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Environmental Health and Protection

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This chapter provides a context for the practice of environmental health law. It is meant as both a road map for the practitioner and an introduction to some of the ways in which environmental health problems can be approached. Although the vast range of environmental health law is difficult to condense, we can give practitioners a flavor of how the tools available to practitioners developed and where environmental health and protection law may be going. Ultimately, the reader must protect environmental health by selecting from among, and employing, the legal tools presented here. Because of the complexity and scope of the law, the modern environmental health practitioner is faced simultaneously with an extensive group of legal tools and a changing landscape in which to apply them.

The major federal laws associated with environmental health and protection (Table 18-1) are broad and heterogeneous, reflecting the diversity of activities that defines environmental health. As we use it in this chapter, the term *environmental health* "comprises those aspects of human health, including quality of life, that are determined by interactions with physical, chemical, biological and social factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling and preventing those factors in the environment that may adversely affect the health of present and future generations."¹

In addition to these federal authorities, state laws and municipal or local

TABLE 18-1. Major Federal Environmental Protection Laws

FEDERAL LAW	SUMMARY OF INTENT AND PROVISIONS
Clean Air Act (CAA)	The CAA protects human health and the environment from outdoor air pollution. It requires the EPA to establish minimum national standards for air quality and assigns primary responsibility to the states to ensure compliance with these standards. Areas not meeting the standards, referred to as "nonattainment areas," are required to implement pollution-control measures. The CAA establishes federal standards for mobile sources of air pollution, for sources of 188 hazardous air pollutants, and for the emissions that cause acid rain. It establishes a comprehensive permitting system for all major sources of air pollution. It also addresses the prevention of pollution in areas with clean air.
Federal Water Pollution Control Act (CWA)	The CWA is the principal law addressing prevention of pollution of surface waters. Originally enacted in 1948, it was totally revised by amendments in 1972 and 1987. The 1972 amendments required all municipal and industrial wastewater to be treated before discharge into waterways, increased federal assistance for municipal treatment plant construction, and strengthened and streamlined enforcement. Before the 1987 amendments, however, programs under the CWA were primarily directed at point source pollution, wastes discharged from discrete and identifiable sources, such as pipes and other outfalls. Little attention had been given to nonpoint source pollution (storm water runoff from agricultural lands, forests, construction sites, and urban areas). The 1987 amendments directed states to develop and implement nonpoint pollution-management programs. Federal assistance was authorized to support control activities.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendment and Reauthorization Act (SARA)	CERCLA and SARA established a fee-maintained fund to clean up abandoned hazardous waste sites. CERCLA authorizes the federal government to respond to spills and other releases of hazardous substances, as well as leaking hazardous waste dumps. Hazardous substances are identified under the SDWA, the CWA, CAA, and the TSCA or are designated by the EPA. Response is also authorized for releases of "pollutants or contaminants," which are broadly defined to include anything that can threaten the health of "any organism." Most nuclear materials and petroleum are excluded. CERCLA also established the Agency for Toxic Substances and Disease Registry (ATSDR) with mandates to (1) establish a National Exposure and Disease Registry, (2) create an inventory of health information on toxic substances, (3) create a list of closed and restricted-access sites, (4) assist in toxic substance emergencies, and (5) determine the relation between toxic substance exposures and illnesses. SARA added responsibilities in health assessment, toxicology, and medical education.

(continued)

TABLE 18-1—Continued

FEDERAL LAW	SUMMARY OF INTENT AND PROVISIONS
Emergency Planning and Community Right-to-Know Act (EPCRA)	EPCRA requires industrial reporting of toxic releases and planning to respond to chemical emergencies. EPCRA established state commissions and local committees to implement procedures for coping with releases of hazardous chemicals and mandated annual reporting on environmental releases of such chemicals by facilities that manufacture or use them in significant amounts.
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	FIFRA governs pesticide products and their use. FIFRA requires the EPA to regulate the sale and use of pesticides in the United States through registration and labeling. It directs the EPA to restrict use of pesticides to prevent unreasonable adverse effects on people and the environment, taking into account the costs and benefits of various uses. FIFRA prohibits the sale of any pesticide in the United States unless it is registered and labeled indicating approved uses and restrictions. The EPA registers each pesticide for each use. In addition, FIFRA requires the EPA to re-register older pesticides based on new data and scientific discoveries. Establishments that manufacture or sell pesticide products must register with the EPA, and managers of these facilities are required to keep records and allow inspections by the EPA or state regulatory staff.
Food Quality Protection Act (FQPA)	The FQPA amends both the FFDCA and the FIFRA. It requires the re-registration of all pesticides used in the United States to account for new scientific understanding and to provide adequate protection for particularly sensitive populations such as children and pregnant women. Specifically, (1) it requires recognition that people can have concurrent exposure to many different chemicals (before this, each pesticide was regulated in isolation, as if exposure occurred only one chemical at a time); (2) it recognizes that exposure can occur from many sources or pathways including pets, lawns, soil, carpets, and even house dust; and (3) it includes provisions to protect children, who may be more vulnerable to the effects of environmental pollutants such as pesticides, and excludes cost-benefit analysis from the regulatory decision-making process.
National Environment Policy Act (NEPA)	The NEPA requires the EPA to review environmental impact statements. The basic purposes of the NEPA are to (1) declare a national policy to encourage harmony between humans and the environment; (2) promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humans; (3) enrich the understanding of the ecologic systems and natural resources important to the United States; and (4) establish the White House Council on Environmental Quality.

(continued)

TABLE 18-1. Major Federal Environmental Protection Laws—Continued

FEDERAL LAW	SUMMARY OF INTENT AND PROVISIONS
Oil Pollution Act (OPA)	The OPA streamlined and strengthened the EPA's ability to prevent and respond to catastrophic oil spills. A trust fund financed by a tax on oil is available to clean up spills when the responsible party is incapable or unwilling to do so. The OPA requires oil storage facilities and vessels to submit to the federal government plans detailing how they will respond to large discharges. It also requires the development of Area Contingency Plans to prepare and plan for oil spill response on a regional scale.
Pollution Prevention Act (PPA)	The PPA states that it is the policy of the United States that "pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner." The PPA focused industry, government, and public attention on reducing the amount of pollution produced in the United States through source reduction.
Residential Lead-Based Paint Hazard Reduction Act	This Act directs the Department of Housing and Urban Development and the EPA to require disclosure of information on lead-based paint hazards before the sale or lease of most housing built before 1978. This ensures that purchasers and renters of housing built before 1978 receive the information necessary to protect themselves from lead-based paint hazards but does not require any testing or removal of lead-based paint by sellers or landlords.
Safe Drinking Water Act (SDWA)	The SDWA is the key federal law for protecting public drinking water systems from contamination. First enacted in 1974 and substantially amended in 1986 and 1996, the SDWA establishes standards and treatment requirements for drinking water, controls underground injection of wastes that might contaminate water supplies, and protects ground water. The SDWA established the current federal-state arrangement in which states may be delegated primary implementation and enforcement authority for the drinking water program. The state-administered Public Water Supply Supervision program remains the basic program for regulating the nation's public water systems. In 1996 Congress substantially revised the SDWA. Among other things, flexibility was added to its standard setting provisions, the EPA was required to conduct cost-benefit analyses for most new standards, consumer information requirements were expanded, provisions to improve small system compliance and protect source waters were added, and a State Revolving Loan Fund to help finance needed projects was created.

