Introduction
The Resource Conservation and Recovery Act (RCRA)\(^1\) establishes a cradle-to-grave program regulating the management of hazardous wastes. Directed by the Environmental Protection Agency (EPA) and implemented in significant part by the various states, the program imposes comprehensive obligations and carries significant sanctions for noncompliance. The RCRA program identifies a broad universe of waste materials as hazardous and regulates the handling of these wastes by generators, transporters, and treatment, storage, and disposal facilities. In addition, RCRA imposes corrective action requirements and provides standards for cleanup under the Superfund statute. Unlike the Superfund statute,\(^2\) which focuses on remedying past waste disposal at abandoned sites, RCRA addresses the ongoing management of hazardous wastes at manufacturing plants and other facilities, thus affecting a large segment of businesses engaged in manufacturing.

RCRA was originally enacted in 1976 as amendments to the Solid Waste Disposal Act.\(^3\) Four years later, EPA published its first RCRA regulations for the regulation of hazardous wastes.\(^4\) These regulations, which filled approximately 200 pages in the Code of Federal Regulations, have, in the 1993 edition, grown to occupy more than 1,000 pages.\(^5\) This vigorous program of RCRA regulation resulted from increased public and congressional concern with hazardous waste beginning with the Love Canal episode, which also led to the passage of the Superfund law in 1980.

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1. 42 U.S.C. §§ 6901 et seq.
In 1984 Congress amended RCRA extensively in the Hazardous and Solid Waste Amendments of 1984 (HSWA). The HSWA authorized the regulation of underground tanks, the cleanup of contaminated areas of industrial sites not covered by the original law, and increased restrictions on the disposal of wastes on land. The amendments contain detailed provisions and establish strict deadlines.

Today RCRA is being implemented primarily at the state level, although some states are not fully authorized to implement RCRA, and EPA has reserved the (controversial) right to overfile enforcement actions even where an authorized state has taken enforcement action.

This chapter is an overview of the principal features of RCRA. Most of the topics discussed here are treated at length in subsequent chapters. You may also wish to check EPA’s website for developments: http://www.epa.gov/epawaste/index.htm.

Definition of Hazardous Waste
Subtitle C of RCRA, which regulates hazardous wastes, applies only to “solid waste” that is “hazardous.” Although these concepts lie at the core of the statute, they remain difficult and controversial, and they are more fully discussed in chapters 3 and 4 of this book. The EPA rules have been the subject of litigation, so they must be read in light of several decisions of the D.C. Circuit.

The first step is to determine whether a waste is a solid waste. Under RCRA, solid waste is any garbage, refuse, sludge, or other discarded material, including solid, liquid, or gaseous material that is contained. Although it is clear that a solid waste need not be solid in the conventional sense, it is less clear when a waste is considered discarded. As a result, there has been a good deal of debate on the extent to which secondary materials that are reused or recycled are covered. These issues are discussed in chapter 4. EPA’s Definition of Solid Waste webpage provides a history of the rulemakings on this topic including the proposed 2011 rulemaking that as of press time has not been finalized.

There are two principal exclusions from the definition of solid waste. The first is industrial wastewater discharges subject to the Clean Water Act permit program, namely mixtures of industrial wastes and domestic sewage that pass through a sewer system to a publicly owned treatment works. The second exemption covers certain recycled materials, such as secondary materials that are returned to the original process and reused, as discussed in chapter 3.

Once a waste is determined to be a solid waste, the next consideration becomes whether that waste is “hazardous.” There are basically two ways in which a waste can fall into

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10. Id. §§ 261.2(e), 261.4(a)(8).
this category: (1) the waste exhibits one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or (2) the waste is specifically listed by EPA as hazardous in the *Code of Federal Regulations*. EPA has implemented this provision of the statute by promulgating four tests for so-called characteristic wastes. The toxicity characteristic, probably the most frequently used, subjects a waste to a procedure (the Toxicity Characteristic Leaching Procedure) that is intended to simulate the leaching that would occur at a municipal landfill.

EPA has also listed several hundred hazardous wastes in three categories: those from nonspecified sources (F-listed), those from specific industrial processes (K-listed), and commercial chemical products and pesticides when discarded or spilled (P and U wastes). Congress also exempted mining and certain other wastes pending further study by EPA. The agency has decided not to regulate oil and gas industry exploration and production wastes, mineral extraction and beneficiation, and certain mineral processing under RCRA Subtitle C. Wastes currently listed by EPA as hazardous may be removed by requesting “delisting,” which is accomplished in a special rule-making proceeding.

