

The Necessary Interrelationship Between Land Use and Preservation of Groundwater Resources

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Depletion and contamination of groundwater resources is one of the most pressing environmental issues in the United States. In response to growing public concern, Congress has recently amended existing legislation, ostensibly to provide increased protection for groundwater resources. State and local governments have also responded with legislative efforts to address the depletion and contamination of groundwater. Unfortunately, the latest federal amendments provide little hope for protecting our valuable groundwater resources. This article explains why the federal response is still insufficient, and considers the need for a comprehensive federal statute regulating groundwater. State and local regulation has been more promising, but ultimately, meaningful protection for groundwater will require making difficult land use decisions that depart from traditional notions of private property. This article concludes that a sliding scale approach to reform of groundwater regulation will be the most responsive in resolving the competing values of private property rights and preservation of a fragile environmental resource.

I.

GROUNDWATER USE

Groundwater is subsurface water beneath the water table in saturated soils and geologic formations known as aquifers.¹ In the United States, groundwater provides drinking water for more than

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1. T. HENDERSON, J. TRAUBERMAN & T. GALLAGHER, *GROUNDWATER STRATEGIES FOR STATE ACTION 2* (1984) [hereinafter HENDERSON]. A water table is the depth at which an aquifer, a confined or unconfined body of water, is found closest to the surface. *Id.* Water under pressure in confined aquifers is known as artesian water. A. TARLOCK, *LAW OF WATER RIGHTS AND RESOURCES*, § 4.02[1] (1988).

one half the population, and accounts for a fourth of all fresh water used. Worldwide, groundwater comprises ninety-five percent of all fresh water, excluding glaciers.² Approximately seventy-five percent of the municipal drinking water supply relies on groundwater to some extent, while most of the population in rural areas relies solely on wells.³ Seventy-five percent of groundwater use is for irrigation alone,⁴ and five hundred thousand new wells are created every year.⁵ Groundwater and surface water are hydrologically interrelated. Groundwater produces thirty percent of all surface stream flow,⁶ and streams, lakes, wetlands, and oceans in turn recharge groundwater.⁷ From 1950 to 1980, total groundwater withdrawals nearly tripled to eighty-nine billion gallons per day.⁸

Groundwater pollution originates from many different sources, some of which have only recently been discovered. The sources of groundwater pollution include waste disposal, underground storage tanks, oil leaks and spills, drilling and operation of oil, gas, and water wells, agricultural practices, and, to a lesser extent, road salting, surface water pollution, and air pollution.⁹ Many common

2. HENDERSON, *supra* note 1, at xix, 1, 4. It also accounts for 22% of the nation's fresh water supply. A. TARLOCK, *supra* note 1, at § 4.02[2].

3. HENDERSON, *supra* note 1, at 7.

4. HENDERSON, *supra* note 1. Much of the use of groundwater is in the arid West, with California and Texas alone accounting for one-third of all groundwater withdrawn. *Id.* at 9.

5. HENDERSON, *supra* note 1.

6. HENDERSON, *supra* note 1, at 4.

7. HENDERSON, *supra* note 1.

8. HENDERSON, *supra* note 1, at 1.

9. Ponds for wastewater and waste disposal leak over 100 billion gallons of waste per year into groundwater. MILLER, WASTE DISPOSAL EFFECTS ON GROUND WATER 508 (1980). Landfills leak over 90 billion gallons of contaminated leachate into groundwater. *Id.* A study in 1983 determined that poorly designed septic systems were the largest source of contamination of groundwater by volume of groundwater affected. PYE, PATRICK, & QUARLES, GROUNDWATER CONTAMINATION IN THE UNITED STATES 19-20 (1983). Municipal wastewater systems introduce nitrates, phosphates, heavy metals, pathogens, and hydrocarbons, among other pollutants, into groundwater. MILLER, *supra*, at 206. Spreading of industrial and municipal sludge may contaminate groundwater with nitrates, heavy metals, and salt. EPA, *Report to Congress: Waste Disposal Practices and their Effects on Groundwater* (1977). Mining activities create acids, dissolved solids, radioactive materials, and metals. MILLER, *supra*, at 322. Oil and gas contaminate groundwater with hydrocarbons; leaking underground gas tanks are a major source of contamination, regulated only recently. *See generally* J. WILSON, GROUND WATER: A NON-TECHNICAL GUIDE (1982). Saline intrusion into fresh water is frequently attributed to improper installation, use, and abandonment of wells. *See generally* FUHRMAN & BARTON, GROUND WATER POLLUTION IN ARIZONA, CALIFORNIA, NEVADA, AND UTAH (1971). Irrigation, use of chemical fertilizers and pesticides, animal feedlot wastes, and aspects of dry-land farming are some agricultural activities that result in groundwater contamination. Contamination from pesticides and

groundwater pollutants are carcinogenic.¹⁰ The varying pace and movement of underground water flow makes it extremely difficult to predict the path and extent of groundwater contamination.¹¹ Nevertheless, a 1988 study indicated that 100 to 200 trillion gallons of groundwater are polluted.¹² In 1981, EPA regional studies found serious groundwater contamination by toxic pollutants in thirty-four states.¹³

At present, the two most common technologies for groundwater cleanup are containment and treatment.¹⁴ Both techniques are extremely difficult and expensive, and are effective only for areas of a few acres.¹⁵ Additionally, containment only limits the damage already done.

The National Water Commission concluded in 1973 that the three main problems of groundwater law were (1) a lack of integrated management of surface water and groundwater, (2) depletion of groundwater at a rate exceeding recharge, and (3) impairment of groundwater quality.¹⁶ As early as 1984, EPA groundwater protection strategy called for a partnership of federal, state, and local governments in the "enormous effort" of protecting groundwater and preserving both the public health and the environment.¹⁷ To date, however, the partnership has been somewhat one-sided, and has

fertilizers is perhaps the most widespread type of groundwater pollution. *See id.* at 16. In addition, polluted surface waters, dissolving road salt, toxic air pollutants such as lead, cadmium, and mercury, and acid rain all contribute to groundwater pollution. *Id.* at 16-17.

Which of these pollutants is the cause of contamination depends upon the prevalent land uses in a given area. In industrial areas, groundwater is frequently contaminated with chemicals from industrial discharges and waste disposal. Coastal areas and arid areas have problems with groundwater pollution from saline contamination through excessive well pumping. Agricultural areas suffer from pesticide and fertilizer contamination, while groundwater underlying cities is polluted by urban runoff and gasoline leakage. HENDERSON, *supra* note 1, at 18.

10. HENDERSON, *supra* note 1, at 18.

11. HENDERSON, *supra* note 1, at 4.

12. PYE, PATRICK & QUARLES, *supra* note 9, at 81-82.

13. Council on Environmental Quality, Contamination of Groundwater by Toxic Organic Chemicals 1, 3 (1981).

14. HENDERSON, *supra* note 1, at 19. In conjunction with groundwater cleaning, there is frequently excavation and removal of contaminated soil. *Id.* at 21.

15. HENDERSON, *supra* note 1, at 21.

16. A. TARLOCK, *supra* note 1, § 4.03.

17. EPA, *A Draft Ground-Water Protection Strategy for the Environmental Protection Agency* 3 (1984). EPA's groundwater strategy allows for the classification of aquifers into three categories with the primary responsibility on the states to protect groundwater quality with federal funding. The three classifications are "special" groundwater that is an "irreplaceable" source of drinking water, groundwater that is a current or potential source of drinking water but not irreplaceable, and groundwater

contributed little to solving the pressing problems of groundwater law.

No federal statute deals comprehensively with groundwater allocation or protection. Federal regulation has addressed the acute problems of impure drinking water, waste disposal, and toxic contamination in a piecemeal fashion after they have occurred rather than attempting to protect and preserve the resources threatened by these problems. Traditionally, allocation of water resources has been left to state law, which only recently has begun to regulate groundwater as a limited resource. State environmental law usually provides private remedies for groundwater contamination instead of the remedies a comprehensive federal environmental statute could offer. As a result, laws regulating use of groundwater are at best scattered and disjointed, and at worst confused and ineffective.

II.

ALLOCATION OF RIGHTS IN GROUNDWATER

A. *In General*

To a large degree, states regulate groundwater through allocation of water rights and state common law. Groundwater allocation rules govern the withdrawal and consumption of groundwater for beneficial purposes such as drinking water, irrigation, and manufacturing. When an inadequate supply of groundwater exists to satisfy competing users, allocation rules determine the priority and extent of use for each claimant.

Although groundwater and surface water are hydrologically interrelated, state law has traditionally distinguished between the two and applied different legal systems to each.¹⁸ Moreover, allocation rules for groundwater can vary depending on whether the groundwater source is classified as artesian waters, percolating waters, or an underground water course.¹⁹ Other aspects of groundwater hy-

that is not a potential source of drinking water. See Getches, *Controlling Groundwater Use and Quality: A Fragmented System*, 17 NAT. RESOURCES J. 623 (1985).

18. A. TARLOCK, *supra* note 1, § 4.03.

19. A. TARLOCK, *supra* note 1, § 4.03. Underground streams have been traditionally subject, however, to surface water rules. See, e.g., *Maricopa County Mun. Water Conservation Dist. v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931) (superseded by statute as explained in *Chino Valley v. Prescott*, 131 Ariz. 78, 638 P.2d 1324 (1981)); *Miller v. Bay Cities Water Co.*, 157 Cal. 256, 107 P. 115 (1910); *Hale v. McLea*, 53 Cal. 578 (1879); *Commonwealth v. Sebastian*, 345 S.W.2d 46 (Ky. 1961); and *Metropolitan Util. Dist. v. Merrit Beach Co.*, 179 Neb. 783, 140 N.W.2d 626 (1966). California has the most comprehensive regulation of interrelated surface rights and subsurface flows. See, e.g., *United States v. Fallbrook Pub. Util. Irrigation Dist.*, 165 F. Supp. 806 (S.D.

drology further complicate effective state management. For example, it is difficult and expensive to identify the user responsible for groundwater depletion in any system of groundwater allocation because of the number of users drawing from any common source. Efficient allocation also requires foresight in anticipating future uses and needs for groundwater. Finally, controlled management of groundwater depends upon the rate of recharge of an aquifer. Some aquifers can be managed as renewable resources by setting a safe annual yield or sustained yield over a period of years. Pumping that exceeds this safe or sustained yield is called groundwater mining.²⁰

The four different systems of groundwater allocation in the United States are the "English" rule of absolute ownership, the "American" rule of reasonable use, the correlative rights rule, and the prior appropriation rule.²¹

Under the "English" rule, every landowner who owns property over groundwater has an absolute right to withdraw any and all of that groundwater.²² The English case of *Acton v. Blundell*,²³ affirming the traditional right of a landowner to own the airspace above and the soil beneath property forms the basis of this doctrine. American courts adopted this rule based partly on the assumption that it is unfair to compel the offending landowner to redress a wrong which the person could not notice.²⁴ The doctrine is still accepted primarily in some New England states which face no groundwater shortages.²⁵ This rule fails to recognize the exhaus-

Cal. 1958); *City of Lodi v. East Bay Mun. Util. Dist.*, 7 Cal. 2d 316, 60 P.2d 439 (1936); *City of San Bernadino v. City of Riverside*, 186 Cal. 7, 198 P. 784 (1921); *Hudson v. Dailey*, 156 Cal. 617, 105 P. 748 (1909); *City of Los Angeles v. Pomeroy*, 124 Cal. 597, 57 P. 585 (1899), *error dismissed*, *Hooker v. City of Los Angeles*, 188 U.S. 314 (1903); *see also Grant, The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under the Appropriation Doctrine*, 22 LAND & WATER L. REV. 63 (1987).

20. A. TARLOCK, *supra* note 1, § 4.03.

21. HENDERSON, *supra* note 1, at 30.

22. R. CLARK, *WATERS AND WATER RIGHTS* § 17.1 (1967).

23. 152 Eng. Rep. 1223 (Ex. ch. 1843). Although the defendant Blundell had left his neighbor's well dry, the court upheld his right to do so because a landowner owns everything from the center of the earth to the heavens and because courts should not try to apportion a "moveable, wandering thing." *Id.* at 1233-35; *see also* Rossmann & Steel, *Forging the New Water Law: Public Regulation of "Proprietary" Groundwater Rights*, 33 HASTINGS L.J. 903, 906 (1982). The case has been criticized for its lack of consideration of the finite nature of groundwater attributable to a lack of scientific knowledge. *See* Rossmann & Steel, *supra*, at 907; R. CLARK, *supra* note 22, § 17.1.

24. A. TARLOCK, *supra* note 1, § 4.04 (citing *Wheatly v. Baugh*, 25 Pa. 528, 534 (1855)).

25. The absolute ownership doctrine is still utilized in Connecticut, Georgia, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Mississippi, Ohio, Rhode Island,

tible nature of groundwater and the problem of its potential depletion.²⁶

In response to the rule of absolute ownership, many state courts began qualifying the rule through reasonable limitations on the right of any one landowner to deplete groundwater. Under the "reasonable use" rule, no owner of overlying land can withdraw more than a reasonable amount of groundwater,²⁷ and the water withdrawn must be for a beneficial purpose on the overlying land.²⁸ Reasonableness is based on such factors as well location, amount of water, and the proposed use and placement of the water.²⁹ Use on non-overlying land is per se unreasonable.³⁰ If the requirements of

and Texas. A. TARLOCK, *supra* note 1, § 4.04; *see generally* Hartford Rayon Corp. v. Cromwell Water Co., 126 Conn. 194, 10 A.2d 587 (1940); Roath v. Driscoll, 20 Conn. 533 (1850); Adams v. Grigsby, 152 So. 2d 619 (La. Ct. App. 1963), *cert. denied*, 244 La. 662, 153 So. 2d 880 (1963); Chase v. Silverstone, 62 Me. 175 (1873); Buffum v. Harris, 5 R.I. 243 (1858); City of Sherman v. Public Util. Comm'n of Texas, 643 S.W.2d 681 (Tex. 1983); and City of Corpus Christi, v. City of Pleasanton, 154 Tex. 289, 276 S.W.2d 798 (1955). One commentator has suggested that it is "doubtful" that Rhode Island will continue to allow absolute ownership and noted that the Vermont legislature in 1985 adopted the correlative rights rule in place of absolute ownership. A. TARLOCK, *supra* note 1, § 4.04. There is also some confusion as to whether absolute ownership is the prevailing doctrine in Indiana. *Id.* (citing Wiggins v. Brazil Coal & Clay Co., 440 N.E.2d 495 (Ind. Ct. App. 1982)), *vacated*, 452 N.E.2d 958 (Ind. 1983); Prohosky v. Prudential Ins. Co., 584 F. Supp. 1337 (N.D. Ind. 1984), *reversed in part*, 767 F.2d 387 (7th Cir. 1985).

Under the strictest application of absolute ownership, it did not even matter if the withdrawal was maliciously done to deprive a neighbor of water. *See, e.g.*, Huber v. Merkel, 117 Wis. 355, 94 N.W. 354 (1903), *overruled*, State v. Michels Pipeline Constr., Inc., 63 Wis. 2d 278, 217 N.W.2d 339 (1974); *contra*, Gagnon v. French Sick Springs Hotel Co., 163 Ind. 687, 72 N.E. 849 (1904). Texas does impose limited liability for subsidence caused by negligent pumping. Friendswood Development Co. v. Smith-Southwest Indus., 576 S.W.2d 21 (Tex. 1978); *see also* Johnson, *Texas Groundwater Law: A Survey and Some Proposals*, 22 Nat. Resources J. 1017 (1982).

26. R. CLARK, *supra* note 22, § 17.1.

27. *See, e.g.*, Jarvis v. State Land Dep't, 106 Ariz. 506, 479 P.2d 169 (1970); Rothrauff v. Sinking Spring Water Co., 339 Pa. 129, 14 A.2d 87 (1940). The landmark case rejecting the absolute ownership doctrine and establishing reasonable use limitations is Bassett v. Salisbury Mfg. Co., 43 N.H. 569, 82 Am. Dec. 179 (1862).

28. For a case involving interpretation of the concept of "overlying land" which was legislatively overruled, see Farmers Inv. Co. v. Bettwy, 113 Ariz. 520, 558 P.2d 14 (1976). *See generally* Looney, *Modification of Arkansas Water Law: Issues Alternatives*, 38 ARK L. REV. 221, 245 (1984).

29. HENDERSON, *supra* note 1, at 31.

30. States that have adopted the reasonable use rule include Alabama, Florida, Illinois, Kentucky, Maryland, New York, North Carolina and Tennessee. Sloss-Sheffield Steel & Iron Co. v. Wilkes, 231 Ala. 511, 165 So. 764 (1936), *overruled*, Henderson v. Wade Sand & Gravel Co., 388 So. 2d 900 (Ala. 1980); Koch v. Wick, 87 So. 2d 47 (Fla. 1956) and Fla. Stat. Ann. §§ 373.013 (1988 & Supp. 1989); Bridgman v. Sanitary Dist. of Decatur, 164 Ill. App. 3d 287, 517 N.E.2d 309 (Ill. App. 4th Dist. 1987); United Fuel Gas Co. v. Sawyers, 259 S.W.2d 466 (Ky. 1953), Sycamore Coal Co. v. Stanley, 292 Ky.

the rule are met, a landowner may withdraw groundwater even if doing so deprives another landowner of the reasonable use of the groundwater.³¹ The rule may prohibit waste to the extent that it deters unreasonable use,³² but this restriction may do nothing more than prohibit malicious pumping.³³

Furthermore, the reasonable use rule does not appear to create a right in a senior pumper to maintain the pressure of groundwater necessary to support the least expensive means of withdrawal. Western states and a few common law states have generally held that a "right to lift" groundwater at a fixed pressure level is not part of a prior appropriator's rights.³⁴ This modification allows junior pumpers to decrease the pressure level previously enjoyed by senior pumpers by a reasonable amount.

The "correlative rights" doctrine gives equal rights to overlying land owners. In periods of insufficient groundwater, the available water is apportioned among the landowners in relation to the

168, 166 S.W.2d 293 (1942); *Finley v. Teeter Stone, Inc.*, 251 Md. 428, 248 A.2d 106 (1968); *Forbell v. City of New York*, 47 App. Div. 371, 61 N.Y.S. 1005 (1900), *aff'd*, 164 N.Y. 522, 58 N.E. 644 (1900); *Rouse v. City of Kingston*, 188 N.C. 1, 123 S.E. 482 (1924); *Nashville C. & St. L. Ry. v. Rickert*, 19 Tenn. App. 446, 89 S.W.2d 889 (1935).

31. A. TARLOCK, *supra* note 1, § 4.05[1], (citing *United Fuels Gas Co. v. Sawyer*, 259 S.W.2d 466 (Ky. 1953)); *Finley v. Teeter Stone, Inc.*, 251 Md. 428, 248 A.2d 106 (1968); *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. App. 1971); *Bayer v. Nello L. Teer. Co.*, 256 N.C. 509, 124 S.E.2d 552 (1962); *Rouse v. City of Kingston*, 188 N.C. 1, 123 S.E. 482 (1924); *Rothrauff v. Sinking Spring Water Co.*, 339 Pa. 129, 14 A.2d 87 (1940); *Nashville C. & St. L. Ry. v. Rickert*, 19 Tenn. App. 446, 89 S.W.2d 889 (1935); *Clinchfield Coal Corp. v. Compton*, 148 Va. 437, 139 S.E. 308 (1927) (dictum); *Pence v. Carney*, 58 W.Va. 296, 52 S.E. 702 (1905).

32. *See generally Moses, Basic Groundwater Problems*, 14 ROCKY MTN. MIN. L. INST. 501, 509 (1969).

33. A. TARLOCK, *supra* note 1, § 4.05[1].

34. A. TARLOCK, *supra* note 1, § 6.04[3]. *See, e.g.*, *City of Colorado Springs v. Bender*, 148 Colo. 458, 366 P.2d 552 (1961); *Erickson v. Crookston Water Works, Power & Light Co.*, 105 Minn. 182, 117 N.W. 435 (1908); *Woodsum v. Township of Pemberton*, 172 N.J. Super. 489, 412 A.2d 1064 (N.J. Super. Ct. Law Div. 1980), *aff'd on other grounds*, 427 A.2d 615 (N.J. Super. Ct. App. Div. 1981); *Mathers v. Texaco, Inc.*, 77 N.M. 239, 421 P.2d 771 (1966); *Wayman v. Murray City Corp.*, 23 Utah 2d 97, 458 P.2d 861 (1969); *see also Comment, Protection of the Means of Groundwater Diversion*, 20 NAT. RESOURCES J. 626 (1980); *Grant, Reasonable Groundwater Pumping Levels Under the Appropriation Doctrine: The Law and Underlying Economic Goals*, 21 NAT. RESOURCES J. 1 (1981); *Lingo v. City of Jacksonville*, 258 Ark. 63, 522 S.W.2d 403 (1975) (acknowledging a limited right to static pressure in senior pumpers).

It is well established that cities must compensate other pumpers injured by export of water. *See A. TARLOCK, supra* note 1, § 4.05[3] (citing *Canada v. City of Shawnee*, 179 Okla. 53, 64 P.2d 694 (1936)); *Meeker v. City of E. Orange*, 77 N.J. Law 623, 74 A. 379 (1909). In most cases, however, pumpers injured by municipal pumpers will be denied injunctive relief when the equities are balanced. *See, e.g.*, *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. App. 1971).

amount of land owned over the groundwater source.³⁵ In California, where the doctrine was first developed,³⁶ overlying landowners are entitled to a "fair and just portion" of the common groundwater,³⁷ but have no right to the maintenance of the natural water table.³⁸ Non-overlying landowners may obtain appropriation rights if there is surplus water over a predetermined safe annual yield and no overlying landowners need the surplus.³⁹ If the basis is overdrawn, use is restricted to overlying landowners.⁴⁰

In contrast to the correlative rights doctrine, the doctrine of prior appropriation gives priority to groundwater uses that are first in time.⁴¹ The doctrine, which in some states is part of state common law and in others is created by statute,⁴² gives states more authority to allocate groundwater. Generally, groundwater must be used beneficially. In times of scarcity, "senior" appropriators who put groundwater to beneficial use receive priority over "junior" appropriators.⁴³ The doctrine is prevalent in the western United States

35. See, e.g., *Katz v. Walkinshaw*, 141 Cal. 116, 74 P. 766 (1903).

36. See *Katz v. Walkinshaw*, 141 Cal. 116, 74 P. 766 (1903).

37. A. TARLOCK, *supra* note 1, § 4.06[1].

38. *Hillside Water Co. v. City of Los Angeles*, 10 Cal. 2d 677, 76 P.2d 681 (1938).

39. *Wright v. Goleta Water Dist.*, 174 Cal. App. 3d 74, 219 Cal. Rptr. 740 (1985).

40. *Tehachapi-Cummings County Water Dist. v. Armstrong*, 49 Cal. App. 3d 992, 122 Cal. Rptr. 918 (1975). Overdraft in California is determined by reference to a safe yield for the basin evaluated over a twenty-nine year period. *City of Los Angeles v. City of San Fernando*, 14 Cal. 3d 199, 123 Cal. Rptr. 1 (1975). For a discussion of how the California Supreme Court has modified the correlative rights doctrine in California, see A. TARLOCK, *supra* note 1, § 4.06[3], [4].

41. See, e.g., *City of Pasadena v. City of Alhambra*, 33 Cal. 2d 908, 207 P.2d 17 (1948), *cert. denied sub nom California-Michigan Land and Water Co. v. City of Pasadena*, 339 U.S. 937 (1950); *Alpaugh Irrigation Dist. v. Kern County*, 113 Cal. App. 2d 286, 248 P.2d 117 (1952); *Corona Foothill Lemon Co. v. Lillibridge*, 8 Cal. 2d 522, 66 P.2d 443 (1937).

42. The doctrine has been adopted in Arkansas, Delaware, Minnesota, Missouri, Nebraska, and New Jersey. *Jones v. Oz-Ark-Val Poultry Co.*, 228 Ark. 76, 306 S.W.2d 111 (1957); *MacArto v. Graylyn Crest III Swim Club, Inc.*, 41 Del. Ch. 26, 187 A.2d 417 (1963); *Erickson v. Crookston Waterworks, Power & Light Co.*, 105 Minn. 182, 117 N.W. 435 (1908); *Higday v. Nickolaus*, 469 S.W.2d 859 (Mo. App. 1971); *Prather v. Eisenmann*, 200 Neb. 1, 261 N.W.2d 766 (1978); *Woodsum v. Township of Pemberton*, 172 N.J. Super. 489, 412 A.2d 1064 (1980), *aff'd*, 177 N.J. Super. 639, 427 A.2d 615 (1981).

43. HENDERSON, *supra* note 1, at 31. When the amount of water needed exceeds the recharge rate of the aquifer, many states impose acceptable pumping levels for the state or for regions within the state. In general, to establish a water right under the prior appropriation system, the claimant must: intend to appropriate the water; divert it from its channel; and apply it to a beneficial use. O. MATTHEWS, *WATER RESOURCES, GEOGRAPHY, AND LAW* 42 (1984). Under permit systems, the permit application is sufficient evidence of the intention to appropriate water. *Id.* Problems frequently arise in satisfying the diversion requirement. As to the beneficial use requirement, mining, manufacturing, irrigation, stock watering, and domestic uses have traditionally been deemed

where many states have codified it. These states also require permits to establish priority applications for groundwater use.⁴⁴ The appropriation doctrine is the only doctrine of the four that does not necessarily relate water rights to ownership of the land overlying the groundwater.⁴⁵

Currently, Idaho, Kansas, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming have adopted the prior appropriation doctrine.⁴⁶ Occasionally, states have exempted from the doctrine's reach groundwater that is a by-product of secondary oil and gas recovery, geothermal resources, or water from mine dewatering.⁴⁷ Colorado, Kansas,

beneficial uses, with the more recent and still unsettled addition of recreation, aesthetics, and preservation of environmental values being considered beneficial uses. *Id.* at 43.