(continued)

TABLE 18-1—Continued

FEDERAL LAW	SUMMARY OF INTENT AND PROVISIONS
Solid Waste Disposal Act (SWDA), Resource Conservation and Recovery Act (RCRA), and Hazardous and Solid Waste Amendments (HSWA)	Federal solid waste law has gone through four major phases. The SWDA focused on research, demonstrations, and training. The RCRA refocused on concern with the reclamation of energy and materials from solid waste. It authorized grants for demonstrating new resource recovery technology and required annual reports from the EPA on means of promoting recycling and reducing the generation of waste. In a third phase, the federal government began a more active regulatory role, embodied in the RCRA. The RCRA instituted the first federal permit program for hazardous waste and prohibited open dumps. In a fourth phase (HSWA), the federal government attempted to prevent future clean-up problems by prohibiting land disposal of untreated hazardous wastes, setting liner and leachate collection requirements for land disposal facilities, setting deadlines for closure of facilities not meeting standards, and establishing a corrective action program. The ATSDR was directed to work with the EPA to (1) identify new hazardous wastes to be regulated, (2) conduct health assessments at RCRA sites, and (3) consider petitions for health assessments from the public or states.
Toxic Substances Control Act (TSCA)	The TSCA regulates the testing of chemicals and their use. The EPA may require manufacturers and processors of chemicals to conduct and report the results of tests to determine the effects of potentially dangerous chemicals on living things. Based on test results and other information, the EPA may regulate the manufacture, importation, processing, distribution, use, and/or disposal of any chemical that presents an unreasonable risk of injury to human health or the environment. A variety of regulatory tools are available to the EPA under the TSCA, ranging in severity from a total ban on production, import, and use to a requirement that a product bears a warning label at the point of sale.

ordinances could contain useful tools for environmental health practitioners. A detailed discussion of these authorities is beyond the scope of this chapter. However, the major common law theories on which they are based are outlined in Table 18-2.

LEGAL AUTHORITIES

Federal and State Authorities

The legal authorities available to environmental health practitioners are broad and extensive. They are based largely in state police powers and the Interstate

TABLE 18-2. Overview of State Police and Plenary Power Common Law Actions

TYPE OF ACTION	DESCRIPTION
Negligence	Negligence is the failure to do something that a reasonable person, guided by the considerations that normally regulate human affairs, would do or the doing of something that a reasonable person would not do. To succeed in bringing a negligence claim, the plaintiff must prove (1) that the party responsible for toxic material had a duty to either warn others about the risks associated with the toxic materials under the particular circumstances or to take precautions to prevent injury to others; (2) that the party responsible for toxic material breached that duty; (3) that the toxic material was the proximate cause of the plaintiff's injury; and (4) that damages, if collected, can remedy the injury. Breach of duty has been found for an insecticide manufacturer failing to warn users that the product was lethal* and for the corporate owner of a toxic waste site failing to prevent the release of toxic materials.†
Negligence per se	If the injured party in a negligence action seeks to prove violation of a statutory or regulatory standard, the action is one of negligence per se. To prevail in a negligence per se claim, the plaintiff must show that (1) the plaintiff is a member of the class of individuals that the legislative provision in question is designed to protect from a particular type of harm and (2) the plaintiff suffered the particular type of harm contemplated by the legislative provision.‡
Strict liability	Parties who carry on "abnormally dangerous" activities that harm persons or land are held strictly liable for the damage or injuries caused by their activities, regardless of the level of care taken to prevent such injuries. The court, not the jury, determines whether an activity is abnormally dangerous. Crop dusting,§ operating hazardous waste facilities,¶ and generating nuclear power** have all been determined to be abnormally dangerous activities. The Restatement (Second) of Torts § 520 sets out six factors to determine whether an activity is abnormally dangerous: (1) the existence of a high degree of risk to the person or land of others; (2) the likelihood that the harm resulting from the activity will be great; (3) the inability to eliminate the risk through reasonable care; (4) the extent to which the activity is not a manner of common usage; (5) the inappropriateness of the activity related to where it is carried on; and (6) the extent to which the value of the activity outweighs its dangerousness.

(continued)

TABLE 18-2—Continued

TYPE OF ACTION	DESCRIPTION
Trespass	Trespass occurs when an actual intrusion occurs onto, above, or below land where the plaintiff has an interest when this intrusion is intentional, reckless, negligent, or the result of ultra-hazardous activity.†† Trespass was found when a defendant's production of aluminum caused fluoride particles to escape onto the plaintiff's farmland, rendering it unusable for grazing.‡‡
Nuisance	Nuisance is the nontrespassory invasion of another's interest in the private use and enjoyment of land.§§ Nuisance has been found for contamination of neighboring groundwater by leaking gasoline storage tanks.¶¶ Nuisance and trespass actions are complementary, and in environmental tort cases the line distinguishing them is blurred.***
Fraud	Fraud is claimed when the defendant knowingly conceals the dangerous nature of the toxic substance and suffered an injury from exposure to it. Fraud was found when an employee was permanently disabled after using a chemical product that his employer claimed was not harmful.†††
Breach of warranty and misrepresentation	Breach of warranty and misrepresentation are causes of action based on a seller's express or implied representation of their product on which the consumer justifiably relied.‡‡‡ Misrepresentation was found when a seller of a gasoline station stated, when asked, that the station had no problems; in reality, a 2000 gallon spill had occurred 5 years earlier.§§§ In breach of warranty and misrepresentation cases, the plaintiff must prove that the misrepresented fact caused the alleged injury.

**Hubbard-Hall Chem. Co v. Silverman*, 340 F 2d 402 (1st Cir. 1965).

†*Ewell v. Petro Processors of La., Inc.*, 364 So 2d 604 (LA. Ct. App. 1978).

