Quality Standards Regulations promulgated by EPA under CAA for six criteria pollutants—sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide, ozone, and lead—in order to protect the public from toxic emissions to the atmosphere.

National Corrective Action Prioritization System A resource management tool by which EPA sets priorities for the Subtitle C corrective action program.

National Emission Standards for Hazardous Air Pollutants Standards set by EPA under CAA to control emissions from specific industrial sources.

National Oil and Hazardous Substances Pollution Contingency Plan The NCP contains the regulations that implement the CERCLA response process. The NCP also provides information about the roles and responsibilities of EPA, other federal agencies, states, and private parties regarding releases of hazardous substances.

National Priorities List EPA's priority hazardous substance sites for cleanup. EPA only funds remedial actions at hazardous waste sites on the NPL.

Nonsudden Accidental Occurrences For purposes of TSDF financial assurance, events that take place over time and involve continuous or repeated exposure to hazardous waste.

Notice of Deficiency A notice requiring that a TSDF permit applicant supply more information for a complete permit application.

Notice of Intent to Deny A notice issued by a permitting agency which tells a TSDF permit applicant that the application does not demonstrate compliance with the RCRA standards.

Notice of Noncompliance An informal letter to a handler written as part of an informal administrative action.

Notice of Violation An informal letter to a handler written as part of an informal administrative action.

Occupational Safety and Health Act The Act that is designed to save lives, prevent injuries, and protect the health of employees in the workplace. OSHA accomplishes these goals through several regulatory requirements including the HCS and HAZWOPER standards.

OECD Council Decision A multilateral agreement by the Organization for Economic Cooperation and Development that establishes procedural and substantive controls for the import and export of recyclables between member nations. Because the United States is a member of the OECD, U.S. businesses can trade recyclables with other member nations.

Off-Specification Used Oil Used oil that is tested and does not meet given parameters for arsenic, cadmium, chromium, flash point, lead, and total halogens.

Omnibus Provision The authority which allows EPA to add conditions to a TSDF permit that are not specifically addressed by the RCRA regulations.

On-Specification Used Oil Used oil that meets all the given parameters for arsenic, cadmium, chromium, flash point, lead, and total halogens.

Open Dumps Solid waste disposal facilities that fail to comply with the Subtitle D criteria.

Operating Requirements Parameters established by a facility and written into a permit that will ensure a combustion unit meets numerical performance standards.

Operation and Maintenance The operation and maintenance phase of the CERCLA response process. Operation and maintenance may include activities such as ground water pump and treat, and cap maintenance. EPA conducts review of operation and maintenance activities to ensure that the remedy selected is still protective of human health and the environment.

Overfiling When a state fails to enforce its hazardous waste program properly, EPA can overfile, or enforce a provision for which a particular state has authorization.

Particulate Matter Small dust-like particles emitted from hazardous waste combustion units.

Payment Bond For purposes of TSDF financial assurance, a type of surety bond that will fund a standby trust fund in the amount equal to the value of the bond.

Performance Bond For purposes of TSDF financial assurance, a type of surety bond that guarantees that owners and operators will comply with their closure, post-closure, and liability requirements.

Performance Standards The numerical pollutant emission limits for hazardous waste combustion units developed by EPA.

Permit-as-a-Shield The provision which ensures that TSDF permittees will not be enforced against for violating new requirements that were not established in the original permit.

Permit-by-Rule A special form of a RCRA permit that is sometimes granted to facilities with permits for activities under other environmental laws.

Permitted Facilities Facilities that have obtained a TSDF permit from EPA or the state agency to engage in the treatment, storage, or disposal of hazardous waste.

Petroleum Brownfields Abandoned or underutilized industrial and commercial properties where redevelopment is complicated by real or perceived environmental petroleum contamination.

Point of Compliance For purposes of RCRA TSDF ground water monitoring, the vertical point where a TSDF owner and operator must monitor the uppermost aquifer to determine if the leak exceeds the ground water protection standard.

Point Source Discharges Discharges of treated wastewater directly into a lake, river, stream, or other water body. Point source discharges are regulated under CWA.

Pollutants or Contaminants Any element, substance, compound, or mixture that, after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, will or may reasonably be anticipated to cause illness, death, or deformation in any organism. The definition of pollutant or contaminant specifically excludes petroleum and natural gas.