EPA’s rules have a catch-22 aspect in the form of the so-called mixture and derived-from rules. A waste that is not listed is hazardous only if its properties fall under one of the four characteristics. However, under EPA’s mixture rule, any solid waste that is mixed with a listed hazardous waste remains a hazardous waste no matter what is done to treat it or reduce its concentration. In addition, EPA rules provide that any waste resulting from the treatment, storage, or disposal of any listed waste is a hazardous waste. These long-standing rules were invalidated on procedural grounds in *Shell Oil Co. v. EPA*. EPA’s rules were reinstated pending further rule making. EPA issued its final rule in May 2001.

Obligations of Generators

Generators of hazardous waste must notify EPA of the initiation of hazardous waste activities, obtain an EPA identification number, and properly store hazardous wastes.

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15. Id. §§ 261.4(b)(1), (2).
Wastes must be properly labeled and must be in proper containers for shipment pursuant to Department of Transportation requirements. Generators must use a manifest to track hazardous waste shipments, and the manifest must designate a facility as the shipment’s final destination. In addition, generators are required to maintain records and submit biennial reports that summarize their waste generation activities. The regulations in 40 C.F.R. part 262 describe the responsibilities of generators of hazardous waste and are discussed in detail in chapter 5 (including a discussion of the Hazardous Waste Electronic Manifest Establishment Act, signed into law on October 5, 2012).

The rules provide a “small generator” exemption to reduce the burden on small businesses or facilities handling small quantities of hazardous wastes. Generators that produce no more than 100 kilograms of hazardous waste per month are exempt from most of the RCRA requirements for generators. Generators producing no more than 1,000 kilograms of hazardous waste per month may accumulate wastes for 180 days and are eligible for certain exemptions, but they must comply with most of the requirements for generators.

Generators may accumulate wastes on site for 90 days without being subject to all of the requirements for treatment, storage, and disposal facilities. They must, however, comply with specific requirements, namely, that they store the waste in tanks or containers that meet RCRA standards, that they clearly label the waste as hazardous, and that they note the date when accumulation begins. Another important provision allows for “satellite” accumulation of 55 gallons or less of any hazardous waste at or near the point of generation. Once the 55-gallon limit is reached, the waste must be moved to the 90-day temporary accumulation area. Generators are also expected to develop programs to minimize the generation of hazardous wastes. EPA has encouraged companies to engage in source reduction and recycling in order to minimize wastes, and has asked companies to report on such efforts in their biennial reports.

Transport of Hazardous Waste
Transportation of hazardous waste is governed by EPA as well as by Department of Transportation (DOT) regulations. Transporters must comply with the EPA regulations in 40 C.F.R. part 263, which require that they obtain EPA identification numbers, use proper containers, and implement the hazardous waste manifest system by ensuring that the
manifest accompanies the waste to its next point of delivery.\(^\text{[33]}\) In addition, transporters are required to retain records for three years.

A transporter is exempt from the RCRA requirements with respect to storage of hazardous waste, provided that the waste is properly packaged and the storage does not exceed ten days.\(^\text{[34]}\)

Transportation of hazardous wastes on-site at an industrial facility is exempt from RCRA’s standards for transporters.\(^\text{[35]}\) The regulations define the scope of the site for purposes of this exemption. They include contiguous properties divided by public or private rights of way.

If a discharge of hazardous waste occurs during transport, the shipper must notify the EPA National Response Center and must take appropriate action to protect human health and the environment, including cleanup of the discharge.\(^\text{[36]}\)

Transporters are extensively regulated by DOT under the Hazardous Materials Transportation Act (HMTA).\(^\text{[37]}\) The DOT regulations applicable to transportation of hazardous waste are contained in 49 C.F.R. part 171 and are discussed in chapter 6.

Treatment, Storage, and Disposal

Unless otherwise exempt, all facilities that treat, store, or dispose of hazardous wastes must obtain a permit.\(^\text{[38]}\) To allow for an orderly permitting process, Congress granted “interim status” to facilities that were operating when EPA’s regulations took effect in 1980, provided that the facilities notify EPA and comply with the applicable EPA standards.\(^\text{[39]}\) The statute allows EPA to delegate permitting and enforcement responsibilities to the states, and the vast majority of states and territories have such authority.\(^\text{[40]}\) Because EPA has reserved authority to enforce RCRA requirements and because many new requirements have not been incorporated in state programs, EPA retains much authority in this area. A more detailed discussion of RCRA’s permit requirements may be found in chapter 7.

