Superfund and the National Contingency Plan: How Dirty is "Dirty"? How Clean is "Clean"?*

*Theodore G. Brown III***

INTRODUCTION

Prompted by growing concerns over the dangers to public health and the environment posed by improper disposal of chemical wastes, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[1] in 1980. The Act provides a vehicle for the cleanup of inactive and abandoned hazardous waste disposal sites and hazardous substance spills.[2] It authorizes the government to abate hazardous conditions,[3] to finance these actions[4] through a fund created from taxes on petroleum and various chemical feedstocks[5] and to sue the parties responsible for the conditions for reimbursement of the fund expenditures.[6] The fund, commonly known as

* An earlier draft of this Comment received first prize in the 1984 Ellis J. Harmon Environmental Law Writing Competition.

** J.D., 1984, School of Law (Boalt Hall), University of California, Berkeley; Ph.D. (Chemistry), 1979, Northwestern University; M.S. (Chemistry), 1976, Northwestern University; B.A., College of Wooster, 1974.

1. Pub. L. No. 96-510, 94 Stat. 2767 (1980) (codified as amended at 26 U.S.C. §§ 4611-4682 (1982), 42 U.S.C. §§ 6911a, 9601-9657 (1982)).

2. *See* H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 17-18, *reprinted in* 1980 U.S. CONG. & AD. NEWS 6119, 6119-20 (committee report of CERCLA's predecessor bill); S. REP. NO. 848, 96th Cong., 2d Sess. 2-8, 12-13 (1980) (committee report of CERCLA's predecessor bill).

3. CERCLA § 104, 42 U.S.C. § 9604 (1982).

4. CERCLA § 111, 42 U.S.C. § 9611 (1982).

5. CERCLA § 211(a), 26 U.S.C. §§ 4611-4612, 4661-4662 (1982); CERCLA §§ 221-223, 42 U.S.C. §§ 9631-9633 (1982).

6. CERCLA § 107, 42 U.S.C. § 9607 (1982). In practice, the three basic components of the cleanup process—abatement, financing from the Fund, and suit against the responsible parties—are not necessarily distinct. Prior to undertaking an abatement action, the government will often attempt to force responsible parties to abate the site's hazards themselves. Rikleen, *Negotiating Superfund Settlement Agreements*, 10 B.C. ENVTL. AFF. L. REV. 697, 702-03 (1982-83). *See also infra* text accompanying notes 39-69. Where those efforts are unsuccessful, governmental cleanup efforts may be carried out in stages, and suits to recover the costs of cleanup may proceed simultaneously with actual cleanup activities. For example, a partial settlement was reached with some of the allegedly responsible parties at the Seymour, Indiana site while cleanup activities were in progress. A trust fund was set up by

"Superfund," is thus a revolving fund and is to be incrementally depleted only when solvent responsible parties cannot be located.[7]

CERCLA provides the Executive with broad authority to respond to threats from hazardous substance spills and inactive or abandoned hazardous waste disposal sites.[8] It directs the President and, in turn, the Environmental Protection Agency (EPA) to give specific content to this broad response authority through revision of the National Contingency Plan (NCP),[9] a set of regulatory guidelines originally promulgated to direct oil spill cleanup under section 311(c)(2) of the Federal Water Pollution Control Act (FWPCA).[10] The revised plan is to provide regulatory guidelines for hazardous waste cleanup and abatement activity authorized by CERCLA.[11]

CERCLA provides two major mechanisms for hazardous waste cleanup. First, section 104 of the Act authorizes the government to act to protect the public health or welfare or the environment from releases or threatened releases of any quantity of hazardous substances, and from releases or threatened releases of pollutants or contaminants in quantities sufficient to present an imminent and substantial danger to health or the environment.[12] Government responses under section 104 may be financed from the revolving $1.6 billion fund.[13] During or after the cleanup, the government may sue the owners and operators of the disposal site and the generators and transporters of the hazardous

---

the defendants to pay for surface cleanup while groundwater contamination remains at issue. United States v. Seymour Recycling Corp., 554 F. Supp. 1334 (S.D. Ind. 1982) (consent agreement reprinted at 13 ENVTL. L. REP. (ENVTL. L. INST.) 20192 (1982)). Resolution of these suits may lead to direct payment to the government for cleanup, avoiding the need to resort to the Fund. *See id.*; *cf.* Ohio *ex rel.* Brown v. Georgeoff, 562 F. Supp. 1300, 1313 (N.D. Ohio 1983). It is, however, conceptually useful to consider the three components of the CERCLA cleanup process separately, even though they do not occur as discrete, successive stages.

7. Ohio *ex rel.* Brown v. Georgeoff, 562 F. Supp. 1300, 1313 (N.D. Ohio 1983).

8. *See infra* text accompanying notes 39-69. The Executive's authority to take steps to alleviate dangers from hazardous waste sites is termed its *response authority* throughout this Comment.

9. CERCLA § 105, 42 U.S.C. § 9605 (1982).

10. 33 U.S.C. §§ 1321(c)(2) (1982).

11. CERCLA § 105, 42 U.S.C. § 9605 (1982); *see infra* text accompanying notes 70-126.

12. CERCLA § 104, 42 U.S.C. § 9604 (1982). "Hazardous substance" is defined by CERCLA § 101(14), 42 U.S.C. § 9601(14) (1982). "Pollutant or contaminant" is defined by CERCLA § 104(a)(2), 42 U.S.C. § 9604(a)(2) (1982). As used in this Comment, the term "hazardous waste" includes hazardous substances, pollutants and contaminants.

CERCLA § 104 authorizes the federal government to clean up a site only if responsible parties are not already taking proper actions. 42 U.S.C. § 9604(a) (1982). "Proper actions" by responsible parties probably include both voluntary actions and actions pursuant to a settlement agreement, court order or administrative order. *See* Rikleen, *supra* note 6, at 702-03.

13. CERCLA § 111(a), 42 U.S.C. 9611(a) (1982); *see* CERCLA § 221(b)(2), 33 U.S.C. § 1321 (1982); CERCLA § 303, 42 U.S.C. § 9653 (1982).

wastes involved to recover the cost of the cleanup.[14] The recovered money is returned to the Fund, where it is available for subsequent cleanup of other sites. All actions taken under section 104 authority must be consistent with the revised National Contingency Plan.[15]

Where the release or threatened release presents an imminent and substantial danger to public health or welfare or the environment, CERCLA section 106 provides a second mechanism for cleanup.[16] Section 106 is similar to the emergency enforcement powers conferred by other environmental statutes.[17] Like other statutes, it permits the Attorney General to sue the responsible parties for relief "as may be necessary to abate such danger."[18] It alternatively provides that the President may direct EPA to issue administrative orders to secure the same relief.[19] CERCLA does not specifically require responses taken under the authority of this section to be in accord with the National Contingency Plan; however, EPA has stated that it intends that the Plan's provisions will apply to all cleanups.[20]

In determining which sites should be cleaned up, which should be cleaned up first, and what remedy is appropriate for each site, EPA must balance complex and frequently uncertain factors concerning the public health and the environment, the potential burdens of cleanup on the responsible parties, and the technological, financial, and administrative resources available for cleanup. Before EPA can proceed under either section 104 or section 106, it must answer two questions: 1) whether the condition it seeks to abate warrants the use of the powers conferred by CERCLA (that is, whether the condition is hazardous within the meaning of either CERCLA section 104 or section 106), and 2) whether the responses undertaken or proposed provide a necessary or sufficient remedy under the Act (that is, how clean a site must be before it is legally "clean"). Uniform, predictable standards, which

14. CERCLA § 107(a), 42 U.S.C. § 9607(a) (1982); *see* United States v. Price, 577 F. Supp. 1103, 1110 (D.N.J. 1983) (the government must incur *some* response costs prior to initiating suit under CERCLA § 107).

15. CERCLA §§ 104(a)(1), 107(a)(4)(A), 42 U.S.C. §§ 9604(a)(1), 9607(a)(4)(A) (1982). *See* National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. pt. 300 (1983).

16. 42 U.S.C. § 9606(a) (1982).

17. *E.g.*, Resource Conservation and Recovery Act (RCRA) § 7003, 42 U.S.C. § 6973 (1982); Federal Water Pollution Control Act (FWPCA) (Clean Water Act) § 504, 33 U.S.C. § 1364 (1982); Safe Drinking Water Act (SDWA) § 1431, 42 U.S.C. § 300i (1982); Clean Air Act § 303, 42 U.S.C. § 7603 (1982); and Toxic Substances Control Act § 7, 15 U.S.C. § 2606 (1982).

18. 42 U.S.C. § 9606(a) (1982).

19. *Id.*

20. Guidelines for Using the Imminent Hazard, Enforcement and Emergency Response Authorities of Superfund and Other Statutes ("Imminent Hazard Guidelines"), 47 Fed. Reg. 20,664, 20,666 (1982) (promulgated pursuant to CERCLA § 106(c), 42 U.S.C. § 9606(c) (1982)).

should have been included in the revised National Contingency Plan, but were not,[21] are vital to encourage responsible parties to clean up waste sites voluntarily, to avoid responses that are overly elaborate or unnecessary to protect the public health or the environment,[22] and to ensure that actions by EPA neither are nor appear to be arbitrary or inconsistent.

The purpose of this Comment is to discuss what responses to hazardous waste disposal sites are appropriate in light of the authority granted by CERCLA, the regulations that have been promulgated pursuant to CERCLA, and the types of hazardous conditions that are likely to be encountered as EPA carries out CERCLA's mandate.[23]

---

21. *See infra* text accompanying notes 307-10. It should be noted that FWPCA directed the promulgation of an essentially procedural National Contingency Plan. 33 U.S.C. § 1321(c)(2) (1982). Congress probably expected that the appropriate responses to oil or hazardous substance spills would be containment, dispersal, and removal of the spills. *See* 33 U.S.C. § 1321(c)(2)(F) (1982). There was therefore less need for substantive cleanup standards under FWPCA than there is under CERCLA.

22. To the extent that such standards encourage voluntary cleanup and avoid unnecessary response, they promote the conservation of the Fund, a high legislative priority, in view of the recognized inadequacy of the amounts provided. *See* S. REP. No. 848, 96th Cong., 2d Sess. 26, 55-60 (1980); *accord* Ohio *ex rel.* Brown v. Georgeoff, 562 F. Supp. 1300, 1313-14 (N.D. Ohio 1983). Several bills have been introduced in Congress to increase the size of the Fund or extend its revenue-collecting lifetime beyond 1985, the CERCLA expiration date. *E.g.*, S. 816, 98th Cong., 1st Sess., 129 CONG. REC. S3070 (daily ed. Mar. 16, 1983); S. 860, 98th Cong., 1st Sess., 129 CONG. REC. S3400 (daily ed. Mar. 18, 1983).

23. There has been considerable concern that EPA is not implementing the response authority delegated to it by CERCLA as quickly or fully as possible. *See, e.g.*, N.Y. Times, Feb. 17, 1983, at 1, col. 5; *id.*, Mar. 3, 1983, at B12, col. 1; *id.*, Mar. 4, 1983, at A14, col. 1. The United States has filed several CERCLA suits. *See* Miller, *EPA Superfund Enforcement*, 13 ENVTL. L. REP. (ENVTL. L. INST.) 10062 (1983). One proceeded to trial and was decided on the limited issue of liability, United States v. Hardage, 18 Env't Rep. Cas. (BNA) 1687 (W.D. Okla. Dec. 13, 1982), and three have been publicly settled. United States v. Seymour Recycling Corp., 554 F. Supp. 1334 (S.D. Ind. 1982) (consent decree *reprinted in* 13 ENVTL. L. REP. (ENVTL. L. INST.) 20192 (Dec. 15, 1982)); United States v. South Carolina Recycling and Disposal, Inc., 14 ENVTL. L. REP. (ENVTL. L. INST.) 20272 (D.S.C. Feb. 23, 1984); United States v. Chem-Dyne Corp., 12 ENVTL. L. REP. (ENVTL. L. INST.) 30026 (Aug. 5, 1982) (pre-litigation settlement agreement). *See also* Notices of Lodging of Consent Decrees, 48 Fed. Reg. 35,539 (1983) (United States v. New Castle County, No. 80-489, (D. Del. Sept. 19, 1983) (partial settlement); United States v. County of Hillsborough, No. 80-1128, (M.D. Fla. Sept. 20, 1983) (complete settlement)); 48 Fed. Reg. 14,767 (1983) (United States v. A & F Materials Co., Inc., No. 80-4395 (S.D. Ill. Feb. 14, 1983) (partial consent decree)). None of the others, however, has progressed beyond rulings on summary judgment motions. *E.g.*, City of Philadelphia v. Stepan Chemical Co., 544 F. Supp. 1135 (E.D. Pa. 1982); United States v. Reilly Tar & Chemical Corp., 546 F. Supp. 1100 (D. Minn. 1982); United States v. Outboard Marine Corp., 556 F. Supp. 54 (N.D. Ill. 1982); Ohio *ex rel.* Brown v. Georgeoff, 562 F. Supp. 1300 (N.D. Ohio 1983); United States v. Price, 577 F. Supp. 1103 (D.N.J. 1983); United States v. Wade, 546 F. Supp. 785 (E.D. Pa. 1982), *appeal dismissed*, 713 F.2d 49 (3d Cir. 1983) (improper interlocutory appeal). *See also, e.g.*, United States v. Stringfellow, 14 ENVTL. L. REP. (ENVTL. L. INST.) 20,388 (C.D. Cal. Apr. 9, 1984). None has as yet directly confronted the question of what remedy is appropriate under CERCLA where the suit and cleanup activities are contemporaneous, or what abatement method is appropriate where the suit is to recover past expenditures from the Fund. Several courts however have addressed the appropriate scope of remedy under the Resource Conservation

The first section of this Comment investigates CERCLA's directives as to when responses should be undertaken and what response is appropriate once action is found to be necessary.[24] The second section discusses the contents of the regulations implementing the broad response authority conferred by the statute, focusing on the revised National Contingency Plan. The third section analyzes the adequacy of the revised Plan in light of the legislative intent. The final section discusses sources and types of standards that could be used to assess the appropriateness of responses to hazardous waste sites and which could have been incorporated in the National Contingency Plan.

I
THE STATUTORY REQUIREMENTS

CERCLA was both formulated[25] and enacted[26] during the final sessions of the lame-duck 96th Congress. Congress had considered several bills dealing with the cleanup of hazardous substance spills and disposal sites during prior sessions, but none had been able to gain the

---

and Recovery Act (RCRA), which may present similar issues. *See, e.g.*, United States v. Price, 523 F. Supp. 1055 (D.N.J. 1981), *aff'd*, 688 F.2d 204 (3d Cir. 1982); United States v. Midwest Solvent Recovery, Inc., 484 F. Supp. 138 (N.D. Ind. 1980); United States v. Vertac Chemical Corp., 489 F. Supp. 870 (E.D. Ark. 1980); United States v. Hooker Chemical and Plastics Corp., 540 F. Supp. 1067 (W.D.N.Y. 1982) (consent agreement reprinted at 12 ENVTL. L. RPTR. (ENVTL. L. INST.) 20710 (Apr. 30, 1982)).

24. This Comment will focus on the responses authorized by CERCLA §§ 104 and 106. CERCLA § 107, which will not be discussed in detail here, provides that responsible parties are liable for damages to natural resources and the costs of their restoration. 42 U.S.C. §§ 9607(a), (c), and (f) (1982). "Natural resources" include land, air, water, biota, groundwater, drinking water, fish and other resources owned or managed by a governmental body. *Id.* § 9601(16). Restoration costs can also form the basis of a claim against the Fund. *Id.* §§ 9611(c)(2) and (d)(1). However, the Fund can be used for restoration only after an appropriate plan for restoring the natural resources has been developed. *Id.* §§ 9611(i) and 9651(c)(2). The President delegated the responsibility for the development of this plan, an additional part of the National Contingency Plan, to the Department of the Interior. Exec. Order No. 12,316, § 8(c)(3), 46 Fed. Reg. 42,237, 42,240 (1981). Although CERCLA required the Executive to promulgate this plan within two years of the Act's passage, 42 U.S.C. § 9651(c)(1) (1982), the Department of the Interior has only recently asked for comments on how such a plan could be developed. Advance Notice of Proposed Rulemaking, 48 Fed. Reg. 1084 (1983); Advance Notice of Proposed Rulemaking, 48 Fed. Reg. 34,768 (1983). Further discussion of natural resource damage or restoration is beyond the scope of this paper, although the issues involved in determining the proper scope of a hazardous waste cleanup plan are conceptually similar to those involved in determining the proper restoration of natural resources damage.

25. *See* 126 CONG. REC. 30,113-14 (1980) (statement of Sen. Stafford) and 126 CONG. REC. 30,916-30 (1980) (amendment No. 2631 to S. 1480).

