

Chapter 3

Environmental Law and Standards

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Ignorantia legis neminem excusat
(ignorance of the law excuses nobody)

Each year, engineers are brought before various regulatory bodies and courts in the United States to answer for their designs, projects and products. It is surprising, that with all of this activity, engineers are not required as part of their education to take a basic course in engineering and environmental law.

This chapter can not cover all of the aspects of law that engineers need to know. At best it can only serve as a flag to the potential complexity that law and regulations bring to the environment. There are over 50 federal laws and 5,000 court decisions that define environmental law.¹ A second problem is that the environmental regulation and law is dynamic and changes even as this is being written. The engineer must be ever alert to new law and regulations and new interpretations of the law and regulations. However, this chapter will provide a foundation for building an understanding of regulatory and legal issues that apply to the environment.

¹. Environmental Law From Resources to Recovery, by Celia Campbell-Mohn, Barry Breen and J. William Futrell, published by West Publishing Co., St. Paul, Minn., pg 52.

Many people think of environmental law in the United States as a recent event. This is not entirely true. The Forest Reserve Act of 1881 was a major piece of environmental law which allowed the President to reserve timber lands as National Parks as well as setting up a principle for timber management and water supply protection. The 1897 Special Session of Congress established the first statement made by Congress on sustained yield goals for resource management. As the United States grew, it found that policies which encouraged development also encouraged waste with potentially lethal effects. Urbanization needed to develop an industrial base also brought increased air, water and solid waste. Municipalities found it necessary to draft ordinances to control and abate pollution in the late 1800's and the early 1900's. Such ordinances would inevitably be tested. However, the court system generally found that such laws were essential and "reasonably necessary." This built the foundation for modern environmental law and became the common law for such law as the Pollution Prevention Act of 1990.

Before delving into various forms of laws and regulations, it is first necessary to understand what law is and how it is created.

3.1 Laws and Regulations

What is the law? As an engineer, you undoubtedly have heard of Newton's Laws of Motions and other laws of scientific basis. Such laws are based upon numerous observations of nature and generally have been found to be inviolable. However, law as it is used here refers to something entirely different. **Law is a rule or a set of rules of conduct which are enacted by a formal body given the authority to make rules for the members of its community.** These rules are made by humans and may or may not have any scientific basis. One also finds that law can be and is often broken. When one violates these laws, the results can vary from no action being taken to the loss of property, status and the very life of the law breaker.

Where does law come from? The definition above hints at the sources: "a formal body given the authority." However, we need to be more specific. Law in the United States is created by

- the United States Constitution
- the United States Congress by passage of various bills and legislation
- the United States President, and the subordinate Executive Branch Agencies through executive orders and administrative regulations
- the Judicial Branch, including the Supreme Court and the Federal Courts through case findings and interpretation of law
- the Agencies independent of the three major branches such as the Federal Reserve System through administrative regulation
- the treaties of the United States with other sovereign nations
- the state constitutions
- the state legislative bodies through passage of various bills

- the state governing executives and agencies through orders and regulations
- local governments through ordinances
- state and local courts and justices through findings and interpretations
- common law: those doctrines and maxims which have origin in court decisions without be founded on basis of statute.

This list is not totally exhaustive. For example one can think laws which have their basis in the Judeo-Christo religious practices. However, we will be more concerned with laws of Federal and state bodies.

Constitutional law is derived from the Constitution of United States and the constitutions of individual states. *Statutory law* is that law created by law making bodies such as the Congress and state legislatures. *Administrative regulation* is created by commissions, agencies and other governmental organizations stemming from the powers given those organizations by the Congress, the state legislatures and/or local community governing bodies. *Case law* is created by courts when they must decide for the first time a new question. Such decisions are called *precedent* and are binding in similar cases in the future under a doctrine known as *stare decisis*. *Stare decisis* is the principle that courts should act in a uniform and predictable way when deciding issues. We will see that environmental law consists of all of these forms.

Common law is somewhat more difficult to understand: Law in the Western world dates back to the Roman law which has become through the ages in English speaking countries common law. While not strictly codified, it is based upon the concept that judges should apply laws under the concepts of equity and fairness as the have been applied before. Thus, if it can be shown that a concept was applied in any court dating back to the Roman times, and that concept is relevant to the case at hand, then that concept should be applied with due consideration. Common law is closely tied to the *stare decisis* doctrine and perhaps inseparable from it.

One can also classify the law into *substantive law* and *procedural law*. Substantive law defines legal rights and liabilities. Procedural law defines the procedures or methods that must be observed in enforcing substantive law. Much of environmental law is procedural in nature or has been ruled procedural such as with the National Environmental Policy Act below.

One might also distinguish between *criminal* and *civil* law. Laws which protect society and are deemed to harm society when the law is violated are called criminal. Violations of criminal law are categorized by seriousness as treason, felonies and misdemeanors. Treason is defined by the United States Constitution as consisting of acts committed during periods of war which give aid and comfort to the enemy, taking up arms against the United States or the adherence to the enemies of the United States. Felonies include more the more serious crimes of arson, homicide, robbery and fraud. Depending upon the nature of the crime, felonious violations are punishable by confinement in prison and, in certain circumstances, death. Misdemeanors are crimes which are not classified as either treason or felony. Misdemeanors are usually punishable by monetary fines, public service requirements and/or short jail sentences. A crime may be a felony in one

locale and a misdemeanor in another. Violations of environmental law may be felonies or misdemeanors. In criminal cases, the government unit having jurisdiction brings the offender into court.

Civil law as contrasted to criminal law are laws which protect the personal and economic rights of individuals. Typically, these laws are broken down into torts, contracts and estates. From an environmental law prospective, the concept of tort is the most important issue although contract law may also be important. A *tort* is a wrong created by an act or an omission of an act for which a civil suit can be brought. In many cases where a violation of law has occurred, a person may be tried for the criminal violation of the law as well as for a civil violation. This is becoming a more popular option particularly when the person harmed does not believe that the punishment meted out in criminal court was adequate.