‡Gerrard, § 33.01(1)(a).

§*Langan v. Valicopters, Inc.*, 567 P 2d 218 (Wash. 1977). The court imposed strict liability against an aerial pesticide sprayer for damages to organic crops.

¶*Sterling v. Veliscol Chem. Corp.*, 855 F 2d 1188 (6th Cir. 1988). The court imposed strict liability to recover for personal injuries and property to residents living near a chemical waste burial site.

***Silkwood v. Kerr-McGee Corp.*, 464 U.S. 238 (1984). The court imposed strict liability for radiation injuries stemming from the operation of a nuclear power plant.

††*Restatement (Second) of Torts*, Chapter 7.

‡‡*Martin v. Reynolds Metals Co.*, 342 P 2d (Or. 1959).

§§*Restatement (Second) of Torts*, § 821D.

¶¶*Exxon Corp. v. Yarema*, 516 A 2d 990 (Md. App. 1986).

***Gerrard, § 33.01(1)(c).

†††*Berkley v. American Cyanamid Co.*, 799 F 2d 1489 (5th Cir. 1985).

‡‡‡Gerrard, § 33.01[1][e].

§§§*Damon v. Sun Co.*, 87 F 3d 1467 (1st Cir. 1996).

Commerce Clause, the authority ceded to the federal government by the states in the U.S. Constitution. The Interstate Commerce Clause, the scope of which was expanded greatly during the New Deal years,² is the basis for almost all modern federal environmental laws.²

This section summarizes the legal authorities in four tables. The first table (Table 18-1) describes the major federal environmental protection laws. The second table (Table 18-2) contains an overview of common law actions available under the police or plenary powers of most states. These authorities underlie the actions that state and local governments can exercise, even in the absence of federal law and regulation. Table 18-3 describes the major federal public health laws that have environmental authorities. Table 18-4 illustrates the range of media-based approaches contained in federal law and indicates some of the laws and agencies that are associated with controlling certain compounds or classes of compounds.

Overview of state police and plenary power common law actions

Many cases brought against environmental polluters contain claims based on tort law and theory. Environmental tort suits can seek recovery for personal injury as well as for property damage. Historically, recovery has been allowed only for actual physical injury. More recently, plaintiffs have been able to collect for the enhanced risk for future disease, fear of contracting a disease, and damage to one's immune system.³ Environmental tort actions generally allege that exposure to a toxic substance has caused the plaintiff's injury. Common law causes of action for tort include negligence, negligence per se, strict liability, nuisance, trespass, fraud, and breach of warranty and misrepresentation (§ 33.01[1]).³ Negligence is the most frequently pleaded claim, followed by strict liability. Table 18-2 contains a fuller explanation of these tort actions.

Overview of the major federal environmental protection laws

The environmental health authorities of the U.S. Environmental Protection Agency (EPA) derive primarily from 13 major environmental statutes that have been enacted or amended over the past 30 years. The multiplicity of federal environmental laws contrasts sharply with federal public health law, which has evolved over the past 250 years and is captured in three main pieces of legislation. Table 18-3 summarizes the components of the major federal public health laws today.

As the substantial number of environmental and public health statutes suggest (Tables 18-1 and 18-3), the process of federal regulation in these areas is complex and fragmented. To demonstrate the complexity of the administration of these regulatory processes, Table 18-4 cross-references some of the major federal regulations of specific chemical groups by individual media. The six separate chemical groups, separated into six separate media, are regulated by four

TABLE 18-3. Major Federal Public Health Laws

FEDERAL LAW	SUMMARY OF INTENT AND PROVISIONS
Federal Food, Drug and Cosmetic Act (FFDCA)	The FFDCA is the basic U.S. food and drug law. It ensures that foods are pure and wholesome, safe to eat, and produced under sanitary conditions; that drugs and devices are safe and effective for their intended uses; and that cosmetics are safe and use appropriate ingredients.
Occupational Safety and Health Act (OSHA)	The OSHA requires safe and healthful conditions for working people by authorizing enforcement of the standards developed under the OSHA and by assisting and encouraging the states in ensuring safe and healthful working conditions. The goal was to ensure that employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions. Standards set under the OSHA regarding toxic materials or harmful physical agents are based on levels that most adequately ensure that no employees will suffer material impairment of health or functional capacity even if such employees have regular exposure to the hazard dealt with for their entire working life. Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria.
Public Health Service (PHS) Act	The Public Health Service (PHS) was established in July 1798. Subsequent legislation has vastly broadened its scope. The PHS Act of 1944 consolidated and revised all legislation relating to the PHS. Its legal responsibilities have been broadened and expanded many times since 1944. Currently, the PHS (1) coordinates with the states to set and implement national health policy; (2) generates and upholds cooperative international health-related agreements, policies, and programs; (3) conducts medical and biomedical research; (4) sponsors and administers programs for the development of health resources and the prevention and control of diseases; (5) provides resources and expertise to the states and other public and private institutions in the planning, direction, and delivery of physical, environmental, and mental health-care services; and (6) enforces laws to ensure the safety and efficacy of drugs and protect against impure and unsafe foods, cosmetics, medical devices, and radiation-producing projects. Today, the vast majority of activities at the CDC, FDA, HRSA, IHS, and NIH are conducted under the auspices of the PHS Act.

TABLE 18-4. Federal Regulations of Chemical Groups by Media

	CAA*	CWA	SDWA	TSCA	RCRA	CERCLA	SARA	EPCRA	FIFRA	FFDCA†	FQPA	RLHRA‡	OSHA§
Metals, air	✓												✓
Metals, water		✓											
Metals, land				✓			✓						
Metals, household				✓						✓		✓	
Metals, food										✓	✓		
Pesticides, air	✓												
Pesticides, water		✓											
Pesticides, land		✓			✓		✓						
Pesticides, crops								✓	✓		✓		
Pesticides, household									✓	✓	✓		
Pesticides, food										✓	✓		
Phthalates, air	✓												✓
Phthalates, water		✓											
Phthalates, land					✓		✓	✓					
Phthalates, food										✓	✓		

separate agencies using 13 individual laws. On the whole, these tables demonstrate that federal environmental protection and health authorities and tools are not easily boiled down or pigeon-holed.