26. CERCLA was passed by the Senate on November 24, 1980, 126 CONG. REC. 30,987 (1980), passed by the House on December 3, 1980, 126 CONG. REC. 31,981 (1980), and signed by President Carter on December 12, 1980. 126 CONG. REC. 33,833 (1980) (statement of Sen. Randolph). Since CERCLA was a revenue bill, it was passed as H.R. 7020, although its entire text was a Senate amendment. 126 CONG. REC. 30,987 (1980).

approval of both houses.[27] Three related bills had been proposed, two in the House and one in the Senate. First, the House passed H.R. 7020[28] which was written as a set of amendments to the Resource Conservation and Recovery Act (RCRA).[29] The bill provided response authorities and established a $600 million fund for the abatement of hazards from inactive and interim status[30] waste disposal sites.[31] The House addressed hazardous substance and oil spills in a second bill, H.R. 85,[32] which proposed to expand the response authorities and the funds authorized by section 311 of the Federal Water Pollution Control Act (FWPCA).[33] The Senate addressed both hazardous substance spill and disposal site response authorities in a single piece of legislation, S. 1480.[34] The bill provided a $4.085 billion fund to cover the costs of responding to waste sites and spills as well as damages for injuries to individuals and property from hazardous waste releases.[35]

CERCLA was largely the synthesis of these three bills into one which was thought to be acceptable to both houses.[36] In informal post-election Congressional negotiations, many compromises were made, notably in the size of the Fund and in the liability provisions.[37] The result was a bill with a number of technical flaws and little or no legis-

---

27. *See generally* Grad, *A Legislative History of the Comprehensive Environmental Response, Compensation, and Liability ("Superfund") Act of 1980*, 8 COLUM. J. ENVTL. L. 1, 1-2 (1982); 1 ENVIRONMENTAL LAW INSTITUTE, SUPERFUND: A LEGISLATIVE HISTORY viii (H. Needham and M. Menefee, eds. 1982).

28. H.R. 7020, 96th Cong., 2d Sess. (1980). *See* 126 CONG. REC. 26,757-99 (1980).

29. 42 U.S.C. §§ 6901-6987 (1982).

30. Interim status sites are waste disposal sites existing at the time RCRA was passed. *See* Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities ("Hazardous Waste Standards"), 45 Fed. Reg. 33,153, 33,158 (1980).

31. H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 27-31, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6131-34.

32. H.R. 85, 96th Cong., 2d Sess. (1980). *See* 126 CONG. REC. 26,369-93 (1980); H.R. REP. NO. 172, Part II, 96th Cong., 2d Sess. 2, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6212-13.

33. 33 U.S.C. § 1321 (1982). Because H.R. 85 implicitly depended on the National Contingency Plan as then formulated, 40 C.F.R. pt. 1510 (1982) (superseded by 40 C.F.R. pt. 300 (1983)), to provide guidance for the appropriate standards of spill cleanup, H.R. 85 has only limited relevance here.

34. S. 1480, 96th Cong., 1st Sess. (1979). *See* 126 CONG. REC. 30,898-987 (1980). Other bills were proposed in the Senate, but none progressed far. *See, e.g.*, S. 1341, 96th Cong., 1st Sess. (1979). For an enumeration of failed bills introduced during the 95th Congress dealing with the same subject matter, see Grad, *supra* note 27, at 2 n.3.

35. S. REP. NO. 848, 96th Cong., 2d Sess. 64-69 (1980).

36. 126 CONG. REC. 30,113 (1980) (statement of Sen. Stafford).

37. 126 CONG. REC. 30,932 (1980) (statement of Sen. Randolph); 126 CONG. REC. 30,972 (1980) (remarks of Sen. Helms). Among the most important compromises was the exclusion of coverage for personal injuries. However, proposals have been made since CERCLA's passage to establish a federal cause of action for personal injuries caused by hazardous substance releases. *E.g.*, S. 917, 98th Cong., 1st Sess. (1983); S. 945, 98th Cong., 1st Sess. (1983).

lative history about to many of its details.[38] The bulk of the Congressional discussion of predecessor bills, while frequently the only guidance to the interpretation of the final product, is thus of uncertain applicability.

A. Cercla Response Authorities

CERCLA contains two principal provisions for cleaning up waste sites: sections 104 and 106. Section 104[39] contains the broadest response authorities of CERCLA. It authorizes the President[40] to provide for the cleanup of hazardous waste sites and to finance the cleanup from the Fund, if he finds that the parties responsible[41] for the hazardous condition will not abate the hazard themselves.[42] The President or his delegate may take such cleanup measures as are necessary to protect the public health or welfare or the environment wherever there is a release or substantial threat of release into the environment of any quantity of a hazardous substance[43] or wherever there is a release or a substantial threat of release of a pollutant or contaminant in quantities

38. *See* 126 CONG. REC. 31,969 (1980) (statement of Rep. Broyhill). Many possible errors in the drafting of the final bill were not addressed during congressional debates. For example, while CERCLA § 104 (a)(1), 42 U.S.C. § 9604(a)(1) (1982), authorizes federal response to a release or threat of release of hazardous substances, pollutants or contaminants, liability under CERCLA § 107(a), 42 U.S.C. § 9607(a) (1982), is limited to costs incurred in governmental response to releases or substantial threats of releases of hazardous substances only. Note, however, that federal response to a release or threat of release of a pollutant or contaminant is authorized only if the public health or welfare is imminently and substantially endangered. CERCLA § 104(a)(1)(B), 42 U.S.C. § 9604(a)(1)(B) (1982). Thus, in any case where the Executive is authorized by § 104(a)(1) to respond to pollutant or contaminant releases or threats, an abatement action under § 106(a) is available, in principle, as a remedy. 42 U.S.C. § 9606(a) (1982). It is not clear whether Congress purposely designed the statutory scheme in this way.

39. 42 U.S.C. § 9604 (1982).

40. In several sections of CERCLA, the President is given the power to act or make determinations. Pursuant to CERCLA § 115, 42 U.S.C. § 9615 (1982), the President has delegated nearly all of these powers to one or more administrative departments or agencies. Exec. Order No. 12,316, 46 Fed. Reg. 42,237 (1981). The President has delegated most powers granted by CERCLA, including the power to revise the National Contingency Plan, to the Administrator of EPA. *Id.* The President has also delegated significant powers to the Coast Guard, the Department of Defense, and the Federal Emergency Management Agency. *Id.* In this Comment, unless otherwise noted, delegation was to EPA, either by CERCLA itself or the President. These delegations are in accord with the legislative expectations. 126 CONG. REC. 30,933-34 (1980) (statement of Sen. Randolph).

41. CERCLA defines responsible parties as facility owners or operators and hazardous waste transporters and generators. 42 U.S.C. § 9607(a) (1982).

42. CERCLA § 104(a)(1), 42 U.S.C. § 9604(a)(1) (1982).

43. Hazardous substances are defined by CERCLA § 101(14), 42 U.S.C. § 9601(14) (1982), as those substances designated as hazardous under CERCLA § 102, 42 U.S.C. § 9602 (1982); FWPCA §§ 311(b)(2)(A) or 307(a), 33 U.S.C. §§ 1321(b)(2)(A) or 1317(a) (1982), respectively; RCRA § 3001, 42 U.S.C. § 6921 (1982); Clean Air Act § 112, 42 U.S.C. § 7412 (1982); or Toxic Substances Control Act § 7, 15 U.S.C. § 2606 (1982). However, CERCLA § 101(14) specifies that petroleum, petroleum distillates, natural gas and synthetic gas usable for fuel are not hazardous substances. 42 U.S.C. § 9601(14) (1982).

sufficient to present an imminent and substantial danger to the public health or welfare.[44] Under CERCLA the Executive is thus authorized to respond to a much wider range of threats and dangers than under other environmental acts, which generally require that all dangers be "imminent and substantial" before the government may respond.[45]

CERCLA section 104 authorizes two broad categories of responses: removal and remedial actions.[46] Removal actions are short-term protective measures, including the literal removal of hazardous substances to a suitable disposal site.[47] The Act authorizes the government to take such actions immediately upon discovery of a release or threat of release. Remedial activities, on the other hand, are long-term measures providing permanent containment or minimization of the release or threatened release.[48] The government may take such remedial actions where it has time to deliberate as to the best final solution.

Section 104 places certain restrictions on both removal and remedial response authorities. The Act authorizes response activities only if they are necessary to prevent or minimize present or future damage to the public health or welfare or the environment.[49] Furthermore, all

---

44. 42 U.S.C. § 9604(a)(1) (1982). It is possible to read CERCLA § 104(a)(1) as authorizing response to a hazardous substance release or threat of release only if it presents an imminent and substantial danger. However, since CERCLA § 106 authorizes emergency response to a release or threat of release of a hazardous substance in quantities sufficient to present an imminent and substantial danger, 42 U.S.C. § 9606 (1982), it would seem that Congress intended § 104 to authorize non-emergency response for a release or threat of release of any quantity of a hazardous substance that could endanger health or the environment. Substances not within the statutory definition of hazardous substances thus trigger the imminent and substantial danger requirement. *See* United States v. Hardage, 18 Env't Rep. Cas. (BNA) 1685, 1686 (W.D. Okla. 1982) (interpreting § 104 in this manner).

45. *See supra* statutes cited at note 17.

46. CERCLA § 104(1), 42 U.S.C. § 9604(1) (1982).

47. CERCLA § 101(23), 42 U.S.C. § 9601(23); S. REP. No. 848, 96th Cong., 2d Sess. 54 (1980). H.R. 7020 did not divide response activities into removal and remedial as CERCLA does and S. 1480 did, but instead into actions to address emergencies, H.R. 7020, 96th Cong., 2d Sess. § 3041(a)(1) (1980), and actions to address long term threats, *id.* § 3041(a)(2); the intent, however, was essentially the same. H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 27-28, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6130-31.

48. S. REP. No. 848, 96th Cong., 2d Sess. 54 (1980).

49. CERCLA § 101(23) provides in part:

> "remove" or "removal" means 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, . . . 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* . . . .

42 U.S.C. § 9601(23) (1982) (emphasis added).

CERCLA § 101(24) provides in part:

> "remedy" or "remedial action" means those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance 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.*

response activities taken under section 104 of CERCLA must be consistent with the National Contingency Plan,[50] as revised pursuant to CERCLA section 105.[51] Unless responses to continuing emergency or remedial actions have been arranged with the affected state,[52] expenditures from the Fund may not exceed one million dollars, and the duration of response activities may not exceed six months.[53]

The second principal authority under CERCLA for cleaning up waste sites is contained in section 106. When the release or threat of release of a hazardous substance presents an imminent and substantial danger to the public health or welfare or the environment, as determined by the designated agency,[54] section 106 authorizes the Attorney General to sue the responsible parties to force them to abate the danger or threat without resorting to the Fund.[55] Alternatively, the section authorizes EPA to issue administrative orders as necessary to protect the public health and welfare and the environment.[56] This imminent hazard provision is analogous to RCRA section 7003,[57] FWPCA section 504(a),[58] section 1431 of the Safe Drinking Water Act (SDWA),[59] and section 303(a) of the Clean Air Act (CAA).[60]

---

42 U.S.C. § 9601(24) (1982) (emphasis added).

50. CERCLA § 104(a), 42 U.S.C. § 9604(a) (1982).

51. CERCLA § 105, 42 U.S.C. § 9605 (1982).

52. CERCLA § 104(c)(3), 42 U.S.C. § 9604(c)(3) (1982). Such arrangements include assumption by the state of future operations and maintenance costs, use of a RCRA certified hazardous waste disposal facility if removal activities are contemplated, and an agreement for cost sharing between the state and the federal government.

53. CERCLA § 104(c)(1), 42 U.S.C. § 9604(c)(1) (1982).

54. The President has delegated the authorities of § 106(a) to EPA except where the release or threat of release is to the coastal zone, the great lakes, or ports or harbors, in which case the President's delegate is the Coast Guard. *See* Exec. Order No. 12,316 § 3, 46 Fed. Reg. 42,237 (1981). *See also infra* text accompanying notes 147-58, discussing delegation of the authorities of § 104.

55. CERCLA § 106(a), 42 U.S.C. § 9606(a) (1982).

56. *Id.* Section 106 also provides for penalties for willful non-compliance with administrative orders and directs EPA to promulgate guidelines for the use and coordination of the enforcement authorities of CERCLA and other environmental statutes. 42 U.S.C. §§ 9606(b) and (c) (1982). The guidelines have been published. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664 (1982).

57. 42 U.S.C. § 6973 (1982).

58. 33 U.S.C. § 1364(a) (1982).

59. 42 U.S.C. § 300i (1982).

60. 42 U.S.C. § 7603(a) (1982). The imminent hazard authorities other than those of CERCLA have been analyzed in some detail. *See, e.g.*, Note, *Using RCRA's Imminent Hazard Provision in Hazardous Waste Emergencies*, 9 ECOLOGY L.Q. 599 (1981); Skaff, *The Emergency Powers in the Environmental Protection Statutes: A Suggestion for a Unified Emergency Provision*, 3 HARV. ENVTL. L. REV. 298 (1979). For a summary of prior interpretations of the phrase "imminent and substantial endangerment," see *id.* at 315-18 and United States v. Waste Industries, 556 F. Supp. 1301, 1310-14 (E.D.N.C. 1982), *rev'd on other grounds*, 734 F.2d 159 (4th Cir. 1984).

It should be noted that the imminent hazard provisions of the other environmental statutes are not strictly comparable to CERCLA § 106 or to cost recovery actions combining CERCLA §§ 104 and 107. First, RCRA and the other statutes were primarily regulatory

Congress' reasons for including section 106 in the Act are not clear from the legislative history;[61] however, there are at least three possibilities. First, Congress may have believed that the mechanisms of section 106 would permit faster cleanup of hazardous sites than would the mechanisms of section 104. Second, Congress may have intended section 106 to provide a means by which the government might force the responsible parties to respond to a site's hazards so that the government's own section 104 response authority would not have to be used.[62] Finally, by using section 106 authority the government could bring about cleanup without use of the Fund, thus conserving it.[63]

---

rather than remedial, and their imminent hazard provisions were essentially their sole enforcement authorities. While these earlier acts did contain authority to enforce compliance with regulations through penalties, their imminent hazard authorities are at once broader and narrower than CERCLA's response authorities. *See, e.g., RCRA's Imminent Hazard Provision and Inactive Hazardous Waste Dumps: A Reappraisal After* United States v. Waste Industries, 13 ENVTL. L. RPTR. (ENVTL. L. INST.) 10074, 10074-75 (1983); Helfrich, *Problems in Pollution Response Liability Under Federal Law: FWPCA Section 311 and the Superfund*, 13 J. MAR. L. & COM. 455, 460-63 (1982) (comparison of penalties vs. cost recovery). They are broader than CERCLA § 106 in that they arguably provided for a complete remedy for imminently and substantially hazardous conditions, while removal under CERCLA generally does not. *See* United States v. Vertac Chemical Corp., 489 F. Supp. 870, 886-88 (E.D. Ark. 1980) (remedy available under RCRA § 7003 and several sections of FWPCA). They are narrower than CERCLA § 104 in allowing only response to imminent and substantial danger, while CERCLA allows response to any release or threatened release of a hazardous substance. *Compare, e.g.*, RCRA § 7003, 42 U.S.C. § 6973 (1982) *with* CERCLA § 104(a), 42 U.S.C. § 9604(a) (1982).

Second, because the imminent hazard provisions of acts other than CERCLA were the only response authorities provided in those acts, they may have engendered interpretations of "imminent and substantial" and "appropriate relief" that are considerably broader than those that may be anticipated under CERCLA § 106 suits. *See* United States v. Waste Industries, 556 F. Supp. 1301, 1316-17 (E.D.N.C. 1982) (interpreting the enactment of CERCLA as narrowing the relief available under RCRA § 7003), *rev'd on other grounds*, 734 F.2d 159 (4th Cir. 1984); *but see* United States v. Reilly Tar & Chemical Corp., 546 F. Supp. 1100, 1114 (D. Minn. 1982) (finding RCRA § 7003 and CERCLA § 106(a) as essentially coextensive); *accord* United States v. Price, 577 F. Supp. 1103, 1110-12 (D.N.J. 1983).

61. Neither H.R. 7020 nor S. 1480 contained a provision analogous to CERCLA § 106. *See* H.R. 7020, 96th Cong., 2d Sess., 126 CONG. REC. 26,775 (1980) (proposed RCRA § 3041(a)(2) providing for administrative orders to abate inactive hazardous waste sites that may present unreasonable risks of harm); S. 1480, § 3(b), 96th Cong., 2d Sess., 126 CONG. REC. 30,909 (1980) (authority to establish and enforce regulations to protect public health and the environment from waste sites not in compliance with RCRA permits).

62. *See supra* note 6.

63. *See* United States v. Price, 577 F. Supp. 1103, 1110-12 (D.N.J. 1983). *See also supra* note 22. Although the inclusion of an imminent hazard provision may have been intended to add administrative flexibility to CERCLA's enforcement authorities or to promote conservation of the Fund by enabling abatement through force of judicial process, *see* S. REP. No. 848, 96th Cong., 2d Sess. 62-63 (1980), the § 106 response authority may be largely superfluous. Section 104 allows the government to respond to a wider range of health threats than does § 106, since § 104 does not require that the threat be imminent and substantial, and it probably permits a faster response than would be available either by court action or by administrative orders. Courts have tended to be reluctant to grant preliminary injunctive relief in suits under the imminent hazard provisions of, for example, RCRA. *See, e.g.*, United States v. Wade, 546 F. Supp. 785, 788-94 (E.D. Pa. 1982), *appeal dismissed*, 713

Although section 106 aims to protect the public health, welfare and the environment, it does not explicitly require any of the emergency responses to be consistent with the National Contingency Plan.[64] The Plan will nevertheless probably be persuasive in determining the appropriate remedy in an enforcement action under section 106. Similarly, Congress probably intended administrative orders to be consistent with the Plan, since their contents are up to the EPA rather than the courts.[65] Finally, if the courts are unwilling to order response activities or responsible parties are unwilling to undertake them, Congress intended the EPA to use the Fund to abate the imminent hazard via the response authorities of section 104.[66] In that case, compliance with the Plan is assured both by the requirements of CERCLA section 104[67] and by provisions of section 107, which specify that only Fund expenditures that are consistent with the National Contingency Plan can be recovered from responsible parties.[68]

Thus, Congress intended that all responses authorized by CERCLA would protect the public health and welfare and the environment and that, with the possible exception of activities taken by responsible parties pursuant to injunctions or administrative orders, the primary guidance for accomplishing this goal would be the National Contin-

F.2d 49 (3d Cir. 1983) (claims under RCRA § 7003 and CERCLA § 106(a)); United States v. Waste Industries, 556 F. Supp. 1301 (E.D.N.C. 1982)(claims under RCRA § 7003), *rev'd on other grounds*, 734 F. 2d 159 (4th Cir. 1984). *But see, e.g.,* United States v. Diamond Shamrock Corp., 17 Env't Rep. Cas. (BNA) 1329, 1333-34 (N.D. Ohio 1981) (claims under RCRA § 7003). EPA may try to avoid a trial on the issues of imminence and substantiality by issuing administrative orders, but if the responsible parties do not comply, the Agency must enforce such orders in court, where these issues are then likely to be raised. CERCLA § 106(b), 42 U.S.C. § 9606(b) (1982). Further, although civil penalties may be assessed for non-compliance with administrative orders, *id.*, good faith belief by the party ordered to clean up that he is not responsible for the condition sought to be abated is probably a defense to the assessment of penalties. *See infra* note 65. Thus § 106 is not likely to provide any greater efficiency or flexibility than the § 104 authorities as long as the Fund exists.