The injured party brings the offender to court through a law suit in the case of tort. Contrast this to the criminal case where the government intervenes. The party bringing suit is known as the *plaintiff* and the party to whom the suit is brought against is the *defendant*. Injury, in itself is insufficient reason to sue another person. There must be a basis upon which the purpose causing harm has liability. The act or omission of act must be voluntary and the harm must have been caused or made possible by the act or omission. In some cases, such as assault and slander, one must show that the person had the intent to harm the injured.

Regulations are rules formed by agencies such as the Environmental Protection Agency. When an agency is formed by law of Congress, it may be given the power to create administrative rules which allow it to perform the duties assigned. The formation of a rule usually begins with an agency employee drafting up a proposal. This proposed regulation must be published in the Federal Register usually for a minimum period of thirty days to allow anyone in the public the opportunity to provide comments either in writing or in person at a public hearing. Upon consideration of the public comments, if the proposed regulation is to be enacted the final proposed regulation must also be published in Federal Register giving the dates and manner the regulation will become effective. Annually, the regulations are combined into the Code of Federal Regulations, commonly abbreviated CFR. For example, the Bureau of Land Management which has responsibility for managing minerals on certain public lands has published a set of rules pertaining to various mining law in 43 CFR 3000.

Not all matters are heard in courts. Various agencies may rule on complaints and law violations within their jurisdictions. There is, in general, no standard method for administrative processes. Thus, processes of various agencies will vary in procedural elements. One should not believe that administrative procedures are in any way lessor than trial by court. In many cases the penalties levied by administrative boards are far greater than those granted in the court systems for the same infractions of law.

3.2 Environmental Law

Environmental law is all regulations, laws, enforceable guidelines, and case specific interpretations that control our natural resources and protect our environment. While this chapter is mainly concerned with Federal Law, states and localities will also have various laws, regulations and ordinances in place to protect the environment. These laws are intended to

- protect ecological resources
- prevent unacceptable risks to human health
- minimize the effect of hazards
- to control transportation of hazardous substances
- prevent or limit pollutant releases
- to provide means to clean up or remediate pollutant releases
- notify appropriate authorities and the public of pollutant releases
- to provide compensation for damages of pollutant releases

Environmental law as with much other law in the United States evolved to address contemporary problems faced by the citizens of this nation. Environmental law today, as we know it, and as it continues to evolve is combination of historical solutions, the growth of morals and ethics as they applied to the environment and modern legal opinions embodied in written law, administrative procedure and court decisions. A detailed up to date description of environmental can be found in books such as the Environmental law Handbook by Thomas Sullivan. Included in the handbook is a description of environmental law legislation, enforcement and compliance information.

The major laws forming the environmental law system include

- National Environmental Policy Act (NEPA)
- Endangered Species Act of 1973 (ESA)
- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA)
- Clean Water Act (CWA) (See Env Econ by Field)
- Safe Drinking Water Act (SDWA)
- Clean Air Act (CAA)
- Toxic Substances Control Act of 1976 (TSCA)
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
- Occupational Safety and Health Act (OSHA)
- Noise Act of 1970
- Emergency Planning and Community Right-to-know Act (EPCRA)
- The Energy Policy Act of 1992
- Oil Pollution Act of 1990

- Federal Facility compliance Act
- Pollution Prevention Act

3.2.1 National Environmental Policy Act of 1969 (NEPA)

President Nixon, on New Year's Day, 1970, signed into law, Public Law 91-190, NEPA, giving the United States a declared environmental national policy². Title I of NEPA is the first law enacted by Congress which mandated that federal agencies conduct themselves in a manner consistent with the environment. The only requirement of the law pertains to the Federal Government but it has had sweeping impacts in forcing federal agencies to recognize their responsibility for the environment.

Essentially the law requires the Federal Government to provide Environmental Impact Statements, and to take public comments, whenever considering any action which may in some way change the environment. One author describes NEPA as a Federal "stop and think, disclose to the public administrative law."³ The teeth of NEPA lays in the subsequent volume of lawsuits that has followed its passage. Federal projects of all manner and nature have been challenged under NEPA, many successfully. Others have been delayed based upon NEPA challenges. NEPA set the tone for the Federal government that it must be responsible for the environment if it expects others to be responsible.

3.2.2 Endangered Species Act of 1973

The Endangered Species Act of 1966, for the first time, recognized a Federal need to provide habitat and protect certain species in danger of extinction. The Endangered Species Act of 1973⁴ superceded the 1966 act and is much stronger making another fundamental change with regard to wildlife. In passing this act, Congress found that various species had been made extinct by "growth and development untempered by adequate concern and conservation." This act not only prohibits that taking of endangered species but also requires that habitat be protected and set aside for species considered endangered. It prohibits with the sale and transfer of endangered wildlife products. It gave the Secretary of Interior the responsibility for determining what species were threaten and for establishing actions to preserve those species. Perhaps the most important and far reaching provision of the act is Section 7 which prevents the Federal government from taking actions which would continue to harm endangered

². 42 USC 4321

³. Environmental Law and Policy: Nature, Law and Society, by Z. Plater, R. Abrams and W. Goldfarb, published by West Publishing Co, St. Paul, Minn. 1992. pg. 596.

⁴. 16 USCA 1531 to 1544

species. Whereas NEPA established rules for *evaluating* the environmental effects of Federal actions, this act *prohibits* action. Thus the Endangered Species Act is substantive law vs. the procedural law nature of NEPA.

The classic case which tested the Endangered Species Act was the snail darter and the proposed Tennessee Valley Authority (TVA) Tellico Dam. The snail darter is a two inch long fish that is a member of the perch family living only in the Little Tennessee River. The case begins far earlier than the discovery of the fish by Dr. David Etnier in 1973. As early as 1936, the mouth of the Little Tennessee River was identified as a potential site for a dam. However, no dam was built because of marginal cost-benefit analyses. The local people wanted a dam for economic development based upon the recreational dollars such a lake created by the dam would bring. Through various economic manipulations and political pressure, Congress finally authorized funds for the dam in 1966. A minority of the local residents opposed the dam and took every action to block the dam construction. The passage of NEPA gave the citizens the tool of the Environmental Impact Statement. This blocked the dam for two years. Then came the discovery of the snail darter and the passage of the Endangered Species Act. The Tellico Dam clearly violated Section 7 since the snail darter was found nowhere else and thus defined to be endangered by the project, and the project would clearly destroy the fish by destroying its habitat. This led to petitions under the act in 1974 and then litigation in 1975.