Litigation

Litigation by government agencies

Litigation is an important tool for environmental health practitioners. Federal environmental laws provide authorities for administering agencies to sue parties that are out of compliance with their permits or are otherwise running afoul of the law. All the major federal environmental statutes contain such provisions. For example, the Clean Air Act (CAA) authorizes the EPA to issue administrative compliance and penalty orders and seek injunctions and civil and criminal penalties (42 U.S.C. § 7413). The Toxic Substances Control Act (TSCA) provides for civil and criminal penalties and states that substances produced in violation of the Act can be seized (15 U.S.C. §§ 2614, 2615, 2616, and 2617). The Federal Water Pollution Control Act (CWA) states that the EPA can issue compliance orders, bring civil actions, and assess administrative, civil, and judicial penalties against violators (33 U.S.C. § 1319). In addition to the ability to seek penalties, issue compliance orders, and bring civil and criminal actions, some environmental statutes provide agencies with the ability to take immediate action in the event of an imminent and substantial endangerment (see 33 U.S.C. § 1319[c]).

State environmental health practitioners can often take advantage of these federal authorities because federal environmental protection programs are frequently delegated to states.⁴ In certain cases, if a state has not begun an action against a violator, the federal government may step in (33 U.S.C. § 1319[a]). State laws may also contain authorities for independent state actions; and traditional common law remedies, such as public nuisance, may also be available (Table 18-2).

In contrast to federal environmental laws, the major federal public health law (the Public Health Service Act) does not provide extensive options for enforcement. Even though certain actions are authorized (such as quarantine [42 U.S.C. § 264-272]), few, if any, authorities seem to be available to bring civil and criminal enforcement actions or seek damages.

Citizen suits

Federal environmental statutes contain provisions that allow citizens to bring civil suits against those who violate environmental statutes, including federal agencies, if they fail to fulfill their statutory mandates.⁶ These authorities em-

power citizens to act as private "attorneys general" to force compliance with the law. For example, under the Resource Conservation and Recovery Act (RCRA), a citizen can begin a civil action against any person, including the United States (e.g., the EPA) or any other government agency for violations of RCRA permits, regulations, or other requirements. Anyone may begin a civil suit against any person who is contributing, or has contributed to, past or present handling, storage, treatment, transportation, or disposal of hazardous or solid waste that may imminently and substantially endanger health and the environment (see 42 U.S.C. § 6972[a][1][A] and [B]). Citizen groups have successfully used the citizen suit provisions of the CWA to collect penalties from companies for non-compliance with (and exceedences to) their National Pollutant Discharge Elimination System permits.^{4b} Citizen groups have also sued the EPA and other federal agencies for failure to comply with environmental laws (§ 4.3).⁴

LEGAL ISSUES AND CONTROVERSIES

Historical Underpinnings

History of federal environmental law and regulation

Current U.S. environmental law and regulation is a relatively recent development that has been concerned primarily with standard setting, monitoring and oversight, and enforcement.⁵ In their present form, environmental laws and regulations have existed since the creation of the EPA in 1970. Before the EPA, federal efforts regarding the environment fell into two categories. Most environmental or ecosystem protection efforts were handled by the Department of the Interior and the Department of Agriculture (USDA) and their predecessors, and most environmental/human health protection efforts were handled by the Department of Health, Education, and Welfare (DHEW) and its predecessors.⁶

The EPA was created to consolidate into one agency a variety of federal research, monitoring, standard-setting and enforcement activities to ensure integrated environmental protection.⁷ In his letter to Congress calling for the creation of the new agency,⁸ President Richard Nixon recognized this country's need for a unified, comprehensive, environmental protection effort⁸:

The Government's environmentally-related activities have grown up piecemeal over the years. . . . Our national government today is not structured to make a coordinated attack on the pollutants which debase the air we breathe, the water we drink, and the land that grows our food. Indeed, the present governmental structure for dealing with environmental pollution often defies effective and concerted action. . . . [D]espite its complexity, for pollution control purposes the environment must be perceived as a single, interrelated system. Present assignments of departmental responsibilities do not reflect this interrelatedness.

Programs from the Department of Interior (including the Federal Water Quality Administration and all pesticide research efforts), the DHEW (the National Air Pollution Control Administration, the Bureau of Solid Waste Management, the Bureau of Water Hygiene, the Bureau of Radiological Health, and certain programs from the Food and Drug Administration), the Atomic Energy Commission and the Federal Radiation Council, and the USDA were brought together to form the new comprehensive environmental agency, the EPA.

Given its creators' clear intent, the new agency would be designed to be a unified, comprehensive, and interconnected organization that addressed the environment as a whole and regulated human interaction with the environment in the same way.⁸ This was, however, not how the new agency and its regulatory efforts developed. Instead of turning away from the historical trend of regulating human interactions with the environment in a medium-by-medium, piecemeal fashion, Congress and the White House methodically established one environmental program after another that focused on only one environmental area. In 1970, Congress substantially amended the CAA.⁹ In 1972, it passed the Federal Environmental Pesticide Control Act, which substantially amended the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).¹⁰ This was followed closely by substantial amendments to the Safe Drinking Water Act in 1974, the Toxic Substance Control Act in 1976, and the Federal Water Pollution Control Act in 1977. In the 1980s the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or "Superfund") was enacted, and the Hazardous and Solid Waste Amendments of 1984 were added to the list of focused pieces of environmental legislation.^{11,12} Superfund was amended in 1986; the original 20-page Act was expanded by over 200 pages of new or changed provisions.¹³ These program-specific and highly detailed amendments continued through the 1990s as Congress passed significant legislation altering the Safe Drinking Water Act (see Public Law 104-182, August 6, 1996, 110 Stat. 1614 *et seq.*), the Federal Food, Drug and Cosmetic Act, and FIFRA (see Public Law 104-170, August 3, 1996, 110 Stat. 1489 *et seq.*, commonly referred to as the Food Quality Protection Act of 1996 [FQPA]).

The historical forces that operated at this time were considerable and somewhat explain why the federal environmental protection system evolved as a series of interconnected media-based programs instead of as an organic whole. After World War II, the new chemical, plastics, and petroleum industries were creating new highly visible forms of pollution that were affecting people and ecosystems on much larger geographic scales than previously. As the scope of pollution became less local and more national, the lack of uniformity in state and local environmental laws became glaringly apparent.⁶ In addition, starting in the late 1960s and continuing into the 1970s and 1980s, several events related to the environment garnered national attention—for example, Rachel Carson's publication of *Silent Spring*; the banning of DDT in 1972; the declared public

health emergency at Love Canal, New York, in 1978; and the public health advisory issued by the Centers for Disease Control (now the Centers for Disease Control and Prevention) (CDC) for Times Beach, Missouri, in 1982. These and other events created pressure on Congress and the EPA to quickly address the problem at hand, which led to the 13 separate major environmental laws that exist today (Table 18-1). In the end, some of the same flaws that led to the creation of the EPA as a unified federal environmental regulatory agency still exist, despite the best intentions of those who created the EPA. In 1988, the EPA published a historical analysis of its regulatory efforts, which concluded that "ideal preconditions for a more coherent and successful future seem today as elusive as they have always been: EPA's laws are still reauthorized and amended one at a time in a manner inimical to cross-media and unified-field ecological thinking."⁶

Despite its fragmented nature, the present federal environmental system has several notable strengths that have resulted in a cleaner, healthier, and less polluted environment.¹⁴ First, federal environmental protection laws contain a variety of tools for environmental health practitioners. Thus environmental health professionals can take advantage of the information, expertise, and enforcement authorities that the major federal environmental laws create. Second, the national system of regulations is more or less uniform, thereby discouraging all polluting industries from locating in one municipality, state, or region. Finally, the environmental law system is participatory and multitiered. It creates federal authorities that states can use and contains extensive opportunities for citizen and stakeholder involvement.