64. 42 U.S.C. § 9606 (1982). Section 106 requires the guidelines issued under this section to be consistent with the Plan to the extent practicable, but these guidelines are merely EPA policy and as such are binding on neither EPA nor the courts. 42 U.S.C. § 9606(c) (1982). Under the guidelines, the appropriate extent of response will be determined, on a case-by-case basis, by a combined legal and scientific judgment, and proposals by responsible parties for cleanup will be judged accordingly. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982). Further, EPA will evaluate the adequacy of any abatement proposal by a responsible party, whether voluntary or the result of administrative or judicial process, by referring to Subpart F of the revised Plan. *Id.*; *see infra* text accompanying notes 311-25.

65. *See* 126 CONG. REC. 30,986 (1980) (remarks of Sen. Stafford). The legislative history indicates that inconsistency of the ordered action with the National Contingency Plan or issuance of an order to one who, for good reason, believed himself not to be a responsible party constitute sufficient defenses to the assessment of the penalty. *Id.*

66. *See, e.g.,* 126 CONG. REC. 30,939-40 (1980) (statement of Sen. Bradley).

67. CERCLA § 104(a), 42 U.S.C. § 9604(a) (1982).

68. CERCLA § 107(a)(4)(A), 42 U.S.C. § 9607(a)(4)(A) (1982).

gency Plan.[69]

B. Cercla's Requirements for Revisions to the National Contingency Plan

CERCLA section 105 contains the Act's primary guidance for Executive action at inactive or abandoned waste disposal sites.[70] It directs the President to revise the National Contingency Plan,[71] which was originally promulgated by the Council on Environmental Quality pursuant to FWPCA section 311(c)(2) to direct oil and hazardous substance spill cleanup.[72] The revisions are to "reflect and effectuate the [additional] responsibilities and powers created by" CERCLA.[73] The President delegated the responsibility for revising the plan to EPA.[74] Although EPA was to promulgate the National Contingency Plan after typical notice and comment procedures, Congress did not intend it to be a set of rigid regulations but rather a set of general guidelines that would give EPA flexibility, especially in the face of emergencies, to accomplish the basic purposes of CERCLA.[75] Like other regulations

---

69. S. REP. NO. 848, 96th Cong., 2d Sess. 62 (1980); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6133; *accord* United States v. Reilly Tar & Chemical Corp., 546 F. Supp. 1100, 1116-17 (D. Minn. 1982). Congress, however, did *not* intend that EPA delay any cleanup activities until after the Plan had been developed.

70. 42 U.S.C. § 9605 (1982).

71. *Id.*

72. 33 U.S.C. § 1321(c)(2) (1982).

73. CERCLA § 105, 42 U.S.C. § 9605 (1982); *see* 126 CONG. REC. 31,965 (1980) (statement of Rep. Florio); 126 CONG. REC. 33,833 (1980) (post-passage remarks of Sen. Randolph).

At the time of their introduction, both of the predecessor waste site cleanup bills provided for a similar plan to be developed by EPA. S. 1480, 96th Cong., 2d Sess. § 3(c)(5)(d), 126 CONG. REC. 30,908 (1980); H.R. 7020, 96th Cong., 2d Sess. § 3, 126 CONG. REC. 26,757-58 (1980).

The revised Plan, in addition to effecting CERCLA's new response authority, was to have significantly different objectives than the Plan promulgated under the FWPCA. The FWPCA Plan was intended primarily to coordinate actions by different agencies and to provide *procedures* for cleaning up oil and hazardous substance spills. 33 U.S.C. § 1321(c)(2) (1982). Since the primary objective of response under the FWPCA was to remove spills, there was probably less need for substantive cleanup standards than there is in CERCLA and thus no directive in the FWPCA comparable to CERCLA's "appropriate extent of response" section. *Compare id. with* 42 U.S.C. § 9605 (1982). The portion of the original Plan relating to oil spills has been retained more or less intact. *Compare* 40 C.F.R. §§ 1510.51-.57, .63, .65 (1982) (superseded) *with* 40 C.F.R. §§ 300.51-.58 (1983).

74. President Carter originally delegated the revision of the National Contingency Plan to the Council on Environmental Quality, which had promulgated prior versions of the Plan under the FWPCA. Exec. Order. No. 12,286, 46 Fed. Reg. 9901 (1981); *see* National Contingency Plan, 40 C.F.R. pt. 1510 (1980) (superseded by 40 C.F.R. pt. 300 (1983)). President Reagan redelegated that authority to EPA. Exec. Order No. 12,316 § 1(c), 46 Fed. Reg. 42,237 (1981).

75. 126 CONG. REC. 33,833 (1980) (post-passage remarks of Sen. Randolph); 126 CONG. REC. 31,965 (1980) (statement of Rep. Florio). *But cf.* Tinkham v. Reagan, 13 ENVTL. L. REP. (ENVTL. L. INST.) 20,553 (D.N.H. Apr. 14, 1983) (National Priorities List,

promulgated under CERCLA, the National Contingency Plan was subject to a legislative veto by one[76] or both[77] houses of Congress.[78]

CERCLA requires that the revised Plan contain, among other provisions:

(1) "methods and criteria for determining the appropriate extent of removal, remedy, and other measures authorized . . .";[79]

(2) "criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action and, to the extent practicable taking into account the potential urgency of such action, for the purpose of taking removal action";[80] and

(3) "means of assuring that remedial action measures are cost-effective over the period of potential exposure to the hazardous substances or contaminated materials."[81]

Congress intended that EPA would base its cleanup priorities on the relative risks posed to the public health or welfare or to the environment by the waste sites.[82] Based on these criteria, EPA was to compile and publish a list of the nation's four hundred highest priority sites.[83]

1. The Appropriate Extent of Response

Neither CERCLA nor its legislative history contains generally applicable substantive standards for determining the appropriate extent of response activities.[84] Many of the legislators intended the Act to

---

Appendix B of the National Contingency Plan, is regulation within the meaning of Administrative Procedures Act, 5 U.S.C. § 706 (1982)).

76. 42 U.S.C. § 9655(a)(2) (1982).

77. 42 U.S.C. § 9655(a)(1) (1982).

78. The legislative veto provisions were specifically intended to be applicable to the revised National Contingency Plan. 126 CONG. REC. 30,985-86 (1980) (remarks of Sen. Stafford).

79. CERCLA § 105(3), 42 U.S.C. § 9605(3) (1982).

80. CERCLA § 105(8)(A), 42 U.S.C. § 9605(8)(A) (1982).

81. CERCLA § 105(7), 42 U.S.C. § 9605(7) (1982).

82. CERCLA § 105(8)(A), 42 U.S.C. § 9605(8)(A) (1982).

83. CERCLA § 105(8)(B), 42 U.S.C. § 9605(8)(B) (1982). CERCLA § 105 requires that the Plan contain several additional features, including methods for discovering and investigating abandoned or inactive disposal facilities or sites, CERCLA § 105(1), 42 U.S.C. § 9605(1) (1982); methods for evaluating and remedying releases or threats of releases from such facilities, § 105(2), 42 U.S.C. § 9605(2) (1982); a plan for allocation of roles and responsibilities of federal, state, and local governmental units, CERCLA § 105(4), 42 U.S.C. § 9605(4) (1982); methods for reporting and assigning responsibility for federally owned or controlled disposal facilities, CERCLA § 105(6), 42 U.S.C. § 9605(6) (1982), response to which cannot be financed by the Fund, CERCLA § 111(e)(3), 42 U.S.C. § 9611(e)(3) (1982); provisions for procurement and maintenance of necessary equipment and supplies, CERCLA § 105(5), 42 U.S.C. § 9605(5) (1982); and specification of the role for private organizations in response activities, CERCLA § 105(9), 42 U.S.C. § 9605(9) (1982). The Plan also is to continue to contain the provisions required by FWPCA, 33 U.S.C. § 1321(c)(2) (1982). CERCLA § 105, 42 U.S.C. § 9605 (1982).

84. Indeed, this was one of the criticisms of H.R. 7020. 126 CONG. REC. 26,759 (1980) (statement of Rep. Stockman).

cover the worst of the hazardous waste release incidents of the recent past;[85] however, Congress indicated neither the degree of danger required to trigger the response and funding mechanisms of the Act, nor the extent of cleanup necessary to satisfy these provisions.[86] At the time of their introduction, both H.R. 7020[87] and S. 1480[88] contained provisions nearly identical to CERCLA section 105(3), which directs the President to determine the appropriate extent of response.[89] The legislative reports for these bills outlined the factors to be considered for a few of the potentially more costly types of responses.[90] For other types of responses, however, the respective committee reports did no more than list the general requirements of the National Contingency Plan.[91]

This absence of substantive standards for determining which sites and spills warrant responses and for determining the appropriate extent of response appears to be the result of two factors. First, since more hazardous sites existed than the Fund could reach with its limited resources,[92] Congress contemplated that the sites would be cleaned up in roughly the order of the magnitude of each site's risk to the public health or welfare or to the environment.[93] Congress therefore was able to defer addressing the question whether responses to relatively low-

85. *See, e.g.,* 126 CONG. REC. 30,113 (1980) (statement of Sen. Stafford); 126 CONG. REC. 30,951 (1980) (statement of Sen. Culver); 126 CONG. REC. 31,972-73 (1980) (statement of Rep. Vento).

86. The Act states only its general objective of protecting the public health and welfare and the environment. *See supra* text accompanying notes 39-69. The Act does not specify the meaning of the phrase "protection of the public health and welfare and the environment." However, it directs the President to determine the appropriate extent of response, CERCLA § 105(3), 42 U.S.C. § 9605(3) (1982), suggesting that the Executive is to define this phrase.

87. H.R. 7020, 96th Cong., 2d Sess. (1980).

88. S. 1480, 96th Cong., 1st Sess., § 3(c)(2)(C) (1979).

89. 42 U.S.C. § 9605(3) (1982). After their introduction, both H.R. 7020 and S. 1480 were amended to contain language identical to CERCLA § 105(3), 42 U.S.C. § 9605(3). 126 CONG. REC. 26,777 (1980) (H.R. 7020 as passed by the House); 126 CONG. REC. 30,908 (1980) (amendments to S. 1480).

90. S. REP. NO. 848, 96th Cong., 2d Sess. 55-56 (1980) (factors to be considered in determining whether to provide fo relocation of residents, alternate drinking water supplies, and off-site removal actions).

91. S. REP. NO. 848, 96th Cong., 2d Sess. 52 (1980); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6133.

92. The Senate realized that even the $4.085 billion fund proposed in S. 1480 would be insufficient by itself to clean up all the sites and spills which deserve attention. S. REP. NO. 848, 96th Cong., 2d Sess. 17-18 (1980). Congress considered a variety of estimates of the cost of cleaning up disposal sites. *See, e.g.,* S. REP. NO. 848, 96th Cong., 2d Sess. 1-4 (1980); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 20, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6123; H.R. REP. NO. 172, Part 2, 96th Cong., 2d Sess. 13-15, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6212, 6224-26. *See also* 126 CONG. REC. 30,940-41 (1980) (remarks of Sen. Tsongas).

93. *See* the discussion of the Act's provisions for hazard ranking and publication of the National Priorities List, *infra* text accompanying notes 187-225.

level hazards were warranted. Second, and more importantly, the legislative history and the text of the statute show that Congress intended that the power to implement CERCLA and to set policy concerning the appropriate extent of response would be delegated to the technically specialized departments of the Executive.[94] Congress believed CERCLA contained sufficient checks on the Executive to ensure that it did not abuse this discretion.[95]

2. *Determination of Cleanup Priorities*

CERCLA section 105(8)(A) requires EPA to consider several factors in determining the magnitude of the risk posed by a site considered for remedial response: the population at risk; the hazard potential of the hazardous substances present; and the potentials for contamination of drinking water supplies, direct human contact, or destruction of sensitive ecosystems.[96] Based on these criteria, the EPA was to formulate a method for ranking sites[97] and was then to compile and publish a National Priorities List containing at least four hundred sites eligible for remedial response and including among the top one hundred sites at least one site from each state.[98]

Congress intended that the NPL would be used primarily as a means of identifying sites eligible for remedial response.[99] The NPL

94. *E.g.,* 126 CONG. REC. 30,933-34 (1980) (statement of Sen. Randolph). Numerous sections of CERCLA explicitly require various determinations by the Executive. *E.g.,* 42 U.S.C. §§ 9604(a), 9605, and 9606(a) (1982). *See* City of Milwaukee v. Illinois, 451 U.S. 304, 317 (1981); Immigration and Naturalization Service v. Chadha, 103 S. Ct. 2764, 2792-811 (1983) (White, J., dissenting) (legitimacy of delegation of legislative authority to Executive). It was expected that EPA would revise the National Contingency Plan and, with the Coast Guard, would be the primary user of the Fund monies. 126 CONG. REC. 30,933-34 (1980) (statement of Sen. Randolph).

95. The major checks on administrative discretion are the requirements of protection of the public health, cost-balancing and cost-effectiveness. *See* 126 CONG. REC. 30,950 (1980) (statement of Sen. Dole). Congress may also have intended the legislative veto to provide further oversight of EPA actions. *See* 126 CONG. REC. 33,833 (1980) (post-passage remarks of Sen. Randolph). In spite of these checks on administrative discretion, some legislators were clearly concerned about the amount of discretion given the Executive. 126 CONG. REC. 31,969 (1980) (statement of Rep. Broyhill); *id.* at 31,975 (statement of Rep. Snyder); *id.* at 31,981 (statement of Rep. Rudd).

96. CERCLA § 105(8)(A), 42 U.S.C. § 9605(8)(A) (1982).

97. *Id.*

98. CERCLA § 105(8)(B), 42 U.S.C. § 9605(8)(B) (1982). Each state was to assist EPA in the preparation of this list and to designate one site as its highest priority. *Id.* S. 1480 and H.R. 7020, as introduced, contained substantially equivalent provisions. S. 1480, 96th Cong., 1st Sess. § 6(a)(2) (1979); H.R. 7020, 96th Cong., 2d Sess., 126 CONG. REC. 7490 (1980) (proposed RCRA § 3032(b)). The House proposal would have placed much of the responsibility for determining priorities with the states. *Id.* § 3041(a). The respective committee reports do little more than list the provisions. S. REP. NO. 848, 96th Cong., 2d Sess. 53 (1980); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 26-27, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6129-30.

99. *See* S. REP. NO. 848, 96th Cong., 2d Sess. 60 (1980).

need not be used to prioritize sites eligible for emergency response because emergency removal responses automatically have a high priority since they pose immediate risks to the public health or welfare or the environment.[100] Although CERCLA directed EPA to consider certain factors in devising the ranking system and the priorities list, the formulation of the details of both were left to the discretion of EPA.[101]

3. Cost-Effectiveness

CERCLA section 105(7) requires that responses to hazardous waste sites be cost-effective.[102] This assures that a range of alternatives is considered when a permanent remedy is planned[103] and that the least costly response that will protect the public health and welfare and the environment is the one that is implemented.[104] In contrast to the "appropriate extent of response"[105] and the risk assessment[106] provisions of section 105, the meaning of the cost-effectiveness requirement[107] is relatively clear. First, "cost-effectiveness" has become a term of art in environmental legislation meaning the least costly alternative that will reach the desired results.[108] It does not simply mean cost-benefit analysis.[109] The legislative history further makes it clear that Congress did not contemplate full cost-benefit analysis, but rather intended cost to be one of several factors. The Plan was to include "*considerations* of the relationship between the costs and benefits of a particular response action,"[110] but was to be formulated "with deference to the threat to public health, welfare or the environment"[111] and the intangible, long-term benefits "customarily included when Congress uses the term 'welfare.' "[112] Protection of the public health and welfare and the environment is the primary goal of a response action; saving money is

100. *See* 126 CONG. REC. 33,833 (1980) (post-passage remarks of Sen. Randolph); *but cf.* CERCLA § 105(8)(A), 42 U.S.C. § 9605(8)(A) (1982) (NPL to determine priorities for removals to extent practicable); *accord* S. REP. No. 848, 96th Cong., 2d Sess. 59, 61 (1980).

101. *See supra* note 94.

102. CERCLA § 105(7), 42 U.S.C. § 9605(7) (1982).

103. *See* 126 CONG. REC. 30,933 (1980) (statement of Sen. Randolph).

104. *See* Rodgers, *Benefits, Costs, and Risks: Oversight of Health and Environmental Decisionmaking*, 4 HARV. ENVTL. L. REV. 191, 204-06 (1980).