In preparing for *Tennessee Valley Authority vs. Hiram Hill*⁵, it is critical to note that the environmental argument was not the sole argument used to block the dam. The dam's opponents backed up the case by attacking the validity of the cost-benefit study which was severely flawed in favor of the benefits and grossly understated the costs. Justice Burger writing for the Court, "One would be hard pressed to find a statutory provision whose terms were any more plainer than those of Section 7 of the Endangered Species Act. Its very words affirmatively command all federal agencies "to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence" of an endangered species or "result in the destruction or modification of habitat of such species..." This language admits no exception..." "One might dispute the applicability of these examples to the Tellico Dam by saying that in this case the burden on the public through loss of millions of unrecoverable dollars would greatly outweigh the loss of the snail darter. But neither the Endangered Species Act nor Article III of the Constitution provides federal courts with authority to make such fine utilitarian calculations. On the contrary, the plain language of the Act, buttressed by its legislative history, shows clearly that Congress viewed the value of the endangered species as "incalculable."

In 1978, largely as a result of the snail darter dilemma, Congress amended the act to form a Cabinet-level Review Committee with the power to grant exceptions if the federal project is such significance with no reasonable alternative that the project clearly outweighs the alternatives. On January 23, 1979, this committee denied the Tellico Dam. Secretary of Interior Andrus stated, "I hate to see the snail darter get the

⁵. 437 US 153, 98 S. Ct. 2279

credit for stopping a project that was ill-conceived and uneconomic in the first place.” But the dam did not die here. Tennessee congressmen attached a pork barrel rider to an appropriations bill which overruled the Supreme Court and all other protective laws as they applied to the Tellico Dam. It has been said that no one read the rider until the bill was passed and delivered to President Jimmy Carter. Despite a threat to veto the bill, President Carter signed it and the dam was built. No snail darters are known to live today. Neither has the dam resulted in the economic benefits purported by its protagonists during its construction.

The Endangered Species Act has also been used to protect spotted owls from logging in the Pacific Northwest. While the end result is still in question, it appears that the Endangered Species Act has been more effective with spotted owls than in the Tellico Dam case.

3.2.3 Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (RCRA)⁶ began life as the Solid Waste Disposal Act (SWDA) of 1965. SWDA did little except study solid waste and therefore was ineffectual. In 1970, the Resource Recovery Act (RRA) was passed led to reporting requirements that defined the size of the solid waste problem. Finally, in 1976, RCRA was passed which was a sweeping change in solid waste law. It was further amended in 1984 and again in 1986. The Environmental Protection Agency (EPA) has further define administrative procedure in 45 Federal Regulations 33066 (May 19, 1980) and 45 Federal Regulations 76632 (November 19, 1980). Also the EPA has published implementing definitions for RCRA in the Code of Federal Regulations, 40 CFR 261.

RCRA is probably one of the most serious environmental laws of concern to engineers. It is a complete law in that its parts are substantive, procedural, civil and criminal in nature. Prior to RCRA, there was almost nothing at the Federal level which controlled solid waste. Creators of solid waste lost responsibility for solid waste when they either disposed of it to the land or water or transferred it to someone else. This “end of pipe” mentality limited the ability of government to handle or limit waste. RCRA was designed as a “cradle to grave” measure that places requirements on everyone associated with a hazardous waste. RCRA along with CERCLA are the source for much of the environmental law litigation occurring today.

RCRA established a national policy that hazardous waste would be reduced or eliminated. Furthermore it specifically discouraged landfilling as a means to accomplish this. RCRA requires that anyone associated with hazardous waste report the waste, obtain permits for handling and processing the waste, manage the waste in a responsible manner and insure that it is disposed of lawfully.

⁶. 42 USCA 6901

The entry point to understanding is to understand how solid waste is defined. Under RCRA, *solid waste* is defined in 42 USCA 6903 (27) as "... any garbage, refuse, sludge from a water treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities..."

The second definition in RCRA that is of immediate importance is that of *hazardous waste*. Section 6903 (5) states "The term "hazardous waste" means a solid waste or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may -

(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitation illness; or,

(B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

The definitions of waste are central to the impact of RCRA. Any person who generates or produces solid wastes (defined as *generators*) must comply with RCRA. Failure to do so could result in criminal penalties. Corporate managers and Federal laboratory managers have been jailed and convicted of felony violations under RCRA.

EPA created three lists of hazardous wastes. Each waste listed is assigned a specific number that must be used when reporting action under RCRA. The first list, numbers preceded by "F", consists of wastes generated from nonspecific sources such as chemicals created by out gassing of certain raw materials. The second list, numbers preceded by "K," are wastes from specific sources such as sludge from paper making processes. The third list, numbers preceded by "U" or "P" are for off the shelf commercial chemical products, spill residues, containers and the like which are considered hazardous either when used or when discarded. A waste generator needs to compare its waste to the lists to determine the management necessary to permit, control, process and transport the waste. Mixtures of wastes having a hazardous component is also classified as being a hazardous waste. Wastes created by the processing of hazardous wastes are considered to be hazardous unless it has been "delisted" (that is, remove from the EPA lists) under the procedures implementing RCRA.

There are a number of separate facilities, each requiring permitting under RCRA. A facility is a treatment facility if the operator uses any method or technique to change the physical, chemical or biological nature or composition of any hazardous waste. There is almost nothing that can be done to hazardous waste under RCRA that would not qualify as treatment. A storage facility is any facility which holds the hazardous waste for a temporary period. A disposal facility is an facility where the hazardous waste is intentionally placed on the land or into water and the waste will remain there upon closure.