44. R. CLARK, *supra* note 22, § 441.

45. O. MATTHEWS, *supra* note 43, at 6.

46. IDAHO CODE § 42-226 (1977 & Supp. 1988); KAN. STAT. ANN. §§ 82a-1020-1035 (1985); MONT. CODE ANN. § 85-2-501-520 (1987); NEV. REV. STAT. § 534.020 (1986 & Supp. 1988); N.M. STAT. ANN. § 72-12-1-28 (1987); N.D. CENT. CODE §§ 61-01-01 and 61-04-02 (1985 & Supp. 1987); OR. REV. STAT. § 537.505 (1988); S.D. CODIFIED LAWS ANN. § 46-6-3 (1983 & Supp. 1988); UTAH CODE ANN. § 73-1-1 (1980 & Supp. 1988); WASH. REV. CODE § 90.44.020 (1962 & Supp. 1989); WYO. STAT. § 41-3-903 (1985 & Supp. 1988). Western groundwater-reliant states conspicuously absent from this list include Arizona, California, Colorado, Nebraska, and Texas. Arizona regulates groundwater under a statutory conservation system that creates property rights in prior users. ARIZ. REV. STAT. ANN. § 45-411-417 (1980 & Supp. 1988). Colorado does apply the prior appropriation doctrine to designated groundwater basins and tributary groundwater. COLO. REV. STATE. § 37-92-103 (1982 & Supp. 1988). California applies the correlative rights doctrine to most groundwater. *See supra* notes 36-40 and accompanying text; *see also* Trager, *Emerging Forums for Groundwater Dispute Resolution in California: A Glimpse at the Second Generation of Groundwater Issues and How Agencies Work Towards Problem Resolution*, 20 PAC. L.J. 31 (1988); Rossman & Steel, *supra* note 23. Nebraska's system is a combination of reasonable use, correlative rights, and special district regulation, *Metropolitan Util. Dist. of Omaha v. Merritt Beach Co.*, 179 Neb. 783, 140 N.W.2d 626 (1966). While Texas continues to utilize the absolute ownership rule, *see supra* notes 21-28 and accompanying text. The change from common law systems to prior appropriation has been challenged as unconstitutional in western states, but without success. *Town of Chino Valley v. City of Prescott*, 131 Ariz. 78, 638 P.2d 1324, *appeal dismissed*, 457 U.S. 1101 (1982), *reh'g denied*, 459 U.S. 899 (1982); *Aikins v. Arizona Dept. of Water Resources*, 154 Ariz. 437, 743 P.2d 946 (Ariz. App. 1987); *Larrick v. North Kiowa Bijou Management Dist.*, 181 Colo. 395, 510 P.2d 323 (1973); *Williams v. City of Wichita*, 190 Kan. 317, 374 P.2d 578, *appeal dismissed*, 375 U.S. 7 (1963), *reh'g denied*, 375 U.S. 936 (1963); *Baeth v. Hoisveen*, 157 N.W.2d 728 (N.D. 1968); *Knight v. Grimes*, 80 S.D. 517, 127 N.W.2d 708 (1964); *Petersen v. Department of Ecology*, 92 Wash. 2d 306, 596 P.2d 285 (1979). To deal with deficiencies in water allocation in western states, one proposal has been increased use of water marketing of instream flows and groundwater. *Anderson & Leal, Going with the Flow: Marketing Instream Flows and Groundwater*, 13 COLUMB. J. ENV'T. L. 317 (1988); *see also* Balleau, *Water Appropriation and Transfer in a General Hydrogeologic System*, 28 Nat. Resources J. 269 (1988).

47. A. TARLOCK, *supra* note 1, § 6.03[3]. Withdrawals of groundwater as a source

Montana, Nebraska, Nevada, New Mexico, and Oregon have combined prior appropriation with critical area legislation to designate areas where new pumping may be prohibited and existing pumping may be restricted to preserve an acceptable amount of groundwater.⁴⁸ Arizona, Colorado, and New Mexico further limit groundwater mining and extraction to a rate that will restore the aquifer to the level necessary for economically feasible extraction.⁴⁹

Liability for excessive or improper groundwater use varies depending upon which of the four rules of allocation is applied. In an absolute ownership jurisdiction, overlying landowners have an indefinite right of usage. The landowner may use whatever groundwater can be pumped without liability for the harm or expenses incurred by others.⁵⁰ Under the reasonable use doctrine, a landowner is liable for any harm caused by unreasonable use of underlying groundwater. Using water off the overlying land is unreasonable per se and can be remedied by an injunction or damages.⁵¹ In some jurisdictions, the overlying landowner may withdraw water for a reasonable use on the overlying land without incurring liability, even if the withdrawal causes subsidence of surrounding land.⁵² There is little or no restriction on the amount of

from appropriation and exportation is, however, constitutionally suspect since the Supreme Court decision in *Sporhase v. Nebraska ex rel. Douglas*, 458 U.S. 941 (1982), that groundwater is an article of interstate commerce. See, e.g., *City of El Paso through its Pub. Serv. Bd. v. Reynolds*, 563 F. Supp. 379 (D.N.M. 1983). But see Trelease, *State Water and State Lines: Commerce in Water Resources*, 56 U. COLO. L. REV. 347 (1985); Trelease, *Interstate Use of Water: Sporhase v. El Paso, Pike & Vermejo*, 22 LAND & WATER L. REV. 315 (1987).

48. KAN. STAT. ANN. §§ 82a-1020-1035 (1985); MONT. CODE ANN. § 85-2-506 (1987); NEV. REV. STAT. §§ 534.010-187 (1986 & Supp. 1988); N.M. STAT. § 72-12-20 (1987); ORE. REV. STAT. § 537.730 (1988). The Idaho courts have also upheld limiting available water to the annual recharge rate and injunctions against junior wells that exceed the reasonably anticipated future rate of recharge. *Baker v. Ore-Ida Foods, Inc.*, 95 Idaho 575, 513 P.2d 627 (1973); *State ex rel. Tappan v. Smith*, 92 Idaho 451, 444 P.2d 412 (1968); *Briggs v. Golden Valley Land & Cattle Co.*, 97 Idaho 427, 546 P.2d 382 (1976).

49. A. TARLOCK, *supra* note 1, § 6.05[2].

50. A. TARLOCK, *supra* note 1, § 6.05[2]. This is still the rule in Texas and Louisiana. *Id.*

51. See *supra* note 30 and accompanying text.

52. See, e.g., *Finley v. Teeter Stone, Inc.*, 251 Md. 428, 248 A.2d 106 (1968); *Bayer v. Nello L. Teer Co.*, 256 N.C. 509, 124 S.E.2d 552 (1962); *New York Continental Jewell Filtration Co. v. Jones*, 37 App. D.C. 511 (D.C. Cir. 1911). This immunity from liability is, however, "arguably inconsistent with a landowner's duty to maintain the lateral and subjacent support of neighboring lands in their natural condition." A. TARLOCK, *supra* note 1, § 4.07, (citing *Prete v. Cray*, 49 R.I. 209, 141 A. 609 (1928)); see also Note, *The Right to Subjacent Support of Oil and Gas*, 49 CAL. L. REV. 353 (1961); Garland, *Subsidence Resulting from the Removal of Groundwater*, 12 S. TEX. L. REV. 201 (1970). Massachusetts among other jurisdictions does impose liability for

use under either rule, nor is there any balancing of the desirability of competing uses.

By contrast, the correlative rights rule limits each landowner to a reasonable share of groundwater. This share is usually based on acreage which may be significantly less than the amount of groundwater that could be withdrawn under the reasonable use rule.⁵³ Under the prior appropriation doctrine, junior users are liable to senior users for harm caused to any vested senior rights.⁵⁴ Under statutory systems for prior appropriation of groundwater, liability depends on the extent of the violation to statutory rights; only unreasonable harm is actionable.⁵⁵

Section 858 of the second Restatement of Torts explicitly protects overlying landowners from liability for withdrawal unless: (1) the withdrawal unreasonably causes harm to a neighboring landowner by lowering the water table or reducing artesian pressure; (2) the withdrawal exceeds a reasonable share of the annual supply or total store of groundwater; or (3) the withdrawal has a direct and substantial effect upon a watercourse or lake and unreasonably causes harm to a person entitled to the use of such water.⁵⁶ Although the Restatement most closely resembles the reasonable use and correlative rights rules, it significantly differs from both. Unlike the reasonable use rule, the Restatement balances the equities and hardships between competing users. And, unlike the correlative

subsidence, at least when done negligently. *Gamer v. Town of Milton*, 346 Mass. 617, 195 N.E.2d 65 (1964); *see also Henderson v. Wade Sand & Gravel Co.*, 388 So. 2d 900 (Ala. 1980); *Labruzzo v. Atlantic Dredging & Constr. Co.*, 54 So. 2d 673 (Fla. 1951); *but see Sloss-Sheffield Steel and Iron Co. v. Wilkes*, 231 Ala. 511, 165 So. 764 (1936).

53. *See supra* note 34 and accompanying text.

54. O. MATTHEWS, *supra* note 43, at 43. The senior user also has an obligation to the junior user to maintain the conditions of use that existed at the time of the junior appropriation. *Id.* at 44.

Appropriators must also be careful to avoid abandonment or forfeiture of their water rights. Abandonment occurs when there is a cessation of use along with "manifestation of intent" to abandon the right. *Id.* Because of the difficulty in proof of abandonment, many states now have forfeiture statutes that extinguish water rights after a statutorily set period of non-use. *Id.*

55. *See infra* note 61 and accompanying text.

56. A. TARLOCK, *supra* note 1, § 4.06[5]. The Restatement rule has been adopted in Michigan, Ohio and Wisconsin. *Maerz v. United States Steel Corp.*, 323 N.W.2d 524 (Mich. App. 1982); *Cline v. American Aggregates Corp.*, 15 Ohio St. 3d 384, 474 N.E.2d 324 (1984); *State v. Michels Pipeline Constr., Inc.*, 63 Wis. 2d 278, 217 N.W.2d 339 (1974). Nebraska as a matter of its own state law has adopted the Restatement approach. *Prather v. Eisenmann*, 200 Neb. 1, 261 N.W.2d 766 (1978). Indiana has rejected the rule in section 858. *Wiggins v. Brazil Coal & Clay Corp.*, 452 N.E.2d 958 (Ind. App. 1983).

rights rule, the Restatement does not tie allocation of water rights to ownership of overlying acreage.

B. Permit Systems

The "steady trend" in groundwater regulation has been to establish state permit systems for groundwater withdrawal.⁵⁷ Every western state except Texas requires some kind of permit for groundwater withdrawals.⁵⁸ States⁵⁹ generally utilize either of two types of permit systems. Most western states require a permit for all groundwater withdrawals, with common exceptions for domestic use, watering of stock, and watering of gardens or lawns.⁶⁰ The second system only requires permits for particular sources of groundwater or for groundwater in designated areas where there is excessive groundwater withdrawal.⁶¹ Both types of permit systems provide an administrative method of protecting water rights instead of relying on piecemeal litigation between competing water users. Permit requirements vary from state to state and incorporate whatever priority for groundwater the state employs—correlative rights, reasonable use, absolute ownership, or prior appropriation.⁶² In the western states, permit systems predominantly incorporate the doctrine of prior appropriation.⁶³ In the eastern, more humid states, permit systems follow four different approaches: (1) a common permit system for ground and surface water; (2) a separate permit system for groundwater; (3) a common law approach that yields in emergencies when high capacity pumpers can be ordered to reduce pumping; and (4) a permit system that only applies in critical areas.⁶⁴ Connecticut, Florida, Iowa, Kentucky, Maryland, North Carolina, and Wisconsin use an integrated system which coordinates groundwater withdrawal with surface water needs.⁶⁵

57. R. CLARK, *supra* note 22, § 441.

58. R. CLARK, *supra* note 22, § 441. Texas does provide for voluntary creation of local management districts. *Id.*

59. This generalization excludes Texas, Nebraska, and Hawaii.

60. R. CLARK, *supra* note 22, § 442.1.

61. R. CLARK, *supra* note 22, § 442.1.

62. See A. TARLOCK, *supra* note 1, § 4.09[1]-[4].

63. A. TARLOCK, *supra* note 1, § 4.09[1]-[4].

64. A. TARLOCK, *supra* note 1, § 4.09[1]. Generally constitutional challenges to substitution of permit systems for common law rights have been unsuccessful. *Id.* § 3.20[3]; see, e.g., *Lindsley v. Natural Carbonic Gas Co.*, 220 U.S. 61 (1911); *Ohio Oil Co. v. Indiana*, 177 U.S. 190 (1900); *Village of Tequesta v. Jupiter Inlet Corp.*, 371 So. 2d 663 (Fla.), *cert. denied*, 444 U.S. 965 (1979); *Crookston Cattle Co. v. Minnesota Dept. of Natural Resources*, 300 N.W.2d 769 (Minn. 1980).

65. CONN. GEN. STAT. ANN. §§ 22a-367-368 (West 1985 & Supp. 1989); FLA. STAT. ANN. § 373.013-.197 (West 1988); IOWA CODE ANN. § 455B.269-273 (1990);

States with separate permit systems for groundwater include Florida, Minnesota, New York, Oklahoma, and Wisconsin.⁶⁶

Surface water can replenish groundwater, but this "recharge" rate may be slower than the rate of withdrawal,⁶⁷ in which case, the groundwater will eventually become exhausted.⁶⁸ Because none of the groundwater allocation rules has as its primary purpose the preservation of the water source, many states have imposed statutory limits on withdrawal. One such method is legislation which restricts or prohibits withdrawal of groundwater in critical areas.⁶⁹

STAT. §§ 151.120, .170 (1982 & Supp. 1988); MD. NAT. RES. CODE ANN. § 8-802 (1987); N.C. GEN. STAT. N.C. 143.214.15 (1988); and WIS. STAT. ANN. § 144.026 (West 1974 & Supp. 1988). The most elaborate of these systems is the Florida Water Resources Act, FLA. STAT. ANN. §§ 373.013-.197 (West 1988). The act creates districts which set minimum groundwater maintenance levels and issue twenty-year renewable permits for withdrawal. To obtain a permit an applicant must demonstrate that there will be no interference with existing uses, that there will be a reasonable-beneficial use, and that the proposed use is consistent with the public interest. *Id.* § 373.223; see also FLA. ADMIN. CODE ANN., r. 17-40 (listing relevant factors to a reasonable-beneficial use). Competing applications are assessed by which best serves the public interest. FLA. STAT. ANN. § 373.233 (West 1988). Groundwater may also be transported outside the basin or used on nonoverlying land if justified by the public interest. *Id.* § 373.233.

66. FLA. STAT. ANN. §§ 373.013-.197 (West 1988); MINN. STAT. ANN. § 105.41 (West 1987 & Supp. 1989); N.Y. ENVTL. CONSERV. L. § 15-1527 (Consol. 1982 & Supp. 1989); OKLA. STAT. tit. 82, § 1020.9 (1970 & Supp. 1989); WIS. STAT. ANN. § 144.025(e) (West 1974 & Supp. 1988). Wisconsin requires permits for withdrawals in excess of 100,000 gallons a day. WIS. STAT. ANN. § 144.025(e). Oklahoma is unique in that it allocates groundwater based on a "... percentage of the total annual yield of the basin . . . which is equal to the percentage of land overlying the fresh groundwater basin which he owns or leases." OKLA. STAT. tit. 82, § 1020.9 (1970 & Supp. 1989). Minnesota's comprehensive statute contains five preferences for groundwater withdrawals. MINN. STAT. ANN. § 105.41 (West 1987 & Supp. 1989). Class A permits are required for withdrawals in areas in which adequate groundwater exists; a class B permit with its more stringent submission requirements is necessary in all other areas. MINN. STAT. ANN. § 105.416. All wells must be constructed in accordance with a state code to be protected from interference by subsequent pumpers. MINN. STAT. ANN. § 105.416(3). Thus, the state decides how many wells may draw on a basin but does not allocate water in times of shortage among pumpers. A. TARLOCK, *supra* note 1, § 4.09[3]. New York only requires a permit to drill on Long Island for an installed pumping capacity of forty-five gallons a minute, with an exemption for fire-fighting and agriculture. N.Y. ENVTL. CONSER. LAW § 15-1527 (1984 & Supp. 1989). In granting permits, the New York Department of Environmental Conservation must consider: "(1) [the] specific yield of the aquifer, (2) the anticipated amount of the withdrawal, (3) whether the aquifer is over or understressed, (4) the proposed use of the water and whether the water will return to the aquifer as fresh recharge or as waste, (5) the relationship between the amount of the requested withdrawal and the level of existing local and regional withdrawals, and (6) the degree of consistency between the requested rate of withdrawal and any regional water management plans." N.Y. ENVTL. CONSER. LAW § 15-1527(3).

67. O. MATTHEWS, *supra* note 43, at 10.

68. *Id.*

69. *Id.*

In Georgia, Indiana, Mississippi, New Jersey, North Carolina, South Carolina, and Virginia the state designates restricted areas in which large capacity pumpers must obtain a permit and reduce consumption during emergency shortages.⁷⁰ Increasingly, states are also beginning to protect critical recharge areas through land use restrictions. For example, New York has designated Long Island and Schenectady as "primary water supply aquifer areas" in which incompatible uses, such as landfills, are prohibited or restricted.⁷¹

Other states set schedules, limited by the legislature, that provide for controlled depletion over a period of years. In some jurisdictions, withdrawals may not exceed the natural recharge rate,⁷² while in others, the rate of depletion may exceed the recharge rate but is limited to an acceptable rate.⁷³ Most permit systems require both a well permit authorizing the the drilling for water and a water right permit authorizing the use of the water.⁷⁴

C. *Conjunctive Use*

"Conjunctive use" refers to the coordinated appropriation of ground and surface waters which are hydrologically connected.⁷⁵

70. GA. CODE ANN. § 12-5-90-105 (1985 & Supp. 1988); IND. CODE § 13-2-2-1-13 (1987); MISS. CODE ANN. §§ 51-4-1-19 (1981 & Supp. 1988); N.J. REV. STAT. § 58:1A-15 (West 1986 & Supp. 1988); N.C. GEN. STAT. § 143-215.15 (1988); S.C. CODE ANN. §§ 49-5-1-120 (Law Co-op. 1987); VA. CODE ANN. § 62.1-44.36-44 (1987).

71. N.Y. ENVTL. CONSERV. LAW § 15-0514 (1984 & Supp. 1989), discussed in A. TARLOCK, *supra* note 1, § 4.10. See also FLA. STAT. ANN. § 373.0395 (West 1988). For a discussion of similar, local controls, see M. JAFFE & F. DiNOVO, *Local Groundwater Protection* 148-152 (1987). Protection of critical recharge areas under the zoning power has been upheld. *Moviematic Indus. Corp. v. Board of Comm'rs of Metro. Dade County*, 349 So. 2d 667 (Fla. Dist. Ct. App. 1977).

72. M. JAFFE & F. DiNOVO, *supra* note 71, at 148-152.

73. *Id.*

74. See A. TARLOCK, *supra* note 1, § 4.09[3].

75. Trelease, *Conjunctive Use of Groundwater and Surface Water*, 273 ROCKY MTN. MIN. L. INST. 1853, 1854 (1982). The focus of this section is on water rights and their effects on land use rather than on groundwater management policies and strategies. When used in the chapter, therefore, "conjunctive use" refers to the different systems for coordination of water rights between surface waters and hydrologically connected groundwater.

An entirely different concept of "conjunctive use" beyond the scope of this discussion is conjunctive use management which attempts to satisfy water needs through flexible utilization of surface water and groundwater. See Trelease, *supra* at 1854. For example, conjunctive use management may allow rights to water in both the interconnected sources supplies by delivering water to the senior appropriator from a new source at the junior user's expense to permit the junior user to assume the senior user's prior right, and may even allow importation of surface water to replenish unconnected groundwater. *Id.* at 1860-80. For a discussion of the relatively undeveloped law of liability for unintended consequences of this type of conjunctive management, see A. TARLOCK, *supra* note 1, § 4.05[4].

Historically courts focused on a defendant user's water rights at the point of diversion, but it made little sense to apply different rules for surface water diversion and groundwater diversion when the water affected was from the same hydrological source.⁷⁶ Today, the basic principle of conjunctive use holds that the same law should apply to both sources if the surface water and groundwater are so closely connected that the diversion of one affects the other.⁷⁷

There are three basic approaches to regulating interconnected groundwater and surface water. Many states fail to recognize conjunctive use and treat the two water sources as distinct, subjecting each to different rules of appropriation.⁷⁸ In many western states, groundwater which is hydrologically connected to surface water is apportioned according to the water allocation rules for surface water.⁷⁹ The remaining states require administrative coordination of groundwater withdrawals with surface water to avoid interfering with surface use of the water supply.⁸⁰

III.

FEDERAL REGULATION OF GROUNDWATER

A. *In General*

No centralized federal authority regulates groundwater, despite considerable federal legislation applicable to groundwater. At least eight federal acts consider groundwater⁸¹ with EPA administering six of the eight statutes.⁸² Most of the acts attempt to remedy con-

76. Trelease, *supra* note 76, at 1855-56.

77. *Id.* at 1856.

78. *Id.* at 1855.

79. *Id.* at 1857.

80. *Id.* at 1857-58.

81. Marks, *Toward a National Groundwater Act: Current Contamination and Future Courses of Action*, 1987 FLA. B.J. 1, 11 (April 1987). The Director of Groundwater Programs lists 44 federal programs in some way governing groundwater. HENDERSON, *supra* note 1, at 35.

82. The six programs administered by EPA are under the Safe Drinking Water Act (SDWA), § 1401, 42 U.S.C. § 300f (1988); Resource Conservation and Recovery Act (RCRA), § 1002, 42 U.S.C. § 6901 (1988); Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), § 101, 42 U.S.C. § 9601 (1988); Clean Water Act (CWA), § 101, 33 U.S.C. § 1251 (1988); Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), § 2, 7 U.S.C. § 136 (1988); and Toxic Substances Control Act (TOSCA), § 2, 15 U.S.C. § 2601 (1988).

TOSCA, which regulates the use and disposal of chemicals that present an unreasonable risk of injury to health or the environment, most frequently arises with the question of when state and local governments are preempted from regulating a substance which EPA has regulated under TOSCA. Courts addressing the issue have differed widely on the preemptive effect of TOSCA. *Compare* Rollins Env'tl. Servs., Inc. v. Parish of St.

tamination after it has occurred rather than prospectively protect the quantity or quality of groundwater.

Waste that is disposed of in landfills, waste that percolates into groundwater from above ground, or waste injected directly into groundwater cause most groundwater contamination.⁸³ The Resource Conservation and Recovery Act (RCRA) regulates the generation, transportation, treatment, storage, and disposal of waste. Both RCRA and the Safe Drinking Water Act (SDWA) are designed to restrict land disposal of untreated waste and to contain releases from any unregulated land disposals. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and to a more limited extent RCRA, are also directed toward cleanup of existing contamination.

B. *The Clean Water Act*

EPA has some authority under the Clean Water Act to take preventive action against groundwater contamination, but it has done very little due to conflicting court decisions and EPA's own hesitancy to utilize the Act's provisions. The Act instructs EPA to develop programs for "preventing, reducing, or eliminating the pollution of the navigable waters and ground waters, and improving the sanitary condition of surface and underground waters. . . ."⁸⁴ The legislative history indicates that Congress intended that EPA regulate both surface and groundwater;⁸⁵ specific provisions in the Act refer to the regulation of groundwater.

Section 303⁸⁶ of the Clean Water Act establishes water quality standards and designated uses for bodies of water in conjunction with section 304⁸⁷ which establishes a methodology for criteria and

James, 775 F.2d 627 (5th Cir. 1985); *Twitty v. North Carolina*, 527 F. Supp. 778 (E.D.N.C. 1981), *aff'd*, 696 F.2d 992 (4th Cir. 1982) *with* Potomac Elec. Power Co. v. Sachs, 639 F. Supp. 856 (D. Md. 1986), *rev'd*, 802 F.2d 1527 (4th Cir. 1986); *SED, Inc. v. City of Dayton*, 519 F. Supp. 979 (W.D. Ohio 1981); *Rollins Env'tl. Servs., Inc. v. Township of Logan*, 199 N.J. Super. 70, 488 A.2d 258 (1984).

Beyond the scope of this analysis is regulation of nuclear disposal to prevent groundwater contamination. The federal government has preempted state and local regulation of safety aspects of nuclear regulation, although state and local governments still retain their traditional authority over certain aspects of land use decisionmaking. See *Pacific Gas & Elec. Co. v. State Energy Resources Conservation and Dev. Comm'n*, 461 U.S. 190 (1983).

83. A. TARLOCK, *supra* note 1, § 4.08[5].

84. CWA § 65, 33 U.S.C. § 1252(a) (1988).

85. MARKS, *supra* note 81, at 11 (citing 118 CONG. REC. H 33,766 (1972)).

86. CWA § 303, 33 U.S.C. § 1313 (1988).

87. CWA § 304, 33 U.S.C. § 1314 (1988).

information regarding the "factors necessary to restore and maintain the chemical, physical, and biological integrity of all navigable waters [and] groundwaters. . . ."⁸⁸ Section 303 also authorizes EPA to require states to promulgate groundwater quality standards for those groundwaters with a hydrologic nexus to surface waters.⁸⁹ However, EPA has not promulgated the criteria or information required by section 304 and has neither regulated groundwater at the federal level, nor required states to do so.⁹⁰ EPA has also refused to extend the Clean Water Act's National Pollutant Discharge Elimination System permits for point source discharges to discharges into groundwater,⁹¹ purportedly due to the legal problems in doing so. Nevertheless, EPA provides funding to state and local planning agencies for groundwater protection and management under section 205(j),⁹² but EPA's emphasis on groundwater preservation under the 1987 provision for state planning to control nonpoint source pollution remains uncertain.⁹³

The relative dearth of regulation under the Clean Water Act is not entirely the fault of EPA. EPA's efforts in the 1970s to control deep-well disposal of wastes met with resistance, and its litigation was not always successful.⁹⁴ As a result, EPA's power to regulate

88. CWA § 304, 33 U.S.C. § 1314 (1988).

89. CWA § 303, 42 U.S.C. § 1313 (1988).

90. Some states have included groundwater quality standards in their state regulations anyway. HENDERSON, *supra* note 1, at 42.