Post-Closure Period after closure during which owners and operators of solid or hazardous waste disposal units conduct monitoring and maintenance activities in order to preserve the integrity of the disposal system.

Potentially Responsible Party The person or persons who may be held liable for hazardous substance contamination under CERCLA. PRPs may include the owners and operators, generators, transporters, and disposers of the hazardous substances.

Precious Metals Reclamation The recycling and recovery of precious metals (i.e., gold, silver, platinum, palladium, iridium, osmium, rhodium, and ruthenium) from hazardous waste.

Preliminary Assessment A review of all readily available site information such as maps, deeds, and other records to determine if further CERCLA response action is necessary. During the PA, EPA tries to determine what type of substances may have been released and the potential impacts to human health and the environment.

Principal Organic Hazardous Constituents Selected organic constituents, which are high in concentration and difficult to burn, that are monitored to ensure a hazardous waste combustion unit's destruction and removal efficiency.

Process Vent Any open-ended pipe or stack that is vented to the atmosphere either directly, through a vacuum-producing system, or through a tank

associated with hazardous waste distillation, fractionation, thin-film evaporation solvent extraction, or air or steam stripping operations.

Processors and Rerefiners Facilities that process used oil so that it can be burned for energy recovery or reused.

Procuring Agency Agencies that purchase $10,000 or more worth of an item designated under the federal procurement program during the course of a fiscal year. Procuring agencies include: federal government departments or agencies; state government agencies that use appropriated federal funds for procurement of a designated item; local government agencies that use appropriated federal funds for procurement of a designated item; and government contractors that work on a project funded by appropriated federal funds with respect to work performed under the contract.

Publicly Owned Treatment Works A municipal wastewater treatment plant that receives domestic sewage from households, office buildings, factories, and other places where people live and work. Treatment at a POTW is regulated by CWA.

RCRAInfo A database that tracks RCRA Subtitle C facility-specific data (i.e., events and activities related to hazardous waste generators, transporters, and TSDFs), and hazardous waste activity reports, known as biennial reports, that are submitted by LQGs and TSDFs.

Reactivity Characteristic The characteristic which identifies wastes that readily explode or undergo violent reactions.

Rebuttable Presumption For purposes of RCRA, an objective test that focuses on the halogen level in used oil to determine whether the used oil has been mixed with a listed hazardous waste.

Reclaimed For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is reclaimed if it is processed to recover a usable product or regenerated by processing it in a way that restores it to usable condition.

Record of Decision A remedial action plan document that describes the remedy selected for a Superfund site.

Recovered Materials Advisory Notice A notice that provides suggested recycled content levels and other purchasing information for each item designated in the CPG. Procuring agencies can use these levels as guidelines but are encouraged to exceed EPA's recommendations.

Recovered Materials Content Levels The minimum amount of recovered material that designated items under the federal procurement program should contain.

Recycled For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is recycled if it is used or reused, or reclaimed.

Recycling The separation and collection of wastes, their subsequent transformation or remanufacture into usable or marketable products or materials, and the purchase of products made from recyclable materials.

Recycling Presumption The assumption that all used oil that is generated will be recycled.

Regulated Community The group of organizations, people, industries, businesses, and agencies that, because they perform certain activities, fall under the purview of RCRA.

Regulations Rules issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements that the regulated community and the agency must work within.

Remedial Action Longer-term CERCLA response actions that ultimately represent the final remedy for a site and generally are more expensive and of a longer duration than removals.

Remedial Action Plans Special form of RCRA permit that a facility may obtain to treat, store, or dispose of hazardous remediation waste at a remediation waste management site.

Remedial Design/Remedial Action Remedial design is a phase in the CERCLA response process in which technical drawings are developed for the chosen remedy, costs for implementing the remedy are estimated, and roles and responsibilities of EPA, states, and contractors are determined. During the remedial action phase, the remedy is implemented

generally by a contractor, with oversight and inspection conducted by EPA or the state (or both).

Remedial Investigation/Feasibility Study A remedial investigation is a phase in the CERCLA response process that entails an in-depth examination of the nature and extent of contamination at a site and the associated risks to human health and the environment. The feasibility study entails an analysis of remedial action alternatives comparing the advantages and disadvantages of each.