105. CERCLA § 105(3), 42 U.S.C. § 9605(3) (1982). *See supra* text accompanying notes 84-91.

106. CERCLA § 105(8), 42 U.S.C. § 9605(8) (1982). *See supra* text accompanying notes 96-101.

107. CERCLA § 105(7), 42 U.S.C. § 9605(7) (1982).

108. *See* Rodgers, *supra* note 104, at 204-06.

109. *Id.*

110. 126 CONG. REC. 30,985 (1980) (remarks of Sen. Stafford) (emphasis added). *See also id.* (remarks of Sen. Helms).

111. 126 CONG. REC. 33,834 (1980) (post-passage remarks of Sen. Randolph).

112. *Id.* (post-passage remarks of Sen. Stafford). For statutory definitions of "welfare," *see, e.g.*, Clean Air Act § 302(h), 42 U.S.C. § 7602(h) (1982); Safe Drinking Water Act § 1401(2), 42 U.S.C. § 300f(2) (1982).

secondary but still significant.[113] The legislative discussions of both CERCLA[114] and H.R. 7020,[115] on which section 105(7) apparently was based,[116] indicate that Congress specifically rejected the idea of requiring a strict cost-benefit analysis because of the need for timely responses under the Act and because of the technical uncertainties involved in assessing both the risks presented by a site[117] and the long-term benefits of proposed response activities.

CERCLA section 104(c)(4)[118] includes a second cost balancing requirement, not designed to be part of the Plan. It requires the President,[119] when choosing a remedial response, to balance the need for protection of the public health and welfare and the environment at the site under consideration against the need to preserve the Fund for responses to other sites.[120] While this balancing will necessarily be closely intertwined with that of section 105(7), it requires the President to take a broader view and to consider the expenditures from the Fund at all sites in relation to the total amounts in the Fund, instead of merely considering the appropriate response at a single site.[121]

While section 105 cost balancing will ensure that funds are used efficiently at each cleanup site, section 104 cost balancing will ensure that the Fund will be used to clean up the most hazardous sites first. For cleanup of remaining sites, the government can bring enforcement actions against responsible parties under section 106[122] or section 107.[123] EPA has interpreted the two provisions as permitting different responses depending on whether they will be financed by the Fund or by private parties.[124] Both of these cost balancing provisions are directed at utilizing the Fund, recognized as insufficient for the task of cleaning up all abandoned or inactive waste sites and hazardous substance releases,[125] as efficiently as possible while still achieving CER-

113. 126 CONG. REC. 30,933 (1980) (statement of Sen. Randolph).

114. *Id.* (post-passage remarks of Sen. Randolph).

115. H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 28, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6131.

116. H.R. 7020, 96th Cong., 2d Sess., 126 CONG. REC. 26,776 (1980) (proposed RCRA § 3041(d)). *See also* S. REP. NO. 848, 96th Cong., 2d Sess. 58 (1980). The Senate report showed concern with cost issues in other areas also. *Id.* at 55-56.

117. *See infra* text accompanying notes 165-86 and 202-12.

118. 42 U.S.C. § 9604(c)(4) (1982).

119. *See* S. REP. NO. 848, 96th Cong., 2d Sess. 57-58 (1980); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 29-30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6132-33. The President delegated to EPA the authority to make these determinations. Exec. Order No. 12,316 § 2(f), 46 Fed. Reg. 42,237, 42,238 (1981).

120. CERCLA § 104(c)(4), 42 U.S.C. § 9604(c)(4) (1982).

121. *See* 126 CONG. REC. 30,985 (1980) (remarks of Sen. Helms).

122. 42 U.S.C. § 9606 (1982). *See supra* text accompanying notes 54-68.

123. 42 U.S.C. § 9607 (1982).

124. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982).

125. *See supra* note 92.

CLA's goal of protecting the public health and welfare and the environment from the hazards from improper disposal of chemical wastes.[126]

II

THE REVISED NATIONAL CONTINGENCY PLAN

The EPA promulgated the new National Contingency Plan on July 16, 1982,[127] approximately one year after the statutory deadline.[128] When the deadline for the promulgation of the Plan's revisions had passed without EPA action, the Environmental Defense Fund and the State of New Jersey obtained a court order requiring publication of the proposed revisions.[129] The court allowed the EPA to extend the period for public comments on the proposed revisions after their publication.[130] The EPA submitted the revised National Contingency Plan to Congress for review;[131] however, the Plan received little comment[132] and, after sixty days of continuous session of both houses, it became effective December 10, 1982.[133] The initial edition of the National Pri-

126. By choosing to incorporate into CERCLA a cost-effectiveness approach rather than a stricter cost-benefit analysis and by failing to qualify "protection of the public health and welfare and the environment" except where the proposed response action will create more environmental harm than it would abate, Congress has indicated that the primary concern of CERCLA is protection of the public health, welfare and the environment, and that cost considerations are secondary. *See* McGarity, *Substantive and Procedural Discretion in Administrative Resolution of Science Policy Questions: Regulating Carcinogens in EPA and OSHA,* 67 GEO. L.J. 729, 784-88 (1979) (legislative priorities from the language of Occupational Safety and Health Act, 29 U.S.C. §§ 651-75 (1982), Consumer Products Safety Commission Enabling Act, 15 U.S.C. §§ 2051-83 (1982), and FIFRA, 7 U.S.C. §§ 136-136y (1982)).

127. NCP, 47 Fed. Reg. 31,180 (codified at 40 C.F.R. §§ 300.1-.81 (1983)).

128. CERCLA § 105, 42 U.S.C. § 9605 (1982) required promulgation of the revised National Contingency Plan by June 9, 1981. *See EPA Proposes Court-Ordered Contingency Plan Revisions Under "Superfund"; Stresses "Flexible" Cleanup Standards,* 12 ENVTL. L. REP. (ENVTL. L. INST.) 10,040, 10,041 n.20 (1982).

129. Environmental Defense Fund, Inc. v. Gorsuch, 17 Env't Rep. Cas. (BNA) 1099 (D.D.C. 1982).

130. *Id.* at 1102 (deadline for final publication extended to May 28, 1982); 47 Fed. Reg. 13,174 (1982) (extension of comment period). *See* National Oil and Hazardous Substances Pollution Contingency Plan (proposed rule) ("Proposed NCP"), 47 Fed. Reg. 10,972 (1982).

131. 128 CONG. REC. H4272 (daily ed. July 19, 1982) (Plan referred to House Committees on Energy and Commerce and Public Works and Transportation; Exec. Comm. No. 4399); 128 CONG. REC. H4969 (daily ed. Aug. 2, 1982) (Exec. Comm. No. 4515, adding previously omitted material); 128 CONG. REC. S8833 (daily ed. July 21, 1982) (Plan referred to Senate Committee on Environment and Public Works; Exec. Comm. No. 3852); 128 CONG. REC. S9593 (daily ed. Aug. 2, 1982) (Exec. Comm. No. 3983, adding previously omitted material).

132. The only remarks made in Congress about the revised Plan were those of Rep. Gore, characterizing the plan as an "abdication of responsibility on the part of this administration to deal with the problem of hazardous chemical waste. . . ." 128 CONG. REC. H871 (daily ed. Mar. 16, 1982).

133. 47 Fed. Reg. 55,488 (1982).

orities List, Appendix B of the National Contingency Plan, was proposed on December 30, 1982[134] and made final September 8, 1983.[135]

EPA added several new sections to the National Contingency Plan developed under FWPCA. The additions of Subpart F (Hazardous Substance Response),[136] Appendix A (the Uncontrolled Hazardous Waste Site Ranking System or HRS),[137] and Appendix B (the National Priorities List or NPL)[138] are of primary concern here. Together, these three sections constitute the Plan's directives on which sites are to be cleaned up and what is to be the extent of that cleanup.[139]

Subpart F is a guide to cleaning up hazardous wastes from the initial discovery of a potentially hazardous condition through to the design and implementation of a final solution.[140] This section divides the response process of CERCLA section 104[141] into seven stages, known as operational phases,[142]and encourages the agency undertaking the response to maximize state participation, to conserve the Fund, to consider local community concerns, to use established technology, and to share technology with industry and other experts.[143] The EPA's intent was to provide a flexible procedure with flexible goals and (implicitly) a wide range of possible final solutions to hazardous conditions.[144] The result is a fairly detailed procedural outline indicating the factors that should be considered at most stages of the cleanup but containing little guidance as to how these factors should be used to achieve CER-

134. Amendment to National Oil and Hazardous Substance Contingency Plan; The National Priorities List ("Proposed NPL") (preamble), 47 Fed. Reg. 58,476 (1982).

135. Amendment to National Oil and Hazardous Substance Contingency Plan; National Priorities List (final rule) ("NPL"), 48 Fed. Reg. 40,658, 40,670-73 (1983) (to be codified at 40 C.F.R. pt. 300, app. B). Before finalization, the proposed National Priorities List was amended to add Times Beach, Missouri. 48 Fed. Reg. 9311 (1983). Upon publication of the final NPL, an amendment to add 133 new sites to the List was proposed. Amendment to National Oil and Hazardous Substance Contingency Plan; National Priorities List (proposed rule) ("NPL Update"), 48 Fed. Reg. 40,670 (1983). Prior to the publication of the NPL, EPA published an interim priority list containing 116 sites eligible for Fund financed response. N.Y. Times, Oct. 24, 1981, at 1, col. 1; *id.* at 48, col. 1. The interim list was published so as not to delay initiation of remedial response under CERCLA. *Id.* It was amended once, adding forty-five sites. N.Y. Times, July 24, 1982, at 8, col. 3.

136. 40 C.F.R. §§ 300.61-.71 (1983).

137. 40 C.F.R. pt. 300, app. A (1983).

138. 48 Fed. Reg. 40,670 (1983) (to be codified at 40 C.F.R. pt. 300, app. B).

139. *See* Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,974-78 (1982).

140. NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982). Although not explicitly required by CERCLA, the National Contingency Plan will serve as a guide for cleanup activities financed and performed by responsible parties as well as those financed by the Fund. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982).

141. 42 U.S.C. § 9604 (1982). Guidance for implementation of CERCLA's emergency response authority has been published elsewhere. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664 (1982).

142. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,974 (1982).

143. 40 C.F.R. § 300.61(c) (1983).

144. NCP (preamble), 47 Fed. Reg. 31,180, 31,182-83 (1982).

CLA's primary substantive goal of protecting the public health and welfare and the environment from the risks resulting from past improper hazardous waste disposal.[145]

A. Phases I and II—Discovery or Notification and Preliminary Assessment

Response activities under Subpart F of the National Contingency Plan begin with discovery by, or notification to, the government of a release or threatened release.[146] The discovery or notification is routed to the appropriate "lead agency" through a national coordination network.[147] The lead agency is the governmental unit with jurisdiction over the area where the release occurs, and it is responsible for formulating and implementing specific response actions,[148] subject to EPA management of the Fund.[149] The lead agency will be the U.S. Coast Guard, if the release (or threatened release) is in the coastal zone, ports, harbors, or the Great Lakes;[150] the Department of Defense, if the release is from a defense facility or vessel;[151] the affected state, where a section 104(d)(1) cooperative agreement or contract is in effect;[152] and EPA, for all other releases or threats of release.[153] After learning of the release or threatened release, the lead agency performs a preliminary assessment of the situation[154] to determine whether response is unnecessary[155] or excluded under CERCLA,[156] whether responsible parties are already correctly responding or are willing to do so,[157] or whether

145. *See infra* text accompanying notes 299-327.

146. 40 C.F.R. § 300.63 (1983). "Discovery" could occur through investigations by the government or by members of the public. *Id.* § 300.63(a)(2) and (4). CERCLA § 103 generally requires the person in charge of a facility to give "notification" of the release of a "reportable quantity" of any hazardous substance. 42 U.S.C. § 9603(a) (1982); *but see* 42 U.S.C. § 9603(e) and (f) (1982) (exceptions to notification requirements). EPA has proposed levels constituting "reportable quantities" for several hundred hazardous substances pursuant to CERCLA § 102(a), 42 U.S.C. § 9602(a) (1982). 48 Fed. Reg. 23,552, 23,570-601 (1983) (to be codified at 40 C.F.R. pt. 302); *see also* 48 Fed. Reg. 23,602 (1983) (provisions for advance notice of proposed designation of additional hazardous substances).

147. 40 C.F.R. § 300.32 (1983).

148. *Id.* §§ 300.6, 300.33.

149. Executive Order No. 12,316 § 7(a), 46 Fed. Reg. 42,237, 42,239 (1981).

150. *Id.* § 2(d), 46 Fed. Reg. at 42,238.

151. *Id.* § 2(c), 46 Fed. Reg. at 42,238.

152. CERCLA § 104(d)(1), 42 U.S.C. § 9604(d)(1) (1982); 40 C.F.R. § 300.6 (1983).

153. Executive Order No. 12,316 § 2(e), 46 Fed. Reg. 42,237, 42,238 (1981).

154. 40 C.F.R. § 300.64 (1983).

155. *Id.* § 300.64(a)(4). The revised Plan does not define "unnecessary."

156. These exclusions include instances where the release is from a federally owned facility, CERCLA § 111(e)(3), 42 U.S.C. § 9611(e)(3) (1982); where the substances released are exempted from CERCLA's coverage, *e.g.*, CERCLA §§ 101(14), 101(22), and 104(a)(2), 42 U.S.C. §§ 9601(14), 9601(22), and 9604(a)(2) (1982); where the release results from a field application of a pesticide, CERCLA § 107(i), 42 U.S.C. § 9607(i) (1982); or where the release is permitted under other federal acts. CERCLA § 107(j), 42 U.S.C. § 9607(j) (1982).

157. *See* CERCLA § 104(a)(1), 42 U.S.C. § 9604(a)(1) (1982).

response is necessary but not urgent or is required on an emergency basis.[158]

B. Phase III—Immediate Removal

Immediate removal is the only emergency response permitted by the Plan,[159] although "defensive actions" such as sampling wastes, erecting security fencing, and providing alternative drinking water supplies may accompany removal of the hazardous substances, pollutants or contaminants.[160] CERCLA does not explicitly state that removals are emergency activities,[161] but the recognition by Congress that the lead agency should have discretionary authority to begin removal without delay,[162] the wording of the limitations on response activities,[163] and the legislative history of the Act[164] all show that Congress intended removal activities to be temporary responses to imminent threats of harm to the public or the environment.

The primary threats requiring emergency response are fire, explosion and direct contact with people or a sensitive environment.[165] To estimate these risks, the lead agency may, but is not required to, use the relevant sections of the Hazard Ranking System (HRS)[166] promulgated by EPA pursuant to CERCLA section 105(8)(a).[167] The HRS, which

158. If immediate response is unnecessary, the government may proceed to Phase IV, Evaluation and Determination of Appropriate Response. 40 C.F.R. § 300.66 (1983).

159. Removals are not, however, limited to emergency situations. *See* CERCLA § 101(23), 42 U.S.C. § 9601(23) (1982).

160. CERCLA § 101(23), 42 U.S.C. § 9601(23) (1982); 40 C.F.R. § 300.65(b) (1983). Removal also includes, but is not limited to, security measures, temporary evacuation, and emergency assistance. 42 U.S.C. § 9601(23) (1982).

161. The Act states only that removal includes "the cleanup . . . of *released* hazardous substances," actions "*necessary* . . . in the event of a threat of release" and other actions "as may be *necessary* to prevent, minimize, or mitigate damage to the public health or welfare or to the environment . . . ." CERCLA § 101(23), 42 U.S.C. § 9601(23) (1982) (emphasis added).

162. *See* S. REP. NO. 848, 96th Cong., 2d Sess. 54 (1980); H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 29-30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6132-33.

163. *See* CERCLA § 104(c)(1), 42 U.S.C. § 9604(c)(1) (1982). Responses are limited in cost and duration unless either continued removal response is *immediately* required to contain a risk to public health or welfare or the environment or a *remedial* response has been arranged with the affected state. *Id.* Furthermore, while remedial responses must be consistent with a permanent solution, removal activities face no such requirement. *Compare* CERCLA § 101(24), 42 U.S.C. § 9601(24) (1982) *with* CERCLA § 101(23), 42 U.S.C. § 9601(23) (1982). *See infra* text accompanying notes 294-98.

164. *See* H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 18-30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6130-33; S. REP. No. 848, 96th Cong., 2d Sess. 54 (1980); and 126 CONG. REC. 26,769 (1980) (remarks of Rep. Florio).

165. 40 C.F.R. § 300.65(a) (1983).

166. 40 C.F.R. pt. 300, app. A (1983).

167. 42 U.S.C. § 9605(8)(a) (1982) (requiring that the NCP include a system for establishing priorities for cleanup based on sites' relative risks). *Compare* NCP (preamble), 47 Fed. Reg. 31,180, 31,387 (1982) (recommending use of fourth and fifth parts of HRS) *with* 40 C.F.R. § 300.65 (1983) (no requirement of use).

provides a general system for establishing cleanup priorities,[168] prescribes risk assessments for groundwater releases, surface water releases, air releases, fire and explosion hazards, and direct contact hazards.[169] The last two provide guidance for a lead agency in its esti-

168. 40 C.F.R. pt. 300, app. A § 1.0 (1983). Since emergency responses must be made immediately, there may be no need to rank them, and accordingly use of the HRS is optional for immediate removals. *See* 40 C.F.R. § 300.65 (1983). Priorities for remedial response are determined by assessments of the relative risks of sites. *See infra* text accompanying notes 187-225.