91. Marks, *supra* note 81, at 12 (citing EPA, Planning Workshop to Develop Recommendations for a Ground Water Protection Strategy, apps. vi-20, 21 (1980)).

The statute's ambiguity may be traced to the history of the 1972 amendments. An administration bill would have included coverage of groundwater, Federal Water Quality Administration, Department of Interior, Clean Water for the 1970's: A Status Report 16 (1970), and the legislative history includes arguments for a federal groundwater pollution control program. See, e.g., S. CONF. REP. NO. 1236, 92d Cong., 2d Sess. 116 (1972), reprinted in 1 COMMITTEE ON PUBLIC WORKS, A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 299 (1973); S. REP. NO. 414, 92d Cong., 1st Sess. 52-53 (1971), reprinted in 2 LEGISLATIVE HISTORY, *supra*, at 1470-71.

The primary hurdle to explicit regulation of groundwater was the perception that such regulation would constitute federal land use planning. S. NOVICK, LAW OF ENVIRONMENTAL PROTECTION § 13.01 [3] (1988). The resulting ambiguity in the 1972 legislation left both sides believing their position had prevailed. See S. REP. NO. 414 at 98, reprinted in 2 LEGISLATIVE HISTORY, *supra*, at 1513.

92. HENDERSON, *supra* note 1, at 43. Section 205(j) of the Clean Water Act authorizes EPA to provide grants to states for water quality management planning. 33 U.S.C. § 1285 (1988).

93. CWA § 319, 33 U.S.C. § 1329 (1988); discussed in notes 84-94, *supra*, and accompanying text.

94. For example, in *United States v. GAF Corp.*, 389 F. Supp. 1379 (S.D. Tex. 1975), the court held that EPA lacked authority to regulate deep-well injection or any groundwater pollution not connected with surface water. When EPA responded later

groundwater, whether or not connected to surface water, is unclear.

C. *The Safe Drinking Water Act*

1. Maximum Contaminant Levels

The Safe Drinking Water Act (SDWA) is designed to assure the safety of water supplies for human consumption. Although the federal statute provides the strongest protection against groundwater contamination, the Act necessarily applies only to groundwater used as a source for drinking water. The SDWA protects drinking water (1) by controlling maximum contaminant levels (MCLs) and setting national standards to regulate the necessary purity level for drinking water, (2) by establishing a program to protect sole source aquifers (the primary source of drinking water for an entire community), and (3) by creating a program to control underground injection of waste. Generally, to protect the quality of drinking water, EPA sets National Primary Drinking Water Standards for "public water systems" at a level that protects the public health. States may adopt their own standards so long as they are at least as stringent as the federal standards. After EPA approval of state standards, a state may assume responsibility for administering and enforcing the Act's requirements.⁹⁵

The Act's minimum standards apply only to "public water systems." A "public water system" is "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."⁹⁶

by requiring permits for deep-well injection with groundwater "associated" with surface water, its approach was upheld by the Seventh Circuit of Appeals in *United States Steel Corp. v. Train*, 556 F.2d 822 (7th Cir. 1977), but invalidated by the Fifth Circuit in *Exxon Corp. v. Train*, 554 F.2d 1310 (5th Cir. 1977).

95. SDWA § 1413, 42 U.S.C. § 300g-2 (1988).

96. SDWA § 1401(4), 42 U.S.C. § 300f(4) (1988). Under this definition, "public" water systems can be privately owned. S. NOVICK, *supra* note 91, § 16.02[1]. Connections to homes or buildings are "service connections." *Id.* § 16.02[1]. "Public water systems" include "(A) collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (B) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system." *Id.* (citing SDWA § 1401(4), 42 U.S.C. § 300f(4) (1988)). Exempt from the definition is a system that has only distribution and storage facilities, obtains all its water from a public water system but is not owned or operated by it, does not sell water, and is not a carrier that conveys passengers in interstate commerce. SDWA § 1411, 42 U.S.C. § 300g (1988).

EPA has administratively created three classes of public water systems. Community systems are systems that serve at least fifteen service connections used by year-round residents or that regularly serve at least twenty-five year-round residents. S. NOVICK,

EPA sets Primary and Secondary regulations for drinking water. The National Primary Drinking Water Regulations (NPDWRs) are enforceable standards to protect public health, while the National Secondary Drinking Water Regulations (NSDWRs) are unenforceable aesthetic standards to protect the public welfare. NPDWRs require compliance with Maximum Contaminant Levels (MCLs) or treatment techniques for contaminants that may adversely affect the public health.⁹⁷ A "contaminant" includes "any physical, chemical, biological, or radiological substance or matter in water;"⁹⁸ and EPA may utilize treatment techniques whenever it is not "economically or technologically feasible" to determine the acceptable level of a contaminant.⁹⁹ Water delivered to users may not exceed MCLs, although a public water system may use whatever method it chooses to comply with the MCLs.¹⁰⁰

EPA is required to establish an NPDWR for any contaminant which "may have any adverse effect on the health of persons and which is known or anticipated to occur in public water systems."¹⁰¹ Under the 1986 amendments, EPA had to meet a schedule for regulating eighty-three designated contaminants by June 19, 1989.¹⁰²

supra note 91, § 16.02[2], (citing 40 C.F.R. § 141.2 (1988)). Community systems are required to meet all drinking water standards. Non-community systems are all other public water systems that serve twenty-five individuals at least sixty days per year. *Id.* These non-community systems have only been required to meet drinking water standards for certain toxic pollutants. 40 C.F.R. §§ 141.11(a)-(d), 141.13, 141.14 (1988). One type of non-community system has recently been required to comply with primary drinking water standards. This type of system is the non-transient non-community water system; water systems serving at least twenty-five of the same individuals over six months per year. *See* 40 C.F.R. § 141.2 (1988); 52 Fed. Reg. 25695, 25712 (1987).

97. SDWA § 1401(1), 42 U.S.C. § 300f(1). NPDWRs also include monitoring procedures for enforcement and may include requirements for minimum quality of intake waters and siting. S. NOVICK, *supra* note 91, § 16.03[1][a] (citing SDWA § 1401(1)(D), 42 U.S.C. § 300f(1)(D) (1988)).

98. SDWA § 1401(6), 42 U.S.C. § 300f(6) (1988).

99. SDWA § 1412(b)(7)(A), 42 U.S.C. § 300g-1(b)(7)(A) (1988).

100. SDWA § 1412(b)(6), 42 U.S.C. § 300g-1(b)(6) (1988). The exception to this flexibility is that systems may not use bottled water or point-of-use treatment devices to meet the MCLs. 52 Fed. Reg. 25701 (1987).

101. SDWA § 1412(b)(3)(A), 42 U.S.C. § 300g-1(b)(3)(A) (1988). Therefore, EPA may regulate when there is a risk of adverse health effects. EPA has indicated that it will establish an NPDWR for a contaminant when there are: "(1) analytical methods to detect a contaminant in drinking water; (2) sufficient health effects information to conclude that there may be a health concern; and (3) occurrence in drinking water or potential for increased occurrence in drinking water." S. NOVICK, *supra* note 91, § 16.03[1][b], (citing 50 Fed. Reg. 46,940-41 (1985)); *see also* Natural Resources Defense Council, Inc. v. Environmental Protection Agency, 824 F.2d 1211 (D.C. Cir. 1987) (EPA can regulate contaminants even without a showing of "significant risk").

102. SDWA § 1412(b)(1), 42 U.S.C. § 300g-1(b)(1) (1988). The eighty-three contaminants are listed in two Advance Notices of Proposed Rulemaking. *See* SDWA

The NPDWRs now require two treatment techniques: disinfection and filtration in public water systems in place of MCLs that are no longer feasible.¹⁰³ After January 1, 1988, EPA must also publish a triennial priority list of contaminants for regulation.¹⁰⁴ EPA must propose NPDWRs for at least twenty-five of the contaminants on the list within two years of that contaminant's listing and promulgate regulations within three years of a listing.¹⁰⁵ In preparing the lists, EPA includes contaminants that appear frequently in groundwater and for which there is sufficient information to evaluate any adverse effects on health.¹⁰⁶

In regulating a contaminant, the EPA first sets an unenforceable Maximum Contaminant Level Goal (MCLG) where "no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety."¹⁰⁷ The MCLG serves as the basis for establishing an enforceable Maximum Contaminant Level, which must be set as close as "feasible" to the MCLG.¹⁰⁸ If an MCL is technologically or economically infeasible to monitor, treatment techniques must substitute for the MCL.¹⁰⁹

§ 1412(b)(1), 42 U.S.C. § 300g-1(b)(1) (1988). This list of contaminants included twenty-two for which there were already NPDWRs, and EPA substituted seven contaminants for those on the list which it considered more dangerous. S. NOVICK, *supra* note 91, § 16.03[1][b]. The seven substituted contaminants may be found in 53 Fed. Reg. 1892 (1988).

103. SDWA §§ 1412(b)(7)(c), (b)(8), 42 U.S.C. §§ 300g-1(b)(2)(c), (b)(8) (1988). Disinfection is for systems using surface and ground waters, and filtration is for systems using surface water. S. NOVICK, *supra* note 91, § 16.03[1][d].

104. SDWA §§ 1412(b)(3)(A)-(D), 42 U.S.C. § 300g-1(b)(3)(A)-(D) (1988). The first triennial list may be found in 53 Fed. Reg. 1892 (1988).

105. SDWA § 1412(b)(3)(C), (D), 42 U.S.C. § 300g-1(b)(3)(C), (D) (1988). EPA must consider for testing contaminants that are "known or anticipated to occur" in public water systems and that have an adverse effect on public health. S. NOVICK, *supra* note 91, § 16.03[1][b]. In determining occurrence of a contaminant in public water systems, EPA has taken the position that it may regulate contaminants that occur in any drinking water, including that in private wells, surface water, liquid or solid waste, and groundwater. 50 Fed. Reg. 46,941-43 (1985).

106. 53 Fed. Reg. 1892-1902 (1988) (to be codified at 40 C.F.R. pt. 141). Hazardous substances under CERCLA and RCRA, as well as regulated substances under FIFRA have also been included in the tests. S. NOVICK, *supra* note 91, § 16.03[1][b].

107. SDWA § 1412(b)(4), 42 U.S.C. § 300g-1(b)(4) (1988).

108. SDWA § 1412(b)(4)-(5), 42 U.S.C. § 300g-1(b)(4)-(5) (1988). In *Natural Resources Defense Council, Inc. v. Environmental Protection Agency*, 824 F.2d 1211 (D.C. Cir. 1987), the court upheld EPA's policy of setting an MCL of zero for probable animal or human carcinogens. For further elaboration on EPA's practice in setting MCL's, see 50 Fed. Reg. 46,944-51 (1985) (to be codified at 40 C.F.R. pt. 141).

109. SDWA § 1401(1)(c)(ii), 42 U.S.C. § 300f(1)(c)(ii) (1988). In determining whether an MCL is infeasible, EPA is to consider whether effective monitoring is technologically available and whether the frequency of monitoring required is economically feasible. H.R. REP. No. 1185, 93d Cong., 2d Sess. 11-12 (1974).

MCLs and treatment techniques are designed to protect health to the extent "feasible," meaning the use of "the best technology, treatment techniques and other means which . . . , after examination for efficacy under field conditions . . . , are available (taking cost into consideration)."¹¹⁰ In short, water must be treated to control a regulated contaminant with the best available technology (BAT).¹¹¹ When EPA determines that a MCL has been exceeded, the agency must either commence a civil enforcement action or issue an administrative order if the violation continues for more than thirty days, and commence enforcement action immediately in states which lack enforcement authority.¹¹²

Less important secondary regulations are set to control contaminants affecting the odor, appearance, taste, or aesthetics of water.¹¹³ The SDWA requires EPA to notify a state when EPA determines that a system violates a secondary regulation because of the state's failure to take "reasonable action" to compel compliance.¹¹⁴ The secondary standards may also be enforceable under state law.¹¹⁵

2. Wellhead Protection

The 1986 amendments to SDWA establish two programs—the wellhead protection and the sole source aquifer demonstration programs—to protect groundwater. Previous attempts of legislating national groundwater quality standards failed to obtain Congressional approval.¹¹⁶ By June 1989, every state had to submit to EPA a program to protect "well head protection areas"¹¹⁷ from contamination. A "wellhead protection area" is "the surface and subsurface area surrounding a water well or wellfield (1) which supplies a public water system and (2) through which contaminants are reasonably likely to move toward and reach such water well or well

110. SDWA § 1412(b)(5), 42 U.S.C. § 300g-1(b)(5) (1988).

111. S. NOVICK, *supra* note 91, § 16.03[1][d]. The legislative history indicates that the costs to be taken into consideration are the reasonable costs to large metropolitan or regional public water systems, and EPA has also considered total nationwide costs of compliance. *Id.*

112. SDWA § 1414(a)(1)(B), 42 U.S.C. § 300g-3(a)(1)(B) (1988). There are limited provisions for variances and exemptions. See SDWA § 1415(a)(1)(A), 42 U.S.C. § 300g-4(a)(1)(A) (1988) (variances), and SDWA § 1416, 42 U.S.C. § 300g-5 (1988) (exemptions).

113. S. NOVICK, *supra* note 91, § 16.03[3].

114. SDWA § 1414(d), 42 U.S.C. § 300g-3(d) (1988).

115. S. NOVICK, *supra* note 91, § 16.03 [3].

116. D. STEVER, *LAW OF CHEMICAL REGULATION AND HAZARDOUS WASTE* § 7.04[3] (1988).

117. SDWA § 1428(a), 42 U.S.C. § 300h-7(a) (1988).

field.”¹¹⁸ Each state program must determine the boundaries of each wellhead protection area, identify all potential “anthropogenic” sources of contamination that may endanger public health, designate the state agency responsible for administering the program, describe the program’s methodology for protection, and provide contingency plans for alternative water supplies to contaminated water.¹¹⁹

Every state program must be submitted to EPA for approval. EPA must respond within nine months of submission,¹²⁰ and if EPA disapproves, a state has six months to cure any defects.¹²¹

3. Sole Source Aquifer Demonstration Program

The sole source aquifer demonstration program is a grant program that reimburses states for fifty percent of their costs in developing and implementing state programs to identify and preserve “critical aquifer protection area[s].”¹²² A “critical aquifer protection area” is generally either (1) an area which meets EPA’s criteria for the susceptibility of the aquifer to contamination, the number of people using the groundwater as a drinking water source, and for the costs and benefits of protection, or (2) an area designated as a sole source aquifer for which an areawide groundwater protection plan was approved under section 208 of the Clean Water Act.¹²³ A state, municipal or local government, and regional planning entities with approval of the governor of the state may apply for these funds.¹²⁴

The goal of a state comprehensive management plan is “to maintain the quality of the groundwater in the critical protection area in a manner reasonably expected to protect human health, the environment and groundwater resources.”¹²⁵ Each plan under section 1427(b) must (1) contain a map outlining the boundaries of the protected areas, (2) identify sources of groundwater contamination, (3) assess the relationship between land activities and groundwater

118. SDWA § 1428(e), 42 U.S.C. § 300h-7(e) (1988).

119. D. STEVER, *supra* note 116, § 7.04[3][a], (citing SDWA § 1428(a)(1)-(6), 42 U.S.C. § 300h-7(a)(1)-(6) (1988)).

120. SDWA § 1428(c), 42 U.S.C. § 300h-7(c)(1) (1988).

121. 42 U.S.C. § 300h-7(c)(2) (1988). States that have more than 2500 active wells that reinject brines between the production, and surface casing of oil and gas wells must have a program as well to control such contamination. SDWA § 1428(i), 42 U.S.C. § 300h-7(i)(2) (1988).

122. SDWA § 1427(c), 42 U.S.C. § 300h-6(j) (1988).

123. SDWA § 1427(b), 42 U.S.C. § 300h-6(b) (1988).

124. SDWA § 1427(c), 42 U.S.C. § 300h-6(c) (1988).

125. SDWA § 1427(f), 42 U.S.C. § 300h-6(f) (1988).

quality, (4) specify actions and management practices to prevent groundwater contamination, and (5) identify the authorities who will implement the plan, estimate its costs, and locate sources of state matching funds.¹²⁶ Programs can be adopted only after public hearings and federal consultation.¹²⁷ The Administrator of EPA must approve or disapprove an application for funding within 120 days based on whether it satisfies the criteria for identification of critical protection areas and includes the elements necessary for a program under section 1427(b).¹²⁸ Federal funding for any one aquifer may not exceed \$4,000,000 in any single fiscal year.¹²⁹

4. Underground Injection Control Program

A third program under the SDWA which protects groundwater is the Underground Injection Control (UIC) program. The purpose of the program is to regulate deep-well injection of wastes into "dry" wells.¹³⁰ Four types of regulations govern the UIC program:

126. SDWA § 1427(f)(1), 42 U.S.C. § 300h-6(f)(1)(A)-(E) (1988). The Act specifies that the following may also be included in a state program:

(A) A determination of the quality of the existing ground water recharged through the special protection area and the natural recharge capabilities of the special protection area watershed.

(B) Requirements designed to maintain existing underground drinking water quality or improve underground drinking water quality if prevailing conditions fail to meet drinking water standards, pursuant to this chapter and State law.

(C) Limits on Federal, State, and local government, financially assisted activities and projects which may contribute to degradation of such ground water or any loss of natural surface and subsurface infiltration of purification capability of the special protection watershed.

(D) A comprehensive statement of land use management including emergency contingency planning as it pertains to the maintenance of the quality of underground sources of drinking water or to the improvement of such sources if necessary to meet drinking water standards pursuant to this chapter and State law.

(E) Actions in the special protection area which would avoid adverse impacts on water quality, recharge capabilities, or both.

(F) Consideration of specific techniques, which may include clustering, transfer of development rights, and other innovative measures sufficient to achieve the objectives of this section.

(G) Consideration of the establishment of a State institution to facilitate and assist funding a development transfer credit system.

(H) A program for State and local implementation of the plan described in this subsection in a manner that will insure the continued, uniform, consistent protection of the critical protection area in accord with the purposes of this section.

(I) Pollution abatement measures, if appropriate.

42 U.S.C. § 300h 6(f)(2)(A)-(E) (1988).

127. SDWA § 1427(h), 42 U.S.C. § 300h-6(h) (1988).

128. SDWA § 1427(i), 42 U.S.C. § 300h-6(i) (1988).

129. SDWA § 1427(j), 42 U.S.C. § 300h-6(j) (1988).

130. See STEVER, *supra* note 116, § 7.04[4][a]. "Underground injection" is defined as "the subsurface emplacement of fluids by well injection" and does not include "un-

(1) general criteria and performance standards; (2) standards and procedures for approval of state programs; (3) provisions from state programs approved in whole or in part by EPA; and (4) procedural and substantive permit requirements administered by EPA in states lacking approved programs.¹³¹ The extent of regulation of a deep injection well depends upon which of the five regulatory categories best describe it. Class I wells are those used by hazardous waste generators, owners or operators of hazardous waste treatment, storage, and disposal facilities as defined by the regulations under RCRA,¹³² and other industrial and municipal injection wells.¹³³ Class II wells include wells used by the petroleum industry for conventional oil and gas extraction.¹³⁴ Class III wells are those used by the mining and power generation industries.¹³⁵ The most extensive standards and criteria apply to wells in Classes I through III.¹³⁶ Class IV wells are those in which radioactive or hazardous waste is injected above or into a formation with an underground source of drinking water within a quarter mile of the well.¹³⁷ The 1984 amendment to RCRA prohibits all such wells.¹³⁸ Finally, Class V wells include "cesspools and septic systems serving multi-family or industrial structures, drainage wells, and assorted other wells."¹³⁹ The owner or operator of a Class V well must identify the well to the director of the applicable state program. The director must then complete a study of the well's potential for contamination within three years of EPA's approval of the state program.¹⁴⁰

Those states with approved programs administer the requirements for each class of regulated well through a permit system,¹⁴¹

derground injection of natural gas for purposes of storage." SDWA § 1421(d), 42 U.S.C. § 300h(d) (1988).

131. STEVER, *supra* note 116, § 7.04[4][a], (citing 40 C.F.R. pt. 146, pt. 145, pt. 147, and pts. 144, 146, and 147 respectively (1988)).

132. *See infra* notes 154-269 and accompanying text. In a 1984 amendment to the RCRA, disposal of hazardous waste by injection is prohibited into or above a formation that is within one quarter mile an underground source of drinking water. The amendment was self-executing, except in states with more stringent UIC requirements prior to May 8, 1985, and except for reinjections of treated groundwater pursuant to a response action under CERCLA. *See* STEVER, *supra* note 116, § 7.04[4][a] n.148.

133. 40 C.F.R. § 146.5(a) (1988).

134. 40 C.F.R. § 146.5(b) (1988).

135. 40 C.F.R. § 146.5(c) (1988).

136. 40 C.F.R. § 146.9(b) (Class I), § 146.9(c) (Class II), § 146.9(d) (Class III) (1988).

137. 40 C.F.R. § 146.5(d) (1988).

138. *See supra* note 132.

139. STEVER, *supra* note 116, § 7.04[4][a], (citing 40 C.F.R. § 146.05(e)).

140. 40 C.F.R. § 146.52 (1988).

141. SDWA § 1422, 42 U.S.C. § 300h-1 (1988). "Any person" may petition EPA to

and may impose requirements more stringent than the federal UIC.¹⁴² EPA may not enforce the Act's requirements directly in a state that has an approved program without thirty days notice to the state of an alleged violation.¹⁴³ After such notice, EPA may issue an administrative order.¹⁴⁴ If a state does not have an approved program, EPA administers the UIC regulations, and can issue an administrative order without prior notice, or seek civil or criminal judicial relief against violators.¹⁴⁵

Excluded from regulation under the UIC program are aquifers that are not then or in the future suitable for water supply, and aquifers that are "mineral, hydrocarbon or geothermal energy producing, or are capable of becoming commercially mineral or hydrocarbon energy producing."¹⁴⁶ States are also authorized to devise special programs for "the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or . . . any underground injection for the secondary or tertiary recovery of oil or natural gas. . . ."¹⁴⁷ Such programs need not meet the requirements for the state's general UIC program but must meet certain procedural requirements for a permit system¹⁴⁸ and be "an effective program (including adequate record keeping and reporting) to prevent underground injection which endangers drinking water

require a permit in an area of a state or states for deep well injection pending an approved state program. EPA may also so designate an area upon a determination that the area has one aquifer which is "the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health." SDWA § 1424(a)(1), 42 U.S.C. § 300h-3(a)(1) (1988).

142. SDWA § 1422(b)(1)(B)(3), 42 U.S.C. § 300h-1(b)(1)(B) (1988). Basically, the permit program must ensure that underground injection will not endanger drinking water sources. For the definition of endangerment of drinking water, see *Natural Resources Defense Council v. Environmental Protection Agency*, 824 F.2d 1258, 26 E.R.C. 1233 (1st Cir. 1987) (court upheld EPA's allowing contamination within disposal area, but struck down EPA's allowance of contamination outside the disposal area in concentrations greater than the SDWA requirements).

143. SDWA § 1423(a)(1), 42 U.S.C. § 300h-2(a)(1) (1988).

144. The maximum administrative penalty is \$125,000, with a maximum of \$10,000 per day of violation (\$5000 per day for petroleum extractors). An appeal of an administrative order must be made to the district court for the District of Columbia. SDWA § 1423(c), 42 U.S.C. § 300h-2(c) (1988).

145. SDWA § 1423(b), 42 U.S.C. § 300h-2(b) (1988). Civil remedies include injunctive relief and penalties of up to \$25,000 per day; criminal punishment includes imprisonment for not more than three years, fines or both for "willful" violations. *Id.*

146. 40 C.F.R. § 146.4 (1988).

147. SDWA § 1425(a), 42 U.S.C. § 300h-4(a) (1988).

148. These requirements are set out in SDWA § 1421(b)(1)(A)-(D), 42 U.S.C. 300(h)(b)(1)(A)-(D) (1988).

sources."¹⁴⁹

Because EPA does not extensively regulate Class I and V wells, Congress amended the SDWA in 1986.¹⁵⁰ Under the amendments, by January 1988, EPA had to identify methods for groundwater monitoring at Class I wells to provide the earliest possible detection of migration into or towards drinking water.¹⁵¹ The amendments also required EPA to report to Congress on the number and categories of Class V wells discharging nonhazardous waste into or above an underground source of drinking water, the primary contamination problems associated with each category, and recommendations for minimum design, construction, installation, and siting requirements to prevent such contamination.¹⁵² Finally, a 1984 amendment to RCRA requires that EPA reconsider allowing injection of cyanides, heavy metals, acids, polychlorinated biphenyls, halogenated organics, solvents, and dioxins before August 1988, and prohibit injection of these wastes after that date unless EPA determines that continued injection will not endanger public health under the criteria set forth in the amendment.¹⁵³

D. *The Resource Conservation and Recovery Act*

1. In General

In part, Congress intended the Resource Conservation and Recovery Act (RCRA) to strengthen the weak land use requirements to remedy groundwater contamination by nonpoint source pollution imposed on the states under section 208 of the Clean Water Act.¹⁵⁴ Yet, by 1984, it was clear that RCRA could not effectively protect groundwater from ongoing waste disposal. The "natural implication" of RCRA's amendments in 1984 was that "groundwater would be protected, regardless of cost,"¹⁵⁵ and that both RCRA and the Comprehensive Environmental Response, Compen-

149. SDWA § 1425(a), 42 U.S.C. § 300h-4(a) (1988).

Underground injection endangers drinking water sources if such injection may result in the presence in underground water which supplies or can reasonably be expected to supply any public water system of any contaminant, and if the presence of such contaminant may result in such system's not complying with any national primary drinking water regulation or may otherwise adversely affect the health of persons.