RCRA requires that anyone who manages a hazardous waste file with EPA a notification identifying the waste as hazardous. Failure to file makes any action with the waste unlawful and thus punishable. Generators of solid waste must initially determine if any of the waste is classified as hazardous. The generator prepares a Uniform Hazardous Waste Manifest that must accompany the waste at all times. This form is prepared in sufficient copies that when the waste is transported, a copy accompanies the transporter and a copy will be returned to the generator when the waste is finally and permanently disposed of. If the generator fails to receive the manifest back, the generator must file within 45 days an “exception report” with the EPA and the state.

The accumulation and storage of hazardous waste is strictly control through permits under RCRA. Generators are allowed to accumulate waste without RCRA permit in quantities up to 55 gallons in proper containers so marked for up to 90 days. A violation of this provision at the US Army’s Aberdeen Proving Ground, Maryland, resulted in the felony convictions of three engineering managers which imposed two year imprisonments and \$100,000 fines each.⁷ In some cases the amounts of waste found were less than 25 grams. It is clear that the permit law applies to individuals and not corporate entities.

It is impossible to overstate the importance of RCRA to engineers. Engineers establish products and processes that create wastes. Almost no product is free from the creation of hazardous waste as it is defined under RCRA. Engineers, particularly those associated with processes of any type, must be aware of the wastes created, how those wastes are categorized and how those wastes are handled and disposed of. Engineers and engineering managers are particularly liable for felony violation under RCRA.

3.2.4 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA)

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)⁸ was initially passed in 1980 and funded at \$1.6. When it passed, the bill was criticized as lacking a strategic view, coordination and funding commitment. The intent of Congress was clear: clean up old waste sites and prevent creation of new ones. In 1986 a set of amendments known as the Superfund Amendments and Reauthorization Act (SARA) was passed and funded at a total of \$9 billion. There has been confusion as to whether to call the result CERCLA , SARA or simply “superfund”. All have been used indiscriminately in referring to the law. At the present time, the convention is that the law is to be called CERCLA.

⁷. United States vs. Dee, 912 F.2nd 741 (4th Cir. 1990).

⁸. 42 USCA 9601

While RCRA was effective in controlling present and future wastes, nothing was done about hazardous wastes already existing. CERCLA with SARA was designed to overcome this. The majority of the language in CERCLA addresses existing wastes; however, there are provisions to address releases that occur contemporaneously. In many respects, CERCLA is the broadest of all environmental laws. CERCLA applies to all media (air, water and soil,) regardless of where produced. The events that cause CERCLA to be applied to a situation is the release or threat of release of a hazardous substance, pollutant or contaminant.

CERCLA makes a distinction between hazardous substance and pollution. In addition to the definition of hazardous wastes under RCRA, CERCLA includes in the definition of hazardous substance the compounds EPA has designated for special consideration under the Clean Air Act, the Clean Water Act or the Toxic Substances Control Act.

The provisions of CERCLA are triggered upon the release of any hazardous substance. Note that this is broader than the limitation of RCRA to hazardous wastes. With respect to petroleum products, EPA has ruled that while petroleum products normally contain listed hazardous chemicals, petroleum is not in itself when containing those chemicals in normal fractional amounts covered by CERCLA; however, petroleum products that have been altered through use or in some other manner so as to contain materials in amounts not normally found in petroleum are covered by the provisions of CERCLA. This doctrine has been upheld in court. A release is any way that a substance can enter the natural environment excluding exposure solely occurring in the workplace, vehicle exhausts, source or by-products from nuclear incidents subject to the requirements of the Nuclear Regulatory Commission, or when occurring through the normal use as a fertilizer.

CERCLA provides for two actions for responding to a release: removal and remedy. While there is specific language in CERCLA for both these terms, a removal is normally considered to be a less expensive, immediate reaction, short term solution to a release whereas a remedy is generally an expensive, delayed, long term solution to a release. For example, a thousand gallons of chlorinated cutting oils are spilled on a clay soil adjacent to a factory. If the oil can immediately be suctioned up, the top soil removed and stripped with no resulting long term consequences, this would be a removal. If on the other hand, the spill had occurred in a deep bed gravel soil several months earlier, a remedial action is necessary. The remedy might be extension excavation, insertion of groundwater pumping wells and long term monitoring.

One of the major problems of CERCLA is determining "how clean is clean?" This question is crucial to the costs of a clean up and the time a clean up may take. The answer to this question is largely left up to the EPA to determine. There are some extremely complex guidelines set out in 40 CFR 300.430 known as the 1990 National Contingency Plan or simply 1990 NCP. For a specific problem this section and the EPA have to be consulted.

CERCLA established two basic rules that EPA must observe before beginning a remedial action. First, EPA must enter into a contract or cooperative agreement with

the state in which the release is located. This is required because the state must put up at least 10% of the clean up costs where liable parties do not contribute. Secondly, the EPA will start cleanups from the “superfund” only on sites listed on the National Priorities List (NPL). It was recognized by Congress that a majority of the major hazardous waste spills had occurred at a time when it was legal to do so. Because of the passage of time, and the transfers of ownership that may have occurred, Congress establish a fund, known as the “Superfund” because of the size, that EPA could use to begin remediation. This did not excuse EPA from finding the persons liable for the spill and billing them for the cost of remedial actions. What the superfund did was allow work to begin while finding the parties and assigning liabilities.

The NPL is a list of the worst releases categorized by a ranking system. The process that is used to put a site on the NPL is as follows. Any site with a potential problem will receive a “preliminary assessment” to determine if further investigation is warranted. Assuming that EPA elects to proceed, a physical site inspection will be the next step to determine the magnitude of the release, the hazard that exists, the need for action, etc. Using the hazard ranking system (also called the MITRE model,) a score will be assigned to the site. If the site receives a HRS score above 28.50, it will be added to the NPL. There are currently more than 1000 such sites in the United States. Since the number of sites exceeds EPA’s ability to fund remediation, even with superfund support, EPA maintains a Superfund Comprehensive Accomplishments Plan listing when EPA believes that work will be initiated.