History of federal public health law and regulation

In July 1798, President John Adams signed into law a bill creating the Marine Hospital Service, now known as the United States Public Health Service (PHS). By the end of the nineteenth century the scope of activities of the Marine Hospital Service began to expand to include the control of infectious diseases. Responsibility for quarantine was originally a function of the states rather than the federal government, but an 1877 yellow fever epidemic that spread quickly from New Orleans up the Mississippi River clearly indicated that infectious diseases (like industrial pollution) do not respect state borders. The epidemic resulted in passage of the National Quarantine Act of 1878, which conferred quarantine authority on the Marine Hospital Service. The Service continued to expand its public health activities as the nation entered the twentieth century.¹⁵

A 1902 law increased cooperation between federal and state public health authorities and cemented the cooperative approach that is often considered emblematic of the federal and state public health relationship. The PHS was charged with convening a conference of state health authorities at least on an annual basis. Beginning at this same time, environmental health and sanitation

became even more central to the work of the PHS when it was asked to investigate a typhoid fever outbreak in Yakima County, Washington, and traced the source of the disease to badly managed human waste disposal practices. The resulting rural sanitation efforts were applied to other areas of the country and helped to encourage establishment of county health departments.¹⁵ In 1912, the PHS was given federal legislative authority to investigate the diseases of humans and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution either directly or indirectly of the navigable streams and lakes of the United States. All types of illness, whatever their cause (including environmental pollution), now came within the purview of the PHS.¹⁵ One of the last major overhauls of the public health law came in 1944 when the Public Health Service Act codified on an integrated basis all the authorities of the PHS and strengthened the administrative authority of the Surgeon General.¹⁵

In contrast to environmental protection, Congress has created an organic statute for public health and its environmental components. Beginning in this post-war period, important investigations began on the hazards of exposure to radiation and toxic chemicals in various industrial settings and on lung disease in miners and granite cutters. The PHS also became more actively involved in studies of water pollution during this time. In addition, the CDC was established, with a mission to control infectious disease. The CDC's mission eventually grew to include the control and prevention of chronic disease and the study and improvement of occupational and environmental health.¹⁵

Although the history of federal public health law, including environmental public health law, is longer than that of environmental law, it is not without gaps. The shortcomings of federal public health law came into focus in the 1950s and 1960s as the federal health bureaucracy tried to address problems associated with pollution. One of the original reasons for moving the environmental programs from the DHEW to the EPA was the belief that the public health model was not effectively addressing the emerging environmental health problems.

The federal public health system has a long and distinguished history. Originally, its focus on infectious diseases provided a unifying foundation on which later efforts were built aimed at controlling chronic diseases. Because the public health model is traditionally cooperative rather than adversarial and relies on developing and nurturing partnerships, it was not effective during the 1960s and 1970s in tackling the escalating pollution from industrialization. Nevertheless, the public health system has several important strengths. First, because it is cooperative, it can bring together local, state, and national groups to solve problems. Second, because it is evidence based and intervention focused, it can forge solutions to environmental problems, which can result in measurable progress. Third, it is a unified system. The Public Health Service Act pulled together almost all public health authorities, so a central legal repository exists for public

health authorities. Unlike the EPA, the PHS has a unified organic statute under which it can function.

Cooperative Federalism: Seeking the Appropriate State-Federal Balance

The environmental health programs in the United States, especially the regulatory programs administered by the EPA, are based on the idea of cooperative federalism. Under cooperative federalism, Congress regulates, offering states the choice of either establishing regulatory programs and schemes that reflect federal standards or having federal standards that preempt state law.² In addition, when Congress enacts laws that occupy a field such as environmental law, states are forbidden to regulate in a way that impedes the federal scheme or place an undue burden on interstate commerce.²

In the field of environmental health law, the respective roles of the state and federal governments have waxed and waned. In the 1960s and before, it was generally thought that the federal role in environmental protection and enforcement should be minimal. This view changed substantially during the 1970s and 1980s, with expansion of the federal laws and regulatory authorities. During the 1990s and the beginning of the twenty-first century, the state-federal relationship is again undergoing re-evaluation, and once again there is talk of "de-evolution" of authority back to the states. Throughout the 1990s, the U.S. Supreme Court supported the de-evolution of domestic programs to the states and reigned in Congress' power to enact protective laws.¹⁶

As responsibilities of environmental health regulatory programs have been devolved to the states, state responsibility in pollution control increased significantly. During 1981-1984, "the delegation of environmental programs to the states doubled from 33 percent to 66 percent of all eligible programs."¹⁶ The Environmental Council of the States reported that as of 2000 "more than 75% of the total number of the major delegable environmental programs^d have been delegated or assumed by the states."^{17,d} Eligible provisions of the CAA have been delegated to 42 states, the CWA to 34 states, the RCRA to 37 states, and the FIFRA to 39 states.¹⁷ This increase in state responsibility appears not to have been adequately covered by federal funds. From 1986 through 1996, state spending on the environment increased 140%, while EPA funding to the states decreased 17%.¹⁷ In fiscal year 1996, the states collectively spent \$12.5 billion on environmental protection, while the EPA provided \$2.5 billion of its total \$6.5 billion budget to the states.¹⁷