SDWA § 1421(d), 42 U.S.C. § 300h(d) (1988).

150. STEVER, *supra* note 116, § 7.04[4][a].

151. SDWA § 1426(a), 42 U.S.C. § 300h-5(a) (1988).

152. SDWA § 1426(b), 42 U.S.C. § 300h-5(b) (1988).

153. RCRA § 3004(f), 42 U.S.C. § 6924(f) (1988).

154. See S. NOVICK, *supra* note 91, § 13.01[3].

155. *Id.*

sation and Liability Act (CERCLA or the "Superfund" Act) were as much groundwater protection statutes as waste disposal laws.

The Solid Waste Disposal Act (SDWA), of which RCRA is a part, regulates "solid waste," broadly defining the term to include what is commonly considered solid waste as well as liquids and contained gases.¹⁵⁶ Under SWDA, states have the responsibility for devising two types of state management plans—one for solid waste disposal and another for hazardous waste disposal. For solid waste disposal, EPA must promulgate criteria for state plans, and specifically consider:

the varying regional, geologic, hydrologic, climatic and other circumstances under which different solid waste practices are required in order to insure the reasonable protection of the quality of the ground and surface waters from leachate contamination, the reasonable protection of the quality of the surface waters from surface runoff contamination, and the reasonable protection of ambient air quality.¹⁵⁷

The plans must distinguish between "sanitary landfills" and open dumps, prohibit the establishment of new open dumps, and require that all solid waste be utilized for resource recovery, disposed of in sanitary landfills, or be "otherwise disposed of in an environmentally sound manner."¹⁵⁸ All existing open dumps must either close or upgrade and become sanitary landfills.¹⁵⁹ Once a state plan is approved by EPA, the state is eligible for federal financial assistance to implement the plan and for resource conservation planning and demonstration projects.¹⁶⁰ Despite these requirements, little money has been appropriated and the process can only be enforced through withholding financial assistance to recalcitrant states.¹⁶¹ As a result, regulation of solid waste disposal continues to be a local concern of towns, municipalities, and counties.

Under RCRA, hazardous waste is a type of solid waste, and

156. RCRA § 1004(27), 42 U.S.C. § 6902(27) (1988). "Solid waste" is defined as ". . . any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and any other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. . . ." *Id.*

157. RCRA § 4002(c)(1), 42 U.S.C. § 6942(c)(1) (1988).

158. RCRA § 4003(a)(2), 42 U.S.C. § 6943(a)(2) (1988).

159. *Id.* §§ 4003(a), 4005, 42 U.S.C. §§ 6943(a)(3), 6945(a) (1988). EPA establishes criteria to distinguish between open dumps and sanitary landfills. At a minimum, such criteria must provide that a facility is a sanitary landfill only if "there is no reasonable probability of adverse effects on health or the environment from disposal of solid waste" at the facility. RCRA § 4004(a), 42 U.S.C. § 6944(a) (1988).

160. RCRA §§ 4007-4008, 42 U.S.C. §§ 6947(b)-6948 (1988).

161. S. NOVICK, *supra* note 91, § 13.02[2][b][ii].

therefore includes "discarded" materials that may be solid, liquid, or gaseous.¹⁶² RCRA defines hazardous waste broadly as solid waste which may "cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or . . . pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed."¹⁶³ EPA will consider a waste to be hazardous if EPA lists it as such, or if tests demonstrate the waste to be hazardous.¹⁶⁴ Any solid waste generated from treatment, storage, or disposal of listed hazardous waste is also considered hazardous.¹⁶⁵ Every generator must test all its own waste to determine if it meets the criteria for hazardous waste.¹⁶⁶ Hazardous waste regulations continue to apply even when the waste is mixed with nonhazardous waste, unless the mixture

162. See *supra* note 156. Discarded materials may be those that are released into the environment if not promptly recovered, byproduct materials stored more than ninety days, materials accumulated for recycling, and some recovered or recycled materials. 40 C.F.R. § 261.2(a)(2), (b), (c) (1989).

163. RCRA § 1004(5), 42 U.S.C. § 6903(5) (1988). There are statutory exclusions for sewage, irrigation return flows, industrial point source discharges by permit under the Clean Water Act, and regulated nuclear materials. RCRA § 1004(27), 42 U.S.C. § 6903(27) (1988). Household wastes are also excluded, RCRA § 3001(i), 42 U.S.C. § 6921(i) (1988), as are mining wastes, RCRA §§ 1006(c), 3001(b)(3)(A)(ii), 3005(f), 42 U.S.C. §§ 6905(c), 6921(b)(3)(A)(ii), 6925(f) (1988). Pending study by EPA, also excluded are wastes from power production, oil and gas drilling, and cement kilns. RCRA § 3001(b)(3)(A), 42 U.S.C. § 6921(b)(3)(A) (1988); 40 C.F.R. §§ 261.4(b)(5), 261.4(b)(8) (1989). See generally STEVER, *supra* note 116, § 5.02[2][d], [e].

164. S. NOVICK, *supra* note 91, § 13.03[1][b][i].

165. 40 C.F.R. § 261.3(c)(2) (1989). The procedure for designation of hazardous wastes is complex. First, there are criteria in RCRA that trigger consideration of a waste as hazardous if there is some hazard to health or the environment. See RCRA § 3001(a), 42 U.S.C. § 6921(a) (1988); 40 C.F.R. § 261.10 (1989). There are then two sets of criteria for listing (or delisting) such wastes as hazardous; criteria EPA uses to list types of waste as hazardous, 40 C.F.R. §§ 261.11, 261.20 (1989), and criteria each generator must use to determine whether a particular allotment of waste is hazardous, 40 C.F.R. §§ 261.11, 261.20 (1989). Common to both sets of criteria are four characteristics: "ignitability," "reactivity," "EP toxicity," and "corrosivity." 40 C.F.R. §§ 261.21-24; see S. NOVICK, *supra* note 91, § 13.03[1][b][i][B]. In listing a waste as hazardous, EPA also considers additional criteria in 40 C.F.R. § 261.11 (1989). A waste must be listed if it meets any of the criteria in 40 C.F.R. § 261.11 (1989), unless it falls within an exception provided in 40 C.F.R. § 261.11(a)(3) (1989). EPA may also classify wastes as hazardous under the regulations by applying the general hazard criteria in RCRA § 1004(5), 42 U.S.C. § 6903(5) (1988); 40 C.F.R. § 261.11(b) (1989).

The governor of a state may petition EPA to identify or list a waste as hazardous. RCRA § 3001(c), 42 U.S.C. § 6921(c) (1988). Also, any person may petition EPA to exempt from a listed waste a waste produced by a particular generator. 40 C.F.R. § 260.22 (1989).

166. 40 C.F.R. § 262.11 (1989).

does not meet the criteria for hazardous waste.¹⁶⁷

The purpose of RCRA's permit system is to provide a "cradle to grave" system of documentation for identifying hazardous waste and controlling its treatment, storage, and disposal. Any facility that handles hazardous waste is either (1) a generator, (2) a transporter, or (3) a treatment, storage, and disposal (TSD) facility, with each type of operation subject to its own set of regulations. Generators are regulated to insure that no hazardous waste goes unidentified, transporters to insure that hazardous waste is identified as such and safely transported, and treatment, storage, or disposal sites to insure that no hazardous wastes release into the environment.

Every generator¹⁶⁸ must first determine if a waste is hazardous and, if so, notify EPA or the relevant state agency.¹⁶⁹ A manifest—a shipping document meeting national standards including among its requirements identifying the waste and its source¹⁷⁰—must accompany wastes shipped off-site, and a generator must keep records of all notices, manifests, and reports.¹⁷¹ Treatment, storage, or disposal facilities that accept wastes must return a copy of the manifest to the generator, who must store the document and/or report any failure to receive the manifest.¹⁷² Each generator must have a plan for minimizing waste production.¹⁷³ For accumulated waste, the generator must meet minimum standards for design and operation, use suitable containers, and train and employ personnel to respond to emergencies.¹⁷⁴ Where the accumulated waste exceeds certain limits, the generator becomes a storage facility and must then meet the additional requirements of the Act for such a facility.¹⁷⁵ Generators may still store and handle waste for brief designated periods of time without becoming a storage facility.¹⁷⁶ Generators that dispose of their wastes at land disposal facilities must first determine whether the wastes are eligible for land disposal without dilution.

Special exemptions apply to small quantity generators. Congress

167. 40 C.F.R. § 261.3(a)(2)(iii) (1988).

168. "Generator" is not defined in the statute, but is defined in the regulations as "any person, by site, whose act or process first causes a hazardous waste to be subject to regulation." 40 C.F.R. § 261.10 (1988). Importers and exporters of hazardous waste are deemed generators. 40 C.F.R. §§ 262.10(c), 262.50 (1989).

169. 40 C.F.R. § 262.11 (1989).

170. 40 C.F.R. § 262 (1989).

171. 40 C.F.R. § 262.40 (1989).

172. 40 C.F.R. § 262.42 (1989).

173. RCRA § 3002(b), 42 U.S.C. § 6922(b) (1988).

174. 40 C.F.R. § 262.34 (1988).

175. 40 C.F.R. § 262.34 (1988).

176. 40 C.F.R. § 263.12 (1988).

removed a very broad exemption for all small quantity generators, leaving only three categories of small quantity generators: (1) generators of between 100 and 1000 kilograms per month; (2) generators of less than 100 kilograms per month; and (3) generators of acutely hazardous waste of one kilogram or less in any one month or of up to 100 kilograms of soil or debris contaminated with acutely hazardous waste.¹⁷⁷ The first category is subject to the requirements that apply generally to all generators, but can store waste for a longer period without becoming a storage facility.¹⁷⁸ Generators in the second category are exempt from regulation as generators as long as they meet certain additional conditions.¹⁷⁹ The third category of generator is also exempt from the regulations applicable to large quantity generators, but must send its acutely hazardous waste to state licensed facilities.¹⁸⁰

Transporters receive identification numbers and must also carry the generator's manifests with every shipment of hazardous waste, identify the waste, and deliver the manifest with the waste to the ultimate destination.¹⁸¹ The transporter must also notify EPA or the state agency of hazardous waste delivered before the manifest system was operational,¹⁸² if the transporter chose the destination. The Department of Transportation regulates the transportation of hazardous waste more rigorously than RCRA.¹⁸³

177. See S. NOVICK, *supra* note 91, § 13.03[3][a][iii].

178. Wastes may be stored for up to 180 days if the quantity of waste does not exceed 6000 kilograms. If the waste must be sent more than 200 miles off-site for treatment, storage or disposal, the waste may be stored for up to 270 days. 51 Fed. Reg. 10,175 (1986) (codified at 40 C.F.R. § 262.34(d), (e) (1988)).

179. 40 C.F.R. § 262.34(b) (1988). The exemption applies month by month. The generator must test the wastes to ensure that none are acutely hazardous (thus placing the generator into the third category) or accumulated beyond the limits to qualify for the second category. The generator must send acutely hazardous waste to a permitted facility, a reclamation facility, or another facility licensed by the state for solid waste. The generator may not mix the wastes with used oil or with fuel for burning without complying with the regulations applicable to large quantity generators. See S. NOVICK, *supra* note 91, § 13.03[3][a][ii], (citing 51 Fed. Reg. 10,174, 10,175 (1986) (codified at 40 C.F.R. § 261.5(b), (h) (1988))).

180. 51 Fed. Reg. 10,174 (codified at 40 C.F.R. § 261.5(f)(3)(ii) (1988)).

181. 40 C.F.R. § 262 (1988).

182. There are criminal penalties for failure to give such notice. CERCLA § 103(c)(d), 42 U.S.C. § 9603(c)(d) (1988).

183. 49 C.F.R. §§ 171-179 (1988).

By far, RCRA reserves its most comprehensive regulations for treatment,¹⁸⁴ storage,¹⁸⁵ and disposal¹⁸⁶ facilities. The Act prohibits the treatment, storage, or disposal of hazardous waste at a "facility"¹⁸⁷ without a permit under RCRA or approval by EPA of "interim status." If the owner and operator do not obtain a permit from EPA, or a designated state agency if the state has an approved program,¹⁸⁸ the facility cannot operate.¹⁸⁹

To expedite approval of state programs, EPA provided "interim authorization" for "substantially equivalent" state programs until January 31, 1986.¹⁹⁰ Under the 1984 amendments, however, EPA could contract with states without authorized programs.¹⁹¹ These contracts generally consisted of administering other requirements of the federal program.¹⁹² In addition, state laws which are more stringent than the federal requirements or which go beyond the

184. "Treatment" is defined in the statute as:

any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste nonhazardous, safer for transport, amenable for recovery, amenable for storage, or reduced in volume. Such term includes activity or processing designed to change the physical form or chemical composition of hazardous waste so as to render it nonhazardous.

RCRA § 1004(34), 42 U.S.C. § 6903(34) (1988).

185. "Storage" is defined as "the containment of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste." RCRA § 1004(33), 42 U.S.C. § 6903(33) (1988).

186. The definition of "disposal" provides:

The term 'disposal' means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

RCRA § 1004(3), 42 U.S.C. § 6903(3) (1988).

187. "Facility" is not defined in the Act. There is a decidedly unhelpful definition in the regulations. 40 C.F.R. § 260.10(a) (1988). It has been suggested that the definition refers to land, structures, and appurtenances within property boundaries. See S. NOVICK, *supra* note 92, § 13.03[2][a]; STEVER, *supra* note 117, § 5.05[2][b], and authorities cited therein.

188. RCRA § 3005(c), 42 U.S.C. § 6925(c) (1988). EPA must approve a state program if it is equivalent to the federal program, consistent with programs in other states, and there is adequate assurance the plan will be enforced. RCRA § 3006, 42 U.S.C. § 6926 (1988). Once a program is approved or "authorized," the state agency enforces the program in lieu of EPA. RCRA § 3006(b), 42 U.S.C. § 6926(b) (1988). EPA has concurrent authority to enforce the state program's requirements. RCRA § 3008, 42 U.S.C. § 6928 (1988).

189. RCRA §§ 3005(a), 3008, 42 U.S.C. §§ 6925(a), 6928 (1988).

190. RCRA § 3006(c), 42 U.S.C. § 6926(c) (1988).

191. RCRA § 3006(c)(3), 42 U.S.C. § 6926(c)(3) (1988); 40 C.F.R. § 271.126 (1988).

192. S. NOVICK, *supra* note 91, § 13.03[4][a][i].

scope of RCRA are not preempted.¹⁹³ The result of this overlapping system of regulation is that a program in any given state under RCRA may have as many as four components, including a state authorized program, a program contracted to the state by EPA, a program administered directly by EPA, and state program requirements not preempted by RCRA.¹⁹⁴

All owners and operators of hazardous waste facilities in existence on November 19, 1980 had to submit the first part of a permit application to EPA or the authorized state.¹⁹⁵ The second part of the application, a detailed form, had to be completed by November 8, 1985 or within twelve months of a facility becoming regulated under RCRA, whichever occurred later.¹⁹⁶ New facilities must obtain permits prior to construction,¹⁹⁷ but the second part of their application need not be submitted until EPA so requires.¹⁹⁸ Permits last up to ten years, with review provided after five years.¹⁹⁹

Because of the long time necessary to review permit applications, RCRA granted "interim status" for existing facilities that had submitted the first part of the application.²⁰⁰ Under the 1984 amendments, existing facilities had to complete the first part of the application and meet interim status standards for groundwater monitoring and financial responsibility by November 8, 1985.²⁰¹ Interim status was limited to four years for land disposal facilities in existence on November 8, 1984 and eight years for all other facili-

193. See RCRA § 3009, 42 U.S.C. § 6929 (1988). State and local land use regulations governing siting, for example, are not preempted by RCRA.

194. S. Novick, *supra* note 91, § 13.03[4][a][ii]. After notice and comment procedures, EPA also has the authority to revoke authorization of a state program which is not being administered or enforced in accordance with EPA guidelines. RCRA § 3006(e), 42 U.S.C. § 6926(e) (1988).

195. 40 C.F.R. § 270.10 (1988). Facilities closed before July 26, 1982 do not have to complete their application, but facilities closed after that date do have to do so and continue surveillance and corrective action for the period of the permit. 40 C.F.R. § 270.1(c). "Part A" of the application forms requires only a general description of the facility and its activities. 40 C.F.R. § 270.13.

196. RCRA § 3005(e)(3), 42 U.S.C. § 6925(e)(3) (1988).

197. RCRA § 3005(a), 42 U.S.C. § 6925(a) (1988).

198. 40 C.F.R. § 270.10(e)(4) (1988).

199. RCRA § 3005(c), 42 U.S.C. § 6925(c); 40 C.F.R. §§ 270.41, 270.50 (1988). Permits may be modified, suspended, or revoked by EPA. RCRA § 3005(c), 42 U.S.C. § 6925(c); 40 C.F.R. §§ 270.41, 270.50 (1988). EPA must provide public notice and an opportunity to comment on every application. A hearing may be requested with administrative appeals within EPA and ultimately judicial review. 40 C.F.R. § 270 (1988). With state issued permits, state law controls the availability of administrative and judicial review. 40 C.F.R. § 271.124(c).

200. RCRA § 3005(e), 42 U.S.C. § 6925(e) (1988).

201. RCRA § 3005(c)(2)(C), 42 U.S.C. § 6925(c)(2)(C) (1988).

ties.²⁰² All interim status facilities must maintain records for inspection,²⁰³ meet the requirements of the Act for closure, provide evidence of insurance, maintain security, and demonstrate financial ability to comply with closure and post-closure requirements. The interim status facilities must also monitor groundwater quality, remedy whenever it exceeds acceptable levels,²⁰⁴ and maintain surveillance for years after closure and longer if a permit requires corrective action.

Facility permits consist of general requirements for all facilities, categorical requirements for the relevant category of facility, and, frequently, specific requirements for the licensed facility negotiated with EPA or the state agency.²⁰⁵ The general requirements include minimum design standards, operating requirements, evidence of financial responsibility, liability insurance against third party claims for physical injury and property damage, and closure and post-closure requirements.²⁰⁶

Subpart F²⁰⁷ imposes stringent groundwater monitoring requirements. EPA had administratively excluded some interim status facilities,²⁰⁸ but a 1984 amendment requires that surface impoundments, landfills, land treatment units, and waste-pile units that receive hazardous waste after July 26, 1982 meet the groundwater monitoring requirements.²⁰⁹ A groundwater monitoring system must be maintained during the active life of the facility. Facilities required to do "detection monitoring"²¹⁰ must continue that monitoring during the post-closure period of approximately thirty years.²¹¹ In addition, facilities compelled to do "compliance monitoring"²¹² or take "corrective action"²¹³ must do so for anywhere from a number of years after the active life of the facility to a time when the groundwater protection standard²¹⁴ has not been ex-

202. RCRA § 3005(c)(2)(C), 42 U.S.C. § 6925(c)(2)(C) (1988).

203. RCRA § 3005(e)(2), 42 U.S.C. § 6925(e)(2); 40 C.F.R. § 265 (1988).

204. RCRA, § 3005(e)(2), 42 U.S.C. § 6925(e)(2); 40 C.F.R. § 265 (1988), *see also* S. NOVICK, *supra* note 91, § 13.03[4][c].

205. S. NOVICK, *supra* note 91, § 13.03[4][e].

206. *See generally* 40 C.F.R. pt. 264 (1988).

207. Exemptions from Subpart F are contained in 40 C.F.R. § 264 (1988).

208. S. NOVICK, *supra* note 91, § 13.03[4][e][v].

209. RCRA § 3005(i), 42 U.S.C. § 6925(i) (1988).

210. *See supra* notes 209 & 212 and accompanying text.

211. 40 C.F.R. § 264.90(a)(2) (1988).

212. 40 C.F.R. pt. 264 (1988).

213. 40 C.F.R. pt. 264 (1988).

214. "Groundwater protection standards" are defined as "conditions . . . designed to ensure that hazardous constituents . . . entering the ground water . . . do not exceed the concentration limits . . . in the uppermost aquifer underlying the . . . area beyond the

ceeded for three consecutive years.²¹⁵ If the facility has not contaminated the groundwater, its permit will specify "(1) the location where monitoring samples must be taken and at which the facility's 'groundwater protection standard' applies; (2) the hazardous constituents which the facility must monitor; (3) the 'concentration limits' applicable to the hazardous constituents the facility must monitor; and (4) other groundwater protection requirements."²¹⁶ The facility must also conduct "compliance monitoring," and, if the level of contamination exceeds the "ground water protection standard," corrective action must follow,²¹⁷ unless the measurement is the result of erroneous sampling, analysis, or evaluation, or the contamination is from an unregulated source.²¹⁸ Compliance monitoring ordinarily involves drilling monitoring wells to determine if the groundwater protection standard has been exceeded.²¹⁹

EPA's categorical requirements have focused on land disposal, where the various disposal methods harm groundwater the most. To prevent contamination, EPA and Congress have restricted disposal of liquids in landfills, established performance standards to prevent leakage, and phased out land disposal of many hazardous substances. With the exception of nonhazardous liquids where "no present rush" of contaminating groundwater or soil exists,²²⁰ the 1984 amendments require EPA to prohibit disposal of absorbent materials in containers at landfills if the materials can release liquids

point of compliance. . . ." 40 C.F.R. § 264.92 (1988). It has been suggested, however, that the term's definition when referring to the requirement of compliance monitoring indicates "the concentration limits that must not be exceeded at the point of compliance, and other limits and monitoring points designed to detect migration of contaminated groundwater." S. NOVICK, *supra* note 91, § 13.03[4][e][v] n.231.

215. S. NOVICK, *supra* note 91, § 13.03[4][e][v] (citing 40 C.F.R. §§ 264.90(c), 264.96 (1988)).

216. S. NOVICK, *supra* note 91, § 13.03[4][e][v]. The hazardous substances for which the facility must monitor will depend upon which substances have been identified in the aquifer in sampling prior to permit issuance and which substances are being disposed which EPA determines are likely to reach groundwater. *Id.*, (citing 40 C.F.R. § 264.93(b), (c)(1988)). The maximum concentration levels are determined by up gradient well sampling and analysis prior to permit issuance, except for fourteen heavy metals and pesticides for which EPA has established limits. 40 C.F.R. § 264.94(a)(2) (1988). EPA or the state may require "alternate concentration limits" that are higher than the concentration limits if they do not create a "substantial present or potential hazard to human health or the environment . . ." 40 C.F.R. § 264.94(a)(3), (c) (1988). Alternate concentration limits are based in part on the quantity of groundwater and the direction of the flow. 40 C.F.R. § 264.94(b)(1)(iii) (1988).

217. 40 C.F.R. §§ 264.91(a)(2), 264.100 (1988).

218. 40 C.F.R. § 264.99 (i), (j) (1988).

219. S. NOVICK, *supra* note 91, § 13.03[4][e][v] (citing 40 C.F.R. § 264.99(a), (b) (1988)).

220. RCRA § 3004(c), 42 U.S.C. § 6924(c) (1988).

when degraded or crushed.²²¹ The Act also imposes minimum technological requirements which reflect "improvements in the technology of control and measurement."²²² For new facilities receiving a permit application after November 8, 1984 and for expansions of existing landfills and surface impoundment units, RCRA requires: (1) at least two liners, with a system to collect liquid above and between the liners, and (2) monitoring of groundwater for leaks.²²³ EPA can waive the requirement of liners if the facility's operator can demonstrate that "alternative design and operating practices, together with location characteristics, will prevent the migration of any hazardous constituents into the ground water or surface water at least as effectively as such liners and leachate collection systems."²²⁴

The 1984 amendments also phase out land disposal on an automatic schedule which establishes by categories of waste a date on which land disposal is prohibited.²²⁵ The ban automatically takes

221. RCRA § 3004(c), 42 U.S.C. § 6924(c) (1988).

222. RCRA § 3004(o), 42 U.S.C. § 6924(o) (1988).

223. RCRA § 3004(o)(1)(A), 42 U.S.C. § 6924(o)(1)(A) (1988).

224. RCRA § 3004(o)(2), 42 U.S.C. § 6924(o)(2) (1988).

225. See RCRA § 3004(d)-(g); 42 U.S.C. §§ 6924(d)-(g). The schedule is as follows:

1. A group of chlorinated hydrocarbons, listed as F001-F005 and very common in groundwater, were banned from land disposal effective November 8, 1986. There is a two year extension for small-generated wastes, wastes of less than 1% of the solvents, and discarded and off-specification products. Superfund and RCRA cleanup wastes, and wastes disposed in injection wells, have until 1988. 42 U.S.C. § 6924(e) (1988).

2. Dioxin contaminated waste is banned from land disposal effective November 8, 1988. Much of the waste is from CERCLA actions. Dioxin wastes disposed of in injection wells is subject to a later date discussed below. 42 U.S.C. § 6924(e) (1988).

3. Wastes listed in California Department of Health Services regulations to be banned — the so-called "California test" — were banned effective November 8, 1987. The list includes liquid hazardous wastes contaminated with designated levels of cyanide, toxic heavy metals, PCB's and total halogenated organic compounds, and wastes which are strongly acidic. 42 U.S.C. § 6924(d)(2) (1988).

4. For wastes disposed of in injection wells by August 1, 1988, EPA must determine whether injection of the above described wastes adequately protect health and the environment, taking into consideration the prohibition on migration from the disposal site. If EPA determines it is not, deep well injection of these wastes must be prohibited. The definition of "deep injection well" excludes wells under section 6939h(a). 42 U.S.C. § 6924(f) (1988).

5. CERCLA and RCRA cleanup soil and debris contaminated with solvents, dioxin, California list wastes, and solvent wastes are subject to the land disposed prohibition on November 8, 1988. 42 U.S.C. § 6924(f) (1988).