A remediation takes place in several steps. If the site is large, EPA may elect to break the site up into “operational units” (OU) each of which is treated as a separate project. The first step is to conduct a Remedial Investigation (RI). The purpose of the RI is to determine the precise site conditions, the source of the pollutant, the methods that the pollutant spreads, the maximum extent of the contamination and any other pertinent factors. Usually, concurrent with the RI, a Feasibility Study (FS) is conducted to determine what alternatives exist to remediate the site and what the costs and benefits of each alternative. The average cost of the RI/FS is currently in the range of \$3 million. Once the RI/FS has been conducted, the EPA selects a preferred alternative and publishes a Record of Decision (ROD). Under CERCLA, EPA must have both public participation and state participation in the ROD. This is usually accomplished through public hearings with opportunities for written comment. The next step is Design and Construction of the remediation action. No permits are required for any person or firm conducting a remediation under CERCLA.

Under CERCLA, the financing of an action may begin with the superfund. However, EPA has the obligation to find the parties liable for the release. These are identified as

- (1) present and past owners or operators of the site
- (2) parties who transported wastes to the site
- (3) generators of the waste who arranged for the waste to be transported, treated or disposed of either directly or indirectly

Note that the requirements are *retroactive*: there is not time restriction. It does not dismiss liability simply because when the release was made, it was legal to discharge it

in the manner found. Lastly, courts have held that the requirement is “*joint and several*.” By joint and several, the costs can be apportioned according to any plan among the parties above to include assignment of full cost to any one party. The courts have also held that in addition to liability for clean up costs, liability also exists for “*natural resource damages*.” Natural resource costs are established by the Department of Interior for flora, fauna, groundwater, surface waters, minerals, etc., which are managed by the Federal or state governments. In some cases, the natural resource damage cost may exceed the cost of remediation. In *United States vs. Exxon Corp.*⁹, natural resources were valued at \$1.6 billion.

3.2.5 Emergency Planning and Community Right-to-Know Act (EPCRA)

In response to the Union Carbide accidental release of methyl isocyanate (MIC) at Bhopal, India, December 3, 1984, which resulted in 3000 killed and 200,000 injured, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 as a free standing amendment to CERCLA with SARA. Up to this time, EPA had not listed MIC as a hazardous material. The outrage of Congress followed the realization that the same incident could have occurred in the United States at any one of a number of major centers where pesticides are manufactured. The intent of EPCRA was to prevent a similar accident in the United States by creating local emergency disaster plans.

EPCRA in concept is fairly simple to understand in terms of concept. Practically stated, EPCRA says, “If you have it, report it to your state and local governments, and the responding fire department.” However, in implementation, EPCRA can be somewhat more complicated. EPCRA required states and local governments to create emergency planning units: at the state level these are called State Emergency Response Commissions (SERC) and the local level Local Emergency Planning Commissions (LEPC). Facilities storing or using “extremely hazardous substances (EHS) in quantities in excess of the “threshold planning quantities” (TPQ) must report to the SERC that the substances are present and notify there LEPC the name of the facility coordinator who will sit with the LEPC to plan emergency processes. In addition, the facilities must report any EHS release above specified reportable quantities (similar to CERCLA.)

The complications of EPCRA arise in the reporting requirements and the identification of EHS. The act provides for very significant exceptions including wood products, food and cosmetic additives, research laboratory chemicals under direct supervision, etc. The EPCRA makes use of the Material Safety Data Sheets, required by OSHA, and adds to this the “Emergency and Hazardous Chemical Inventory Forms” which list materials, quantities and locations of EHS. This last form must be provided to the SERC, the LEPC and the local fire department. EPCRA can not be avoided: there are criminal sanctions and citizen suits allowed to increase the enforcement mechanisms.

⁹. Action A90-015-1CR (D. Alaska)

In addition any citizen desiring to know what EHS exist in their community can request the information from the LEPC and the SERC which must provide it.

3.2.6 Clean Water Act (CWA)

Of all of environmental law, probably no single area has a more interesting history than that of water pollution control. It includes the discovery of an 1899 law thought to be out dated but quite effective in current application and court cases which required EPA to make drastic enforcement shifts.

In a short synopsis, the first law applicable to clean water was the 1899 Refuse Act. This was an act to facilitate navigation on the nations waterways. It provided that no discharge of solids could be made into a navigable waterway without a permit from the US Army Corps of Engineers. It contains no water quality standard, no framework for granting or denial of permits and no clear distinction between federal and state responsibilities. In fact this law was not applied to pollution control until the 1960's. In 1948, the Water Pollution Control Act was passed which allowed the Federal government the authority to research and investigate but no means to set standards and enforce those standards. This was amended in 1956 to allow states to set standards. The Water Quality Act of 1965 required states to set standards and enforce the standards. In 1972 the Water Pollution Control Act was again amended and became the foundation for clean water law. It required Federally set technology based effluent standards with Federal enforcement provisions. The standards were initially set as "best practicable" and latter enforce to "best available technology" (BAT). It declared a zero discharge goal by 1985.

The EPA focused on enforcing provisions for biochemical oxygen demand (BOD), suspended solids (SS), fecal coliform and pH. However, EPA felt it had no guidance to act for more toxic components. This changed in the court case NRDC vs. Train.¹⁰ The national Resources Defense Council (NRDC) sued EPA to develop an effective toxic control standards. The result is the "Consent Decree of 1976" which the major provisions of were later incorporated in the 1977 Clean Water Act (CWA). In 1987, the Clean Water Act was again amended by Congress. Up to this point in time, the petroleum effectively lobbied Congress to exclude certain parts of the petroleum industry from the CWA. After the Exxon Valdez oil spill, Congress rejected the petroleum industry arguments and passed the Oil Pollution Act of 1990 which extensively revised the CWA with respect to the oil industry.