Remediation Waste All solid and hazardous wastes and all media (including ground water, surface water, soils, and sediments) and debris that are managed for implementing cleanup.

Removal Action Short-term cleanup action taken under CERCLA that usually addresses problems only at the surface of a site. A removal is conducted in response to an emergency and generally is limited to 12 months duration or $2 million in expenditures.

Resource Conservation Challenge A major national effort to find flexible, yet more protective, ways to conserve our valuable natural resources through waste reduction and energy recovery. To achieve the goals of the RCC, EPA has formed voluntary partnership programs, including the National Waste Minimization Partnership Program, the Greenspace Alliance, Plug-In to eCycling, Product Stewardship Partnerships, WasteWise, the Coal Combustion Partnership Program, and America's Marketplace Recycles.

Rulemakings Rules issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements that the regulated community and the agency must work within.

Safe Drinking Water Act The Act designed to protect the nation's drinking water supply by establishing national drinking water standards (MCLs or specific treatment techniques) and by regulating UIC wells.

Scrap Metal Worn or extra bits and pieces of metal parts, such as scrap piping and wire, or worn metal items, such as scrap automobiles and radiators.

Secondary Materials The five categories of solid wastes regulated under Subtitle C, which include: spent materials, by-products, sludges, commercial chemical products, and scrap metal.

Sham Recycling Illegitimate activities executed under the guise of recycling in order to be exempt from or subject to lesser regulation.

Site Inspection An in-depth assessment of on-site conditions, conducted as part of the CERCLA response process, to rank the site's hazard potential by determining the site's hazard ranking system score. Activities to assess the site may include sampling, field reconnaissance, and examination of site records (e.g., topographical maps, logs).

Sludges Any solid, semisolid, or liquid wastes generated from a wastewater treatment plant, water supply treatment plant, or air pollution control device.

Small Quantity Generators Facilities that generate between 100 kg and 1,000 kg of hazardous waste per calendar month.

Small Quantity Handlers of Universal Waste Handlers that do not accumulate 5000 kg of all universal waste categories combined at their location at any one time.

Sole Active Ingredient For purposes of determining if a waste is P or U listed, the only chemical ingredient serving the function of a commercial product formulation.

Solid Waste Any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material, resulting from industrial, commercial, mining, and agricultural operations and from community activities. For the purposes of hazardous waste regulation, a solid waste is a material that is discarded by being either abandoned, inherently waste-like, a certain waste military munition, or recycled.

Solid Waste Management Units For purposes of Subtitle C corrective action, discernible units where solid or hazardous wastes have been placed at any times, or any area where solid wastes have been routinely and systematically released.

Source Reduction Maximizing or reducing the use of natural resources at the beginning of an industrial process, thereby eliminating the amount of waste produced by the process. Source reduction is EPA's preferred method of waste management.

Spent Materials Materials that have been used and can no longer serve the purpose for which they were produced without processing.

Spill Prevention Control and Countermeasures Regulations establishing spill prevention procedures and equipment requirements for nontransportation-related facilities with certain aboveground or underground storage capacities that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines.

Staging Pile An accumulation of solid, non-flowing remediation waste that is not a containment building and that is used only during remedial operations for temporary storage at a facility.

State Authorization Tracking System A tool used by EPA to chart those states that have been authorized to implement the RCRA hazardous waste program.

Storage Holding hazardous waste for a temporary period, after which the hazardous waste is treated, disposed of, or stored elsewhere.

Storage Prohibition LDR provision that prevents the indefinite storage of untreated hazardous waste for reasons other than the accumulation of quantities necessary for effective treatment or disposal.

Sudden Accidental Occurrences For purposes of TSDF financial assurance, events that are not continuous or repeated.

Superfund The common name for CERCLA. Superfund refers to the entire CERCLA program as well as the trust fund established to fund cleanup of contaminated sites where potentially responsible parties cannot be identified, or are unwilling or unable to pay.

Superfund Amendments and Reauthorization Act SARA, enacted in 1986, reauthorized and amended CERCLA to include additional enforcement authorities, technical requirements, community involvement requirements, and various clarifications. SARA Title III authorized EPCRA.