6. All other listed hazardous wastes as of November 8, 1984 are divided into three groups with land disposal bans effective on August 8, 1988, June 8, 1989, and June 8, 1990.

If EPA misses the 1988 or 1989 deadline, wastes in the first and second category of all other listed hazardous wastes may only be disposed of in facilities that meet the minimum chronological requirements for new facilities, and only if there is no practical

effect unless EPA either (1) adopts regulations prescribing treatment standards for the category of waste based on the best available and demonstrated treatment technology,²²⁶ or (2) allows land disposal to continue based on a finding "to a reasonable degree of certainty, that there will be *no migration* of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous."²²⁷ Thus, in most cases, if EPA does not publish regulations establishing treatment standards by the day the relevant land disposal goes into effect, the disposal prohibition automatically takes effect.²²⁸ For wastes listed as hazardous after November 8, 1984, EPA must determine within six months of listing or identifying the waste whether land disposal adequately protects health and the environment and, if not, promulgate regulations prohibiting land disposal.²²⁹

2. RCRA Enforcement and Liability

The regulatory sections of RCRA discussed thus far focused on prevention of contamination. Only one section of RCRA, section

alternative. RCRA § 3004(g)(6), 42 U.S.C. § 6924(g)(6) (1988). S. NOVICK, *supra* note 91, § 13.03[5][a][iii][B], (citing RCRA § 3004(e)), 42 U.S.C. § 6924(e) (1988); 51 Fed. Reg. 40,572 (codified at 40 C.F.R. §§ 268.30, 31, and 51 Fed. Reg. 19,300 (1986)).

226. RCRA § 3004(m), 42 U.S.C. § 6924(m) (1988). Treatment technology which creates greater risks than those of land disposal is not deemed "available." 51 Fed. Reg. 40,572, 40,592 (1986). These treatment standards are promulgated in 40 C.F.R. pt. 268, subpt. D (1988).

BDAT must have been demonstrated in use, not in bench or pilot projects. BDAT also requires an evaluation of availability based on whether risks to health and the environment from discharges from such treatment exceeds the risks of untreated land disposal. 51 Fed. Reg. 40,572, 40,588, 40,592 (1986). The most common types of treatment are thermal treatment and tank treatment. See S. NOVICK, *supra* note 91, § 13.03[5][C].

227. RCRA § 3004(d)(1), 42 U.S.C. § 6924(d)(1) (1988) (emphasis added). The exemption may be granted on petition by any interested person. RCRA §§ 3004(d)(1), (e)(1), (g)(5), 42 U.S.C. §§ 6924(d)(1), (e)(1), (g)(5) (1988); *cf.* RCRA § 3004(f)(2), 42 U.S.C. § 6924(f)(2) (1988). EPA has stated that it expects few exemptions will be granted. 51 Fed. Reg. 40,572, 40,576, 40,582 (1986). There are also exemptions for some surface impoundments. 52 Fed. Reg. 40,572, 40,639 (1986) (codified at 40 C.F.R. § 268.4 (1988)).

There are also three types of variances which EPA may grant. EPA may give extensions in the general deadlines not to exceed two years. RCRA § 3004(h)(2), 42 U.S.C. § 6924(h)(2) (1988). There may be site-specific variances for up to one year. RCRA § 3004(h)(2), 42 U.S.C. § 6924(h)(2) (1988). See also 51 Fed. Reg. 40,572, 40,639 (1986) (codified at 40 C.F.R. § 268.5 (1988)). The third type of variance is a fundamentally different factor (FDF) variance from treatment standards. 51 Fed. Reg. 40,642 (1986).

228. RCRA § 3000(m)(2), 42 U.S.C. § 6924(m)(2) (1988).

229. RCRA § 3004(g)(4), 42 U.S.C. § 6924(g)(4) (1988). EPA fails to make the decision within six months, there is no automatic ban that takes effect as with other wastes. RCRA § 3004(g)(4)(C), 42 U.S.C. § 6924(g)(4)(C) (1988).

7003, addresses the issue of contamination that has already occurred. Whenever past or present handling, storage, treatment, transportation, or disposal of any solid or hazardous waste "may present an imminent and substantial endangerment to health or the environment," the Administrator of EPA may sue in district court any past or present owner or operator of a treatment, storage, or disposal facility, any past or present generator, and any past or present transporter who has contributed or is contributing to such handling, storage, treatment, transportation or disposal, to compel corrective action.²³⁰ Owners and operators of land disposal facilities and some storage facilities may even be required to take corrective action beyond facility boundaries if necessary to protect public health and the environment, and if offsite landowners give the owner or operator permission to undertake the action.²³¹ Under EPA's regulations, any significant increase in groundwater contamination by any of a list of designated pollutants, or any hazardous waste at the site, requires cleanup. Cleanup must continue until MCLs are met, or, if impractical, until alternate concentration levels are met.²³² Section 7003 has become somewhat less important following RCRA's regulatory expansion to require cleanup of contamination and CERCLA's creation of a fund for cleaning up abandoned sites.

Although some courts have held that section 7003 applies to inactive sites,²³³ most hold that the section is not retroactive in application because it is designed to remedy only present and ongoing conditions.²³⁴ It is clear that section 7003 imposes strict liability as a matter of federal law²³⁵ even without a showing that the defendant violated a regulatory requirement of RCRA.²³⁶ Although courts disagree on whether traditional common law prerequisites to equitable relief such as balancing the equities are necessary, the better view is that Congress intended that the "imminent and substan-

230. RCRA § 7003(a), 42 U.S.C. § 6973 (1988).

231. RCRA § 3004(v), 42 U.S.C. § 6924(v) (1988).

232. S. NOVICK, *supra* note 91, § 13.05[4][a].

233. *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.* 810 F.2d 726 (8th Cir. 1986), *cert. denied*, 108 S. Ct. 146 (1987); *United States v. Waste Indus., Inc.*, 734 F.2d 159 (4th Cir. 1984).

234. *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.* 810 F.2d 726 (8th Cir. 1986), *cert. denied*, 108 S. Ct. 146 (1987); *United States v. Waste Indus., Inc.*, 734 F.2d 159 (4th Cir. 1984).

235. *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.*, 810 F.2d 726 (8th Cir. 1986), *cert. denied*, 108 S. Ct. 146 (1987); *United States v. Waste Indus., Inc.*, 734 F.2d 159 (4th Cir. 1984).

236. *United States v. Waste Indus., Inc.*, 734 F.2d 159 (4th Cir. 1984).

tial endangerment standard" authorize broader relief.²³⁷ Persons acting in a corporate capacity may also be individually liable if they are personally involved in, or directly responsible for, the conduct violating section 7003.²³⁸

Courts have also split on whether there is joint and several liability under section 7003 for injunctive relief.²³⁹ For several years courts struggled with the showing necessary to demonstrate imminent and substantial endangerment. In one influential case, the court held that the relevant factors included the degree and nature of toxicity of the contaminant and the likelihood of human or environmental exposure absent corrective action.²⁴⁰ However, courts have held that the standard is lower than the common law requirement of actual harm, since only a risk of harm need be demonstrated.²⁴¹

The regulatory requirements of RCRA are enforceable through civil, administrative, criminal,²⁴² and citizen suit remedies. Section 3008(a) provides for judicial and administrative enforcement of the Act's requirements.²⁴³ EPA may issue a compliance order (which may include administrative penalties), seek injunctive relief, or impose civil penalties.²⁴⁴ EPA's enforcement powers, however, are relatively unimportant in states with authorized programs containing a wide variety of enforcement procedures and sanctions.²⁴⁵

237. Compare *United States v. Price*, 688 F.2d 204 (3d Cir. 1982) with *United States v. Waste Indus., Inc.*, 734 F.2d 159 (4th Cir. 1984); *Environmental Defense Fund v. Lamphier*, 714 F.2d 331 (4th Cir. 1983); see also Farber, *Equitable Discretion, Legal Duties, and Environmental Injunctions*, 45 U. Pitts. L. Rev. 513, 535 (1984).

238. *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.*, 810 F.2d 726, 745 (8th Cir. 1986), cert. denied, 108 S. Ct. 146 (1987).

239. See, e.g., *United States v. Ottati & Goss, Inc.*, 630 F. Supp. 1361 (D.N.H. 1985); *United States v. Stringfellow*, 14 *Env'tl. L. Rep. (Env'tl. L. Inst.)* 20385 (C.D. Cal. 1984).

240. *United States v. Vertac Chem. Corp.*, 489 F. Supp. 870 (E.D. Ark. 1980).

241. *United States v. Waste Indus., Inc.*, 734 F.2d 159, 168 (4th Cir. 1984); *United States v. Price*, 688 F.2d 204, 214 (3d Cir. 1982).

242. Criminal penalties are found in RCRA § 3008(d) & (e), 42 U.S.C. § 6928(d) & (e) (1988), which includes a heavy penalty in section 3008(e) for "knowing endangerment" as defined in section 3008(f).

243. RCRA § 3008, 42 U.S.C. § 6928 (1988).

244. RCRA § 3008(a)(1), 42 U.S.C. § 6928(a)(1) (1988). The 1984 amendments required compulsory termination of authorization for land disposal facilities that had filed Part B of the permit application and certified compliance with the groundwater monitoring and financial responsibility. RCRA § 3005(e), 42 U.S.C. § 6925(e) (1988). RCRA permits require cleanup of all releases of hazardous waste or constituents from solid waste, RCRA § 3004(u), 42 U.S.C. § 6924(u) (1988), and EPA may order corrective action at interim status sites if a release of hazardous waste into the environment occurs, RCRA § 3008(h), 42 U.S.C. § 6928(h) (1988).

245. See S. NOVICK, *supra* note 91, § 13.06[1][b].

3. Leaking Underground Storage Tanks Program

In the early 1980's, EPA discovered that a widespread cause of groundwater contamination was leaking underground storage tanks. Gasoline tanks, buried to lessen the risk of fire and explosion, leaked into drinking water supplies.²⁴⁶ The exclusion of petroleum products from Superfund prevented EPA from conducting cleanup of such contaminated groundwater.²⁴⁷ Leaking underground tanks of solvents, particularly trichlorethylene, could be cleaned up, but remained unregulated by RCRA because they contained a product, not wastes.²⁴⁸ Amendments in 1984 and 1986 created a new program in Subtitle I of RCRA—the leaking underground storage tank program, known as the “LUST” program.²⁴⁹

The LUST program requires EPA to set national performance criteria for buried tanks containing “regulated substances”²⁵⁰ in order to prevent corrosion and structural defects. States may administer the program through EPA-approved plans, and there is a fund for cleanup of abandoned petroleum tanks.

Owners of existing tanks, of tanks taken out of service after 1973, and of new tanks brought into operation after November 8, 1985, must send notice to state agencies regarding the tanks, including their age, size, type, location, and use.²⁵¹ Persons who deposit regulated substances in underground tanks must also inform tank owners of the owners' obligation to provide notice for a period beginning thirty days after EPA prescribes the form of the owners' notice, and running for eighteen months thereafter.²⁵² Furthermore, any person who sells a new tank must inform the buyer of the notice obligation beginning thirty days after the criteria for new tank performance are promulgated.²⁵³

The definition of “underground tank” includes “any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of regulated substances,

246. *Id.* § 13.04[1].

247. CERCLA §§ 101(14), 104(a)(2), 42 U.S.C. §§ 9601(14), 9604(a)(2) (1988).

248. S. NOVICK, *supra* note 91, § 13.04[1].

249. RCRA §§ 9001-9008, 42 U.S.C. §§ 6991-6991I (1988).

250. “Regulated substance” includes all hazardous substances covered under CERCLA § 101(14), 42 U.S.C. § 9601(14), and petroleum. RCRA § 9001(2), 42 U.S.C. § 6991(2) (1988).

251. RCRA § 9002(a)(2), 42 U.S.C. § 6991a(a)(2) (1988); 50 Fed. Reg. 46,602 (1985).

252. RCRA § 9002(a)(5), 42 U.S.C. § 6991a(a)(5) (1988).

253. RCRA § 9002(a)(6), 42 U.S.C. § 6991a(a)(6) (1988).

and the volume of which (including the volume of the underground pipes connected thereto) is ten per centum or more beneath the surface of the ground.”²⁵⁴ Excluded from the definition are farm or residential tanks of 1,100 gallons or less, tanks used for storing heating oil that is consumed on the premises, septic tanks, designated pipeline facilities, surface impoundments, pits, ponds or lagoons, storm water or waste water collection systems, flow-through process tanks, liquid traps or associated gathering lines directly related to oil and gas operations, and storage tanks in an underground area situated on or above the surface of the floor.²⁵⁵ In 1987 each state had to prepare inventories of underground tanks containing regulated substances—one for tanks containing petroleum and another for those containing hazardous wastes.²⁵⁶

RCRA requires EPA to promulgate criteria for leak detection, corrective measures, cleanup, closure, and financial responsibilities to protect human health and the environment. In promulgating the regulations, EPA may distinguish between categories based on age, use, location, industry practice, and the “technical capability” of owners and operators.²⁵⁷ All tanks must meet the criteria of section 9003(c). New tanks brought into use on or after the date the criteria are promulgated must also meet performance standards, not yet promulgated, concerning, among other things, design, construction, installation, release detection, and compatibility standards.²⁵⁸ Until issuance of the new performance standards, no person may install an underground tank not designed and built to specifications to “prevent releases due to corrosion or structural failure for the operational life of the tank.”²⁵⁹

States have the primary responsibility for enforcement of the LUST program. States may prepare programs that meet federal criteria,²⁶⁰ but need not submit the programs to EPA for approval. If a state does not have an adequate program, EPA administers the

254. RCRA § 9001(1), 42 U.S.C. § 6991(1) (1988).

255. RCRA § 9001(1), 42 U.S.C. § 6991(1) (1988).

256. RCRA § 9002(c), 42 U.S.C. § 6991a(c) (1988).

257. RCRA § 9003(b), 42 U.S.C. § 6991b(b) (1988).

258. RCRA § 9003(e), 42 U.S.C. § 6991b(e) (1988).

259. RCRA § 9003(g), 42 U.S.C. § 6991b(g) (1988). State programs may be stricter than the federal requirements. RCRA § 9004(b), 42 U.S.C. § 6991c(b) (1988).

260. The program must include the following and provide for adequate enforcement:

(1) requirements for maintaining a leak detection system, an inventory control system together with tank testing, or a comparable system or method designed to identify

Act's requirements.²⁶¹ The states and EPA have concurrent enforcement authority. Thus, if EPA discovers a violation, it may issue an administrative order or commence a civil action and administratively or judicially assess civil penalties of up to \$25,000 per day for noncompliance.²⁶² If the violation occurs in a state with an adequate program, EPA must give notice to the state prior to issuing an order or bringing suit.²⁶³

Under the criteria required for state programs,²⁶⁴ each state program must have requirements for corrective action to respond to a release into the environment and for closure to prevent future releases.²⁶⁵ Programs must also have requirements for maintaining evidence of financial responsibility for corrective action and compensation to third parties for "bodily injury and property damage caused by sudden and nonsudden accidental releases arising from operating an underground tank. . . ." ²⁶⁶

A "mini-Superfund" was also established for cleanup of soil and

releases in a manner consistent with the protection of human health and the environment;

(2) requirements for maintaining records of any monitoring or leak detection system or inventory control system or tank testing system;

(3) requirements for reporting of any releases and corrective action taken in response to a release from an underground storage tank;

(4) requirements for taking corrective action in response to a release from an underground storage tank;

(5) requirements for the closure of tanks to prevent future releases of regulated substances into the environment;

(6) requirements for maintaining evidence of financial responsibility for taking corrective action and compensating third parties for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from operating an underground storage tank;

(7) standards of performance for new underground storage tanks; and

(8) requirements —

(A) for notifying the appropriate State agency or department (or local agency or department) designated according to section 6991a(b)(1) of this title of the existence of any operational or non-operational underground storage tank; and

(B) for providing the information required on the form issued pursuant to section 6991a(b)(2) of this title.

RCRA § 9004(a), 42 U.S.C. § 6991c(a) (1988).

261. See RCRA § 9006(a)(1), 42 U.S.C. § 6991e(a)(1) (1988).

262. RCRA § 9006(a)(3), 42 U.S.C. § 6991e(a)(3) (1988).

263. RCRA § 9006(a)(2), 42 U.S.C. § 6991e(a)(2) (1988).

264. See *supra* note 260.

265. RCRA § 9004(a)(4), (5), 42 U.S.C. § 6991c(a)(4), (5) (1988).

266. RCRA § 9004(a)(6), 42 U.S.C. § 6991c(a)(6) (1988). EPA may, but is not required to, have such requirements. RCRA § 9003(c)(2), 42 U.S.C. § 6991c(c)(2) (1988).

groundwater from leaking underground petroleum tanks.²⁶⁷ EPA, or a state in a cooperative arrangement with EPA, may use the LUST fund to remedy contamination from underground liquid petroleum or petroleum product storage tanks when the owners and operators cannot be found to pay the costs, when the owners and operators have inadequate financial assurances to pay the costs, or when prompt action is “necessary” to protect health or the environment.²⁶⁸ EPA must give priority to sites which pose the greatest threat.²⁶⁹

D. *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*

The purpose of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)²⁷⁰ is not to prevent groundwater and soil contamination but to remedy contamination after it has occurred. Whenever there is a “release”²⁷¹ of a hazard-

267. Cleanup of leakages of hazardous waste from underground tanks is covered by CERCLA. See *infra* notes 270-332 and accompanying text.

268. RCRA § 9003(h)(2), 42 U.S.C. § 6991b(h)(2) (1988).

269. RCRA § 9003(h)(3), 42 U.S.C. § 6991b(h)(3) (1988).

270. CERCLA §§ 101-405, 42 U.S.C. §§ 9601-9675 (1988).

271. “Release” is defined as:

any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes (A) any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons, (B) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine, (C) release of source, byproduct, or special nuclear materials from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954 [42 U.S.C. 2011 et seq.], if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act [42 U.S.C. 2210], or, for the purposes of section 9604 of this title or any other response action, any release of source byproduct, or special nuclear material from any processing site designated under section 7912(a)(1) or 7942(a) of this title, and (D) the normal application of fertilizer.

CERCLA § 101(22), 42 U.S.C. § 9601(22) (1988), *as amended by* Superfund Amendment and Reauthorization Act (SARA) § 101(c), 42 U.S.C. § 9601(22) (1988). Releases must be of “hazardous substances,” defined to include most substances designated as hazardous or toxic under other environmental statutes. CERCLA § 101(14), 42 U.S.C. § 9601(14) (1988). Petroleum and petroleum products are excluded. CERCLA § 101(14), 42 U.S.C. §§ 9601(14) (1988). A private party with a permit under a federal environmental statute is not liable for response costs attributable to “federally permitted releases.” CERCLA § 101(10), 42 U.S.C. § 9601(10) (1988). Releases of substances regulated under FIFRA in accordance with federally registered label directions are similarly excluded. CERCLA § 107(i), 42 U.S.C. § 9607(i) (1988).

For other exclusions, see CERCLA § 101(10), 42 U.S.C. § 9601(22)(B) (1988) (vehicle exhaust emissions and pipeline pumping station emissions); and CERCLA

ous substance, a substantial threat of a release of a hazardous substance, or a release or threat of release of a "pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare," EPA may respond under Section 104 by taking a "removal"²⁷² or a "remedial"²⁷³ action.²⁷⁴ Procedures for both response and removal actions are detailed in a

§ 104(a)(3), 42 U.S.C. § 9604(a)(3) (1988) (farm products, natural substances, and releases into water supplies from ordinary system deterioration are exempt from releases to which EPA may respond).

Proof of a release requires a showing of contamination of soil or water in or near the site. *Eagle-Picher Indus., Inc., v. Environmental Protection Agency*, 822 F.2d 132 (D.C. Cir. 1987); *State of New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985).

272. The terms "remove" and "removal" are defined as:

the cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. The term includes, in addition, without being limited to, security fencing or other measures to limit access, provision of alternative water supplies, temporary evacuation and housing of threatened individuals not otherwise provided for, action taken under section 9604(b) of this title, and any emergency assistance which may be provided under the Disaster Relief and Emergency Assistance Act [42 U.S.C. 5121 et seq.].

CERCLA § 101(23), 42 U.S.C. § 9601(23) (1988).

273. A "remedy" or "remedial action" is an action

consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of hazardous substances into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazardous substances and associated contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment. The terms include the costs of permanent relocation of residents and businesses and community facilities where the President determines that, alone or in combination with other measures, such relocation is more cost-effective than and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition off-site of hazardous substances, or may otherwise be necessary to protect the public health or welfare; the terms includes off-site transport and off-site storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.

SARA § 101(d), 42 U.S.C. § 9601 (24) (1988).

274. SARA § 104(a)(b)(c), 42 U.S.C. § 9604(a) (1988). The showing of an "imminent and substantial danger to the public health or welfare" is only necessary for releases or substantial threats of release of "pollutants or contaminants," not for hazardous substances.

National Contingency Plan.²⁷⁵ Both actions aim to clean up contamination, particularly when no responsible parties are legally required to perform the cleanup or responsible parties cannot be found. To finance cleanup, CERCLA established a revolving trust fund (the "Superfund"), funded by general revenues and taxes on petrochemical feedstocks, crude oil, and general corporate income.²⁷⁶ The fund may be reimbursed for response costs by "responsible parties" for the contamination. If responsible parties refuse to reimburse the fund, EPA can file suit. States, local governments, and private parties who conduct cleanups may also be reimbursed either by the Superfund or directly from responsible parties.²⁷⁷

Any person with a known, suspected, or likely release of a hazardous substance into air, water, soil, or groundwater must give notice to the EPA or face criminal penalties.²⁷⁸ EPA has compiled a list of sites from these notice reports and from states, members of Congress, private citizens, and its own investigations; the list is known as the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS).²⁷⁹ Each site on the list received a preliminary assessment to determine whether EPA has jurisdiction and whether there was a release or is a substantial threat of a release of a hazardous substance or "imminent and substantial danger" from a contaminant allowing EPA to conduct a cleanup of the site.²⁸⁰ Based on a site inspection, EPA determines whether a removal or long-term remedial action is necessary. If a remedial action is necessary, EPA must first rank the site on the National Priority List. For responses financed by the Superfund, the actual cleanup may be done by EPA, by a state or local government in agreement with EPA, or by a private party.

Among the factors EPA considers in determining whether re-

275. SARA § 105, 42 U.S.C. § 9605 (1988). The procedures are set out in 40 C.F.R. pt. 300 (1987).

276. CERCLA § 111, 42 U.S.C. § 9611 (1988). The fund was set at not more than 8.5 billion dollars for 1986 to 1991. CERCLA § 111, 42 U.S.C. § 9611 (1988).

277. SARA § 112, 42 U.S.C. § 9612 (1988).

278. CERCLA § 103(a), 42 U.S.C. § 9603(a) (1988).

279. See generally S. NOVICK, *supra* note 91, § 13.05[3][a].

280. See discussion *infra*. By January 1, 1988, EPA had to have conducted a preliminary assessment for all sites listed on Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) on October 17, 1986. The next step after finding federal jurisdiction is for EPA to conduct a site assessment to evaluate whether the site poses an "imminent and substantial danger." All site inspections for sites listed in CERCLIS on October 17, 1986 are to be completed by January 1, 1989. SARA § 116, 42 U.S.C. § 9616 (a) (1988).

removal is appropriate is whether nearby populations will be exposed to the hazardous materials through food or drinking water unless removal action is taken.²⁸¹ EPA may go beyond monitoring and assessing a release to removal action "as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment"²⁸² when there is danger of actual injury.²⁸³ The distinction between what constitutes a removal and what a remedial action is blurry, especially after a 1986 amendment requiring that removal actions "contribute to the efficient performance of any long-term remedial action" when "practicable."²⁸⁴ A typical remedial action is soil and groundwater cleanup.²⁸⁵ On-site treatment of wastes is preferred;²⁸⁶ wastes may be transferred offsite only to TSD facilities that comply with RCRA and all other applicable state and federal requirements.²⁸⁷

CERCLA broadly authorizes remedial actions, only prescribing that such actions "prevent or minimize the release of hazardous

281. 40 C.F.R. § 300.65(b)(2) (1988). The factors to be considered are:

(i) Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or food chain;

(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems:

(iii) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;

(iv) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

(vi) Threat of fire or explosion;

(vii) The availability of other appropriate Federal or State response mechanisms to respond to the release;

(viii) Other situations or factors which may pose threats to public health or welfare or the environment.

282. CERCLA § 101(23), 42 U.S.C. § 9601(23) (1988).

283. S. NOVICK, *supra* note 91, § 13.05[3][a][i].

284. CERCLA § 104(a)(2), 42 U.S.C. § 9604(a)(2) (1988).

285. *See* S. NOVICK, *supra* note 91, § 13.05[3][a][ii]:

Such cleanup is often protracted and expensive, and very little experience was available before CERCLA. EPA has been feeling its way into the new technology. At a typical site, extensive explorations are needed to establish the location of aquifers and the extent of contamination. Wells may be drilled to pump up groundwater for treatment and to prevent further spread of contaminants. Trenches may be excavated and a permeable barrier installed down to bedrock. The site may be capped with asphalt to prevent infiltration of rainwater. A treatment facility may be constructed on site. Arrangements may be made for off-site disposal of the residue of contaminants extracted from groundwater. Such remedies may take years to plan, design, and carry out.