169. *Id.* This is one instance where the Plan provides for an absolute, albeit qualitative, risk assessment. In its simplest terms, the overall risk presented by a hazardous substance is the product of 1) the probability of exposure of the public or the environment (the "target") to the substance of concern, 2) the probability of harm to the target from the exposure, and 3) the magnitude of the resultant harm. *See* 40 C.F.R. pt. 300, app. A § 3.5 (1982) (meaning of "target" in the HRS); L. CASARETT AND J. DOULL, TOXICOLOGY 17-22 (1975) (quantitative measures of probability of harm); W. LOWRANCE, OF ACCEPTABLE RISK 70-74 (1976) (expressing magnitude of harms); W. ROWE, THE ANATOMY OF RISK (1977). Where multiple risks are present, as where the public or the environment may be exposed to more than one substance or may be exposed by more than one route, the total risk is equal to the sum of the individual products of exposure, probability of harm, and magnitude of harm, assuming the individual risks are independent. The assumption of the independence of multiple risk sources frequently can be shown to be invalid, as where two or more substances have synergistic or antagonistic effects. *See* W.LOWRANCE, *supra*, at 67-68. However, the assumption has the practical utility of reducing the number of permutations of exposures that needs to be considered, and it is probably acceptable for qualitative risk assessments such as those contemplated by the National Contingency Plan.

While conceptually straightforward, the estimation of overall risk from, for example, an abandoned hazardous waste disposal site can be enormously complex. *See generally* RISK ASSESSMENT AT HAZARDOUS WASTE SITES (F. Long and G. Schweitzer eds. 1982); Truhaut, *Ecotoxicology: Objectives, Principles and Perspectives*, in THE EVALUATION OF TOXICOLOGICAL DATA FOR THE PROTECTION OF PUBLIC HEALTH 373 (W. Hunter and J. Sweets eds. 1977). Exposure to a hazardous substance can occur through several routes: inhalation of gases or particulates from the air, *see, e.g.*, Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 631-38 (1980) (exposure to benzene vapor); Reserve Mining Co. v. EPA, 514 F.2d 492, 507-14 (8th Cir. 1975) (en banc) (exposure to asbestos particulate); ingestion of contaminated drinking water or food, *see, e.g.*, Reserve Mining Co. v. EPA, 514 F.2d 492, 514-20 (8th Cir. 1975) (exposure to asbestos fibers in drinking water); Bondene, *Food Contamination by Metals*, in TRACE METALS: EXPOSURE AND HEALTH EFFECTS 163 (E. Farrante ed. 1979); or by direct contact of hazardous chemicals with the skin or other sensitive membranes, *see, e.g.*, Potts and Gonasum, *Toxicology of the Eye*, in L. CASARETT AND J. DOULL, *supra*, at 275. Injury from the physical effects as well as the fumes from fire and explosion are also frequently possible. *See, e.g.*, 126 CONG. REC. 30,940 (1980) (remarks of Sen. Bradley concerning Chemical Control Corp. fire); N.Y. Times, July 8, 1980, at 1, col. 2 (fire and explosion in Perth Amboy, N.J.); N.Y. Times, Aug. 3, 1971, at 33, col. 6 (fire and explosion in Kearny, N.J. chemical storage area). Finally, a variety of substances with differing migration characteristics and health effects may be involved in a release or threat of release from an abandoned or improperly managed disposal site. Soil migration characteristics depend on the nature of the soil (porosity, chemical composition, etc.) and the characteristics of the substances of concern, such as polarity and solubility in water. The effects of chemical exposure can be quite different for differing types, levels, and durations of exposure, ranging from acute toxicity and chemical burns to carcinogenesis or mutagenesis. *See* Becker, *Teratogens*, in L. CASARETT AND J. DOULL, *supra*, at 313; Weisburger, *Chemical Carcinogenesis*, *id.* at 333. Both when evaluating the site's risk and when planning a cleanup of the site, most or all of these factors need to be considered. *See, e.g.*, Kramer, *Air Quality Modeling: Judicial, Legislative and Administrative Reactions*, 5 COLUM. J. ENVTL. L. 236,

mation of emergency risks.[170]

The fire and explosion component of the HRS[171] first provides for consideration of the characteristics of the waste, including the chance of ignition,[172] the reactivity,[173] and the incompatibility[174] of the substances. Each factor is weighted by the quantities of the relevant substances present.[175] The sum of these factors indicates the magnitude of the potential fire or explosion.[176] Then, to determine the risk from fire and explosion, the agency multiplies this total waste characteristics score by the likelihood of release[177] and by the risk of injury to a relevant target (nearby population, sensitive environment, or vulnerable land use).[178]

243-56 (1979); Sullivan and Shanoff, *Air Quality Assessments: Dispersion Modeling*, 17 TRIAL, Dec. 1983, at 50; *see generally* 40 C.F.R. pt. 300, app. A §§ 3.0-4.5 (1983) for some of the necessary considerations in calculating potential exposure via ground and surface water. Finally, if the many different types of harms that may result from exposure are to be included in the total risk figure, some means of weighting the different harms would be necessary; this is a normative and highly subjective process. *See* W. LOWRANCE, *supra*, at 94-101.

On the problems and methods of risk and safety assessment, *see also, e.g.*, RISK ASSESSMENT AT HAZARDOUS WASTE SITES (F. Long and G. Schweitzer eds. 1982); SOCIETAL RISK ASSESSMENT (R. Schwing and W. Albers eds. 1980); Gelpe and Tarlock, *The Uses of Scientific Information in Environmental Decisionmaking*, 48 SO. CAL. L. REV. 371 (1974); Latin, *Environmental Deregulation and Consumer Decisionmaking Under Uncertainty*, 6 HARV. ENVTL. L. REV. 187 (1982); Latin, *The "Significance" of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty*, 10 ECOLOGY L.Q. 339 (1982); Leape, *Quantitative Risk Assessment in Regulation of Environmental Carcinogens*, 4 HARV. ENVT'L L. REV. 86 (1980).

170. The first three parts of the HRS are used to assess priorities for remedial response. *See infra* text accompanying notes 187-91 and 202-12.

171. 40 C.F.R. pt. 300, app. A §§ 7.0-7.3 (1983).

172. The chance of ignition is proportional to the flash points of liquids and the flammability of gases. The flash point for a flammable organic liquid is the temperature above which the vapor pressure of the liquid will form a flammable mixture in air. R. PERRY AND C. CHILTON, CHEMICAL ENGINEERS' HANDBOOK 2250 (5th ed. 1972).

173. Reactivity is the propensity of a substance to detonate or react vigorously when heated or shocked. 40 C.F.R. pt. 300, app. A § 5.2 (1983) (table 11).

174. Substances are considered incompatible with each other when they would react violently or emit poisonous fumes if they were to come into contact with each other. *See* 40 C.F.R. pt. 300, app. A § 5.2 (1983) (table 12). This category includes substances that react violently or readily with water.

175. 40 C.F.R. pt. 300, app. A § 7.2 (1983).

176. *Id.*

177. The likelihood of release is inversely proportional to the integrity of the present containment. 40 C.F.R. pt. 300, app. A §§ 3.3, 4.3, 7.1, 8.3 (1983).

178. 40 C.F.R. pt. 300, app. A §§ 7.1, 7.3 (1983). The risk of release (containment score) and the risk of injury to a relevant target (target score) will be approximately the same for the risks of fire, explosive ignition, and explosion due to contact of incompatible substances. The sum of the risks from each of these hazards therefore will be equal to the product of the containment score, the target score, and the sum of the individual waste characteristics score. However, rather than adding the rating for waste quantity to the other characteristics, as these sections of the HRS do, a truer picture of the size of the possible fire or explosion might be gained by multiplying the sum of the waste characteristics score by the quantity of waste. The HRS, though, directs that if a quantity is unknown, it be assigned a value of zero, *id.* § 2.0, therefore, if the substance characteristics were multiplied by the waste quan-

The direct contact component of the HRS provides an estimate of the risk of injury due to direct contact between persons or a sensitive environment and the hazardous substances present at the site.[179] The risk is proportional to the accessibility of the site,[180] the extent to which the substances are separated from people or animals on or near the site,[181] the characteristics of the waste such as toxicity or corrosivity,[182] and the number of persons who could reasonably come in contact with the site or its contents.[183] If there has been an observed poisoning, chemical burn, or other acute condition resulting from direct contact, the HRS assumes that the risk of future direct contact is high.[184]

These sections of the HRS are intended to guide the lead agency in its decisions by indicating what types of hazards may be addressed with emergency responses and what types of emergency responses are appropriate.[185] Immediate removal actions are complete when they have mitigated the immediate and significant risks of harm to public health and welfare and the environment.[186]

C. Phase IV—Evaluation for Remedial Response

If emergency responses are complete or were originally found unnecessary, cleanup enters a second assessment phase, in which EPA evaluates and ranks the relative risks of sites for possible remedial action.[187] Since federal remedial response authority is limited to sites listed on the National Priorities List (or, prior to publication of the NPL, the interim priority list)[188] this phase consists largely of gathering information necessary for computing an overall hazard score for each site.[189] The Agency uses the Hazard Ranking System to calculate a risk score for each of three potential pathways of release: air, surface water,

---

tity factor and the waste quantity were unknown, the resulting score would be zero; this would also be a distorted result.

179. *Id.* §§ 8.0-8.5.

180. *Id.* § 8.2.

181. *Id.* § 8.3.

182. *Id.* § 8.4.

183. *Id.* § 8.5.

184. *Id.* § 8.1.

185. For example, if there is a high risk of direct contact, security fencing may be a sufficient emergency response. Similarly, physical separation of chemically incompatible substances may be sufficient to alleviate the risk of explosion. 40 C.F.R. § 300.65(b) (1983).

186. *Id.* § 300.65(c). The agency may terminate immediate removal when it has taken six months or cost $1 million, but in practice the agency will do this only if it has mitigated the risk. *Compare id.* § 300.65(c) *with id.* §§ 300.65(d) (1)-(3).

187. *Id.* § 300.66. Remedial actions are not emergency responses but seek to contain or minimize the release or threat of release permanently. *See* S. REP. No. 848, 96th Cong., 2d Sess. 54 (1980).

188. 40 C.F.R § 300.68(a) (1983); *see supra* note 135 and accompanying text.

189. Although inclusion on the NPL, and not a high overall score, is the prerequisite for taking remedial action, for the purposes of this Comment, a high score is an equivalent measure of eligibility for remedial response. Use of the NPL is discussed *infra* at text ac-

and groundwater.[190] These three scores are then weighted and combined to yield a single "hazard score."[191]

The HRS does not attempt to quantify the absolute risk presented by a given site[192] but instead determines only relative risk. It does so for two reasons. First, the purpose of the HRS is to determine relative priorities for cleanup.[193] Second, even if it were technically feasible to determine an absolute risk, the time and the money necessary to investigate each site and to conduct research into the health effects of the substances involved would render the process prohibitively expensive. Although many waste chemicals will be present at several sites so that experimental determinations of their toxicity, carcinogenicity or other health effects would be useful for assessment of the risk at many sites,[194] much of the investigation necessary to determine the risk of

---

companying notes 213-25. The statutory requirements for the hazard ranking system are discussed *supra* at text accompanying notes 96-101.

190. 40 C.F.R. §§ 300.66(d) and (e); *see also* 40 C.F.R. pt. 300, app. A § 1.0 (1983).

191. 40 C.F.R. pt. 300, app. A § 1.0 (1983). The scores for the individual pathways are adjusted to a scale of 0 to 100 and the root mean square of the three is normalized to yield an overall score, the migration hazard score. *Id.* This measure, rather than the arithmatic mean of the individual pathway scores, is used to give a truer picture of the actual hazard presented. For example, consider two hypothetical sites: the first has scores of 30 for each of the air, surface water, and groundwater pathways (which would place it near the bottom of the present NPL, *see infra* note 220 and accompanying text); the second has a score of 90 for one pathway and zero for the other two (as might be obtained from a storage area containing 3000 cubic yards of DDT, located next to a river used for drinking water in which DDT has been found, near the center of a medium sized city). If the arithmatic mean of the three pathways were used to calculate the overall score, the overall score and NPL ranking would be the same for both sites. With the root mean square method, a better picture is obtained: site 1 would still have a total score of 30; site 2's score would be 52, sufficient to rank it near the top of the NPL.

192. For example, one possible measure of absolute risk would be the number of deaths or injuries that could reasonably be expected to result from the substances at the site over the lifetime of the hazards. *See* Lowrance, *supra* note 169, at 70-74.

193. 42 U.S.C. § 9605(8)(A) (1982).

194. However, since most experimental determinations of toxicity and carcinogenicity or other health effects are done under conditions other than those which are likely to obtain following an uncontrolled hazardous waste release, researchers must extrapolate from those experimental determinations to predict the actual harmful effects of a release. These extrapolations are subject to significant uncertainties. For example, species other than humans must be used for the experiments, and the relatively small scale of most experiments adds to uncertainty. Scientific and statistical certainty in the determination of many cancer risks can be achieved only through experiments with many millions of subjects. Weinberg, *Science and Trans-Science*, 10 MINERVA 210 (1972). This uncertainty is compounded where the effects of a given exposure level are known to vary widely among different species. *See, e.g.*, Rawls, *Dioxin's Human Toxicity is Most Difficult Problem*, 61 CHEMICAL AND ENGINEERING NEWS, June 6, 1983, at 46 (toxicity of dioxin is 5000 times greater in guinea pigs than hamsters). *See also* Sharratt, *Uncertainties Associated with the Evaluation of the Health Hazards of Environmental Chemicals From Toxicological Data*, in THE EVALUATION OF TOXICOLOGICAL DATA FOR THE PROTECTION OF PUBLIC HEALTH 105 (W. Hunter and J. Smetts eds. 1977). For a discussion of several theoretical means of extrapolating carcinogenicity data, see OSHA Carcinogenicity Policy, 45 Fed. Reg. 5002, 5178-201 (1980) (promulgating 29 C.F.R. pt. 1990).

any particular site accurately is unique to that site. For example, calculation of airborne exposure requires knowledge of wind speeds and directions and other atmospheric conditions, as well as the number of people likely to be exposed. Calculation of groundwater exposure requires, at a minimum, extensive knowledge of hydrogeological and geological formations, of the migration characteristics of the hazardous substances in the soil and rock underlying the site,[195] and of domestic and agricultural uses of the aquifer of concern.[196]

Relative risk assessment, while useful for many purposes, leaves several questions unanswered. First, it obscures the question of what risk is acceptable. The determination that one site is riskier than another does not allow one to say whether either or both should be cleaned up. Under the response authorities of CERCLA, however, the failure to clarify an acceptable level of risk is unlikely to present a problem. EPA will continuously update the NPL, adding new sites of increasingly low overall score while removing sites that have been cleaned up.[197] Estimates of the number of existing sites that may threaten the public health or welfare or the environment and of the average cleanup costs for these sites[198] suggest that the money available for cleanup (the Fund authorization plus amounts recovered from responsible parties minus expenditures for emergency removals) will run out before the list of sites is exhausted.

Second, a relative ranking of sites, by not directly addressing the levels of acceptable risk, leaves open the question of how much a site must be cleaned up in order to protect public health and the environment, that is, to *reach* an acceptable level of risk.[199] However, the objective of the HRS is only to permit the lead agency to calculate a site's relative risk without large expenditures of time and money.[200] The scores produced by the HRS are fairly crude estimates of risk but are probably sufficient to accomplish this statutory purpose.[201] They are not intended to determine the extent of the cleanup required.

Like the estimation of risks due to fire, explosion, and direct contact,[202] the risk assessments for the individual air,[203] groundwater[204]

---

195. *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,189 (1982).

196. *See, e.g.*, United States v. Price, 523 F. Supp. 1055, 1063-65 (D.N.J. 1981), *aff'd*, 688 F.2d 204 (3d Cir. 1982); Village of Wilsonville v. SCA Servs., Inc., 77 Ill. App. 3d 618, 628-32, 396 N.E.2d 552, 559-561 (1979), *aff'd*, 86 Ill. 2d 1, 426 N.E.2d 824 (1981).

197. Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,479 (1982); *but see* NPL Update (preamble), 48 Fed. Reg. 40,674, 40,675-76 (1983) (lower limit HRS score of 28.5 retained for amendment of NPL).

198. *See, e.g.*, S. REP. NO. 848, 96th Cong., 2d Sess. 17-19 (1980); *see also supra* note 92.

199. *See infra* text accompanying notes 263-65.

200. NCP (preamble), 47 Fed. Reg. 31,180, 31,187-88 (1982).

201. *See supra* text accompanying notes 96-101.

202. *See supra* text accompanying notes 165-84. These are the principal threats calling for emergency (immediate removal) responses.

and surface water[205] pathways are the product of the probability of release (containment score), the severity of injuries likely to be caused by a release (waste characteristics score), and the potential for exposure to persons or sensitive environments (targets score). The containment score is highest if a release has actually been observed through measurements of ambient levels of the contaminant in the air or water.[206] In the absence of an observed release, the containment score for surface and groundwater routes is calculated from the type and integrity of on-site containment[207] and the "route characteristics" reflecting the likelihood that ground or surface water will be contaminated if the containment is breached.[208] The air route is assigned a containment score of zero if no release has been observed.[209] The waste characteristics score is calculated from the quantity of waste present, its toxicity and, for the surface and groundwater route, the persistence of the waste.[210] For the air route, the reactivity and imcompatibility of the waste is also considered in calculating the waste characteristics score.[211] Finally, the target score is calculated from estimates of the size of the population and types of land use and environment near enough to the site to be ex-

203. 40 C.F.R. pt. 300, app. A §§ 5.0-5.3 (1983).

204. *Id.* §§ 3.0-3.5.

205. *Id.* §§ 4.0-4.5.

206. *Id.* §§ 3.1, 4.1, 5.1. An observed release is the escape of the substance from the original containment or its migration via air, water, or soil away from the disposal site proper. *Id. See* NCP (preamble), 47 Fed. Reg. 31,180, 31,188-89 (1982).

207. 40 C.F.R. pt. 300, app. A §§ 3.3 and 4.3 (1983).