Supplemental Environmental Projects Environmentally beneficial projects which a defendant or respondent agrees to undertake in the settlement of a civil or administrative enforcement action, but which the defendant is not otherwise legally required to perform.

Surety Bond A guarantee which certifies that a surety company will cover the TSDF financial assurance requirement on behalf of the owner and operator.

Surface Impoundment A natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials that is used to treat, store, or dispose of hazardous waste.

Tanks Stationary devices used to store or treat hazardous waste.

Technical Grade For purposes of determining if a waste is P or U listed, a commercial chemical product that is not 100 percent pure but is of a grade of purity that is either marketed or recognized in general usage by the chemical industry.

Temporary Units Containers or tanks that are designed to manage remediation wastes during corrective action at permitted or interim status facilities.

Thermal Treatment The treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the waste.

Totally Enclosed Treatment Units Units that are designed and constructed to practically eliminate the potential for hazardous wastes to escape into the environment during treatment.

Toxic Substances Control Act The Act that controls the manufacture and sale of certain chemical substances.

Toxicity Characteristic The characteristic which identifies wastes that are likely to leach dangerous concentrations of toxic chemicals into ground water.

Toxicity Characteristic Leaching Procedure A lab procedure designed to predict whether a particular waste is likely to leach chemicals into ground water at dangerous levels.

Transfer Facilities Any transportation-related facility such as loading docks, parking areas, storage areas, or other similar areas where shipments of hazardous waste, used oil, or universal waste are held temporarily during the normal course of transportation.

Transporter Any person engaged in the off-site transportation of hazardous waste, used oil, universal waste, or medical waste.

Treatment Any method, technique, or process designed to physically, chemically, or biologically change the nature of a hazardous waste.

Treatment Standards LDR criteria that hazardous waste must meet before it is disposed.

Treatment, Storage, and Disposal Facilities Facilities engaged in the treatment, storage, or disposal of hazardous waste. These facilities are the last link in the cradle-to-grave hazardous waste management system.

Trial Burn Burn conducted to test the performance of a hazardous waste combustion unit over a range of conditions.

Trust Fund A financial mechanism by which a facility can set aside money in order to cover the TSDF financial assurance requirement.

Underground Injection Control Well Units into which hazardous waste is permanently disposed of by injection 1/4 mile below an aquifer with an underground source of drinking water (as defined under SDWA).

Underground Storage Tanks A tank and any underground piping connected to the tank that is used to contain an accumulation of regulated substances and that has at least 10 percent of its combined volume underground.

Underlying Hazardous Constituents Constituents that must be treated in order to meet contaminant-specific levels for purposes of the LDR program.

Universal Treatment Standards Contaminant-specific hazardous waste LDR treatment levels.

Universal Wastes Commonly recycled wastes with special management provisions intended to facilitate recycling. There are four categories of universal wastes: hazardous waste batteries, hazardous waste pesticides that have been recalled or collected in waste pesticide collection programs, hazardous waste lamps, and hazardous waste mercury-containing equipment.

Use Constituting Disposal The direct placement of wastes or waste-derived products (e.g., asphalt with petroleum refining wastes as an ingredient) on the land.

Used Oil Any oil that has been refined from crude or synthetic oil that has been used and, as a result of such use, is contaminated by physical or chemical impurities.

Violation The act or an instance of breaking or disregarding the law.

Waste Analysis Plan A plan that outlines the procedures necessary to ensure proper treatment, storage, or disposal of hazardous waste.

Waste Minimization The reduction, to the extent feasible, in the amount of hazardous waste generated prior to any treatment, storage, or disposal of the waste. Because waste minimization efforts eliminate waste before it is generated, disposal costs may be reduced, and the impact on the environment may be lessened.

Waste Pile An open pile used for treating or storing nonliquid hazardous waste.

Wastewater Treatment Units Tanks or tank systems that treat hazardous wastewaters and discharge them pursuant to CWA.

Zero Discharges Wastewater that is not directly or indirectly discharged to a navigable water (e.g., wastewater that is land disposed through spray irrigation) under CWA. Zero discharge facilities are subject to federal or state regulatory limitations that are as strict as those that apply to direct and indirect dischargers under CWA.