286. *Id.*

287. CERCLA § 121, U.S.C. § 9621 (1988).

substances so that they do not migrate or cause substantial danger to present or future public health or welfare or the environment."²⁸⁸ EPA only engages in remedial actions at sites on the National Priorities List and must rank all releases on the list in order of priority.²⁸⁹ To rank sites, EPA must consider their

relative risk . . . taking into account to the extent possible the population at risk, the hazard potential of the hazardous substances at such facilities, the potential for contamination of drinking water supplies, the potential for direct human contact, the potential for destruction of sensitive ecosystems, the damage to natural resources which may affect the human food chain and which is associated with any release or threatened release, the contamination or potential contamination of the ambient air which is associated with the release or threatened release, State preparedness to assume State costs and responsibilities, and other appropriate factors. . . .²⁹⁰

EPA then delineates the techniques for remedial actions.²⁹¹ Due to concern that the ranking undervalued the threat from contaminated groundwater, a 1986 amendment to CERCLA required EPA to give high priority to health risks from contamination of drinking water.²⁹²

The first step in a remedial action consists of two studies: a "remedial investigation" which evaluates the nature of and danger from contamination, and a "feasibility study" which evaluates potential remedies.²⁹³ EPA must consult with the state containing a contaminated site before selecting a remedy.²⁹⁴ The state must agree to provide at least ten percent (fifty percent for some sites under state ownership)²⁹⁵ the initial cleanup costs and to assume

288. CERCLA § 101(24), 42 U.S.C. § 9601(24) (1988).

289. CERCLA § 105(a), 42 U.S.C. § 9605(a). Section 116 in 1986 established a schedule for remedial actions. CERCLA § 116, 42 U.S.C. § 9616 (1988).

290. CERCLA § 105(a)(8)(A), 42 U.S.C. § 9605(a)(8)(A) (1988).

291. CERCLA § 105, 42 U.S.C. § 9605 (1988).

292. CERCLA § 104(i), 42 U.S.C. § 9604(i) (1988). Congress also required a health assessment of substances found at listed sites by the Agency for Toxic Substance and Disease Registry in the Department of Health and Human Services. CERCLA § 104(i), 42 U.S.C. § 9604(i) (1988); see also S. NOVICK, *supra* note 91, § 13.05[3][f][i].

293. 40 C.F.R. § 300.68(d) (1988). The so-called "RI/FS" includes data on the air, soil, surface water and groundwater contamination in the vicinity of the site. S. NOVICK, *supra* note 91, § 13.04[3][f][iii][A].

By October 17, 1989, EPA must begin at least 275 new RI/FSs, and complete studies and begin construction on 175 facilities before October 1989 and another 200 facilities by October 1991. CERCLA § 116, 42 U.S.C. § 9616 (1988).

294. CERCLA § 104(c)(2), (3), 42 U.S.C. § 9604(c)(2), (3) (1988).

295. CERCLA § 104(c)(3)(C)(i), (ii), 42 U.S.C. § 9604(c)(3)(C)(i), (ii) (1988). States must pay the 50% when a state or political subdivision operated the site at the time of disposal. CERCLA § 104(c)(3)(C)(ii), 42 U.S.C. § 9604(c)(3)(C)(ii) (1988). States who

responsibility for maintenance costs incurred after the first ten years of groundwater treatment.²⁹⁶ Cleanup must comply with state environmental quality or facility siting standards if the state standards are stricter than the federal requirements.²⁹⁷ EPA must publish notice of its final remedial plan, provide an opportunity for public comment and a public hearing, and publish notice of its final plan.²⁹⁸

Responsible parties may be permitted or required to assist in carrying out the remedial plan. A responsible party is prohibited from undertaking any remedial action without EPA authorization at a site where EPA or another responsible party under an administrative order or consent decree has begun a remedial action and feasibility study.²⁹⁹ EPA may grant releases and enter into partial settlement with responsible parties.³⁰⁰ Among other restrictions, remedial plans are to give preference to on-site treatment over land disposal as "[t]he offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available."³⁰¹

As of November 8, 1988, RCRA's prohibition against disposal on land of untreated waste applies to wastes generated in CERCLA cleanups. After November 8, 1988, on-site treatment that is the best demonstrated available treatment technology must be used.³⁰² Groundwater cleanup must make the water meet the SDWA's Maximum Contaminant Levels³⁰³ or, if no MCLs have been established,

acquired property through bankruptcy or foreclosure are not considered the owner or operator of the property. CERCLA § 101(20)(A)(iii), 42 U.S.C. § 9601(20)(A)(iii) (1988).

296. CERCLA § 104(c), 42 U.S.C. § 9604(c) (1988). Beginning in 1989, states must also give assurances of off-site disposal availability if needed. CERCLA § 104(c)(9), 42 U.S.C. § 9604(c)(9) (1988). Each state may participate in selecting sites for the National Priorities List. A state must also concur with deletion of a site from the National Priorities List which EPA claims to have cleaned up. CERCLA § 121(f)(1)(C), 42 U.S.C. § 9621(f)(1)(C) (1988).

297. CERCLA § 121(d)(2)(A)(ii), 42 U.S.C. § 9621(d)(2)(A)(ii) (1988).

298. CERCLA § 117, 42 U.S.C. § 9617 (1988).

299. CERCLA § 122(e)(6), 42 U.S.C. § 9622(e)(6) (1988).

300. CERCLA § 122, 42 U.S.C. § 9622 (1988).

301. CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1) (1988).

302. CERCLA § 121(b)(1), 42 U.S.C. § 9621(b)(1) (1988).

303. Section 121(d)(2)(B)(ii) assumes the use of alternate concentration levels when groundwater cannot be restored to MCL levels, but prohibits their use by a process that "assumes a point of human exposure beyond the boundary of the facility," unless the routes of exposure through groundwater are known and the remedial measures will preclude human exposure. CERCLA § 121(d)(2)(B)(ii), 42 U.S.C. § 9621(d)(2)(B)(ii) (1988).

standards in any other applicable federal statutes.³⁰⁴

Section 106(a) empowers the federal government to sue to abate any "imminent and substantial endangerment to the public health or welfare or the environment" caused by an "actual or threatened release of a hazardous substance from a facility."³⁰⁵ The government also may issue administrative orders under Section 106 "as may be necessary to protect public health and welfare and the environment."³⁰⁶ EPA must provide notice and an opportunity for informal public participation in its selection of remedies under Section 106.³⁰⁷ The exact interrelationship between Section 106 and Section 107 is unclear,³⁰⁸ although it is doubtful that Section 106 can be used remedially as a basis for reimbursement of remedial costs for complete cleanup.

Section 107(a) delineates the potentially responsible parties (PRPs) for cleanup costs under CERCLA. The first category of PRPs includes, generally, any owner or operator of a vessel or "facility".³⁰⁹ Persons who were owners and operators of a facility at the time of disposal of any hazardous substance are also potentially

304. CERCLA § 121(d)(2)(A)(i), 42 U.S.C. § 9621(d)(2)(A)(i) (1988). EPA may depart from any applicable standards only if compliance would pose even greater risks to human health and the environment, would be technically impracticable, or if the costs of compliance for cleanup financed from the Superfund are out of balance with other demands on the Superfund. CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4) (1988).

305. CERCLA § 106(a), 42 U.S.C. § 9606(a) (1988). States may participate in EPA's settlement negotiations under section 106 and not concur in the settlement, entitling the state to intervene in the federal enforcement suit to argue against the consent decree. CERCLA § 121(f)(2)(B), 42 U.S.C. § 9621(f)(2)(B) (1988).

306. CERCLA § 106(a); 42 U.S.C. § 9606(a) (1988). An emerging judicial view is that there need not be a hearing on a section 106 administrative order to satisfy due process but the defendant may challenge the order and assert a good faith defense in judicial enforcement of the order. *Wagner Elec. Corp. v. Thomas*, 612 F. Supp. 736 (D. Kan. 1985); *United States v. Reilly Tar & Chem. Corp.*, 606 F. Supp. 412 (D. Minn. 1985); *Solid State Circuits, Inc. v. Environmental Protection Agency*, 25 Env't Rep. Cas. (BNA) 1758 (W.D. Mo. 1985). *But see Industrial Park Dev. Co. v. Environmental Protection Agency*, 604 F. Supp. 1136 (E.D. Pa. 1985).

307. CERCLA § 117, 42 U.S.C. § 9617 (1988).

308. STEVER, *supra* note 116, § 6.05[2][c].

309. "Facility" is defined as:

(A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel.

CERCLA § 101(9), 42 U.S.C. § 9601(9) (1988); *see also State of New York v. General Elec. Co.*, 592 F. Supp. 291 (N.D.N.Y. 1984) (broad definition of facility). "Vessel" is

responsible.³¹⁰ Also included within responsible parties are persons who arranged for transportation of hazardous substances, or arranged for treatment or disposal of hazardous substances owned or possessed by them at a facility for which response actions are required.³¹¹ Transporters who accept or accepted hazardous substances for transport to a facility selected by them constitute the final category of PRPs.³¹²

Responsible parties may be compelled by injunction to assist in a response.³¹³ All responsible parties are strictly as well as jointly and severally liable³¹⁴ for all response costs and damage to natural re-

defined in CERCLA § 101(28), 42 U.S.C. § 9601(28) (1988), to include most watercraft.

Federal facilities are covered by CERCLA, but the Superfund may not be used to finance cleanup of contaminated federal sites, CERCLA §§ 111(e)(3), 120(a)(1)(2), 42 U.S.C. §§ 9611(e)(3), 9620(a)(1)(2) (1988). EPA was required to establish a list of federally owned remedial sites and determine which sites should be included on the National Priority List by April 17, 1988. CERCLA § 120, 42 U.S.C. § 9620 (1988).

So-called "innocent" owners of facilities from which there is a release or threatened release may have a defense under section 101(35), 42 U.S.C. § 9601(35)(B) (1988). If an owner acquires property without "reason to know" that hazardous substances were disposed on-site there is no liability under section 101(35). However, to utilize this defense, the party must have "undertaken, at the time of acquisition, all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice in an effort to minimize liability." CERCLA § 101(35), 42 U.S.C. § 9601(35)(B) (1988).

310. CERCLA § 107(a), 42 U.S.C. § 9607(a) (1988).

311. CERCLA § 107(a)(3), 42 U.S.C. § 9607(a)(3) (1988).

To obtain response costs against a generator, it must be demonstrated that the generator's hazardous substances were shipped to the facility, the generator's substances or substances like them are present at the site, and there was a release or threatened release of any hazardous substance at the site that necessitated the response. *United States v. South Carolina Recycling and Disposal, Inc.*, 653 F. Supp. 984 (D.S.C. 1984).

It is not a defense that: (1) the generator sold the substances to a third party who disposed of them, *United States v. Ward*, 618 F. Supp. 884 (E.D.N.C. 1985); (2) the generator shipped the waste to a site other than the contaminated site, *Missouri v. Independent Petrochem. Corp.*, 610 F. Supp. 4 (E.D. Mo. 1985); or (3) that the generator shipped only a de minimis amount of the substance to the site, *United States v. Conservation Chem. Co.*, 619 F. Supp. 162 (W.D. Mo. 1985). *But see Walls v. Waste Resources Corp.*, 640 F. Supp. 79 (E.D. Tenn. 1986); *Idaho v. Bunker Hill Co.*, 634 F. Supp. 800 (D. Idaho 1986).

312. CERCLA § 107(a)(4), 42 U.S.C. § 9607(a)(4) (1988).

313. CERCLA § 106(a), 42 U.S.C. § 9606(a) (1988).

314. *See, e.g., New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985); *United States v. Ward*, 618 F. Supp. 884 (E.D.N.C. 1985); *United States v. Ottati & Goss, Inc.*, 630 F. Supp. 1361 (D.N.H. 1985); *United States v. Shell Oil Co.*, 605 F. Supp. 1064 (D. Colo. 1985); *United States v. Chem-Dyne Corp.*, 572 F. Supp. 802 (S.D. Ohio 1983). There is a statutory right of contribution among parties who are "liable or potentially liable under section 9607(a)." CERCLA § 113(f)(1), 42 U.S.C. § 9613(f)(1) (1988).

sources without reference to respective degrees of fault.³¹⁵

Under Section 107(a),³¹⁶ responsible parties are strictly liable³¹⁷ for: (1) federal and state response costs pursuant to Section 104 that are "not inconsistent with" the National Contingency Plan; (2) any "other necessary costs of response incurred by any other person consistent with" the National Contingency Plan;³¹⁸ (3) damages for injury to, destruction of, or loss of natural resources, including the costs of assessing the loss;³¹⁹ and (4) the costs of health assessments³²⁰ performed at the site by the Agency for Toxic Disease Registry.³²¹ The only statutory defenses to liability are that the sole cause of the release or threatened release was an act of God, an act of war, or an act or omission of a third party.³²² To assert the latter defense, the party must demonstrate that there was no "contractual relationship"³²³ between the potentially responsible party and the third party (unless the third party is a railroad) and that the PRP exercised due care with regard to the substances and took precautions against "foreseeable acts or omissions of any such third party and the consequences that could foreseeably result from such acts or omissions."³²⁴

The procedures and substance of administrative and judicial settlements between EPA and potentially responsible parties is set out

315. It is not necessary to prove that the party's own hazardous substances were released or caused the release. *United States v. South Carolina Recycling & Disposal, Inc.*, 653 F. Supp. 984 (D.S.C. 1984). As with section 7003 of RCRA, section 107 of CERCLA has been upheld against claims of retroactivity. *United States v. South Carolina Recycling & Disposal, Inc.*, *supra*; *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.* 810 F.2d 726 (8th Cir. 1986), *cert. denied*, 108 S. Ct. 146 (1987) (allowing federal government to recover costs incurred prior to effective date of CERCLA). *Northeastern Pharmaceutical* also held that a plant manager that had arranged for disposal could be held personally liable under 107(a)(3).

316. CERCLA § 107(a), 42 U.S.C. § 9607(a) (1988).

317. *See, e.g.*, *J.V. Peters & Co. v. Environmental Protection Agency*, 767 F.2d 263 (6th Cir. 1985); *New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985).

318. The terms "not inconsistent with" costs for response costs of government and "consistent with" for other response costs is deliberate and involves different burdens of proof for claimants. *See S. NOVICK, supra* note 91, § 13.06[3][a].

319. CERCLA §§ 107(a)(4)(A)-(C), 42 U.S.C. §§ 9607(a)(4)(A)-(C) (1988).

320. CERCLA § 107(a)(4)(D), 42 U.S.C. § 9607(a)(4)(D) (1988).

321. *See S. NOVICK, supra* note 91, § 13.06[3][a].

322. CERCLA § 107(b), 42 U.S.C. § 9607(b) (1988). There are also specified limitations on the amount of liability that do not apply in certain instances of serious and willful violations. *See CERCLA § 107(c)(2)*, 42 U.S.C. § 9607(c)(2) (1988).

323. "Contractual relationship" is defined in CERCLA § 101(35), 42 U.S.C. § 9601(35) (1988).

324. CERCLA § 107(b)(3), 42 U.S.C. § 9607(b)(3) (1988).

in Section 122.³²⁵ There are separate statutes of limitations for cost recovery, contribution actions, natural resource damages actions, and a variety of other CERCLA-based suits.³²⁶ Section 109³²⁷ contains sanctions for violations of the following other sections: 103; 108; 122 (relating to administrative orders, consent decrees, and orders to carry out settlement agreements); and 120 (relating to the failure of federal facilities to carry out agreements with EPA for remedial action). CERCLA also provides general criminal sanctions.³²⁸

Federal agencies, state agencies, and Indian tribes who are trustees for natural resources are entitled to recover either the value of the damaged resources or the costs of restoration of resources threatened with irreversible loss.³²⁹ Persons other than state or federal governments may recover their costs of cleanup directly from responsible parties or from the Superfund, but not do both.³³⁰ All government response costs must be consistent with the National Contingency Plan and private parties' costs must be approved before expenditure as consistent with the Plan.³³¹ Persons who incur cleanup costs pursuant to a Section 106(a) order may seek reimbursement from the Superfund and statutory interest.³³²

IV.

PRIVATE REMEDIES FOR GROUNDWATER CONTAMINATION

A private party damaged by groundwater contamination may pursue statutory remedies under the Safe Drinking Water Act, RCRA and/or CERCLA, or seek injunctive relief and damages through state common law claims. Under the SDWA citizen suit

325. CERCLA § 122, 42 U.S.C. § 9622 (1988); see also STEVER, *supra* note 117, § 6.09[4][e][iii].

326. CERCLA § 113(g), 42 U.S.C. § 9613(g) (1988).

327. CERCLA § 109(a), 42 U.S.C. § 9609(a) (1988).

328. CERCLA § 109, 42 U.S.C. § 9609 (1988).

329. CERCLA § 111(b)(1), 42 U.S.C. § 9611(b)(1) (1988). There may only be recovery from the Superfund for natural resource damage if there is a threat of irreversible damage to natural resources subsequent to the adoption of a plan. 42 U.S.C. § 9611(i) (1988).

330. CERCLA § 112(b), (f), 42 U.S.C. § 9612(b), (f) (1988).

331. CERCLA § 107(a)(4), 42 U.S.C. § 9607(a)(4) (1988); *United States v. Northeastern Pharmaceutical & Chem. Co., Inc.*, 810 F.2d 726 (8th Cir. 1986), *cert. denied*, 484 U.S. 848 (1987).

332. CERCLA § 106(b), 42 U.S.C. § 9606(b) (1988). If the claim on the Superfund is rejected, the claimant may sue for recovery in federal district court and in addition seek costs and fees under subsections (a) and (d) of section 2412 of title 28. *Id.*

provision, any person may bring a civil action in federal district court against anyone in violation of the Act or regulations (including the United States and individual states) to compel compliance.³³³ A citizen suit may also be brought to compel EPA to perform a nondiscretionary duty under the Act.³³⁴ Sixty days notice prior to commencement of the suit notice must be given to EPA, the alleged violator, and the state where the alleged violation occurred.³³⁵ A citizen suit may not be brought if the United States is "diligently" prosecuting a civil action in the federal courts.³³⁶ Also, no suit can be brought to require a state to prescribe a schedule for variance or exemption unless the citizen-plaintiff demonstrates the state has failed to prescribe schedules in "a substantial number of cases. . . ."³³⁷ Attorneys' fees and expert witness fees may be recovered by any party when the court determines the award is "appropriate."³³⁸ Surprisingly, only four citizen suits have been brought under the SDWA.³³⁹

Similarly, Section 7002 of RCRA allows any person to commence a civil suit in federal district court against any person in violation of the Act or regulations, any person who is contributing to or contributed to management of solid or hazardous waste which may present an imminent and substantial endangerment to health or the environment, or to compel EPA to perform nondiscretionary duties.³⁴⁰ The suit must be brought in the district where the violation or the endangerment occurred or may occur, or in the district court for the District of Columbia, to compel EPA to perform a nondiscretionary duty.³⁴¹ There must be advance notice to EPA, the alleged violator, and the state where the alleged violation occurred sixty days before the suit is filed (ninety days for suits alleging imminent endangerment), unless the complaint alleges a violation of the provisions regulating hazardous waste management.³⁴² Again, a citizen suit cannot be brought if EPA or the au-

333. SDWA § 1449(a), 42 U.S.C. § 300j-8(a) (1988).

334. SDWA § 1449(a), 42 U.S.C. § 300j-8(a) (1988).

335. SDWA § 1449(b), 42 U.S.C. § 300j-8(b) (1988).

336. SDWA § 1449(b), 42 U.S.C. § 300j-8(b) (1988).

337. SDWA § 1449(b), 42 U.S.C. § 300j-8(b) (1988).

338. SDWA § 1449(d), 42 U.S.C. § 300j-8(d) (1988).

339. *See* S. NOVICK, *supra* note 91, § 16.06[2].

340. RCRA § 7002(a), 42 U.S.C. § 6972(a) (1988).

341. RCRA § 7002(a), 42 U.S.C. § 6972(a) (1988).

342. RCRA § 7002(b), 42 U.S.C. § 6972(b) (1988). Most courts have found the advance notice rules to be jurisdictional and without exception. *See, e.g.,* *Garcia v. CECOS Int'l, Inc.*, 761 F.2d 76 (1st Cir. 1985); *Walls v. Waste Resource Corp.*, 761

thorized state is pursuing civil or criminal enforcement.³⁴³ A citizen plaintiff may obtain injunctive relief,³⁴⁴ assessment of civil penalties, and costs including fees for attorneys and expert witnesses (if the party is "prevailing" or "substantially prevailing").³⁴⁵ As with the SDWA citizen suit provisions, the RCRA citizen suit provision has been little utilized, perhaps because of the minimal re-

F.2d 311 (6th Cir. 1985). *But see* *Proffitt v. Commissioners of Bristol Township*, 754 F.2d 504 (3d Cir. 1985).

343. RCRA § 7002(b)(2)(B), (c), 42 U.S.C. § 6972(b)(2)(B), (C) (1988).

(B) No action may be commenced under subsection (a)(1)(B) of this section if the Administrator, in order to restrain or abate acts or conditions which may have contributed or are contributing to the activities which may present the alleged endangerment—

(i) has commenced and is diligently prosecuting an action under section 6973 of this title or under section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. 9606];

(ii) is actually engaging in a removal action under section 104 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. 9604];

(iii) has incurred costs to initiate a Remedial Investigation and Feasibility Study under section 104 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. 9604] and is diligently proceeding with a remedial action under that Act [42 U.S.C.A. 9601 et seq.]; or

(iv) has obtained a court order (including a consent decree) or issued an administrative order under section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. § 9606] or section 6973 of this title pursuant to which a responsible party is diligently conducting a removal action, Remedial Investigation and Feasibility Study (RIFS), or proceeding with a remedial action.

In the case of an administrative order referred to in clause (iv), actions under subsection (a)(1)(B) of this section are prohibited only as to the scope and duration of the administrative order referred to in clause (iv).

(C) No action may be commenced under subsection (a)(1)(B) of this section if the State, in order to restrain or abate acts or conditions which may have contributed or are contributing to the activities which may present the alleged endangerment—

(i) has commenced and is diligently prosecuting an action under subsection(a)(1)(B) of this section;

(ii) is actually engaging in a removal action under section 104 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. 9604]; or

(iii) has incurred costs to initiate a Remedial Investigation and Feasibility Study under section 104 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 [42 U.S.C. 9604] and is diligently proceeding with a remedial action under that Act [42 U.S.C. 9601 et seq.].

RCRA § 7002(b)(2)(B)-(C), 42 U.S.C. § 6972(b)(2)(B)-(C) (1988).

344. RCRA § 7002(b)(2)(B)-(C), 42 U.S.C. § 6972(b)(2)(B)-(C) (1988). Citizens may not, however, seek an injunction against the siting of a new TSD facility or enjoin issuance of a permit for a TSD facility. RCRA § 7002(b)(2)(D), 42 U.S.C. § 6972(b)(2)(D) (1988). Transporters that are common carriers may not be sued unless they failed to exercise due care. RCRA § 7002(g), 42 U.S.C. § 6972(g) (1988).

345. RCRA § 7002(a)(2), (e), 42 U.S.C. § 6972(a)(2), (e) (1988).

porting obligations for facilities under RCRA.³⁴⁶

Under a recent provision added to CERCLA, there is limited citizen enforcement of final Section 106(a) orders and settlement agreements. A suit may be brought in federal district court against any person other than EPA and the Agency for Toxic Substances Disease Registry (ATSDR) to compel compliance with "any standard, regulation, condition, requirement, or order . . ." which has become effective under CERCLA, including interagency agreements for federal facilities.³⁴⁷ Suits may also be brought against EPA and the ATSDR to compel performance of a nondiscretionary duty.³⁴⁸ Again, actions must be brought in the district court for the District of Columbia when suing to compel EPA or ATSDR to perform a nondiscretionary duty.³⁴⁹ The court may award civil penalties and grant costs (including reasonable attorney and expert witness fees) to the "prevailing" or "substantially prevailing" party when appropriate.³⁵⁰ Sixty days notice must be given before the suit is commenced,³⁵¹ and no suit may be brought if the government is "diligently prosecuting an action" under CERCLA or RCRA.³⁵²

1986 amendments authorized EPA to provide grants of up to \$50,000 to help with technical assistance on the danger, study, and response actions for "any group of individuals which may be affected by a release or threatened release . . ." at listed facilities.³⁵³ Any such group of individuals can also petition EPA to conduct a preliminary assessment of an unlisted site and petition ATSDR to conduct a preliminary health assessment.³⁵⁴ ATSDR is also authorized to provide health information regarding exposure to individuals pursuant to cooperative agreements with states.³⁵⁵ If ATSDR finds there is a "significant risk to human health" EPA is required to take such steps as may be necessary to reduce exposure

346. S. NOVICK, *supra* note 91, § 13.06[1][c].

347. CERCLA § 310(a)(1)-(2), 42 U.S.C. § 9659(a)(1)-(2) (1988). Citizen groups had sought in 1984 a federal cause of action for personal injuries and citizen suits to abate imminent hazards. S. NOVICK, *supra* note 91, § 13.05[3][f][ii][c].