208. *Id.* §§ 3.2, 4.2-.3. A release of a hazardous substance through the groundwater pathway occurs when a substance contaminates an aquifer underlying or near the site. The primary mechanism of migration from the site proper to the aquifer is assumed to be seepage of aqueous solutions of the hazardous substance, pollutant, or contaminant to the water table. The magnitude of the probability of a release thus depends on the depth of the aquifer, the permeability of the soil or other strata underlying the site, and the amount of water migrating to the aquifer from the surface. *Id* § 3.2. For surface water routes, the likelihood of release depends on the adequacy of the containment of the hazardous wastes, the amount of water flowing into the site (streams or rainfall), the slope of the surrounding terrain, and the distance to the nearest accessible stream, pond, or other body of water. *Id.* §§ 4.2-.3.

209. *Id.* § 5.1; *see* NCP (preamble), 47 Fed. Reg. 31,180, 31,189 (1982). The apparent (and probably justifiable) rationale for this difference from the other pathways is that if gases are likely to be released into the air, they will be released continuously or not at all, and if there are unreleased gases present at the site, their containment is likely to be adequate to prevent their escape into the air.

210. 40 C.F.R. pt. 300, app. A §§ 3.4, 4.4, and 5.2 (1983). The toxicity score ranges from zero to three, and is not proportional to measured toxicities. Each substance is evaluated for its local and systemic, and acute and chronic toxicities. The highest of these assigned values is used as the toxicity score in the HRS. *Id.* § 3.4. Persistence is an indication of how long the substance is likely to exist before degradation by neutralization, oxidation, photochemical or similar processes. Where more than one toxic substance is present at a site, the waste score is based on the single most toxic chemical. *Id.*

211. *Id.* § 5.2. Reactivity provides a measure of the potential for fire or explosion. Incompatibility provides a measure of any increased threat due to the mixture of hazardous substances. *Id.*

posed by a release or threatened release.[212]

After overall scores for the initial sites were determined, EPA compiled and published the National Priorities List.[213] The NPL does not reflect cleanup which is complete or in progress; that is, each site was ranked according to its risks before any action pursuant to CERCLA.[214] Listing a site on the NPL is a prerequisite to initiating a remedial response at that site.[215] EPA may revise the NPL[216] to delete sites that have been cleaned up, to add sites with scores too low to appear on a prior list, or to add newly discovered sites with scores sufficiently high to have appeared on previous lists.[217] The NPL first proposed by the EPA listed 419 sites,[218] listed because of the size of their HRS scores or because they represented the highest priority sites of the states.[219] The list at present consists of the known sites with an HRS score of 28.5 or greater.[220]

The goal of CERCLA and the objective of EPA is to clean up as many sites on the NPL as possible, giving priority to the higher ranked sites.[221] There is, however, no guarantee that sites will be cleaned up in the order in which they appear on the list, nor does inclusion on the list

---

212. *Id.* §§ 3.5, 4.5, and 5.3.

213. 40 C.F.R. § 300.66(e) (1983). *See* NPL, 48 Fed. Reg. 40,658, 40,670 (1983). The NPL will be published as Appendix B to 40 C.F.R. pt. 300.

214. Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,477 (1982).

215. 40 C.F.R. § 300.68(a) (1983). In addition, listing authorizes planned removal, assuming the other prerequisites for planned removal are satisfied. *Id.* § 300.67(a)(2); *see infra* notes 226-42 and accompanying text.

216. The NPL will be revised at least once a year. 40 C.F.R. § 300.66(e)(7) (1983); NCP (preamble), 47 Fed. Reg. 31,180, 31,192 (1982); *but see* Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,480 (1982) (policy of quarterly revision).

217. NPL Update (preamble), 48 Fed. Reg. 40,674, 40,674-75 (1983); NPL (preamble), 48 Fed. Reg. 40,658, 40,668-69 (1983); Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,479-80 (1982); *see also* 48 Fed. Reg. 9311 (1983) (adding Times Beach, Mo. to proposed NPL).

218. Proposed NPL, 47 Fed. Reg. 58,476, 58,481-85 (1982). Prior to this list, an interim priority list was used to determine eligibility for remedial response. *See supra* note 135.

219. CERCLA § 105(8)(B) provides that the highest priority site submitted by each state will be ranked within the top 100 sites. 42 U.S.C. § 9605(8)(B) (1982). These sites are so noted on the published NPL. NPL, 48 Fed. Reg. 40,658, 40,670 (1983; Proposed NPL, 47 Fed. Reg. 58,476, 58,481-85 (1982).

220. NPL (preamble), 48 Fed. Reg. 40,658, 40,666 (1983). *See* Proposed NPL, 47 Fed. Reg. 58,476, 58,477 (1982). As an example of a site with this score, Jibboom Junkyard, Sacramento, Cal. is ranked 409 on the original NPL. *Id.* at 58,485. The site was used by a company salvaging transformers and lead acid batteries. PCBs and lead ions have been found in the soil and groundwater underlying the site in significant concentrations, but the total quantity of waste is unknown, as all of it appears to have been absorbed into the ground. The site abuts a river and is adjacent to the primary intake for the public water supply of Sacramento. Jibboom Junkyard's overall HRS score is 28.94. Superfund National Priorities List Dockets for EPA Region IX (Aug. 17, 1982); *see also* NCP (preamble), 47 Fed. Reg. 31,180 (1982).

221. Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,479 (1982).

guarantee that the site will be cleaned up at all.[222] Whether the government will act to clean up a site and which sites it will address first depend on the amount of money available in the Fund,[223] the distribution of administrative resources, any new information indicating that the hazard is either greater or less than previously calculated,[224] or special considerations not adequately addressed in the HRS.[225]

D. Phase V—Planned Removal

Although CERCLA contemplates that removal will be primarily an emergency response,[226] the Plan subdivides removal actions into immediate removal and planned removal.[227] The two types of removal are similar, but planned removal is more deliberate and subject to more constraints.[228] Planned removal, Phase V of Subpart F,[229] shares characteristics with both immediate removal and remedial responses. It addresses non-emergency risks that nevertheless require an expedited response.[230] Although CERCLA does not specifically authorize planned removal,[231] the provision of this intermediate response is probably within EPA's authority under the Act.[232]

Under the NCP, planned removal is appropriate either when the government or a responsible party has already mobilized resources to effect an immediate removal and continuation of those activities would be cost-efficient,[233] or when a site presents sufficient risk to the public or the environment that the delay required to implement a remedial

---

222. *Id.*

223. The Fund monies are not available all at once, CERCLA § 221, 42 U.S.C. § 9631 (1982), and CERCLA requires some to be spent for emergency responses.

224. Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,477 (1982).

225. NCP (preamble), 47 Fed. Reg. 31,180, 31,192 (1982).

226. *See* CERCLA § 101(23), 42 U.S.C. § 9601(23) (1982) and *supra* text accompanying notes 46-48.

227. 40 C.F.R. §§ 300.65 and .67 (1983).

228. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,974-75 (1982); *accord* NCP (preamble), 47 Fed. Reg. 31,180, 31,193 (1982).

229. 40 C.F.R. § 300.67 (1983).

230. *See* NCP, 40 C.F.R. § 300.67(a)(1) (1983); NCP (preamble), 47 Fed. Reg. 31,180, 31,193 (1982); Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,975 (1982); *compare* 40 C.F.R. § 300.67(c) (1983) *with id.* § 300.65(a).

231. *See supra* text accompanying notes 39-53.

232. *E.g.*, CERCLA § 105(8)(A) directs that the factors to be considered in the Hazard Ranking System be used for determining priorities "for the purpose of taking remedial action and, to the extent practicable taking into account the potential urgency of such action, for the purpose of taking removal action." 42 U.S.C. § 9605(8)(A) (1982). Planned removal is consistent with congressional intent to avoid the more costly removal responses, because it forces the lead agency to give greater consideration to the correct response, thus making removal a more difficult option to take. *See EPA Proposes Court-Ordered Contingency Plan Revisions under "Superfund"*, 12 ENVTL. L. REP. (ENVTL. L. INST.) 10,040, 10,042 (1982).

233. 40 C.F.R. § 300.67(a)(1) (1983). *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,193 (1982); Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,975 (1982).

response would entail unacceptable dangers.[234] Further, to qualify for planned removal the risk must be amenable to abatement by removal activities.[235] If, for example, halogenated hydrocarbons were stored on site in relatively secure containers, immediate removal might not be justified.[236] The most appropriate means of disposing of these substances, however, might be incineration off-site.[237] Planned removal would therefore be an appropriate response. An analogous situation might occur if the site contained highly contaminated soils but the danger of leaching was relatively low.[238] The inclusion of planned removal in the Plan is a reasonably happy medium between immediate removal and remedial response, and is consistent with the need to strike a balance between protection of the public and the environment and the limitations of the resources that Congress has made available for this task.

Sites at which planned removal is undertaken need not be listed on the NPL,[239] but the affected state must specifically request planned removal[240] and must share costs and make other assurances as it does for remedial actions.[241] The physical factors that justify planned removal are similar in many respects to those for immediate removal.[242] Planned removal is subject to the same duration and cost limitations as immediate removal.[243]

E. Phase VI—Remedial Response

Remedial response activities, Phase VI of the response process, are the most complex and variable of the responses authorized by CER-

234. 40 C.F.R. § 300.67(a)(2) (1983). *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,193 (1982); Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,975 (1982).

235. *See* 40 C.F.R. § 300.67(c) (1983).

236. Halogenated hydrocarbons such as PCBs, TCE, and EDB tend to be non-flammable and have relatively low acute toxicities; their most problematic risks are carcinogenicity and mutagenicity from long term, low level exposures. *See generally, e.g.,* WORLD HEALTH ORGANIZATION, TOXICOLOGICAL APPRAISAL OF HALOGENATED AROMATIC COMPOUNDS FOLLOWING GROUNDWATER EXPOSURE (1980).

237. High temperature incineration appears to be an effective disposal method for compounds ranging from chloroform and trichloroethylene (TCE) to polychlorinated biphenyls (PCBs) and the related dibenzo -dioxins and -furans. *See* 40 C.F.R. § 761.70 (1983) (allowing PCB incineration).

238. 40 C.F.R. § 300.67(c)(4) (1983).

239. *Id.* § 300.67(a)(2).

240. *Id.* § 300.67(b).

241. *Id.*; CERCLA § 104(c)(3), 42 U.S.C. § 9604(c)(3) (1982); *see supra* note 52 and accompanying text.

242. *Compare* 40 C.F.R. § 300.67(c) (1983) *with id.* § 300.65(a).

243. 40 C.F.R. § 300.67(d)(e) (1983). If both immediate and planned removals are undertaken, it is not clear whether altogether the responses must be shorter than six months and cost less than $1 million or whether each response would have independent limitations. *Cf.* NPC (preamble), 47 Fed. Reg. 31,180, 31,193 (1982).

CLA.[244] The remedial response must provide a "permanent remedy to prevent or mitigate the migration of a release of hazardous substances into the environment."[245] Subpart F defines three types of remedial response: initial, source control, and offsite, which may be used singly or in combination.[246] Initial remedial responses are expedited remedial measures.[247] They are appropriate in conditions analogous to those which would prompt removals, but where removal is unnecessary or impractical.[248] Source control measures are those designed to prevent migration of hazardous wastes from the site. They include both physical and chemical techniques.[249] Offsite measures are those designed to remedy hazards located away from the original site.[250] They may be necessary where hazardous substances have migrated from the site, for example, where groundwater has been contaminated.[251] There is a strong preference against offsite measures because they generally entail higher cost and lower cost-effectiveness than do equally effective source control measures.[252]

After investigating the site and considering all the possibilities for exposure to the hazardous substances and the probabilities of harm from such exposures,[253] the lead agency, in consultation with the affected state, must develop a limited number of alternative plans that "effectively contribute to the protection of public health, welfare or the environment."[254] Of these, the agency is to select the "lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of the public health, welfare, or the environment."[255] For responses financed from the Fund, the cost considerations of CERCLA section 104(c)(4)[256] may preempt all or part of the chosen remedial

244. *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,182-83 (1982).

245. 40 C.F.R. § 300.68(a) (1983). All sites at which remedial responses are undertaken must have been listed on the NPL, and the affected state must have arranged for cost-sharing and made the EPA other specified assurances. 42 U.S.C. §§ 9605(8)(B) and 9604(c)(3) (1982).

246. 40 C.F.R. § 300.68(e) (1983).

247. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,977 (1982).

248. *Compare* 40 C.F.R. § 300.68(e)(1) (1983) (Initial Remedial Response) *with id.* § 300.65(a) (Removal Measures) *and id.* § 300.67(c) (Planned Removal Factors).

249. 40 C.F.R. § 300.68(e)(2) (1983). *See id.* § 300.70 (methods of remedying releases).

250. *Id.* § 300.68(e)(3).

251. *Id.*

252. *See* S. REP. No. 848, 96th Cong., 2d Sess. 55-56 (1980).

253. 40 C.F.R. § 300.68(f) (1983).

254. *Id.* §§ 300.68(g)-.68(h). The Plan includes a list of abatement measures that may be used in developing these alternatives. *Id.* § 300.70.

255. *Id.* § 300.68(j). In screening the alternatives, the agency is to focus on a number of listed factors broadly classifiable as cost, health, and technological criteria. *Id.* §§ 300.68(h) and (i).

256. 42 U.S.C. § 9604(c)(4) (1982); *see supra* text accompanying notes 118-21.

alternative.[257]

CERCLA section 105(3) requires EPA to revise the NCP to include criteria for determining "the appropriate extent of . . . remedy . . . ."[258] EPA's revision of the NCP, however, contains no guidance as to the extent that a hazardous waste site should be cleaned up beyond specifying that the proposed alternatives should "effectively contribute" to protecting health, welfare, and the environment and that the "least cost alternative" should be chosen. When promulgating the Plan, EPA rejected proposals for more specific guidelines or standards, citing the need for flexibility in remedial responses, the Agency's inexperience in dealing with the range of problems likely to be encountered in implementing its response authorities under CERCLA, and the inapplicability of existing regulatory standards to some of the anticipated conditions at waste sites.[259] EPA instead apparently proposed a general policy of proceeding on a case-by-case basis, making, for each site, a "combined scientific and legal judgment as to the appropriate extent of remedy, based on the extent of hazard, existing federal and state standards and criteria, available technologies and their relative costs, the financial capabilities of prospective defendants, the culpability of prospective defendants and relevant court precedents."[260] The following section of this Comment will discuss the content of each of these "standards" for determining the appropriate remedy and the extent to which they satisfy the statutory directives of CERCLA.

III

THE ADEQUACY OF THE NATIONAL CONTINGENCY PLAN

The primary goal of CERCLA is to protect the public health and welfare and the environment from releases of hazardous substances, pollutants, and contaminants.[261] Conceptually, the responses authorized by the Act are straightforward: following a determination of which sites present risks, the designated agency or responsible party is to clean up the worst and most pressing of those sites using the available funds.[262] A site is "cleaned up" when risks have been reduced to a

257. 40 C.F.R. § 300.68(k) (1983). This is the only step of selecting a response that is inapplicable to cleanups done or financed by responsible parties. Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982).

258. 42 U.S.C. § 9605(3) (1982).

259. NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982).

260. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,978 (1982). This is the approach EPA has historically taken in enforcement cases. *Id. Accord* Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982).

261. *See supra* text accompanying notes 43-48 and 54-60.

262. "Available funds" includes the government fund established by CERCLA and the response costs paid by responsible parties. *See supra* text accompanying notes

point where the agency deems that the site is "safe" and that it does not threaten the public or the environment.

If risk could be evaluated quantitatively with some confidence, then a single quantity, the acceptable or "safe" level of risk, would determine both the level of risk that would trigger response and the ultimate objective of the cleanup.[263] If the risk presented by a site were above that level, the condition would be hazardous; if equal or below, no response (or no further response) would be required.

In fact, it will seldom, if ever, be possible to accurately determine quantitatively the risk posed by a hazardous substance spill or disposal site;[264] nevertheless, CERCLA, in effect, requires EPA to determine the level of risk that will trigger response, the level of risk that will remain at each stage of the projected cleanup, and the point at which cleanup will stop, i.e. the level of risk that is acceptable or must be tolerated by the public and the environment.[265] Congress intended that EPA, in the National Contingency Plan, would address each of these issues for both removal and remedial responses.[266] This section examines the adequacy of EPA's implementation of these statutory directives. It concludes that while EPA included in the Plan adequate provisions for removal and for the development of the NPL, it failed to include sufficient substantive standards for determining the appropriate extent of response.

A. Removal Response

The provisions of Subpart F of the revised National Contingency Plan concerning removal[267] provide adequate guidance for implementing CERCLA's emergency response authority. They provide guidelines both for determining when EPA or a responsible party should initiate a removal action[268] and for determining when removal is complete.[269] Decisionmaking with respect to removal is highly discretionary under the Plan;[270] however, this discretion is necessary to enable the lead agency to act quickly and flexibly to mitigate catastrophic, im-

263. *See* LOWRANCE, *supra* note 169, at 8-11.

264. The empirical determination of risk is limited by resource limitations and by practical and theoretical technical constraints. *See* Gelpe and Tarlock, *supra* note 169, at 371, 392-96 (1974).

265. *See* 42 U.S.C. § 105 (1982). In a procedural context, the first consideration is analogous to stating a cause of action; the second and third are the rough equivalent of determining an appropriate remedy. The Act subsumes the second and third considerations in the single directive that EPA determine the appropriate extent of response.

266. *See* CERCLA §§ 105(3), (7) and (8); *see also supra* text accompanying notes 84-101.

267. 40 C.F.R. § 300.65 (1983).

268. *Id.* § 300.65(a).

269. *Id.* §§ 300.65(c) and (d).