Treatment, storage, and disposal facilities (TSDFs) are subject to several types of operating and design standards: general facility standards, closure and postclosure care standards, and unit-specific standards.\(^\text{[41]}\) These standards, contained in 40 C.F.R. part 264 (permitted facilities) and part 265 (interim status facilities), are discussed more fully in chapter 8. The general standards require that each TSDF obtain an identification number, obtain or

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33. 40 C.F.R. § 263.20.
34. Id. § 263.12.
35. Id. § 263.10(b).
36. Id. §§ 263.30–31.
37. 49 U.S.C. §§ 1801 et seq.
39. Id. § 6925(e).
41. 42 U.S.C. § 6924(a).
conduct waste analyses, implement security measures, schedule regular inspections, and provide personnel training.\footnote{42} The TSDF must also take special precautions in handling ignitable, reactive, and otherwise incompatible waste and may not locate facilities in floodplains or near seismic faults.\footnote{43} TSDFs must implement preparedness and prevention measures to minimize nonsudden releases, and these facilities must comply with various record keeping requirements. Finally, land disposal units must implement a groundwater-monitoring program, which varies depending on whether the facility is under interim status or is permitted.\footnote{44} If groundwater protection levels are exceeded, corrective action may be required.\footnote{45}

RCRA’s closure, postclosure, and financial responsibility regulations are intended to secure a TSDF so that it does not pose a significant threat of a release. Each facility must have a written closure plan that identifies how each unit will be closed to satisfy EPA standards, including procedures for removing contaminated soil, cleaning equipment, and performing necessary sampling and analysis.\footnote{46} Land disposal facilities must develop post-closure care plans where hazardous wastes or constituents are left in place after closure.\footnote{47} The plans must provide for continued groundwater monitoring and maintenance of the integrity of any cap or cover for a period of up to 30 years.\footnote{48}

The financial assurance regulations require that each TSDF demonstrate its financial ability to meet closure and postclosure obligations as well as third-party liability.\footnote{49} The rules allow TSDFs several means to demonstrate financial ability, including self-insurance, insurance policies, surety bonds, and parent company guarantees.\footnote{50} Self-insurance is generally the preferred route, and the rules should be reviewed with care. For a more detailed treatment of RCRA’s closure, postclosure, and financial responsibility regulations, see chapter 9.

In addition to the general requirements outlined above, EPA has established specific standards for containers, tanks, land disposal facilities, miscellaneous units, incinerators, furnaces, and boilers. The standards are generally quite complex and detailed, and must be reviewed in detail; they are described more fully in chapter 10. The standards for permitted container storage areas require containment systems, timely removal of spills, and removal of waste upon closure.\footnote{51} Similarly, permitted tank systems used to manage

\footnotesize{\begin{itemize}
  \item \footnote{42}{40 C.F.R. §§ 265.11–.16.}
  \item \footnote{43}{Id. §§ 265.17–.18.}
  \item \footnote{44}{Id. §§ 265.90–.91.}
  \item \footnote{45}{Id. § 264.100.}
  \item \footnote{46}{Id. §§ 264.112, 265.112.}
  \item \footnote{47}{Id. §§ 264.110(b), 265.110(b).}
  \item \footnote{48}{Id. §§ 264.117, 265.117.}
  \item \footnote{49}{Id. pts. 264, 265, subpt. H.}
  \item \footnote{50}{Id. §§ 264.143–145, 265.143–145.}
  \item \footnote{51}{Id. § 264.175.}
\end{itemize}}
hazardous waste must have secondary containment systems and leak detection. The rules contain detailed design requirements, rules governing maintenance and operation, and rules governing closure.

EPA requires that incinerators demonstrate an ability to meet a destruction efficiency of 99.99 percent of the principal organic hazardous constituent identified in the permit. Incinerators must also achieve standards for other parameters, such as carbon monoxide and fugitive emissions, and are subject to inspection and maintenance requirements. Boilers and industrial furnaces that burn hazardous waste are regulated separately. In addition, there are certain exemptions for boilers and furnaces used for specific purposes, such as smelting furnaces and small-quantity burners.

HSWA directed EPA to develop regulations establishing technical design standards (minimum technology requirements) for land disposal units. Landfills generally must have double liners, a leachate collection system, and groundwater monitoring. Bulk or free-liquid containing wastes may not be placed in a landfill. After closure, the owner or operator must conduct postclosure care for a period specified in the permit. Surface impoundments, including lagoons and ponds, also are subject to detailed regulations. The regulations require double liners and leachate collection systems. For surface impoundments, groundwater monitoring also must be conducted. Land disposal facilities are discussed in greater detail in chapter 11.