348. CERCLA § 310(a)(2), 42 U.S.C. § 9659(a)(2) (1988).

349. CERCLA § 310(b)(2), 42 U.S.C. § 9659(b)(2) (1988).

350. CERCLA § 310(f), 42 U.S.C. § 9659(f) (1988).

351. CERCLA § 310(e), 42 U.S.C. § 9659(e) (1988).

352. CERCLA § 310(d)(2), 42 U.S.C. § 9659(d)(2) (1988).

353. CERCLA § 117(e), 42 U.S.C. § 9617(e) (1988).

354. CERCLA §§ 104(i)(6), 105(d), 42 U.S.C. §§ 9604(i)(6), 9605(d) (1988).

355. CERCLA § 104(i)(4) (1988), 42 U.S.C. § 9604(i)(4), amended by Pub. L. No. 99-499 § 110 (1986).

and eliminate or substantially mitigate the risk to health.³⁵⁶ There is also a federal commencement date for triggering state statutes of limitations for state law causes of actions covering personal or property damage from exposure to Superfund releases.³⁵⁷ Such statutes of limitations do not begin to run until the plaintiff knew or reasonably should have known the injury or damage was caused or contributed to by the substance release.³⁵⁸

Section 107(a) of CERCLA also allows recovery of response costs by parties other than the state and federal government, such as neighboring property owners.³⁵⁹ Private parties are limited to response cost recovery, however, and cannot obtain injunctive relief except pursuant to pendent state claims.³⁶⁰ As originally drafted, CERCLA included a victim compensation provision for physical injuries for hazardous wastes, but the provision was deleted before enactment.³⁶¹

Under state law, rules of allocation for groundwater that are utilized to remedy groundwater pollution are used less than state common law causes of action against tortious conduct.³⁶² The viability of groundwater allocation rules to remedy contamination depended for many years upon which rule of allocation was followed. For example, in a "correlative rights" state, no landowner would have a superior right to pollute groundwater, but in an "absolute ownership" state, landowners were generally considered to own the groundwater beneath their property and could essentially do what they wanted.³⁶³ It is now relatively well established that, despite earlier cases to the contrary, an overlying landowner has a right to uncontaminated groundwater whatever the state system of water allocation.³⁶⁴ Remedies under state common law may include injunc-

356. CERCLA § 104(i)(11), 42 U.S.C. § 9604(i)(11) (1988), *amended by* Pub. L. No. 99-499 § 110 (1986).

357. CERCLA § 309(a)(1), 42 U.S.C. § 9658(a)(1) (1988).

358. CERCLA § 309(b)(4), 42 U.S.C. § 9658(b)(4) (1988). This rule is effective retroactively to December 11, 1980.

359. S. NOVICK, *supra* note 91, § 13.06[3]; *Wickland Oil Terminals v. Asarco, Inc.*, 792 F.2d 887 (9th Cir. 1986); *City of New York v. Exxon Corp.*, 633 F. Supp. 609 (S.D.N.Y. 1986); *Artesian Water Co. v. Government of New Castle County*, 605 F. Supp. 1348 (D. Del. 1985).

360. S. NOVICK, *supra* note 91, § 13.06[3], (citing *New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985)); *Velsicol Chem. Corp. v. Reilly Tar & Chem. Corp.*, 15 *Envtl. L. Rep. (Envtl. L. Inst.)* 20103 (E.D. Tenn. 1984).

361. 125 *Cong. Rec.* § 9173-80 (daily ed. July 11, 1979).

362. HENDERSON, *supra* note 1, at 32.

363. *Id.*

364. *Compare* *Rose v. Socony-Vacuum Co.*, 54 R.I. 411, 173 A. 627 (1934), *overruled by* *Wood v. Picillo*, 443 A.2d 1244 (R.I. 1982) *with* *Burr v. Adam Eidemiller, Inc.*,

tive relief, a court-ordered cleanup plan, or actual damages, including costs of obtaining water supplies, lost profits, and reduced property values.³⁶⁵ Increasingly, courts are finding damages alone an insufficient remedy for pollution and have enjoined activities causing contamination.³⁶⁶

386 Pa. 416, 126 A.2d 403 (1956); *Reinhart v. Lancaster Area Refuse Authority*, 201 Pa. Super. 614, 193 A.2d 670 (1963); *Nelson v. C & C Plywood Corp.*, 154 Mont. 414, 465 P.2d 314 (1970); *Branch v. Western Petroleum, Inc.*, 657 P.2d 267 (Utah 1982); see also *Davis, Groundwater Pollution: Case Law Theories for Relief*, 39 MO. L. REV. 117, 120 (1974).

365. *HENDERSON*, *supra* note 1, at 32; *A. TARLOCK*, *supra* note 1, § 4.08[1] (citing *Miller v. Cudahy Co.*, 592 F. Supp. 976 (D. Kan. 1984), 656 F. Supp. 316 (D. Kan. 1987) *aff'd in part, rev'd in part*, 858 F.2d 1449 (1988), *reh'g denied* (1988)). Injunctive relief is generally awarded when there is a continuing nuisance. "Injunctive relief may be particularly appropriate in soil and water pollution cases due to the importance accorded the preservation of our natural resources and the protection of the environment." *Turner, The Role of Private Litigation in Protecting Against Groundwater Pollution*, 35 U. KAN. L. REV. 443, 454-55 (1987). Courts have ordered removal of wastes and contaminated soil and water, *New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985); *Village of Wilsonville v. SCA Serv., Inc.*, 86 Ill. 2d 1, 426 N.E.2d 824 (1981); *Village of Wilsonville v. Earthline Corp.*, 11 Env't Rep. Cas. (BNA) 2137 (7th Cir. 1978); *Wood v. Picillo*, 443 A.2d 1244 (R.I. 1982); reclamation of a site to its prior condition, *Village of Wilsonville v. SCA Serv., Inc.*, *supra*; *Village of Wilsonville v. Earthline Corp.*, *supra*; and in some cases prohibition of further operation of the facility, *Village of Wilsonville v. Earthline Corp.*, *supra*; *Neal v. Darby*, 282 S.C. 277, 318 S.E.2d 18 (Ct. App. 1984).

Temporary damages to property are generally based on loss in rental value from the time of injury to the time of suit. *Crown Cork & Seal Co. v. Vroom*, 480 So. 2d 108 (Fla. Dist. Ct. App. 1985). Permanent damages may be based on loss of market value, or the cost of restoring land to its prior condition, if the costs of restoration are not prohibitive. *Id.*; see also *Nelson v. C & C Plywood Corp.*, 154 Mont. 414, 465 P.2d 314 (1970); *Ewell v. Petro Processors of Louisiana, Inc.*, 364 So. 2d 604 (La. 1978).

366. See *RESTATEMENT (SECOND) OF TORTS*, § 849 (2)(e) - (f), comments (1964). Courts do, however, refuse to issue an injunction by balancing the equities in favor of the defendant. See, e.g., *Village of Wilsonville v. SCA Serv., Inc.*, 86 Ill. 2d 1, 426 N.E.2d 824 (1981). Potential private plaintiffs under section 107(a)(4)(B) include: innocent site owners, e.g., *Cadillac Fairview/California, Inc. v. Dow Chemical Co.*, 21 Env't Rep. Cas. 1108 (C.D. Cal. 1984); potentially responsible site owners or generators, e.g., *Bulk Distrib. Centers, Inc. v. Monsanto Co.*, 589 F. Supp. 1437 (S.D. Fla. 1984), *City of New York v. Exxon Corp.*, 633 F. Supp. 609 (S.D.N.Y. 1986); and neighboring landowners, *Walls v. Waste Resources Corp.*, 761 F.2d 311 (6th Cir. 1985), *Jones v. Inmont Corp.*, 584 F. Supp. 1425 (S.D. Ohio 1984).

Several courts have imposed limitations on private actions for recovery costs. For example, it has been held that there may only be private recovery for damage from sites on the National Priority List, *Cadillac Fairview/California, Inc. v. Dow Chemical Co.*, 21 Env't Rep. Cas. 1108, 1114 (C.D. Cal. 1984); *contra* *New York v. Shore Realty Corp.*, 759 F.2d 1032, 1046 (2d Cir. 1985); see generally *Bulk Distrib. Centers, Inc. v. Monsanto Co.*, 589 F. Supp. 1437, 1444 (S.D. Fla. 1984), or pursuant to governmentally ordered removal or containment action, *Cadillac Fairview/California, Inc. v. Dow Chemical Co.*, *supra*. One court has also held that liability under section 107(a)(4)(B) is several and not strict. *Smith Land & Improvement Co. v. Rapid American Corp.*, No. 86-0016 (M.D. Pa. 1987) *cited in* *STEVEY*, *supra* note 116, § 6.07[2][1]. It has also been

Possible theories of liability for groundwater contamination include nuisance, negligence, trespass, and strict liability.³⁶⁷ For purposes of nuisance, when determining the nature of relief for the groundwater contamination, courts will consider "the extent and duration of the harm; the character of the harm; the preventability of the harm; the locality of the activity; and the social utility of the defendant's conduct."³⁶⁸ Nuisance continues to be the most common theory of liability for harm caused by pollution.³⁶⁹ To establish a nuisance, there need not be a showing of negligence on the part of the defendant so long as there is an unreasonable interference with the use and enjoyment of another landowner's property from hazardous waste.³⁷⁰ One court has held that groundwater contamination in violation of a state water quality standard is a nuisance per se.³⁷¹

If groundwater contamination is so extensive as to threaten injury to public health or injure public drinking water supplies, the nuisance may be deemed a public nuisance.³⁷² The reasonableness of

suggested that governmental approval of a private remedial plan is a prerequisite. *See*, Bulk Distrib. Centers, Inc. v. Monsanto Co., 589 F. Supp. 1437, 1444 (S.D. Fla. 1984), Wickland Oil Terminals v. Asarco, Inc., 590 F. Supp. 72 (N.D. Cal. 1984), *modified* 792 F.2d 887 (9th Cir. 1986); Artesian Water Co. v. New Castle County, 605 F. Supp. 1348 (D. Del. 1985); *but cf.* Jones v. Inmont Corp., 584 F. Supp. 1425 (S.D. Ohio 1984); Pinole Point Properties, Inc. v. Bethlehem Steel Corp., 596 F. Supp. 283 (N.D. Cal. 1984). By regulation EPA does require that private response actions pursuant to a section 106 consent decree or administrative order be pre-approved as well as response actions by potential claimants against the Superfund, 40 C.F.R. § 300.68(1) (1989). EPA does not require approval for private response actions but does provide general criteria for consistency with the NCP. 40 C.F.R. § 300.71(a)(2) (1989). It is generally accepted that a potentially responsible party may use section 107(a)(4)(B) for response costs against other responsible parties. STEVER, *supra* note 116, § 6.07[2][1].

Section 310 of CERCLA does authorize a citizen suit for injunctive relief for enforcement of any "standard, regulation, requirement, or order which has become effective. . ." under CERCLA, but applies to only a very limited group of actions by EPA under CERCLA. *See* STEVER *supra* note 116, § 6.07[2][1].

367. For a discussion of each of these theories, see *infra* notes 384-403 and accompanying text.

368. HENDERSON, *supra* note 1, at 33.

369. TURNER, *supra* note 365, at 448; *e.g.*, Williams v. Amoco Prod. Co., 241 Kan. 102, 117, 734 P.2d 1113, 1124 (1987); *see also* Pollard v. Land West, Inc., 96 Idaho 274, 276, 526 P.2d 1110, 1112 (1974); Nelson v. C & C Plywood Corp., 154 Mont. 414, 442, 465 P.2d 314, 318 (1970); Cities Service Oil Co. v. Merritt, 332 P.2d 677, 681 (Okla. 1958); Wood v. Picillo, 443 A.2d 1244, 1245 (R.I. 1982); Watson v. Great Lakes Pipeline Co., 85 S.D. 310, 311, 182 N.W.2d 314, 315 (1970); Branch v. Western Petroleum, Inc., 657 P.2d 267, 272 (Utah 1982); Haveman v. Beulow, 36 Wash. 2d 185, 186, 217 P.2d 313, 315 (1950).

370. Wood v. Picillo, 443 A.2d 1244, 1249 (R.I. 1982).

371. Branch v. Western Petroleum, Inc., 657 P.2d 267, 276 (Utah 1982).

372. New York v. Shore Realty Corp., 759 F.2d 1032, 1051 (2d Cir. 1985); Village

the interference is evaluated by comparing the extent of public harm to the utility of the conduct causing the harm.³⁷³ Evidence that the conduct violates a statute or ordinance is especially significant in demonstrating public harm.³⁷⁴ Many statutes and local ordinances authorize injunctions against public nuisance and assessment of civil penalties or, in some instances, criminal sanctions.³⁷⁵ Increasingly, courts have rejected the traditional distinction between public and private nuisance, acknowledging that the same tortious conduct can be considered both a public and private nuisance.³⁷⁶ A local government which owns or operates a TSD facility that constitutes a nuisance may also be responsible for a taking of private property without just compensation under state and federal constitutional law.³⁷⁷

In early negligence cases involving groundwater pollution, the foreseeability of the harm for activities leading to groundwater pollution sometimes posed a hurdle to demonstrating negligence.³⁷⁸ Statutes of limitations and the requirement of demonstrating a duty continue to create problems in establishing liability under a theory of negligence.³⁷⁹ Strict liability only applies when the polluting activities are ultrahazardous or abnormally dangerous,³⁸⁰ but has been increasingly recognized in the disposal of toxic wastes.³⁸¹

of *Wilsonville v. SCA Serv., Inc.*, 86 Ill. 2d 1, 27, 426 N.E.2d 824, 837 (1981); *Neal v. Darby*, 282 S.C. 277, 286, 318 S.E.2d 18, 24 (Ct. App. 1984). A public nuisance action may be brought by state, county, or municipal officials. 1 A. RATHKOPF & D. RATHKOPF, *THE LAW OF ZONING AND PLANNING* § 7A.03, at 7A-8 (4th ed. Supp. 1988) [hereinafter RATHKOPF].

373. 1 RATHKOPF, *supra* note 372, § 7A.03, at 7A-10.

374. *Id.* at 7A-10.

375. *Id.* at 7A-11.

376. *See Spur Indus., Inc. v. Del E. Webb Dev. Co.*, 108 Ariz. 178, 184, 494 P.2d 700, 706 (1972).

377. *Stoddard v. Western Carolina Regional Sewer Auth.*, 784 F.2d 1200, 1206 (4th Cir. 1986); *Warren County v. North Carolina*, 528 F. Supp. 276, 285 (E.D.N.C. 1981); *Twitty v. North Carolina*, 527 F. Supp. 778, 782 (E.D.N.C. 1981), *aff'd*, 696 F.2d 992 (4th Cir. 1982).

378. HENDERSON, *supra* note 1, at 34.

379. TURNER, *supra* note 365, at 451.

380. *See* discussion *supra* notes 340-346. Toxic waste disposal close to domestic wells has been determined to be an abnormally dangerous activity in Florida, Kentucky, Maryland, New Jersey, Tennessee, and Utah. *Cities Serv. v. State*, 312 So. 2d 799 (Fla. Dist. Ct. App. 1975); *Mowrer v. Ashland Oil & Ref. Co.*, 518 F.2d 659 (7th Cir. 1975); *Yommer v. McKenzie*, 255 Md. 220, 257 A.2d 138 (1969); *New Jersey v. Ventron*, 94 N.J. 473, 468 A.2d 150 (1983); *Sterling v. Velsicol Chem. Co.*, 647 F. Supp. 303 (W.D. Tenn. 1986); and *Branch v. Western Petroleum, Inc.*, 657 P.2d 267 (Utah 1982). *But see Williams v. Amoco Prod. Co.*, 241 Kan. 102, 734 P.2d 1113 (1987) (natural gas development not an abnormally dangerous activity).

381. A. TARLOCK, *supra* note 1, § 4.08[1].

A common impediment to trespass is that statutes of limitations may begin to run for trespass when the pollution occurs, rather than when an injury occurs or is discovered.³⁸² Common law causes of action face difficulties in establishing liability for groundwater contamination including statutes of limitations, demonstrating causation between the polluting activities and the resulting harm,³⁸³ and the possibility of contributory negligence on the part of the plaintiff in negligence suits.³⁸⁴ Traditional defenses to liability for property damage are also available, such as laches and prescription.³⁸⁵ Other frequently asserted defenses include compliance with federal or state legislation, compliance with local zoning ordinances, sovereign immunity, and exclusive remedies provided by federal or state legislation.³⁸⁶ There has been, however, a "gradual" trend toward ex-

382. TURNER, *supra* note 365, at 451. Leakage of hazardous waste into a neighbor's soil or groundwater may constitute trespass. See RESTATEMENT (SECOND) OF TORTS §§ 158 comment g, 159(1) (1964).

383. Miller v. Cudahy Co., 567 F. Supp. 892, 898 (D. Kan. 1983) (discussed in note 401 *infra*); see also Note, *An Analysis of Common Law and Statutory Remedies for Hazardous Waste Injuries*, 12 RUTGERS L.J. 117 (1980). In a few cases, courts have accepted causation on the basis of *res ipsa loquitur* when the injury was under the exclusive control of the defendant. See, e.g., Weston Drilling Co. v. Tupper, 243 Miss. 589, 139 So. 2d 361 (1962); Peyton v. Hammer, 269 N.E.2d 136, 27 Ohio Misc. 68 (1970).

384. HENDERSON, *supra* note 1, at 34.

385. A. TARLOCK, *supra* note 1, § 4.08[4]; see, e.g., Miller v. Cudahy Co., 567 F. Supp. 892 (D. Kan. 1983) (unsuccessful use of prescription defense). In a companion case to *Miller*, the district court also rejected defendants' argument that they could not be held liable for groundwater contamination if the plaintiff were to be unable to obtain the necessary state permit for withdrawal of the groundwater. Miller v. Cudahy Co., 656 F. Supp. 316 (D. Kan. 1987) *aff'd in part, rev'd in part*, 858 F.2d 1449 (1988), *reh'g denied* (1988). On appeal the Tenth Circuit Court of Appeals upheld an award of \$3.6 million in actual damages and \$10 million in punitive damages for the permanent nuisance created by a salt mining operation. The salt had made the plaintiffs' groundwater unfit for crop irrigation, necessitating a change to less profitable dryland crops. The Tenth Circuit held that the district court had correctly applied Kansas law in basing actual damages on the difference between the net value of corn crops that would have been grown using supplemental irrigation without groundwater contamination and the net value of the wheat and milo crops which had been grown. The award of punitive damages was upheld because the defendants had maintained the nuisance with a reckless disregard of the plaintiffs' rights. Miller v. Cudahy Co., 858 F.2d 1449 (10th Cir. 1988) *reh'g denied* (1988).

386. RATHKOPF, *supra* note 372, § 7A.03[2][a]-[c]. Compliance with state or federal regulation is irrelevant to strict liability, and is only relevant to negligence to the extent compliance is accepted as due care. Its relevance to nuisance, however, is more troublesome and may depend upon the theory of nuisance alleged. *Id.* § 7A.03[2][a][i]. Although one court has held that compliance with local zoning laws precludes a public nuisance, Greene v. Castle Concrete Co., 181 Colo. 309, 509 P.2d 588 (1973), the better view analytically is that such compliance is one factor to be utilized in assessing the reasonableness of the alleged interference.

Any defense to state common law claims which asserts that federal statutory reme-

pansion of liability for groundwater contamination.³⁸⁷

V.

STATE AND LOCAL LAND USE REGULATION TO PREVENT GROUNDWATER CONTAMINATION

Groundwater contamination has been documented in all fifty states.³⁸⁸ Despite the variety of federal statutes that impact on groundwater, direct regulation to preserve groundwater quality is primarily left to state and local governments. As of 1982, approximately forty states and territories had general environmental statutes granting authority to protect groundwater.³⁸⁹ However, by 1985, only twelve states had enacted legislation specifically requiring groundwater protection; fifteen additional states had an existing policy for protecting groundwater quality; and eighteen more states were in the process of establishing a groundwater protection policy for the first time.³⁹⁰ Both the Leaking Underground Storage Tank program (LUST) and the Underground Injection Control program (UIC) leave regulatory authority to the states. Unfortunately, states have greater responsibility for groundwater protection at a time of decreased federal funding.

Increasingly, state and local land use restrictions are the most

dies are exclusive is unlikely to succeed where the injury is groundwater contamination. Most of the relevant federal statutes expressly preserve state common law remedies. *See, e.g.*, CWA § 505(e), 33 U.S.C. § 1365(e) (1988); SDWA § 1449(e), 42 U.S.C. § 300j-8(e) (1988); RCRA § 7002(f), 42 U.S.C. § 6972(f) (1988); CERCLA § 107(j), 42 U.S.C. § 9607(j) (1988). *See also* Chappell v. SCA Serv., Inc., 540 F. Supp. 1087 (C.D. Ill. 1982); New York v. Monarch Chem. Inc., 111 Misc. 2d 343, 443 N.Y.S.2d 967 (N.Y. Sup. Ct. 1981); Glicksman, *Federal Preemption and Private Legal Remedies for Pollution*, 134 U. PA. L. REV. 121 (1985).

387. RATHKOPF, *supra* note 372, § 7A.03[2][a]-[c]. Disposal of waste, especially toxic waste, can expose corporations and corporate officers to criminal liability as well. Many states have criminal nuisance statutes for aggravated public nuisances and statutes criminalizing conduct which recklessly endangers the public health or welfare. As a matter of federal law, a number of environmental statutes provide criminal penalties, including the Refuse Act of 1899, the Clean Water Act, RCRA, and CERCLA. In addition, federal criminal laws prohibiting mail and wire fraud, conspiracy, and the Racketeer, Influence and Corrupt Organization Act may be utilized. In addition to corporate liability, there is a "growing trend" with environmental violations to indict corporate employees when the effect of the violation is serious or when significant data has been withheld. *See* M. DORE, *LAW OF TOXIC TORTS*, § 29.03[3], n.41 (1990).

388. U.S. Congress, Office of Technology Assessment, OTA-0-233, *PROTECTING THE NATION'S GROUNDWATER FROM CONTAMINATION* (Oct. 1984).

389. OFFICE OF GROUNDWATER PROTECTION, U.S. ENVIRONMENTAL PROTECTION AGENCY, *A GROUNDWATER PROTECTION STRATEGY FOR THE ENVIRONMENTAL PROTECTION AGENCY* 21 (Aug. 1984).

390. U.S. ENVIRONMENTAL PROTECTION AGENCY, *1 OVERVIEW OF STATE GROUNDWATER PROGRAM SUMMARIES A-9* (Mar. 1985).

stringent means of groundwater protection. Zoning ordinances typically classify TSD facilities as heavy industry, with most ordinances classifying the facilities as conditional uses, giving zoning boards maximum control over location, design, and operation.³⁹¹ TSD facilities may also be subject to performance zoning, which uses descriptive or numerical standards to evaluate a proposed use, or to impact zoning, which evaluates the effect of a proposed use on the carrying capacity of an environmentally sensitive area.³⁹² Several communities have utilized impact zoning for aquifer protection.³⁹³ Other land use techniques utilized include purchase of fee interests and development rights, conservation easements, planned unit development ordinances, site review, environmental impact assessments, and transferable development rights.³⁹⁴

Legal challenges to groundwater protection ordinances may include *ultra vires*, statutory, or constitutional challenges.³⁹⁵ Although *ultra vires* challenges to local governmental authority are unlikely to succeed,³⁹⁶ a municipality may have more difficulty overcoming statutory substantive and procedural challenges.³⁹⁷ Given recent Supreme Court decisions under the takings clause,³⁹⁸ any land use restriction that significantly limits the development potential of land may be challenged as a taking.³⁹⁹ Ordinances imposing density restrictions are also susceptible to due process challenges in states with strong precedents against exclusionary zoning.⁴⁰⁰ In some states, as a matter of state constitutional law,

391. RATHKOPF, *supra* note 372, § 7A.05[1] (1987).

392. *Id.* § 7A.05[2].

393. *See, e.g.*, Fla., Broward County, Ordinance No. 94-60 (August 30, 1984).

394. RATHKOPF, *supra* note 372, § 7A.05[2][a], [b].

395. Yanggen & Amrhein, *Ground Water Quality Regulation: Existing Governmental Authority and Recommended Roles*, 14 COLUM. J. OF ENVTL. L. 1, 58-93 (1989).

396. *See, e.g.*, *Salamar Builders Corp. v. Tuttle*, 29 N.Y.2d 221, 275 N.E.2d 585, 325 N.Y.S.2d 933 (1971); *Goddard v. Bd. of Appeals of Concord*, 13 Mass. App. Ct. 1001, 433 N.E.2d 98 (1982); *City of Austin v. Jamail*, 662 S.W.2d 779 (Tex. Civ. App. 1983) (upholding exercise of extraterritorial jurisdiction).

397. *See, e.g.*, *City of Schenectady v. Flacke*, 100 A.D.2d 349, 475 N.Y.S.2d 506 (1984).

398. *Keystone Bituminous Coal Ass'n v. DeBenedictus*, 480 U.S. 470, 485 (1987); *First English Evangelical Lutheran Church of Glendale v. County of Los Angeles*, 482 U.S. 304 (1987); *Nollan v. California Coastal Comm'n*, 483 U.S. 825 (1987); *see also* Malone, *A Fifteen Year Overview of the Coastal Zone Management Act and Coastal Protection*, "Slip Sliding Away," — Colo. L. Rev. — (1991).

399. *See, e.g.*, *Annicelli v. Town of S. Kingston*, 463 A.2d 133 (R.I. 1983). *But see* *Moviematic Indus. Corp. v. Board of County Comm'rs of Metro. Dade County*, 349 So. 2d 667 (Fla. Dist. Ct. App. 1977) (recognized groundwater protection as a valid land use purpose and upheld downzoning).

400. *See, e.g.*, *Alabano v. Mayor & Township Comm. of the Township of Washing-*

local communities may be required to take a fair share of regional housing needs or justify exclusionary ordinances with a stronger public interest than that of a "rational basis" test required for economic legislation.⁴⁰¹ Complete exclusion of TSD facilities or out-of-state waste from a community may also be challenged under state or federal constitutional law. As a matter of federal constitutional law, exclusion of out-of-state waste is per se discriminatory under the commerce clause and any such ordinance will likely be invalidated. In *City of Philadelphia v. New Jersey*⁴⁰² the Supreme Court invalidated a New Jersey statute which had been justified by the state as necessary to limit the consumption of dwindling landfill space. One commentator observed that the case suggests that states and local governments may have an obligation to accept a fair share of TSD facilities.⁴⁰³

Governmentally operated TSD facilities may in some instances be immune from local zoning laws.⁴⁰⁴ In contrast, not only does a municipal government have the power to separate TSD facilities from incompatible land uses, but also a local government's failure to create such a buffer zone may be challenged as inverse condemnation of the neighboring property.⁴⁰⁵

Given the likelihood and susceptibility of local governmental ordinances restricting TSD facilities, a number of states have enacted statutes creating state siting authorities which approve or disapprove the sites of proposed facilities.⁴⁰⁶ Although states have the

ton, 194 N.J. Super. 265, 476 A.2d 852 (1984); *D & R Pipeline Constr. Co. v. Greene County*, 630 S.W.2d 236 (Mo. Ct. App. 1982).