270. The Plan explicitly gives the lead agency considerable decisionmaking authority. *See* 40 C.F.R. §§ 300.65(b) (1983) ("If the lead agency determines . . .") and (c) (". . . in

mediate threats. Since the types of threats calling for removals (e.g., fire, explosion, direct contact) are well-defined,[271] and it is clear that removal is not necessarily intended to abate all threats to the public health and welfare and to the environment,[272] the lead agency is unlikely to abuse its discretionary powers by initiating a removal action when removal is inappropriate. In addition, if there is doubt as to whether the threat presented by a site is sufficient to require removal action, the Hazard Ranking System provides guidance for estimating the magnitude of that threat.[273]

The Plan's provisions for terminating a removal response appear to be vague. The Plan provides only that "[i]mmediate removal actions are complete when, in the opinion of the lead agency, the criteria in subsection (a) of § 300.65 [criteria for initiating response] are no longer met."[274] Arguably, this is an insufficient criterion for determining the "appropriate extent of removal;" however, again, the HRS could be used to provide guidance for determining when the risks have been abated where there is any doubt.[275]

B. Remedial Response

Remedial response is a category with which EPA is relatively unfamiliar.[276] Unlike removals and other emergency responses, there are few analogues to remedial response authority in other environmental legislation.[277] Possibly for this reason, the provisions of the National Contingency Plan for remedial activities have major deficiencies. The Plan's primary deficiency is its failure to provide adequate criteria for determining the appropriate extent of response.[278] As a result, reme-

---

the opinion of the lead agency . . ."). *See also* NCP (preamble), 47 Fed. Reg. 31,180, 31,199 (1982).

271. 40 C.F.R. §§ 300.65(a)(1)-(4) (1983). *See also* 40 C.F.R. pt. 300, app. A §§ 7.0-8.5. "Well defined" in this sense means not only that the regulations delineate the threats with some exactness, but also that the sources and consequences of the threats are well understood.

272. *See supra* text accompanying notes 159-86.

273. *See* 40 C.F.R. pt. 300, app. A §§ 7.0-8.5 (1983). *See also supra* text accompanying notes 165-86.

274. 40 C.F.R. § 300.65(c) (1983).

275. *See* 40 C.F.R. pt. 300, app. A §§ 7.0-8.5 (1983) and *supra* text accompanying notes 165-86. Immediate removals have generally the same time and expenditure limitations under CERCLA and the NCP. *Compare* 42 U.S.C. § 9604(c)(1) (1982) *with* 40 C.F.R. § 300.65(d) (1983).

276. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,977-78 (1982).

277. The primary counterexamples to this statement are the response authority provided by FWPCA § 311 which has been used primarily for oil spill removal, 33 U.S.C. § 1321 (1982), *see* Helfrich, *Problems in Pollution Response Liability under Federal Law: FWPCA Section 311 and the Superfund*, 13 J. MAR. L. & COM. 455 (1982), and the kinds of relief permitted under RCRA § 7003. 42 U.S.C. § 6973 (1982). *See also* Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,977-78 (1982).

278. *See infra* text accompanying notes 299-327.

dial actions may fail to assure the protection of the public health and welfare and the environment, even aside from the limitations on governmental funding and from potential abuses of administrative discretion.

1. Initiation of Remedial Response

Before the government can initiate a remedial response, three conditions must be satisfied: first, there must be a release or threatened release of a hazardous substance, pollutant, or contaminant;[279] second, the site must be listed on the National Priorities List after having been evaluated under the Hazard Ranking System;[280] and third, the affected state must agree to share costs and give other assurances if the expenditure will be greater than $1 million or if the response will take more than six months.[281]

Although both are subject to a variety of criticisms, the NPL and HRS procedures are adequate to determine cleanup priorities among hazardous waste sites and to guide initiation of the remedial action authorized by CERCLA section 104 at individual sites. One possible criticism of the HRS is that it is inaccurate. Since the HRS is not intended to calculate absolute risk,[282] the fact that its use may result in inaccurate assessments is not crucial. Inaccuracies in the relative rankings of sites can be cured at a later stage, when, after promulgation of the National Priorities List, the appropriate responses for individual sites are considered.[283]

The weighting schemes used in the HRS to determine relative degrees of risk can be criticized because they appear arbitrary and because they incorporate normative judgments. Apparently arbitrary

279. CERCLA § 104(a)(1), 42 U.S.C. § 9604(a)(1) (1982). *See* CERCLA § 101(14), 42 U.S.C. § 9601(14) (1982) (definition of "hazardous substance"); CERCLA § 104(a)(2), 42 U.S.C. § 9604(a)(2) (1982) (definition of "pollutant" and "contaminant").

280. *See supra* text accompanying notes 187-225.

281. CERCLA § 104(c), 42 U.S.C. § 9604(c) (1982); *see supra* note 52 and accompanying text. The procedures for establishing these agreements are outside the scope of this Comment and will not be discussed explicitly.

282. *See supra* text accompanying notes 192-96.

283. The significant inaccuracies in the rankings are of two types: either inclusion on the list of a site that does not belong there, or omission of a site that does. The first error, improper inclusion of a site, can result from the sometimes overinclusive nature of the HRS. If, for example, a low concentration of PCBs were detected in the soil near a municipal water system intake due to the presence of pieces of a power transformer that had exploded and been cleaned up several years earlier, the site would very likely have a sufficiently high HRS score to be listed on the NPL, even though the total quantity of PCBs actually present could be quite small. *See* 40 C.F.R. pt. 300, app. A §§ 3.0-4.5 (1983) and Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,479 (1982). The second error, improper omission of a site, can result simply from an oversight. It can be cured, after later discovery or reevaluation, by amending the NPL. *See, e.g.*, 48 Fed. Reg. 9311 (1983) (adding Times Beach, Mo. to the NPL).

features of the HRS include its equal weighting of air, surface, and groundwater pathways.[284] However, given that it is reasonable to consider the three pathways separately when calculating potential risks,[285] it would be difficult to devise a less arbitrary weighting scheme that at the same time has an adequate factual foundation.[286] Normative judgments incorporated in the weighting schemes include the weights given various sensitive environments in the calculation of population and land use target scores. For example, under the HRS a critical habitat of an endangered species within one quarter mile of a waste site would receive a lower weight in the air route than would up to one hundred persons living three to four miles away;[287] in comparison, in the surface water pathway calculation, a critical habitat of an endangered species within one quarter mile of the site would be weighted equally with the recreational use of the surface water directly downstream of the site.[288] These weighting schemes, however, are either empirically supportable[289] or probably within the discretionary authority given EPA by CERCLA.[290] Considering the uses of the HRS and the NPL, and considering that EPA sought to compile the NPL without incurring excessive costs, these sections of the National Contingency Plan satisfy the directives of CERCLA. These sections of the Plan provide adequate guidelines for the initiation of remedial activities.[291]

2. Extent of Remedial Response

In contrast, the criteria for determining the appropriate extent of remedy are inadequate. CERCLA is what Professor Ackerman has termed a "solution forcing" statute: Congress has determined the "solution" and "forced" the Executive to develop the means to attain that end.[292] This was undoubtedly Congress' intent when it directed the

284. *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,188 (1982).

285. The separation is at least convenient for determining the total HRS score. Further, assuming the individual risks presented by the individual pathways are mutually independent, the separation of the risk calculations for the three pathways is mathematically correct. *See supra* note 169.

286. *See* Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,975-76 (1982) and NCP (preamble), 47 Fed. Reg. 31,180, 31,188 (1982).

287. 40 C.F.R. pt 300, app. A § 5.3 (1983).

288. *Id.* § 4.5. For EPA's discussion of target weighting and scoring, *see* NCP (preamble), 47 Fed. Reg. 31,180, 31,190-92 (1982).

289. *See* NCP (preamble), 47 Fed. Reg. 31,180, 31,191-92 (1982).

290. *See* CERCLA § 105(8), 42 U.S.C. § 9605(8) (1982).

291. If the Fund were considerably larger than it is now, EPA would have to decide when to stop adding sites to the NPL, that is, at what point there are no sites that warrant remedial action. However, it can fairly be assumed that all or most of the sites presently listed on the NPL endanger the public or the environment within the meaning of that phrase. *See supra* text accompanying notes 92-93.

292. Ackerman and Hassler, *Beyond the New Deal: Coal and the Clean Air Act*, 89 YALE L.J. 1466, 1557-59 (1980).

President to include "criteria for the appropriate extent of . . . remedy" in the revised National Contingency Plan.[293] However, EPA has not included any "appropriate criteria" in the Plan apart from the goals of the statute itself, and there is reason to doubt that the Plan as promulgated provides for the same "solution" as that mandated by CERCLA.

CERCLA defines remedial activities as activities "consistent with permanent remedy taken . . . 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."[294] Congress probably sought a complete remedy of the targeted hazardous waste releases. However, neither the Act nor its legislative history explains what Congress intended by "consistency" with a permanent remedy. The term could be interpreted to mean "equivalent to" or to mean that no remedial activities should be undertaken which would later have to be undone to achieve a permanent remedy. Either interpretation, however, indicates that Congress intended remedial activities to result in a permanent complete remedy at some time in the future.[295] Further, although Congress provided for either prevention or minimization of hazardous waste releases, Congress understood that "minimization" would be the appropriate response only when complete cleanup would create more environmental problems than it would solve.[296] Although the descriptions of remedial responses in the predecessor bills to CERCLA vary,[297] in CERCLA, Congress clearly intended that the remedy first maximize safety of the public and the environment, and only then minimize cost.[298]

The procedure adopted by EPA in the NCP is not adequate to achieve the aims of CERCLA. First, under the Plan, the responsible agency is to select as a remedy that *alternative* which is least costly and which effectively "mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment."[299] A

293. 42 U.S.C. § 9605(3) (1982). *See supra* text accompanying notes 94-95.

294. 42 U.S.C. § 9601(24) (1982).

295. The only situation where an incomplete remedy can be justified by the legislative history is where the governmental response is entirely financed from the Fund under CERCLA § 104(c)(4). 42 U.S.C. § 9604(c)(4) (1982); *see supra* text accompanying notes 118-23. Then, a partial remedy, where public health and welfare and the environment are not completely protected or their protection is not maximized, is permissible if there is a greater need for Fund monies at other sites. S. REP. No. 848, 96th Cong., 2d Sess. 57-58 (1980); H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 29-30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6132-33.

296. *See* S. REP. No. 848, 96th Cong., 2d Sess. 55 (1980).

297. *Id.* (remedial actions are to *assure* that hazardous substances will not cause danger); H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 2830, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6131-33.

298. *See* 126 CONG. REC. 30,834 (1980) (post-passage remarks of Sen. Randolph).

299. 40 C.F.R. § 300.68(j) (1983).

proposed remedy, however, need only "effectively contribute" to protection of public health, welfare, or the environment to be considered an alternative.[300] After the agency develops the alternative methods for cleaning up a waste site, it analyzes them to determine which is *relatively* most effective.[301] The Plan thus allows the lead agency to choose an appropriate final remedy that only "effectively contributes" to the public health or welfare or the environment. Second, the words used in the Plan are more qualified than those of the statute. The Plan calls only for a remedy providing "adequate protection" of the public health or welfare or the environment,[302] and EPA gives no explanation of what it intends by "adequate." Third, CERCLA consistently requires protection of the public *and* the environment;[303] the Plan requires only that a remedy protect the public *or* the environment.[304] In light of the emphasis CERCLA places on its requirement that response activities be consistent with the National Contingency Plan,[305] it is unfortunate and potentially dangerous to the public health and welfare and to the environment that the final result of the remedy provided by the Plan can be so much milder than that intended by CERCLA.

The Plan's provisions for determining the appropriate extent of remedy, providing for the selection of one of a limited number of alternatives rather than requiring consideration of a continuum of possible solutions, is a reasonable procedure for maximizing cost-effectiveness,[306] but it is substantively deficient. EPA rejected the suggestion that explicit environmental standards should be included in the Plan, on the ground that any such rigid requirements would obscure the real issue of protecting the public health.[307] Instead, the Plan's sole substantive guideline[308] for determining the appropriate extent of remedy is its requirement that the agency select the most cost-effective alternative that is technologically feasible.[309] This is largely a translation of the statutory goal into the regulatory framework. If this were all that

300. *Id.* § 300.68(h)(2).

301. *Id.* § 300.68(i)(2)(d).

302. *Id.* § 300.68(j).

303. *See, e.g.*, CERCLA §§ 101(23), 101(24), 104, and 106, 42 U.S.C. §§ 9601(23), 9601(24), 9604, and 9606 (1982).

304. 40 C.F.R. § 300.68(j) (1983); *see supra* text accompanying note 299.

305. *See, e.g.*, CERCLA §§ 104(c)(4) (responses authorized), 107(a)(4) (cost recovery), and 111(a)(1) (fund payments), 42 U.S.C. §§ 9604(c)(4), 9607(a)(4), and 9611(a)(1) (1982).

306. 126 CONG. REC. 30,933 (1980) (remarks of Sen. Randolph). *Cf.* National Environmental Policy Act § 102(2)(c)(iii), 42 U.S.C. § 4332(2)(C)(iii) (1976 & 1982).

307. NCP (preamble), 47 Fed. Reg. 31,180, 31,184-85 (1982).

308. For evidence that this is the sole criterion intended by EPA for selection of the appropriate extent of response, see NCP (preamble), 47 Fed. Reg. 31,180, 31,182 (1982).

309. 40 C.F.R. § 300.68(j) (1983). While CERCLA contains no indication that the agency should consider technological feasibility in selecting an alternative, there are suggestions in the legislative history that it should consider engineering factors. *See* 126 CONG. REC. 30,933 (1980) (remarks of Sen. Randolph). However, nowhere in CERCLA is there

Congress intended, CERCLA section 105(3), requiring that EPA develop criteria for the selection of remedies,[310] was superfluous. At best, the Plan only repeats rather than implements the statutory goal.

EPA's proposal that the lead agency determine appropriate remedies on a case-by-case basis, using a combined legal and scientific judgment,[311] is an unacceptable answer to the dictates of CERCLA. As a practical matter, each remedy for a waste site or other hazardous condition will have to be tailored to the individual circumstances; however, without environmental standards by which the "combined judgment" can be tested on a case-by-case basis, it is unlikely that CERCLA's goal of uniform protection of the public health and the environment can be met.

The justification offered by EPA[312] for the use of this "standard" is that the Agency has used this approach in the past with some success in enforcement actions under other environmental acts such as RCRA,[313] FWPCA,[314] SDWA,[315] and the Clean Air Act.[316] In offering this rationale, EPA ignores the fundamental differences between the response authorities in these other acts and those of CERCLA. First, Congress intended CERCLA to address a greater range of hazards than do the other acts[317] and incorporated in it broadened liability provisions.[318] Second, CERCLA section 104[319] and, to a lesser extent, CERCLA section 106[320] require the Executive to determine, in advance of cleanup, uniform criteria for the allowable extent of response.[321] In contrast, the responses authorized by the imminent hazard provisions of other environmental acts are not subject to such explicit limitations. For example, the remedy to be sought in enforcement actions under

any qualification of the requirement of protecting the public health and welfare and the environment by any suggestion of technological feasibility.

310. 42 U.S.C. § 9605(3) (1982).

311. *See supra* note 260 and accompanying text.

312. Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,978 (1982); *see also* Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982).

313. 42 U.S.C. § 6973 (1982).

314. 33 U.S.C. §§ 1321 and 1364 (1982).

315. 42 U.S.C. § 300(i) (1982).

316. 42 U.S.C. § 7603 (1982).

317. See the discussion of CERCLA § 104, 42 U.S.C. § 9604 (1982), *supra* text accompanying notes 43-48.

318. CERCLA § 107 explicitly imposes liability on owners, operators, transporters, and generators for hazardous substance cleanup costs, while the other statutes do not. 42 U.S.C. § 9607 (1982). *See supra* statutes cited at notes 313-16.

319. 42 U.S.C. § 9604 (1982); *see generally supra* text accompanying notes 39-53.

320. 42 U.S.C. § 9606 (1982); *see generally supra* text accompanying notes 54-65.

321. CERCLA § 104 requires that remedial actions conform to the criteria outlined by the Executive in the NCP. CERCLA § 104(a)(1), 42 U.S.C. § 9604(a)(1) (1982). CERCLA § 106 requires only that the Executive issue guidelines and that removal responses conform to those guidelines whenever possible. CERCLA § 106(c), 42 U.S.C. § 9606(c) (1982).

RCRA is "such . . . action as may be necessary."[322] Accordingly, an ad hoc approach to the determination of an appropriate remedy does not violate legislative directives. Generally, where courts have granted relief, the agency and the other parties involved have determined the remedy on a case-by-case basis, and the courts have simply accepted the solution agreed upon by the parties.[323] EPA and the courts have paid little attention in these cases to the *uniform* protection of the public health and the environment now mandated by CERCLA.[324] In CERCLA, Congress did not, although it might have, legislate a "combined legal and scientific judgment" approach.[325] Given CERCLA's limitations on Agency authority, EPA should probably not adopt such a variable approach itself, unless it explicitly states how judgments under such a standard would be made. Finally, since Subpart F is substantively deficient because it lacks cleanup standards, it is also procedurally deficient in that it gives little practical notice of the bases upon which the lead agency will decide, or has decided, the appropriate remedy for an individual site.

In summary, the provisions of the revised Plan contain little substantive content beyond the directives of CERCLA and do not assure that the statute's goals will be met. Given the discretion granted the lead agency, there is no guarantee that the agency will protect the public health or the environment to the extent that Congress intended. Further, the fact that the agency pursues a case-by-case determination of the appropriate response without sufficient regulatory guidance will discourage the voluntary cleanups by responsible parties which Congress desired[326] and which are necessary for the efficient use of the

322. 42 U.S.C. § 6973 (1982). Although § 106 of CERCLA similarly authorizes "such relief as may be necessary" to abate an imminent hazard, it requires the Executive to publish, and whenever possible, to follow guidelines for the exercise of that response authority. CERCLA § 106(c), 42 U.S.C. § 9606(c) (1982).