In addition to their partnership with the federal government in setting standards and enforcing federal regulation, states have actively enforced and administered state environmental laws such as facility siting and property transfer laws.¹⁸ Every states does, in fact, have detailed laws regulating air pollution, water pollution, waste disposal, and resource management. Many state laws are

modeled after federal legislation. Fifteen states^e have adopted state environmental policy acts (SEPA) that are either identical to or closely resemble the National Environmental Policy Act (NEPA).¹⁹ California's and New York's SEPA are considered more stringent than the NEPA in several ways. They define terms left undefined in the NEPA and require the state to consider additional environmental effects not included in the NEPA impact statement.¹⁹ States continue to "differ significantly in their programs, rules, regulations, and in their capacities for effective implementation."²⁰ Several states have enacted innovative laws or established novel programs. California is widely recognized for its Proposition 65,²¹ which established stringent drinking water standards and warnings to the public about harmful and potentially harmful substances. New Jersey's Environmental Cleanup Responsibility Act,²² and Massachusetts' regulation of toxic substances,^{23,f} exceed federal standards, as do Arizona's, Wisconsin's, and Connecticut's groundwater protection regulations.²⁴⁻²⁶ Michigan, Pennsylvania, Rhode Island, and Illinois are among states that have declared a clean environment to be a state constitutional right,²⁷⁻³⁰ and Michigan's Citizen Suit Act requires state courts to review any private or agency action that adversely affects the environment.²⁷

The federal environmental health infrastructure put into place in the 1970s and 1980s was a broadly supported "response to perceived inadequacies with [state] law and the frustration with the failure of decentralized approaches to environmental protection."³² The problems of transboundary pollution and the possibility of a "race to the bottom" among states has been effectively addressed by a centralized federal regulatory authority. Uniform federal regulations also improve national efficiency. Under the CAA, the federal government defines, monitors, and enforces emission standards for newly manufactured automobiles. Allowing 50 different state standards for automobile manufacturers would be extremely inefficient.³³

In most environmental regulatory schemes, the states are "junior-partners in the federal-state regulatory enterprise."³³ Nevertheless, states have retained the right to formulate state policy in addition to and beyond that established by federal authorities. Federal oversight of state programs has actually raised the standards of many states,³⁴ and in some instances (such as the establishment of state environmental protection acts and the improvement of pollution standards) federal regulations have served as a catalyst for advancing more aggressive state action and the expansion of state programs.

The federal-state relationship is complicated and delicate. Federal standards have provided a consistent level of nationwide environmental quality and have tremendously reduced pollution. However, because states vary significantly in climate, terrain, sources of pollution, economic conditions, and preferences for environmental protection, state flexibility and enforcement are crucial. For prac-

titioners, this cooperative federalism brings both good and bad news. The good news is that many legal tools are available in both federal and state arenas to improve environmental health. The bad news is that the optimum use of such tools is rarely obvious.

Making Preventive Decisions in an Uncertain Scientific Climate

Environmental health laws often have goals that are aspirational and difficult to achieve.³⁴ However, because almost all environmental health laws seek to protect public health and welfare, action is usually necessary before a complete picture about an environmental hazard has emerged. Many decisions regarding environmental health are made using less than optimal data. Although the need for environmental health laws and regulations to be preventive is widely recognized, the public and regulated entities often have difficulty accepting the uncertainty that accompanies decision making that incorporates data gaps.

A technique called *risk assessment* is commonly used to justify regulations and standards. In a risk assessment, science and data are analyzed to obtain a measure of the potential individual and population harms that could occur through exposure to a substance.³⁵ Risk assessment is generally a four-part process that begins with a hazard identification. In a hazard identification, a determination is made as to whether exposure to a compound or agent should be of concern. After the hazard identification, a dose-response analysis occurs in which toxicologic data are compiled to create a dose-response curve (or margin of exposure) that links exposure with harm. Dose-response analysis is complicated because toxicology or human epidemiology data, if available, are nearly always available only for doses far above environmental levels. Next, an exposure assessment is conducted; it analyzes information about the scope, nature, route, and duration of the exposure to the agent in question. Finally, the hazard, dose-response, and exposure information are integrated into a risk characterization, which generally describes the potential population and individual risks. For carcinogens, this risk is most commonly expressed probabilistically—that is, a one-in-one-million chance of contracting cancer. For compounds that are not carcinogens, risks are often described by comparing the exposure or dose level with a theoretical reference dose that should not be exceeded.

The preparation of a risk assessment requires much professional judgment. If data are not available, default assumptions or inferences that are public health protective are frequently used. For example, without specific knowledge, adults are often assumed to drink an average of 2 liters of water per day.³⁶ These assumptions can be controversial.³⁷ The information obtained in a risk assessment is used by a risk manager, who is often a government employee, to make decisions about how to manage environmental risks. This risk manager combines

the information contained in the assessment with social, cultural, and political factors.

In contrast to risk assessment, disease and exposure surveillances are the traditional tools of public health. This philosophy is clearly evident in *Healthy People 2010*,³⁷ which guides national efforts to set a health agenda and chart health improvement. For example, *Healthy People 2010* sets a series of goals related to environmental exposures or diseases associated with environmental exposure, such as asthma. These goals are generally community based and measurable, and the *Healthy People 2010* protocol calls for regularly updating progress toward reaching its goals. The *Healthy People 2010* goals are not regulatory.⁴

Environmental health practitioners should become familiar with risk assessment and risk management and understand their roles in, and impact on, environmental health regulation. In addition, environmental health law practitioners should recognize that risk assessment and risk management are processes that employ as much art as science. They should not shy away from asking hard questions about how such analyses were carried out, especially about default assumptions, inferences, data sources, and analysis techniques. Several federal and state agencies, including the EPA, have published guidance manuals explaining how these assessments are meant to be carried out.³⁸ Environmental health law practitioners should also be familiar with how the Department of Health and Human Services sets its environmental health goals and measures them through the *Healthy People 2010* process. It employs traditional public health tools to set objectives and work toward them.

PRACTICE CONSIDERATIONS

Tools for Environmental Health Protection

A multitude of approaches can be taken to advance environmental health and protection. For example, to reduce harmful releases from a facility, authorities can specify the allowable amount to be released (in a permit such as a discharge permit allowed under the CWA) or specify technologic approaches that will ultimately limit releases (as in the CAA's approach to hazardous air pollutants) or penalize the facility by imposing liability for damages from specified releases (as in Superfund). Traditional public health tools, such as surveillance of hazardous conditions (i.e., childhood lead poisoning) and cooperative approaches (such as grants to states to support environmental health programs), also are available. Using these tools, a state public health department can begin or improve an asthma surveillance program or start or increase environmental health information and outreach efforts to citizens. The complexity of environmental health protection is substantial because these different approaches can be mixed

in many ways. In addition, multiple actors, including the federal government, state governments, and citizens, all could be tackling the same problem using different tools.