In the 1984 HSWA legislation, Congress directed that wastes not be disposed of on land unless they are treated to meet standards promulgated by EPA. This provision is known as the “land ban” because it would prohibit all land disposal if EPA were to fail to meet the statutory dates for promulgating treatment standards. After treatment to best-demonstrated available technology (BDAT), waste can be disposed of in land disposal units meeting applicable requirements. The BDAT standards have been the subject of considerable controversy, with litigation centering on the level of control and the point at which treatment must cease. Since the first edition of this book, Congress has clarified that LDRs do not apply to characteristic wastes that are decharacterized before disposal and then managed in certain land-based treatment systems. EPA developed universal treatment standards in 1994. The agency has also promulgated rules attempting to minimize disincentives to active remediation. These rules include treatment variances and alternative

52. Id. §§ 264.191–196, 265.191–196.
54. Id. §§ 264.343–347.
55. 42 U.S.C. § 6924(q); 40 C.F.R. § 266.100.
56. 42 U.S.C. §§ 6924(o), 6925(j).
57. 40 C.F.R. §§ 264.301, 265.301.
58. Id. §§ 264.220, 266.220.
59. 42 U.S.C. § 6924(d), (e)(1), (g)(5).
60. Id. § 6924(m), (o).
standards for contaminated soils. EPA in 1993 promulgated rules for corrective action management units (CAMUs) for on-site treatment, storage, and disposal of hazardous wastes managed for implementing cleanup, but the agency later tightened these rules in a manner that limits the utility of CAMUs. The land disposal restrictions are discussed in detail in chapter 12.

The land disposal standards are subject to several exceptions. EPA has authority to grant national capacity variances based on a finding that there is insufficient alternative protective treatment, recovery, or disposal capacity for the wastes.62 This provision has been used in a number of cases. EPA may also grant one-year extensions, renewable for another year, of a prohibition effective date. Surface impoundments are subject to special provisions.63 Untreated wastes may be placed in surface impoundments provided that the impoundments meet the technology requirements and sludges are removed within one year.64 Finally, wastes may be placed without treatment in a “no migration” unit, typically an underground injection well, based on a showing to EPA that there will be no migration of hazardous constituents.65

Corrective Action

Before the enactment of HSWA, corrective action had fairly limited scope under RCRA. EPA had authority under RCRA section 7003 to require persons to take action necessary to address an “imminent and substantial endangerment to health or the environment.”66 Although this provision was used in some early cases to address past contamination at abandoned landfills, its use at such sites was limited once the Superfund statute was enacted in 1980.

HSWA dramatically changed the thrust of RCRA in 1984 by adding three important new provisions. Section 3004(u) of RCRA allows EPA to require corrective action for releases from solid waste management units for any person seeking a RCRA permit after 1984, regardless of when the waste was placed in the unit.67 Section 3004(v) authorizes EPA to require corrective action beyond the boundary of a TSDF where necessary to protect human health and the environment.68 In addition, section 3008(h) authorizes EPA to require corrective action for interim-status facilities.69 These provisions have enormous financial and practical implications for industry that may overshadow the Superfund program. Corrective action is discussed further in chapter 13.

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63. Id. § 6925(i)(11).
64. 40 C.F.R. § 268.4.
65. Id. § 268.6.
67. Id. § 6924(u).
68. Id. § 6924(v).
69. Id. § 6928(h).
Sections 3004(u) and 3008(h) apply to facilities that must obtain a RCRA permit or interim status. Thus generators, transporters, and persons accumulating wastes for no more than 90 days are not subject to corrective action. On the other hand, where there is ongoing waste management at a facility, EPA has interpreted the statute to require corrective action anywhere within the contiguous plant boundary.\(^{70}\)

In July 1990, EPA published a proposed corrective-action rule.\(^{71}\) This rule proposes the concept of a conditional remedy that allows on-site contamination not meeting cleanup levels to remain provided that certain conditions are met. EPA's proposal sets forth cleanup goals and standards in the form of “action” or trigger levels and “target” or media protection standards. These levels are generally based on promulgated health and environmental standards. EPA has not yet promulgated final regulations. This rule was never finalized; instead, it was withdrawn in October 1999.\(^{72}\) EPA's 1999 announcement stated that the agency intends to implement issues addressed in the proposal as guidance.