The goals of the CWA are "to restore and maintain the chemical, physical and biological integrity of the nation's waters." The 1972 Act had set a zero discharge goal by 1985. That goal still exists in 33 USCA 1251 (a) (1) although the date has not been met. While the CWA is a complex document, there are five major considerations addressed:

- (1) Federal water quality standards

¹⁰. 8 ERC 2120 (DDC 1976) modified in 12 ERC 1833 (DDC 1979)

- (2) minimum national industrial effluent standards
- (3) enforceable discharge permitting
- (4) toxic chemical standards as they apply to water
- (5) loan program for publicly owned treatment works

CWA regulates most point source discharges into water bodies. By point source, it is meant “any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture.”¹¹ Non-point sources are virtually unregulated by CWA with the exception of plant site runoffs. Two categories of discharges are recognized: direct industrial discharge and publicly owned waste treatment plants. All dischargers are required to be permitted. The National Pollutant Discharge Elimination System (NPDES) authorizes the Environmental Protection Agency (EPA) to determine discharge limits, requires industrial dischargers to report volume and content of the discharges and gives both EPA and citizens the right to enforce the permit system. Any point discharge unless under NPDES permit is unlawful. The minimum standard for a new permit are the standards granted in previous permits. Thus each succeeding permit must enforce standards that are equal or better than previous permit standards.

A major part of the act addresses publicly owned treatment works (POTW). Industrial wastes which are routed to the POTW must meet certain “categorical pretreatment standards” regarding volume, temperature, chemical content, fire hazard, etc. Pollutants which are incompatible with the POTW treatment technology in use are prohibited from being sent to a POTW. The POTW must insure that their discharges meet standards based on conventional water quality measurements, namely, BOD, TSS, fecal coliform bacteria and pH. The limits are set based upon the best conventional technology (BCT) that can be used to treat waste water. In addition, best available technology (BAT) effluent limitations are set on “toxic” and “non-conventional” pollutants. The minimum standards for secondary treatment from a POTW are listed in Table 3-1.

¹¹. 33 USCA 1362 (14)

Table 3-1: Maximum Secondary Treatment Levels¹²

Contaminant	Maximum 30 day Average	Maximum 7 day Average
BOD ₅	30 mg/L	45 mg/L
Suspended Solids	30 mg/L	45 mg/L
pH	6.0 – 9.0	

Ambient Concentration Levels (ACLs) are the maximum concentration of a water contaminant that a person can be exposed to. Effluent standards are established by national and state guidelines and vary depending on the intended water use. The categories for water usage are listed in Table 3-2. All states have established standards for dissolved oxygen, pH, coliform, temperature, floating solids, settleable solids, turbidity/color, taste/odors and toxic substances. Other parameters vary depending on the state and water usage.¹³

¹² US EPA, Secondary Treatment Regulation, CFR 40 Part 133

¹³ Liu, David H.F., Liptake, Bela G., “Environmental Engineers’ Handbook, Second Edition, Florida, 1997”

Table 3-2: Water Usage Classes

Class	Water Use
A	Recreation including swimming, boating and fishing
B	Wildlife propagation (fish and fowl)
C	Public water supply
D	Agricultural and industrial use (irrigation, food processing and cooling)

3.2.7 Safe Drinking Water Act (SDWA)

Drinking water is covered under a separate law, the Safe Water Drinking Act of 1974¹⁴. This law was further amended in 1986. This law requires EPA to establish maximum contaminant levels (MCL's) and maximum contaminant level goals (MCLG's) for public drinking water. Since most of the water used for drinking has underground sources, EPA requires continuous monitoring of groundwater and that water systems come as close as possible to meeting the minimum standards by using the best technology available. States are the primary enforcers of the Act but, if using the standards set by EPA, states can request and receive EPA assistance. Standards for drinking water regulations and health advisories exist for numerous organics, inorganics and radionuclides. Some of the MCL's are listed in Table 3-3. Secondary contaminants do not adversely affect health but cause water to look unpleasant. Table 3-4 lists secondary maximum contaminant levels that are not enforceable by Federal law but are recommended to the states as reasonable goals to obtain.

¹⁴. 42 USCA 300f

Table 3-3: Maximum Contaminant Level Drinking Water Standards

Contaminant	MCL (mg/L)
Alachlor	0.002
Benzene	0.005
Vinyl Chloride	0.002
PCB's	0.0005
Toluene	1.0
Carbon Tetrachloride	0.005
Trichloroethylene	0.005
Nitrate (as N)	10
Sulfate	500
Mercury	0.002
Uranium	20 g/L
Radon	300 pCi/L

Table 3-4 Secondary Maximum Contaminant Levels

Contaminant	SMCL (mg/L)
Aluminum	0.05 to 0.2
Chloride	250
Color	15 color units
Copper	1.0
Corrosivity	Non-corrosive
Foaming agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 threshold odor numbers
pH	6.5 to 8.5
Silver	0.1
Sulfate	250
Total Dissolved Solids (TDS)	500
Zinc	5

3.2.8 Clean Air Act (CAA)

The Clean Air Act (CAA) of 1970¹⁵, amended in 1977 and in 1990 is another very long piece of law that has a long and detailed history. Initial attempts to control air pollution were made by cities in the late 1800s and early 1900s. Smoke ordinances arose from the inability of nuisances suits to cure certain domestic and industrial problems. These ordinances typically set limits and limit violation standards. However, the rise of automotive usage greater complicated air pollution law. Congress first acted in 1955 with the Air Pollution Act. This was followed by the Motor Vehicle Exhaust Study Act in 1960. California, largely frustrated with the progress being made, began leading the nation with an independent state pollution law¹⁶ in 1960. The federal Clean Air Act of 1963 and the Motor Vehicle Control Act of 1965 continued federal study programs. The Air Quality Act of 1967 preempted state control of automobile emissions although it did specifically permit California to make standards above the Federal action.