The Office of Technology Assessment³⁹ identified 12 types of environmental protection tools, divided into three broad categories: single-source tools, multi-source tools, and tools that do not directly limit pollution. Single-source tools, often described as "command-and-control" tools, have been most extensively used. They can (1) ban or limit production or use of a product, (2) specify the technology for how a product can be made or how pollution can be controlled, (3) set standards on the basis of potential harm from exposure for the reduction of releases, or (4) set standards on the basis of what a desirable or best technology might achieve. Almost every environmental statute relies to some degree on "command-and-control" approaches.

Multisource tools allow individual facilities or multiple entities the option to vary or even trade emission limits so that a collective protection limit is met, even if limits are exceeded at individual facilities. These tools provide greater flexibility in meeting standards than single-source tools. Finally, a variety of tools exist that do not specify release limits but rely on "carrots and sticks" to either encourage environmental protection through subsidies or technical assistance or discourage releases by requiring public disclosure, payment of fees, or imposition of liability. These tools take various forms, including civil penalties and criminal sanctions, as well as public disclosure of information about pollution. (Most traditional public health tools fall into this category.)

Applying Environmental Health Protection Tools

The environmental health tools used by public health agencies and the environmental protection tools used by environmental agencies complement each other and are rarely mutually exclusive. Nevertheless, they are infrequently found in the same federal environmental statute. The CAA, for example, does not primarily utilize public health tools. On the other hand, CERCLA contains tools that embody both the environmental health and environmental protection traditions. CERCLA created a new public health agency, the Agency for Toxic Substances and Disease Registry (ATSDR), to carry out many of its environmental health functions. Each of these statutes is discussed in some detail to illustrate this point.

The Clean Air Act

The clearly stated purpose of the CAA is "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare" (42 U.S.C. § 7401[b][1]). Even from this most cursory review of the key titles

in the Act, regulatory provisions clearly dominate and were considerably strengthened from earlier iterations of the CAA that Congress considered insufficiently protective of public health (§ 3.2).^d As amended by the CAA Amendments of 1990, the CAA contains almost the full range of environmental protection tools to achieve its stated goals. It established National Ambient Air Quality Standards (pollution levels that states are required to meet by preparing and enforcing implementation plans); created a program for reducing emissions from mobile sources (by requiring the EPA to set standards for emissions levels from vehicles); established a methodology for reducing toxic air pollutants (by setting technology-based standards); and sought to reduce acid rain deposition through an allowance program for electric utilities. In addition to these major provisions, additional sections exist that create research programs, including environmental health research.^j

The CAA outlines a limited role for federal public health authorities. Even in areas where public health could be expected to lead, the statute indicates that PHS agencies are to play a secondary role. Subsection 103(d) of the Act (42 U.S.C. § 7403[d]) illustrates Congress' approach. This subsection, "Research, investigation, training, and other activities," specifically calls for environmental health research. The EPA Administrator, in consultation with the Secretary of the DHHS, is ordered to conduct a research program on the short- and long-term effects of air pollutants and prepare environmental health assessments for hazardous air pollutants. The subsection also creates an Interagency Task Force, which includes several PHS agencies, such as the ATSDR and the National Institute of Environmental Health Sciences. However, the statutory language indicates that the EPA is expected to control this research agenda. The CAA thus creates an opportunity to bolster environmental health research but does not seem to give PHS agencies a leadership role in its design and implementation.

The balance in the CAA is overwhelmingly weighted toward traditional regulatory tools. Additional (or more effective) surveillance of respiratory disease, a role for state health departments in respiratory health education in communities, additional involvement of health agencies at any number of points in the regulatory process, or application of other environmental health tools would most likely be helpful in achieving the public health goals of the CAA. However, the CAA does not contain these tools.^k

Superfund

Superfund, enacted in 1980, was amended extensively in 1986 by the Superfund Amendments and Reauthorization Act. Its main goal is to protect public health by cleaning up inactive or abandoned sites at which hazardous substances are being released. The "Superfund" name comes from the funding mechanism created by a tax imposed on the petroleum, chemical, and other industries. It assigns

liability and apportioned responsibility for the cost of cleaning up the sites among classes of persons (e.g., individuals, state and federal government entities, and corporations) deemed to have been responsible for these releases. Environmental protection tools play an important role in making CERCLA effective. CERCLA also uses significant environmental health tools.

Among its features, CERCLA created a National Priorities List (a method for establishing clean-up priorities among the thousands of sites in the country at which hazardous substances are found), a National Contingency Plan (guidance for conducting more immediate response actions when necessary), and a detailed remedial process for evaluating and cleaning up the sites (see 42 U.S.C. § 9605[a]).

Many of the most important tools of CERCLA relate to its liability and enforcement provisions. Strict, and joint and several liability, which can result in one or several significant polluters at a site being responsible for all clean-up costs even though many parties may have contributed to the pollution, is the centerpiece of CERCLA's environmental protection scheme (42 U.S.C. § 9601.) Additional provisions relate to identification of potentially responsible parties, e.g., information requests (42 U.S.C. § 9603), cost recovery actions that the government or a private party can bring to recoup its clean-up expenses (42 U.S.C. § 9607), the abatement of imminent and substantial hazards to public health (42 U.S.C. §§ 9604[a] and 9606), administrative orders issued by the federal government to compel private parties to undertake response actions (42 U.S.C. § 9606), penalties for failure to comply (42 U.S.C. § 9609), and citizen lawsuit provisions (42 U.S.C. § 9659).

CERCLA also contains significant health-related provisions that use classic environmental health tools. When enacted, CERCLA established a new agency within the PHS known as the ATSDR.⁴⁰ In cooperation with the EPA and other PHS agencies, the ATSDR has the responsibility to "effectuate and implement the health related authorities" of Superfund (42 U.S.C. § 9604[i][1]). Among other things, the ATSDR conducts public health assessments at all National Priorities List sites, maintains national registries of persons exposed to toxic substances and of illnesses and diseases, develops toxicology profiles for each substance on a hazardous substance priority list, and conducts epidemiologic or other health studies and health surveillance and health education programs when appropriate (42 U.S.C. §§ 9604[i][1] and [2]). CERCLA also created a mechanism whereby the ATSDR provides extensive public health review, evaluation, and feedback on environmental sampling, monitoring, and remediation to the EPA. In addition, CERCLA authorized a substantial basic research program at NIEHS, along with worker training and education programs (42 U.S.C. § 9604[i][1] to [18]).

CERCLA marries a nonregulatory, newly created public health agency (ATSDR) with a regulatory agency (EPA). In practice, this resulted in extensive

opportunities for collaboration and coordination among public health and environmental agencies to fulfill the mandates of a major environmental protection statute. Environmental health practitioners should consider the potential for such partnerships in other critical situations that arise in the practice of environmental law.