Companies conducting corrective action often must manage contaminated soil and other residues as hazardous waste. EPA is developing a rule that may exempt many such remedial residues from hazardous waste status. Otherwise, the treatment of such remedial residues can be subject to hazardous waste permitting and their redisposal may invoke land disposal restrictions. In May 1998, EPA issued RCRA land disposal treatment standards for contaminated soils.\(^{73}\) In early 1993, EPA promulgated a rule setting forth the concept of a “corrective action management unit” (CAMU) that allows remediation wastes to be managed without triggering land disposal or minimum technology restrictions.\(^{74}\) CAMUs are established by section 3004(u) permits or section 3008(h) orders.

Underground Storage Tanks

The 1984 Hazardous and Solid Waste Amendments established a comprehensive program for regulating underground storage tanks (USTs) in Subtitle I of RCRA. The statute regulates tanks containing regulated substances such as petroleum products and hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) but excluding hazardous wastes under RCRA.\(^{75}\) EPA defines an underground tank as a tank or series of tanks and connected piping in which the volume of regulated substances is ten percent or more beneath the surface of the ground.\(^{76}\) States with approved programs may implement and enforce the UST standards.\(^{77}\)

\(^{70}\) United Techs. Corp. v. EPA, 821 F.2d 714 (D.C. Cir. 1987).
\(^{75}\) 42 U.S.C. § 6991.
\(^{76}\) Id. § 6991(1); 40 C.F.R. § 280.12.
\(^{77}\) 40 C.F.R. §§ 281.10 et seq.
Each owner of a UST was required to notify the appropriate agency of the existence, location, type, and uses of its tank within 18 months of HSWA’s enactment. Under the statute and EPA regulations, owners of USTs are required to construct them to maintain structural integrity, install leak detection systems, report releases of regulated substances, take corrective action for releases, and demonstrate financial responsibility. The requirements vary depending on whether the tank is new or old and whether the tank contains petroleum or hazardous substances. A more extensive discussion of these requirements appears in chapter 14, including a discussion of the November 2011 proposed rulemaking.

The statute contains several exemptions. These include farm or residential tanks of 1,100 gallons or less for storing motor fuel, tanks used to store heating oil for consumptive use on the premises where stored, pipeline tanks regulated under federal laws, surface impoundments, and storage tanks in an underground area such as a basement that are above the surface of the floor.

Disposal of Nonhazardous Waste

Although hazardous wastes have been the primary focus of RCRA, nonhazardous wastes are addressed to a more limited extent in Subtitle D. The statute directs states to develop solid waste management plans and to eliminate the open dumping of solid waste. EPA has published criteria for classifying design criteria and practices that constitute open dumping. Landfills that do not meet these criteria are banned. For a detailed discussion of nonhazardous waste regulation, see Chapter 15.

In 1984 HSWA required EPA to examine whether the previously published Subtitle D criteria were sufficient to protect groundwater. In 1991 EPA published new criteria for landfills receiving municipal solid waste. When RCRA is reauthorized, Congress can be expected to consider ways to strengthen and increase the federal role in the Subtitle D program.

RCRA specifies several kinds of nonhazardous wastes for special regulation. These include medical wastes, used oil, and sewage sludge. Medical wastes are regulated under Subtitle J of RCRA, which requires record keeping and manifesting. EPA does not treat used oil as a hazardous waste. However, the agency has promulgated regulations
applicable to generators, transporters, and processors of used oil. Sewage sludge is regulated under section 405 of the Clean Water Act. EPA has published detailed regulations for the use and disposal of sewage sludge.

Conclusion
RCRA has emerged as one of the most complex areas of environmental law. Over time, Congress has made the statute more comprehensive, and EPA has issued hundreds of major regulations. As EPA continues to amend the rules and issue new rules and guidance documents, tracking down the regulatory preambles that explain various related provisions and EPA guidance has become increasingly challenging. Today various EPA websites sponsored by the Office of Solid Waste provide ready access to rulemakings, guidance documents, and other information useful to understanding both the current requirements and the history of RCRA.

Our goal in publishing this manual is to make RCRA more comprehensible to the practitioner. The chapters that follow were prepared by experts in the field to give lawyers and environmental managers insights into the meaning and implications of the law. It is important to keep in mind, however, that this area of law continues to change, and practitioners must keep up-to-date with changes in the statute and with EPA and state regulations and policies.

89. 40 C.F.R. pt. 279, subpts. C, E, F
90. 33 U.S.C. § 1345.