One commentator on the Clean Air Act states that explaining the act is more like describing a geological formation rather than interpreting an exercise in abstract logic.¹⁷ The law is massive. But the law with its 1977 and 1990 amendments consists of several subchapters which pertain to

- air quality regulatory system
- emission standards for vehicles
- noise abatement
- acid deposition in the climate
- stratospheric ozone

Addressing the air quality regulatory system first, the CAA of 1970 originally attempted to establish harm based ambient quality standards which attempt to provide limits based upon eliminating risk or humans. However, the difficulty in determining what constitutes harm from a cause and effect viewpoint and then what is the minimum level responsible for that harm resulted abandonment of harm based standards to the more demonstrable “maximum available control technology” (MACT) of the 1990 amendments. The National Ambient Air Quality Standards (NAAQS) are currently based upon six major categories of contaminants. The NAAQS establish a standard for human health and welfare that should not be exceeded anywhere in the United States. The States are divided into Air Quality Control Regions (AQCR). If the criteria of an AQCR does not meet the NAAQS, the region (state or local) pollution regulatory agency must adopt regulations and enforce regulations which will bring the AQCR into compliance by a certain time. AQCR’s which are not in compliance with the NAAQS are said to be in “*nonattainment*.” One the more obvious impacts of the NAAQS

¹⁵. 42 USCA 7401

¹⁶. Cal. Health & Safety Code 24378

¹⁷. Russel V. Randle and Mary Elizabeth Bosco in Environmental Law Handbook, 11th ed., published by Governmental Institutes, Inc., Rockville, MD, 1991. Page 525.

nonattainment of an AQCR is the requirement for these regions to use oxygenated gasoline for automotive fuels. The NAAQS as they stand now are listed in Table 3-5.

Table 3-5: NAAQS for the seven criteria pollutants

Pollutant/Contaminant	Primary Standard
Ozone (O ₃)	<ul style="list-style-type: none"> ▪ 1 hour average of 0.120 ppm (235 micrograms/cu meter) ▪ 8 hour average of 0.08 ppm (157 micrograms/ cu meter)
Carbon Monoxide (CO)	<ul style="list-style-type: none"> ▪ 1 hour average of 35 ppm (40 mg/cu meter) ▪ 8 hour average of 9 ppm (10 mg/cu meter)
Particulate Matter less than 10 microns (PM-10)	<ul style="list-style-type: none"> ▪ 24 hour average of 150 micrograms/cu meter ▪ annual arithmetic mean of 50 micrograms/cu meter
Particulate Matter less than 2.5 microns (PM-2.5)	<ul style="list-style-type: none"> ▪ 24 hour average of 65 micrograms/cu meter ▪ annual arithmetic mean of 15 micrograms/cu meter
Sulfur Dioxide (SO ₂)	<ul style="list-style-type: none"> ▪ 24 hour average of 0.140 ppm (365 micrograms/cu meter) ▪ annual arithmetic mean of 0.03 ppm (80 micrograms/cu meter)
Nitrogen oxides (NO _x)	<ul style="list-style-type: none"> ▪ annual arithmetic mean of 0.053 ppm (100 micrograms/ cu meter)
Lead (Pb)	<ul style="list-style-type: none"> ▪ annual arithmetic mean averaged quarterly of 1.5 micrograms/cu mete

The NAAQS are not source emission standards. Source emission standards apply to specific emitters are set by permits to meet the overall AQCR air quality. The operating permits are issued by states under the review of EPA. The regulatory system allows a distinction between an existing source and a new source. In general, the standards applied to new sources are more stringent. In a nonattainment area, new sources must achieve an emission standard of “Lowest Achievable Rate” as established by the EPA. Under the 1990 amendments, 189 chemicals are identified as hazardous air pollutants which will be regulated. In some cases, the list is nonspecific such as coke oven emissions and radionuclides. A major source is identified as any source emitting more than 10 tons of any single hazardous air pollutant or more than 25 tons in combination of hazardous air pollutants.

Probably the most notable effects of CAA are in area of vehicle emissions. Beginning in 1965, the Federal government has increased the standards on automotive emissions beginning with automobiles manufactured after 1968. Engineers in the automotive industry must constantly be updated on the current status of the CAA as the amending of the CAA and the changes imposed by the EPA have created successively tighter standards. This is not expected to change. The standards imposed by the CAA are very

precise and technological in nature. For example, 42 USCA 7521 (a)(3)(B)(ii) reads “Effective for the model year 1998 and thereafter, the regulations under paragraph (1) of this subsection applicable to the emissions of oxides of nitrogen (NO_x) from gasoline and diesel-fueled heavy duty trucks shall contain standards which provide that such emissions may not exceed 4.0 grams per brake horsepower (gbh).” Table 3-6 lists vehicle emission standards of hydrocarbons, carbon monoxide, and nitrous oxides.

Table 3-6: Vehicle Emission Standards

42 USCA 7521(g) (CAA 202(g) Emission standards (gpm)

Vehicle Type	Column A			Column B		
	NMHC	5 yr/50000 mi CO	NOX	NMHC	10 yrs/10000 mi CO	NOX
Light duty vehicles	.25	3.4	0.4 ¹⁸	0.31	4.2	0.6 ¹⁹
Lt. trucks < 3750 lb						
Lt. trucks > 3750 lb	0.32	4.4	0.7 ²⁰	0.40	5.5	0.97
Trucks > 5750 lbs	0.39	5.0	1.1 ^c	0.56	7.3	1.53

Acid rain pollution caused by the release of sulfur dioxide and carbon dioxide into the atmosphere has been linked to coal burning, primarily for electric power. The CAA establishes a two phase program to reduce these emissions. Annual tonnage allowances are placed on coal burning units. Units which produce less than their allowance may trade allowances to other units provided that EPA is may aware of the trade. Certain credits are allowed under the program by units which employ qualifying energy conservation measures and renewable energy sources.