EMERGING ISSUES

Environmental Health Aspects of Chemical, Biologic, and Radiologic Terrorism

The September 11, 2001, terrorist attacks on New York City and Washington, DC, and the dissemination of anthrax through the US postal system brought into focus some of the gaps in our public health systems' preparedness for responding to terrorism. Public health responsibilities during and after such events must be performed expeditiously and coordinated effectively. All terrorist actions will have environmental health consequences and will require a sustained environmental health presence. Appropriate environmental health response—including air and water monitoring, disease tracking, laboratory analysis of samples, and protection of the health and safety of responders—is vital. Although federal and state statutory authority exists to provide integrated and rapid action in certain cases, more effective environmental health response planning and a fuller assessment of the gaps in authority, leadership, and workforce are needed.

Environmental surveillance and monitoring; case ascertainment; environmental sampling in air, water, and other media; and provision of potable water and clean-up of toxic releases are just some of the tasks that will challenge environmental health responders in the event of other terrorist attacks. Environmental health law practitioners are also likely to face the following issues:

- Lack of clarity about unusual legal enforcement powers during terrorist events
- Operation under completely different chain of command and legal authority structure when a response plan is implemented
- Unusual instances of public health professional liability
- Lack of clarity regarding the availability to the public of the information collected (security vs. right to know)
- Need to use nontraditional and less-than-optimal surveillance methodologies and analyses to make decisions because of the breakdown of public health information systems

Each of these challenges requires public health and legal practitioners to take several steps to respond to the new complexities. First and foremost, public health laws will have to be revisited and revised to address these previously

unimaginable situations. Second, public health and legal practitioners will need to collaborate more closely to plan joint action and to coordinate activities before and during emergencies so that a better understanding of roles, responsibilities, and authorities within the unique circumstances emerges.

National Health Tracking

Environmental protection tools provide considerable information about pollutants in the environment. Unfortunately, limited data are available concerning exposures and the distribution of diseases and their relation to the environment. As a result, our public health system is working without even the most basic information about chronic diseases and environmental health factors. In addition, our system of environmental protection has no good way of evaluating whether it is improving public health and reducing disease.

The Pew Environmental Health Commission (PEHC), a blue ribbon panel of policy and scientific experts from industry, government, and academia, described this situation as a national "environmental health gap."¹ It concluded that information about trends in health conditions potentially related to the environment is largely unavailable.¹ Furthermore, the tracking systems that do exist at state and local levels are a patchwork. No agreed-on minimum standards exist, and almost no synchronization exists in the collection, analysis, and dissemination of the information.

Environmental health tracking for pollutants is crucial because hazards often can be removed or contained before they cause harm. Although such monitoring would be valuable, it is not sufficient by itself. Tracking actual exposures to hazards in the environment is frequently the missing link between public health efforts to evaluate a risk and the ability to respond to a health threat from that risk in a specific community. Thus, improving national efforts to track population exposures to contaminants and providing this information to local public health officers is essential.

To fill this environmental health gap, the PEHC offered the following recommendation¹:

Create a federally supported Nationwide Health Tracking Network with the appropriate privacy protections that informs consumers, communities, public health practitioners, researchers, and policy makers on chronic diseases and related environmental hazards and population exposures. This will provide the capacity to better understand, respond to and prevent chronic disease in this country. (p. 10)

By creating a national system that links disease endpoints with potential environmental exposures, the environmental health and environmental protection traditions would be effectively joined. This national health tracking system would provide environmental health practitioners with information that could be

used to more effectively plan and target resources, as well as discover emerging disease and exposure trends. Ultimately, a national health tracking network has the potential to greatly assist in achieving the goal that underlies almost every environmental law—protection of public health and welfare.

Notes

- ^a See, for example 42 U.S.C. § 7604; 33 U.S.C. § 1365(a); 42 U.S.C § 6972(a)(1)(A).
- ^b An illustrative case is *Sierra Club v. Simkins Industries, Inc.*, 847 F.2d 1109, cert. denied, 491 U.S. 904 (1989).
- ^c The U.S. Supreme Court ruled that the Gun-Free School Zones Act exceeded Congress' right to regulate interstate commerce and was therefore unconstitutional.
- ^d Many federal statutes provide that states can administer and enforce their own programs in lieu of the federal program. Generally, states cannot implement programs if the EPA finds that the state program is not equivalent to the federal program, is not consistent with the federal program, or does not provide adequate enforcement. See, for example, 42 U.S.C § 6929 (RCRA); and 33 U.S.C. § 1342(b) and (c)(1) (CWA permit program for pollution discharges).
- ^e California, Connecticut, Georgia, Hawaii, Indiana, Maryland, Massachusetts, Minnesota, Montana, New York, North Carolina, South Dakota, Virginia, West Virginia, Washington, and Wisconsin.
- ^f The Massachusetts Toxics Use Reduction Act reduces industrial use of toxins through mandatory planning approaches. At least 12 other states have toxic use reduction laws, McElfish note 8.1.
- ^g For example, the CWA states that "it is the national goal that the discharge of pollutants . . . shall be eliminated by 1985" (see 33 U.S.C. § 1251[a][1]). This goal has not yet been met.
- ^h One of the more controversial and public health protective assumptions is the assumption that the dose-response curve associated with carcinogenicity is linear. According to the proposed EPA cancer risk guidelines, linear extrapolation "is generally conservative of public health, in the absence of information about the extent of human variability in sensitivity of effects. For linear extrapolation, a straight line is drawn from the point of departure to the origin—zero dose, zero response." EPA. "Proposed Cancer Risk Assessment Guidelines." 61 *Federal Register*.
- ⁱ Consider goal 8-1, which aims to reduce the population exposed to air above the EPA's health-based standard for hazardous air pollutants. The Department of Health and Human Services will undoubtedly use surveillance data for this analysis.
- ^j See, for example, 42 U.S.C. § 7404 (research relating to fuels and vehicles) and 42 U.S.C. § 7403(d) (environmental health effects research).
- ^k It is feasible that, as this chapter suggests, public health agencies could use authorities such as those contained in the Public Health Service Act to conduct these functions. We make this point here only to show that the CAA does not embrace them.
- ^l For example, as *America's Environmental Health Gap*¹ points out, endocrine and metabolic disorders such as diabetes, and neurologic conditions such as migraines and multiple sclerosis, increased approximately 20% during 1986–1995. For most of the country, asthma is not systematically tracked, even though this disease has reached epidemic proportions (pp. 8–9).

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