401. RATHKOPF, *supra* note 372, § 7A.05(4). Such challenges have been utilized, however, only to challenge residential apportionment. *Id.* at 7A-64; *see also* A. TARLOCK, *Anywhere But Here: An Introduction to State Control of Hazardous Waste Facility Location*, 2 UCLA J. ENVTL. L. & POL'Y 1 (1981).

402. 437 U.S. 617 (1978). On this and other issues of state and federal preemption of local regulation, see Schwenke, Lockett, & Walls, *Local Control of Hazardous Wastes Through Land Use Regulation*, 21 REAL PROP., PROB. & TR. J. 603 (1986).

403. RATHKOPF, *supra* note 372, §§ 7A.05(4), 7A-64. A more direct implication of the case, however, would be that states have an obligation to accept their fair share of waste, regardless of its origin.

404. *Rutgers State Univ. v. Piluso*, 60 N.J. 142, 286 A.2d 697 (1972); *City of Temple Terrace v. Hillsborough Ass'n for Retarded Citizens*, 322 So. 2d 571 (Fla. Dist. Ct. App. 1975), *aff'd*, 332 So. 2d 610 (Fla. 1976). Private entities acting under a governmental contract are less likely to be found immune. *See, e.g., Omaha Fish & Wildlife Club v. Comm. Refuse Disposal, Inc.*, 213 Neb. 234, 329 N.W.2d 335 (1983); *Washington County Cease, Inc. v. Persico*, 99 A.D.2d 321, 473 N.Y.S.2d 610 (1984).

405. RATHKOPF, *supra* note 372, § 7A-66, (citing *Wilson v. Key Tronic Corp.*, 40 Wash. App. 802, 701 P.2d 518 (1985)).

406. A. TARLOCK, *Siting New or Expanded Treatment, Storage, or Disposal Facilities: The Pigs in the Parlors of the 1980s*, 17 NAT. RESOURCES J. 429 (1984); *see, e.g.,*

power to preempt totally local land use restrictions in non-home rule and home rule jurisdictions,⁴⁰⁷ most states have only partially or conditionally preempted local land use regulation.⁴⁰⁸ In some states which do preempt local land use regulation, cognizance of local concerns is accomplished by requiring state consideration of local effects and land use plans, preparation of state plans to identify potential sites, or negotiated "settlements" between the applicant and affected local communities.⁴⁰⁹

VI.

THE NEED FOR REFORM

Given the labyrinth of federal regulation potentially impacting groundwater, it is difficult to justify increased federal regulation to remedy groundwater contamination and shortages. In the past few years, programs like the LUST program and UIC program were designed to "fill in the gaps" of federal regulation, which too frequently addressed groundwater as a legislative afterthought. Unrealistically, Congress continues to create regulatory programs for the states to administer, with little or no federal funding and even less guidance. At the same time, the federal statutes addressing air

IND. CODE § 13-7.86-3 (1985); IOWA CODE § 455 B.444 (1985); MICH. COMP. LAWS § 299.517(3) (1984).

407. *Hunter v. Pittsburgh*, 207 U.S. 161 (1907) (non-home rule preemption); *Town of Warren v. Hazardous Waste Facility Site Safety Council*, 392 Mass. 107, 466 N.E.2d 102 (1984); *Township of Cascade v. Cascade Resource Recovery, Inc.*, 118 Mich. App. 580, 325 N.W.2d 500 (1982); *Clermont Envtl. Reclamation Co. v. Wiederhold*, 2 Ohio St. 3d 44, 442 N.E.2d 1278 (1982) (home rule preemption).

408. Compare COLO. REV. STAT. § 25-15-202 (Supp. 1985) (broad presentation of local land use restrictions); KY. REV. STAT. ANN. § 224.855 (Michie/Bobbs-Merrill Supp. 1984); LA. REV. STAT. ANN. § 30:2180 (West Supp. 1987); MO. REV. STAT. § 260.430(2) (Vernon Pocket Pt. 1986); TENN. CODE ANN. § 68-46-108(9) (Supp. 1985 amended by 1990 Tenn. Pub. Acts 993) (state and local approval required); N.Y. ENVTL. CONSERV. LAW § 27-1105(b) (Consol. 1988) (local ordinances at the time of application preserved); ILL. REV. STAT. ch. 111.5 para. 1039.2 (Smith-Hurd Supp. 1985) (possible state reversal of local exclusionary decision); CAL. HEALTH & SAFETY CODE §§ 25149.1 *et seq.* (West 1984 & Supp. 1986) (state restrictions on land disposal); ARK. STAT. ANN. § 8-7-215 (Supp. 1990); GA. CODE ANN. § 12-8-66 (Supp. 1985) (amended by Ga. Laws 1344); ME. REV. STAT. ANN. tit. 38, § 1303-1304 (1986); MISS. CODE ANN. 1972 § 17-17-27 (Supp. 1985); MONT. CODE ANN. § 75-10-406 (1985); N.H. REV. STAT. ANN. § 147-A:4 (Supp. 1985); NEV. REV. STAT. § 459.400-600 (1985); N.D. CENT. CODE § 23-29-04 (Supp. 1989); W. VA. CODE § 20-9-3 (1989) (preemption not explicitly determined). Most states have preempted total exclusion by a local government of new or expanded TSD facilities. RATHKOPF *supra* note 372, § 7A.06[3] (citing statutes in Connecticut, Florida, Idaho, Indiana, Iowa, Kansas, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, Ohio, Oregon, Pennsylvania, Utah, Virginia, and Wyoming).

409. RATHKOPF, *supra* note 372, §§ 7A.06[4]-[6].

and water pollution have led to an increased reliance on underground discharge and disposal of waste. As RCRA's restrictions on land disposal are slowly implemented and state and local governments refuse to have TSD facilities in their "backyards," it is reasonable to expect an increase in illegal dumping of waste and the exploitation of regulatory loopholes for continued underground disposal. Beyond the problems created by deliberate discharge of waste and seepage from storage and disposal of waste, runoff or nonpoint source contamination continues to be essentially uncontrolled at the federal level and in all but a few states.⁴¹⁰

In short, there is no reason to expect the federal programs, even as recently amended, will significantly improve current groundwater problems. For example, leaking underground storage tanks have been identified as a source of groundwater contamination. Congress responded with the LUST program, which leaves regulatory authority to the already overburdened states.⁴¹¹ Similarly, regulatory enforcement of the underground injection control program was handed over to the states.⁴¹² Not surprisingly, by 1985 only four states were administering UIC programs.⁴¹³ In any event, the UIC program only applies to injections which threaten "public" water supplies,⁴¹⁴ leaving unprotected many rural residents who rely on private wells. Pesticide use is widely recognized as one of the primary sources of groundwater contamination. At least nineteen different pesticides have been detected in groundwater in twenty-four states,⁴¹⁵ and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)⁴¹⁶ has a provision addressing groundwater pollution. As of 1986, EPA had only provided assurances of safety under FIFRA for thirty-seven of the over 600 active ingredients used in 45,000 pesticides, and EPA had not completed a final safety reassessment for any active ingredient.⁴¹⁷

Even when federal statutes arguably provide EPA with the authority to protect groundwater, EPA has been unwilling or unable to utilize the authority. EPA has taken the position that it lacks

410. See *infra* notes 419-420 and accompanying text.

411. See *supra* notes 246-269 and accompanying text.

412. See *supra* notes 130-153 and accompanying text.

413. Marks, *supra* note 81, at 13.

414. See *supra* note 96.

415. Environmental Protection Agency, "Agricultural Chemicals in Groundwater: Proposed Pesticide Strategy 21" (1987) (hereinafter EPA Proposed Strategy).

416. 7 U.S.C. §§ 136 *et seq.* (1988).

417. Myers, *Groundwater Issues Emerge as Focus on FIFRA Reform*, AGRIC. LAW UPDATE at 4, Apr. 1988.

power to enforce RCRA's prohibition on open dumping, leaving enforcement to the states and private parties by citizen suits.⁴¹⁸ Although the Clean Water Act specifically refers to groundwater, EPA has not regulated groundwater in any way, has not required regulation at the state level, has not established quality criteria or guidelines for groundwater under § 304, and has not extended the permit system for point source discharges to discharges into groundwater.

These illustrations demonstrate that, at a minimum, reform would simply involve clarifying and reorganizing existing programs pertaining to groundwater. The Clean Water Act could be used to establish quality criteria for groundwater under § 304, to require water quality standards under § 303, or even go so far as to extend the permit system for point source discharges to discharges into or affecting groundwater. Such use of the Act, however, would squarely present the issue of Congress' power to regulate groundwater (or, at the least, groundwater connected to surface water) under the Commerce Clause should Congress remove the Act's references to "navigable waters."⁴¹⁹ Given that the protection of health is the primary focus of the Safe Drinking Water Act, Congress could require that that Act's protection extend to water supplies not currently covered within the definition of "public water systems." Under RCRA, Congress could also require EPA to enforce the open dumping prohibition.

These reforms, however, would do little to address the problem of nonpoint source contamination of groundwater, particularly from pesticide use.⁴²⁰ Congress and EPA have just begun to focus on the interrelationship between pesticide use and groundwater contamination. EPA has begun to develop under FIFRA data requirements for active ingredients likely to reach groundwater, do special reviews of problematic pesticides, and survey active ingredients likely to leak into groundwater.⁴²¹ In 1987, Congress introduced two bills to control pesticide contamination of groundwater.⁴²² The bills would have required EPA to set groundwater residue guidance levels for pesticides having the potential to leak into groundwater. Under the bills' regime, if EPA finds that pesticide concentrations

418. Marks, *supra* note 81, at 12.

419. See *supra* note 91.

420. As is frequently the case, agriculture has benefitted from exceptions to and gaps in federal regulation of the environment, even though agriculture is largely responsible for toxic contamination of groundwater and depletion of groundwater supplies.

421. Myers, *supra* note 417, at 4.

422. S. 1419, 100th Cong., 1st Sess. (1987); H.R. 3174, 100th Cong., 1st Sess. (1987).

reach or exceed fifty percent of the guidance level, EPA must notify the designated state agency where the groundwater is located. The state then has six months to rectify or prevent any adverse effects on human health or the environment from the contamination. If the state fails to do so, EPA must take preventive or remedial measures. In addition, if EPA determines that it is likely a guidance level will be exceeded in drinking water wells as a result of pesticide use, in accordance with its labeling, the registration can be amended to comply with the guidance level through geographic limitations, limits on application rates, limitations on timing and frequency of use, limitations on methods of application, storage, handling or disposal, and site specific responses. EPA's Proposed Pesticide Strategy recommends the use of MCLs under the SDWA as a starting point for setting the groundwater residue guidance levels.⁴²³ Under the Proposed Strategy, there is a rebuttable presumption that the risks posed by pesticides exceeding these levels outweigh any benefits. In some instances this permits cancelling registration if the manufacturer refuses to make any labeling amendments.⁴²⁴ The Strategy also contemplates labeling amendments for pesticides with the potential to reach unacceptable levels.⁴²⁵ Where unacceptable contamination has already occurred, EPA may cancel the use of a pesticide in an entire county or state and may provide alternate water supplies if the contamination presents an imminent and substantial endangerment to human health.⁴²⁶

These administrative and legislative proposals are necessary, preliminary steps toward controlling pesticide contamination of groundwater. There are, however, two federal programs already in operation that could be utilized more effectively to protect groundwater from agricultural nonpoint source contamination. The 1985 Farm Bill established the conservation reserve program, which is designed to remove from production highly erodible land in production at least two consecutive years from 1981 to 1985.⁴²⁷ Farmers who want to enroll land in the reserve agree by contract to devote the land to conservation uses for ten years in return for technical assistance, cost sharing for conservation measures, and annual rental payments for retirement of the land.⁴²⁸ The Act authorizes

423. EPA Proposed Strategy, *supra* note 415, at 82.

424. *Id.*

425. *Id.* at 88.

426. *Id.* at 122, 136. Comments on the Proposed Strategy were to be submitted to EPA by June 27, 1988. 53 Fed. Reg. 5830-31 (1988).

427. 16 U.S.C. §§ 3831-3836 (1988).

428. 16 U.S.C. §§ 3831-3833.

the Secretary of the USDA to include in the program land that poses an off-farm environmental threat or that poses a threat to productivity due to soil salinity.⁴²⁹ The Secretary, by regulation, could identify critical recharge areas threatened or contaminated by pesticide use and qualify farmland within that area for the reserve.

A recent amendment to the Clean Water Act, in the Water Quality Act of 1987, provides a mechanism to require farmers to use the best management practices to control runoff in order to qualify for federal farm subsidies. Under the amendment, the governor of every state, after public notice and comment, must submit to EPA for approval a state assessment report.⁴³⁰ The report must (1) identify those waters which, without additional control on nonpoint source pollution, "cannot reasonably be expected to attain or maintain applicable water quality standards" or the goals and requirements of the Clean Water Act; (2) identify categories and subcategories of nonpoint sources as well as individual sources which add "significant pollution" to those waters in amounts which "contribute to such portion not meeting such water quality standards or such goals and requirements"; (3) describe the process for identifying "best management practices and measures" to control these nonpoint sources and reduce their pollution "to the maximum extent practicable"; and (4) identify and describe state and local

429. 16 U.S.C. § 3831(c)(2). The program has been utilized recently to control nonpoint source water pollution. Under an interim rule, a field suitable for a filter strip may be placed in the reserve even if it does not meet the eligibility criteria, if the participant agrees to grow permanent grass, forbs, shrubs, or trees on the field. A field is considered suitable for use as a filter strip if it:

[1] Meets the criteria of paragraph [a][1] of this section [§ 704.7, the criteria for eligible cropland for the reserve];

[2] Is located adjacent to streams having perennial flow, other waterbodies of permanent nature (such as lakes and ponds, or seasonable streams, excluding such areas as gullies or sod waterways);

[3] Is capable, when permanent grass, forbs, shrubs, or trees are grown on the field, of substantially reducing sediment that otherwise would be delivered to the adjacent stream or other waterbodies; and

[4] Is 1.0 to 1.5 chain lengths (66 to 99 feet) in width: *Provided* That such width may be exceeded to the extent necessary to meet SCS Field Office Technical Guide criteria.

53 Fed. Reg. at 734-35 (Jan. 12, 1988).

Expansion of the CRP along these lines would also be in keeping with the 1988 National Conservation Program. The top priorities of the program are to: (1) "reduce the damage caused by excessive soil erosion on crop, pasture, range, forest, and other rural lands" and (2) "protect the quality of ground and surface water against harmful contamination by nonpoint sources." USDA, A National Program for Soil and Water Conservation: The 1988-97 Update 8 (March 1988).

430. Water Quality Act of 1987 [hereinafter WQA] § 319(a)(1), 33 U.S.C. § 1329(a)(1) (1988).

programs for controlling such pollution.⁴³¹ The governors of every state must then submit to EPA after public notice and comment a management program to control nonpoint source pollution covering the next four fiscal years.⁴³² Each management program must (1) identify the best management practices, taking into account impacts on groundwater quality; (2) identify programs to achieve the best management practices; (3) contain a schedule with "annual milestones" for implementation of state programs to achieve best management practices "at the earliest practicable date"; (4) have assurances of adequate enforcement of the program; (5) identify sources of funding for implementing the program; and (6) identify applications for federal development projects and federal financial assistance which the state will review for its consistency with the state program.⁴³³ The state is to develop the program to the maximum extent practicable on a watershed-by-watershed basis.⁴³⁴ All reports and management programs must be submitted to EPA during the eighteen month period beginning on February 4, 1987.⁴³⁵ Within 180 days after submission of a report or management program, the Administrator of EPA must approve or disapprove it in whole or in part.⁴³⁶

If a state fails to submit a report within the designated period, EPA by July 1988 was required to identify both the nonpoint sources of pollution and water sources threatened by them.⁴³⁷ If a state fails to submit a management program, or the program is rejected, a local public agency or organization which "has expertise in and authority to control water pollution resulting from nonpoint sources" in any area of the state which EPA determines is of "sufficient geographic size" may receive technical assistance for developing a program for its area.⁴³⁸ Such an area program must be submitted to EPA for approval.⁴³⁹ A local agency or organization may also receive financial assistance for its program as if it were a state.⁴⁴⁰ States may also receive technical assistance to develop a management program.⁴⁴¹

431. WQA § 319(a)(1), 33 U.S.C. § 1329(a)(1) (1988).

432. WQA § 319(b)(1), 33 U.S.C. § 1329(b)(1) (1988).

433. WQA § 319(b)(2), 33 U.S.C. § 1329(b)(2) (1988).

434. WQA § 319(b)(4), 33 U.S.C. § 1329(b)(4) (1988).

435. WQA § 319(c)(2), 33 U.S.C. § 1329(c)(2) (1988).

436. WQA § 319(d)(1), 33 U.S.C. § 1329(d)(1) (1988).

437. WQA § 319(d)(3), 33 U.S.C. § 1329(d)(3) (1988).

438. WQA § 319(e), 33 U.S.C. § 1329(e) (1988).

439. WQA § 319(e), 33 U.S.C. § 1329(e) (1988).

440. WQA § 319(e), 33 U.S.C. § 1329 (e) (1988).

441. WQA § 319(f), 33 U.S.C. § 1329(f) (1988).

If a state is not meeting water quality standards or the Act's requirements due to significant nonpoint source pollution from another state, either state may petition EPA to convene an "interstate management conference."⁴⁴² If the Administrator determines that the failure can be attributed to another state, the Administrator must so notify the polluting state and convene the conference not later than 180 days after the notification.⁴⁴³ The conference seeks to develop an agreement between the states to reduce pollution and improve the water quality.⁴⁴⁴ The agreement then becomes part of both states' management program.⁴⁴⁵

To expedite state programs, states may also receive grants of federal financial assistance to implement management programs.⁴⁴⁶ Federal assistance may not exceed sixty percent of the state's costs of implementation and is made on condition that the forty percent does not include other federal assistance.⁴⁴⁷ Priority in grants is given to state programs which will (1) control difficult or serious pollution problems and (2) implement innovative methods or practices of control; (3) control interstate pollution; or (4) carry out groundwater quality protection.⁴⁴⁸

States may also receive grants for groundwater quality protection activities, including "research, planning, groundwater assessments, demonstration programs, enforcement, technical assistance, education and training to protect the quality of groundwater and to prevent contamination of groundwater from nonpoint sources of pollution."⁴⁴⁹ A grant may not exceed fifty percent of a state's costs, with a maximum amount of assistance in any fiscal year of \$150,000.⁴⁵⁰

By the end of 1988, each state had to identify categories of sources and individual sources significantly contributing to water quality problems. A source of erosion and water pollution could then determine the most cost-effective means of compliance with the best management practices. As currently formulated, the re-

442. WQA § 319(g)(1), 33 U.S.C. § 1329(g)(1) (1988).

443. WQA § 319(g)(1), 33 U.S.C. § 1329(g)(1) (1988).

444. WQA § 319(g)(1), 33 U.S.C. § 1329(g)(1) (1988).

445. WQA § 319(g)(2), 33 U.S.C. § 1329(g)(2) (1988).

446. WQA § 319(h)(1), 33 U.S.C. § 1329(h)(1) (1988).

447. WQA § 319(h)(3), 33 U.S.C. § 1329(h)(3) (1988). Administrative costs cannot exceed 10% of the grant. WQA § 319(h)(12), 33 U.S.C. § 1329(h)(12) (1988). Not more than 15% of the amount appropriated for grants can go to any one state. WQA § 319(h)(4), 33 U.S.C. § 1329(h)(4) (1988).

448. WQA § 319(h)(5), 33 U.S.C. § 1329(h)(5) (1988).

449. WQA § 319(i)(1), 33 U.S.C. § 1329(i)(1) (1988).

450. WQA § 319(i)(3), 33 U.S.C. § 1329(i)(3) (1988).

quirement of best management practices (BMP) has very few "teeth" in that the state program need only establish "annual milestones" for implementation of BMP and there are no mandatory enforcement measures for BMP. Given the significant amount of farm income derived from farm subsidies, however, most farmers would have to utilize BMP as a matter of economic necessity if compliance were necessary to qualify for federal farm subsidies. Cross compliance with BMP and revisions to FIFRA could be effective in limiting pesticide contamination at least on a short term basis, pending long term solutions through means such as increased integrated pest management and biotechnological improvements.⁴⁵¹

It is not surprising given the hodge-podge of federal legislation that there are periodic calls for a national groundwater act to coordinate state and federal efforts.⁴⁵² There are two fundamental issues concerning the contents of such an act. First is the question of whether the underlying standard of protection for groundwater should be nondegradation or an acceptable level of pollution. Nondegradation avoids the uncertainties of future groundwater needs by providing a margin of safety against not yet realized effects of existing pollution. It would be a clear, unequivocal standard with the public health and safety as the paramount concern. Allowing some degradation, however, to a set acceptable level of water quality better serves concerns of economic efficiency in that the benefits of groundwater protection outweigh the costs. The conflict is perhaps best exemplified in the Clean Water Act itself, which pays lip service in its goals to nondegradation yet establishes an elaborate system of point source controls to bring pollution within acceptable limits. If some pollution is deemed acceptable, there are two ways in which limitations on pollution could be imposed: (1) classification of aquifers by use; or (2) water quality standards based on protection of public health (similar to the MCLs under the Safe

451. Increased release on biotechnology, of course, may create more environmental problems than it solves. USDA has adopted a formal policy on protecting groundwater from harmful substances that optimistically calls for alternative crop management systems. 52 Fed. Reg. 48,135 (1987).

452. See e.g., Marks, *supra* note 81, at 15; Note, *A DRASTIC Approach to Controlling Groundwater Pollution*, 98 YALE L.J. 773 (1989); Tripp & Jaffe, *Preventing Groundwater Pollution: Towards a Coordinated Strategy to Protect Critical Recharge Zones*, 3 HARV. ENVTL. L. REV. 1 (1979). But see Coggins & Glicksman, *Groundwater Pollution II: An Immodest Proposal for a Strategy to Prevent Groundwater Pollution*, 35 U. KAN. L. REV. 241 (1987) (state regulation is preferable to increased federal regulation); Willey & Graff, *Federal Water Policy in the United States — An Agenda for Economic and Environmental Reform*, 13 COLUM. J. ENVTL. L. 325 (1988) (federal legislation needed to establish tradable discharge permits for nonpoint pollution).

Drinking Water Act) or based on preservation of designated uses. Proponents of a federal groundwater act generally presume that a regulatory approach is necessary over a market-oriented approach of incentives, economic sanctions, and tradeable permits. As the Clean Water Act demonstrates, there need not be an "either/or" approach, in that a comprehensive regulatory system should incorporate noncompliance penalties and marketable permits to allow polluters to choose the most cost effective method of complying with health- or use-based standards.

Although there has been much controversy about whether federal or state and local governments are best situated to regulate groundwater, it seems reasonable to assume that for the near future groundwater regulation will continue to proliferate at every level of government. What, then, is the "best" solution to preserve groundwater? It is, perhaps, this search for the "best" solution that has stymied efforts to improve regulation. In recognition of political realities and conflicting public concerns, potential reform should be evaluated as a continuum from the weakest acceptable level of enhanced protection to the most stringent, politically difficult but environmentally desirable, standards at the federal, state, and local levels. The minimum level of federal reform would include extension of the SDWA beyond "public water systems," clarification of EPA's authority to enforce the open dumping prohibition, and increased federal funding and guidance to states to implement fully the LUST and UIC programs. A further step along the continuum would involve expansion of the Clean Water Act and FIFRA. The Clean Water Act would be amended to clarify EPA's authority to regulate groundwater to the fullest extent of the Commerce Clause, opening the way for federal groundwater quality standards or even extension of the point source permit systems to point source discharges into groundwater. To control nonpoint source contamination, FIFRA could be amended along the lines of the previously discussed bills requiring EPA to set groundwater residue guidance levels with the sanction of regional cancellation for pesticides which could be utilized in fragile waterbasins within the acceptable levels. Farmers would also be required to use best management practices to control runoff at its source in order to qualify for federal farm subsidies. Critical water basins particularly susceptible to pesticide contamination would qualify for the conservation reserve program and be removed from production for at least ten years. The final steps on this continuum would be a national groundwater act with

Act. Even if a national groundwater act were to establish enforceable standards, states would not necessarily be preempted from imposing water quality standards stricter than the federal standards. Many states have been very innovative in enforcing state groundwater standards. For example, as early as 1984, Wisconsin enacted a comprehensive groundwater law under which the state agency may prohibit polluting activity until compliance with set standards are achieved.⁴⁵³ And in 1986, California voters approved the Safe Drinking Water and Toxic Enforcement Act of 1986 which provides that no person in the course of doing business shall knowingly discharge or release chemicals, known to the state to cause cancer or endanger reproductivity, into water or onto land if such chemicals leak into any source of drinking water.⁴⁵⁴ Nonpoint source contamination must be controlled by local land use restrictions as authorized by state legislatures. Local zoning could be utilized to prohibit pesticide use in critical recharge areas, limit density, and in some instances exclude TSD facilities and hazardous industrial operations. State control over siting decisions would ensure that local parochial concerns would not predominate over valid health concerns and any unavoidable need for additional disposal sites. To the extent that groundwater allocation affects groundwater quality, states must not hesitate to limit use even though limitations on water rights may be susceptible to takings challenges, given current uncertainty about the degree of interference necessary for a taking.

There is, in short, no simple, focused solution for groundwater preservation. The hydrology of groundwater is such that it is susceptible to point source and nonpoint source contamination that must be regulated at the federal, state, and local levels. As Congress and state legislatures embark on groundwater programs, hopefully their consideration will include recognition of the uncertainties of the effects of toxic contamination and the difficulties in groundwater cleanup. Otherwise, whatever preliminary steps are taken along the possible continuum of protection will be too little and too late.

453. WIS. STAT. §§ 160.001-160.50 (1984), discussed in Yanggen & Amrhein, *supra* note 395.

454. CAL. HEALTH & SAFETY CODE §§ 25249.5-25250.25 (West Supp. 1989).