3.2.9 Federal Insecticide, Fungicide and Rodenticide Act and Toxic Substances Control Act

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)²¹ and The Toxic Substances Control Act of 1976 (TSCA)²² take a similar approach to controlling chemicals and the chemical industry. The chemical industry is the third largest manufacturing industry in the United States. SIC 28, the Department of Commerce identification of the chemical industry can be further segmented into industrial organic

¹⁸. Diesel light duty vehicles/trucks < 3750 lbs, 1.0 gpm NOX

¹⁹. Diesel light duty vehicles/trucks < 3750 lbs, 1.25 gpm NOx

²⁰. Does not apply to diesel powered vehicles.

²¹. 7 USCA 135

²². 15 USCA 2601

chemicals, plastics and synthetics, drugs, soaps and cleaners, industrial inorganic chemicals, agricultural chemicals, paints and allied products, and miscellaneous products in decreasing size of the category. During the creation of chemical products, chemical by-products are often also created which must be either sold or disposed.

The earliest controls on chemicals were put in place with the Insecticide Act of 1910. Since the beginnings of this century, there has been concern over the growth of chemicals and their potentially lethal effects upon man, animals, plants and the environment. Later the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 extended control to most pesticides. FIFRA was amended in 1972 by the Federal Environmental Pesticide Control Act and again amended in 1972, 1975, 1978, 1980 and in 1988. Additionally, TSCA was put in place in 1976 which extended control to chemicals other than pesticides. TSCA was largely the result of the 1975 Kepone incident which contaminated the James River in Virginia as well as being identified for causing neurologic problems with laborers exposed to Kepone. The infamous Love Canal of Upstate New York in which Hooker Chemical Company allowed a chemical disposal area to be used as a children's playground was also brought to public attention during this period. Chemicals from the disposal site were also found leaking into the homes of the area. The primary strategy of these laws has been to insure that the chemicals have been reviewed by EPA for their environmental effect, the chemicals are labeled correctly, that the user understands how the manufacturer intended the chemical to be used and that a registry of the chemicals is maintained and available in the event of emergencies. Both FIFRA and TSCA allow citizen suits.

FIFRA requires that all pesticide products be registered with the Environmental Protection Agency before being manufactured and distributed. This requires that EPA be notified of the chemical formula, that a proposed label be submitted and that when the substance is used in the manner proscribed, that it will not cause "unreasonable adverse effects on the environment." EPA is charged with maintaining manufacturer trade secrets but may reveal them in order to protect public safety or otherwise fulfill the requirements of the act. EPA may act to remove pesticides from the public where there is harm or potential harm. FIFRA also requires the imports be subject to the same requirements as domestic products.

TSCA is very similar to FIFRA. TSCA requires that manufacturers file a premanufacturing notice with EPA. Manufacturers of new chemicals must provide sufficient test data to allow EPA to determine risk to man and the environments. As with FIFRA, EPA may ban the manufacture and use of a chemical that poses unacceptable risks. If EPA deems the data insufficient to determine risk, EPA may prohibit manufacturing of the chemical. EPA must maintain an inventory list of approved chemicals. Manufacturers are required to maintain data on any adverse health or environmental effects arising from the substances they manufacture. If information exists that one of their substances has posed or contributed to a substantial risk to health or the environment, the manufacturer must immediately notify EPA.

3.2.10 Occupational Safety and Health Act (OSHA)

The Occupational Safety and Health Act of 1970²³ (OSHA), while not *per se* an environmental law, has several provisions which grant environmental safety to workers. OSHA is administered by the Occupational Health and Safety Administration in the Department of Labor. Since its passage, the act has had only one minor amendment in 1990. OSHA is limited by conditions that must exist in a workplace. There are major penalties for violations.

Under this act, employers have a general duty to insure that the workplace of their employees is safe and healthful. Thus, air quality and exposure to various agents are factors of enforceable control under this law provided that these occur within a workplace. OSHA requires labeling of hazardous substances so that workers know what the substances are, how to properly handle it and how to safely use it. The basis for knowing what the substance content is the material safety data sheet (MSDS) that is required to accompany any chemical. OSHA may be enforced by unannounced site inspections.

Another provision of OSHA concerns noise. Workers are to be protected from excessive noise. Table G-16 of the act defines a permissible 8 hour exposure of 90 dBA. Exposure levels up 115 dBA for 15 minutes are permitted for shorter durations. When noise levels of industrial equipment can not be maintained under the limits by any other acceptable alternative, workers must be protected by hearing protective devices.

3.2.11 The Energy Policy Act of 1992

The most recent completed legislation that can be considered environmental law is the Energy Policy Act of 1992. The Department of Energy (DOE) is responsible for its administration.

Title I of the act addresses energy efficiency. It specifically allows DOE to set standards for commercial building lighting, heating and water usage. Voluntary guidelines have been set for home energy usage. Considerable authorizations are given in the Act for studies and research on programs which promote increased energy efficiency. The act promotes alternative fuels. Essentially, alternative fuels are defined as alcohol (methanol, ethanol, others), natural gas, hydrogen, fuels of biologic origin and electricity. The provisions of Title III require the Federal government to buy alternative fuel vehicles for its fleets. Title IV further provides incentives to cause public and private usage of alternative fuel vehicles. Fuel providers are required to make available alternative fuels. In addition the act provides for tax advantages be provided for use of mass transit systems and alternative fuels.

²³. 29 USC 651

3.3 Summary

The importance of environmental law to engineering can not be under stated. As a minimum, engineers must understand the Resource Conservation and Recovery Act (RCRA). Depending on their discipline and their management roles, parts of other environmental law is equally important. This chapter provides only the barest description of the law. Law, while not easily read, is best obtained and understood by reading. Ignorance of the law is not a defense. As Chief Justice Burger wrote in *TVA vs. Hiram Hill* (98 St. Ct. 2279) and attributed to Sir Thomas More,

The law, Roper, the law. I know what's legal, not what's right. And I'll stick to what's legal... I'm not God.

(R. Bolt, *A Man for All Season*, Act I, 147 (Heinemann ed, 1967).

There are those that have said the law is not logical. This is certainly true in environmental law. Engineers, by a large lot, are driven by logic. When dealing with law, engineers must forego logic for the fact of the written page.