323. *E.g.*, United States v. Hooker Chemical and Plastics Corp., 540 F. Supp. 1067 (W.D.N.Y. 1982) (consent decree); United States v. Vertac Chemical Corp. 489 F. Supp. 870, 880, 886-88 (E.D. Ark. 1980); cases cited *supra* note 7.

324. While the case-by-case approach may be acceptable in negotiations with responsible parties and in § 106 enforcement actions, *see* Imminent Hazard Guidelines, 47 Fed. Reg. 20,664, 20,666 (1982), it provides no assurance that protection of the public health and the environment will be uniform. *See* United States v. Chem-Dyne Corp., 572 F. Supp. 802, 808-809 (S.D. Ohio 1983) (CERCLA requires nationally uniform application of liability standards); 126 CONG. REC. 26,765 (1980) (remarks of Rep. LaFalce) (urging defeat of proposed amendment to H.R. 7020 that would give primary authority for clean up to the states, on the ground that a uniform, comprehensive approach was needed).

325. *See Clean Air Act Amendments of 1977: Hearing Before the Subcommittee on Environmental Pollution of the Senate Committee on Environment and Public Works (Pt. 3)*, 95th Cong., 2d Sess. 8 (1977) (remarks of Sen. Muskie: Mobile source emission standards in 1970 Clean Air Act were "best judgment . . . on the basis of the available evidence as to what the unacceptable health effects . . . would be.").

326. *See* CERCLA § 104(a)(1), 42 U.S.C. § 9604(a)(1) (1982).

Fund.[327]

EPA's failure to incorporate practical cleanup standards in the National Contingency Plan will do more than merely make it uncertain how or whether the hazards of past improper waste disposal will be abated. Other sections of CERCLA implicitly depend on the contents of the Plan for their effective operation.[328] For example, the government can hold responsible parties liable under CERCLA section 107 only for those governmental response costs which are "not inconsistent with" the Plan.[329] If this provision is read literally, almost no EPA response actions will be found to be inconsistent with the Plan because it is so vague. Responsible parties will have no basis for attacking any response cost as being unnecessary to protect the public health and welfare and the environment, as long as EPA follows the Plan's procedural requirements in determining its course of action. On the other hand, where parties other than the federal or state governments act to abate a hazard,[330] their costs are recoverable from responsible parties under section 107 only when their actions are "consistent with" the Plan.[331] Since the Plan as revised depends almost exclusively on lead agency decisions for its operation,[332] it may prove practically impossible for

327. *See supra* text accompanying notes 125-26.

328. *E.g.*, CERCLA §§ 107(a) and (d) and 111(a), 42 U.S.C. §§ 9607(a) and (d) and 9611(a) (1982).

329. CERCLA § 107(a)(4)(A), 42 U.S.C. § 9607(a)(4)(A) (1982); *see infra* note 331.

330. *See, e.g.*, City of Philadelphia v. Stepan Chemical, 544 F. Supp. 1135 (E.D. Pa. 1982).

331. CERCLA § 107(a)(4)(B), 42 U.S.C. § 9607(a)(4)(B) (1982). Section 107(a)(4) provides in part that responsible parties shall be liable for

> (A) all costs of removal or remedial action incurred by the United States Government or a State *not inconsistent with* the national contingency plan;
>
> (B) any other necessary costs of response incurred by any other person *consistent with* the national contingency plan; . . . .

42 U.S.C. § 9607(a)(4) (1982) (emphasis added). The legislative history does not explain the difference in the language of these sections. In the original compromise bill offered by Senators Randolph and Stafford, *see supra* text accompanying notes 36-38, responses by parties other than the federal or state governments had to be consistent with the National Contingency Plan, but no "consistency" requirement was included in the section concerning federal and state response. *See* proposed CERCLA § 107(a)(4), 126 CONG. REC. S14,719 (daily ed. Nov. 19, 1980). A few days later, the "not inconsistent" language was added to the bill without explanation. *See* proposed CERCLA § 107(a)(4), 126 CONG. REC. 30,921 (1980). The best explanation for the difference in liability for cleanup costs is that Congress contemplated a heavier burden of proof for private parties than for governments. *Cf.* CERCLA § 112(b)(4)(D), 42 U.S.C. § 9612(b)(4)(D) (1982) (burden of proof of claimants against the Fund). Whether such an allocation of the burden of proof is appropriate for non-governmental cleanups is open to debate; however, the burden of proof would appropriately be on the responsible parties in actions by the federal or state governments to recover cleanup costs in view of the broad authority given the Executive to protect public health and the environment. *See* Latin, *The "Significance" of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty*, 10 ECOLOGY L.Q. 339, 349-50 (1982) (burden of proof allocation to effectuate legislative policy). The difference in language could also connote a difference in the quantum of proof required from different parties.

332. *E.g.*, 40 C.F.R. §§ 300.65(a) (initiation of removal), 300.65(c) (termination of re-

such a party to recover its costs from responsible parties or the Fund, regardless of the epidemiological soundness of its response plan. EPA could have avoided both of these problems if the Plan had contained environmental or other standards of fairly general applicability.

Regardless of whether the requirements of CERCLA section 107 are interpreted so literally,[333] the Plan clearly does not contain sufficient standards for a court to judge the necessity or adequacy of a particular response with respect to the protection of public health and the environment. In a cost recovery action either concurrent with or following cleanup, a court would be faced with two basic alternatives: it could accept the determination of the lead agency as the appropriate response, or it could measure the adequacy of the response by standards not contained in the National Contingency Plan.

IV

DETERMINING HOW CLEAN "CLEAN" IS

In promulgating the National Contingency Plan, EPA rejected commentators' suggestions that the Plan contain standards for assessing both the necessity and adequacy of a particular remedial response plan.[334] EPA believed that it would be impossible to develop standards

---

moval), 300.66(a) (necessity of response beyond removal), 300.67(a) (initiation of planned removal), 300.68(d) (determination of necessary types of removal actions), and 300.68(j) (selection of appropriate remedial alternative) (1983).

333. In determining the liability of responsible parties, courts should interpret the CERCLA § 107(a)(4)(A) requirement that government responses not be inconsistent with the plan in light of CERCLA's requirements that responses protect, but be limited to protecting, the public health and welfare and environment. *See supra* text accompanying notes 39-45 and 54-56. One possible approach would be for the trial court in a cost recovery action to make an independent determination of what is necessary and sufficient to protect the public health and the environment. *Cf.* United States v. Delian Cruises, SA, 505 F. Supp. 79, 81 (E.D. La. 1980) (de novo review by court for assessment of FWPCA civil penalty imposed by Coast Guard) and United States v. Chevron Oil Co., 583 F.2d 1357, 1363-64 (5th Cir. 1978) (FWPCA "oil sheen" test creates presumption of danger to environment in FWPCA § 311 civil penalty assessment which is rebuttable on appeal to District Court). *But see* 5 U.S.C. § 706(2)(A) (1982) (courts to review agency actions under abuse of discretion standard); United States v. Healy Tibbitts Construction Co., 713 F.2d 1469 (9th Cir. 1983) (de novo review of Coast Guard civil penalty proceedings in district court inappropriate; Administrative Procedures Act requires substantial evidence test; defendants did not contest harm presumed from application of "sheen test."); *see also* Ethyl Corp. v. EPA, 541 F.2d 1, 26-29 (D.C. Cir.) (en banc), *cert. denied*, 426 U.S. 941 (1976) (standard of review when Agency sets standards where risks are uncertain; Agency conclusions to be "rationally justified"). Further, due process may *require* that responsible parties be given an opportunity to challenge the appropriateness of the remedial response in a CERCLA enforcement action, especially where, as here, the NCP is lacking in standards. *See* Historic Green Springs, Inc. v. Bergland, 497 F. Supp. 839, 853-56 (E.D. Va. 1980); Northern California Power Agency v. Morton, 396 F. Supp. 1187, 1192-93 (D.D.C. 1975), *aff'd mem. sub nom.* Northern California Power Agency v. Kleppe, 539 F.2d 243 (D.C. Cir. 1976).

334. NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982); *see* Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,978 (1982).

for the large variety of substances and situations that were likely to be encountered, that frequently no standards would be "clearly applicable," and that inclusion of standards in the Plan would divert attention from the real aim of CERCLA, that is, protecting the public health and welfare and the environment.[335] EPA could have added that the extreme difficulties involved in estimating the risks presented by waste disposal sites make precise standards unworkable.[336] While all of these arguments have merit, on closer consideration none can justify the Plan's lack of standards for evaluating the necessity and adequacy of remedial responses.

This section will first discuss EPA's authority under CERCLA to develop criteria for determining the appropriate extent of remedial response from regulations promulgated under other acts and from basic EPA policies. The section then examines three possible approaches to assessing remedial responses. The first two approaches would require a cleanup to reach either the background level of hazardous substances or a uniform and specific level of total risk. These approaches, however, would be generally unworkable and would not be authorized by CERCLA, and they are therefore discussed only briefly. Finally, the section examines a scheme of existing federal health and environmental regulations, supplemented with relatively narrow Executive policy determinations which might successfully provide standards for assessing the appropriateness of most remedial responses.

A. EPA's Authority Under CERCLA to Develop Standards For Remedial Response

CERCLA provided the Executive with broad authority to protect public health and welfare and the environment from the hazards of improper waste disposal.[337] Congress intended that the National Contingency Plan would include directions as to how the Executive would protect the public and the environment and would define the extent of cleanup sufficient to meet this goal.[338] Other environmental statutes have similarly required the Executive to define how it would solve environmental problems and how much action that would require.[339] These other statutes, however, give the Executive the authority to regulate specific types of releases of specific substances to which the public

335. NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982); *see* Proposed NCP (preamble), 47 Fed. Reg. 10,972, 10,978 (1982).

336. *See supra* text accompanying notes 165-84 and 202-12.

337. *See supra* text accompanying notes 39-69.

338. *See supra* text accompanying notes 71-95.

339. *E.g.*, RCRA § 3004, 42 U.S.C. § 6924 (1982); FWPCA § 304(a), 33 U.S.C. § 1314(a) (1982); SDWA § 1412, 42 U.S.C. § 300g-1 (1982); Clean Air Act §§ 108-109 and 111-112, 42 U.S.C. §§ 7408-7409 and 7411-7412 (1982).

or the environment are likely to be exposed.[340] In contrast, the response authority that CERCLA gives EPA is more generalized. Under certain conditions, the EPA can respond to abate a risk to health or the environment posed by almost any substance[341] to which the public or the environment could be exposed from any of several different routes.[342] The regulations under CERCLA thus must be broader than those under other environmental statutes.

Congress, however, did not expect EPA to develop specific health standards for every substance or situation likely to be encountered in a release or threatened release from a waste disposal site.[343] Rather, the Plan was to contain "appropriate" means to achieve the statutory goals.[344] Given such a broad delegation of authority and the need for rapid implementation of CERCLA in light of the waste site "crises" against which it was developed,[345] "appropriate" could include regulatory standards borrowed from other acts addressing other hazards to the public health, welfare, and the environment. Although these standards cannot provide a complete scheme for cleanup of hazardous waste sites because they cover only a limited number of situations and substances,[346] they can provide a basic framework to guide response actions by the government, responsible parties, and other groups.

Neither CERCLA nor its legislative history contains direct support for incorporating regulations promulgated under other acts into the NCP.[347] However, by exempting federally permitted releases from

340. These legislative delegations have not always been unqualified successes, for a variety of reasons. *See generally* Schoenbrod, *Goals Statutes or Rules Statutes: The Case of the Clean Air Act*, 30 U.C.L.A. L. REV. 740 (1983) (criticizing goals oriented approach of Act); B. ACKERMAN AND W. HASSLER, CLEAN COAL/DIRTY AIR 122-25 (1981).

341. The Notification Requirements, 48 Fed. Reg. 23,570 (1983) (to be codified at 40 C.F.R. pt. 302) (proposed May 25, 1983), proposed an initial list of 696 hazardous substances. In addition, CERCLA § 104(b) provides that nearly any substance, except petroleum, natural gas and related substances, which endangers the public health or the environment may be considered a potential pollutant or contaminant, even if it is not hazardous within the statutory definition contained in CERCLA § 101(14), 42 U.S.C. § 9601(14) (1982). CERCLA § 104(b), 42 U.S.C. § 9604(b) (1982).

342. *See supra* text accompanying notes 165-85 and 202-12.

343. The contrary should be inferred from Congressional intent to move quickly to abate health hazards. *See, e.g.*, NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982) and *supra* text accompanying notes 54-63.

344. CERCLA § 105(3), 42 U.S.C. § 9605(3) (1982).

345. *See, e.g.*, 126 CONG. REC. 30,113 (statement of Sen. Stafford); *Id.* at 30,951 (statement of Sen. Culver); *id.* at 31,972-73 (statement of Rep. Vento).

346. For example, regulations under the Clean Air Act, 42 U.S.C. §§ 7407 and 7412 (1982), regulate only ten substances, 40 C.F.R. §§ 50.4-.12 and pt. 61 (1983), regulations under the SDWA, 42 U.S.C. § 300g-1 (1982), only twelve classes of chemicals, 40 C.F.R §§ 141.11-.12 (1983), and regulations under FWPCA, 33 U.S.C. § 1314(a)(1) (1982), sixty-four substances. 45 Fed. Reg. 79,318 (1980).

347. Section 3(b) of S. 1480 would have allowed the EPA to "establish and to enforce . . . such control or removal or remedial action requirements as . . . appropriate to protect the public health and welfare and the environment" for waste disposal sites that were not

the coverage of some sections of CERCLA,[348] Congress at least acknowledged that a release allowed under a permit issued under these regulations should not endanger public health or welfare or the environment. Congress believed that if such releases did endanger health, enforcement authorities other than those of CERCLA would address them.[349] The regulations under which such permits are issued might also be used to address releases from an unauthorized site or from a site whose permit is not legally enforceable. Where an agency has promulgated regulations governing the issuance of such permits pursuant to congressional directions to protect the public health and environment,[350] if the release or site design conforms to the relevant regulations or permit conditions, then the public health and the environment prima facie are not in danger.[351]

These regulatory programs, however, provide only a starting point for determining a set of environmental and public health standards that

---

permitted under SWDA, but this section was not included in CERCLA. *See* 126 CONG. REC. 30,908 (1980) (proposed S. 1480 § 3(b)); S. REP. No. 848, 96th Cong., 2d Sess. 62-63 (1980).

348. *E.g.*, CERCLA §§ 107(j) and 111(j), 42 U.S.C. §§ 9607(j) and 9611(j) (1982) (exempting federally permitted releases from the liability provisions of CERCLA). *Accord* NPL (preamble), 48 Fed. Reg. 40,658, 40,662-63 (1983). "Federally permitted releases" include releases under permits issued by authority of the Clean Air Act, FWPCA, SDWA, the Marine Protection, Research, and Sanctuaries Act of 1972, and several other environmental statutes. CERCLA § 101(10), 42 U.S.C. § 9601(10) (1982).

349. *See* 126 CONG. REC. 30,932-33 (1980) (remarks of Sen. Randolph); S. REP. No. 848, 96th Cong., 2d Sess. 56 (1980).

350. *See, e.g.*, RCRA § 3005(c), 42 U.S.C. § 6925(c) (1982) (requiring compliance of disposal facilities with health and environmental standards promulgated under RCRA § 3004, 42 U.S.C. § 6924 (1982) as condition of permit for disposal facility); SDWA § 1424(b)(3), 42 U.S.C. § 300h-3(b)(3) (1982) (Administrator may issue a permit for a new well for underground injection of any fluid only if the operation of such well will not contaminate an aquifer so as to create a significant public health hazard.).

351. Courts occasionally have used federal or state permit standards to determine appropriate remedies for public health nuisances. *See, e.g.*, Illinois v. Milwaukee, 599 F.2d 151, 175-77 (7th Cir. 1979), *vacated and remanded on other grounds*, 451 U.S. 304 (1981); Village of Wilsonville v. SCA Services, Inc., 77 Ill. App. 3d 618, 630-31, 396 N.E.2d 552, 559-60 (1979), *aff'd*, 86 Ill. 2d 1, 426 N.E.2d 824 (1981).

Some statutes, however, provide for greater consideration of economic and feasibility factors in regulation than does CERCLA. *See, e.g.*, Clean Air Act § 111(j)(1)(A)(iii), 42 U.S.C. § 7411(j)(1)(A)(iii) (1982) (waivers from New Stationary Source Performance Standards granted if control method will not cause an *unreasonable* risk to public health, welfare, or safety); FWPCA § 402(a), 33 U.S.C. § 1324(a) (1982) (NPDES permits may be granted for discharges to navigable waters of hazardous pollutants if best available technology economically achievable is used to limit discharges); Marine Protection, Research, and Sanctuaries Act of 1972 §§ 102-103, 33 U.S.C. §§ 1412-1413 (1982) (permit to dump dredged and other material into ocean waters may be granted if such dumping will not *unreasonably* degrade or endanger human health or welfare, the marine environment, ecological systems, or economic potentialities). These considerations may be at odds with the goals of CERCLA, and therefore these sections should be applied with caution. Nevertheless, regulations that are governed by the same or similar goals as those of CERCLA would be relevant to the selection of an appropriate remedy for a release or threatened release of hazardous waste. *See infra* notes 375-76.

the EPA might have incorporated into the National Contingency Plan or which agencies, courts, and parties might use to evaluate the necessity and adequacy of a particular remedial cleanup plan. Existing regulations frequently will not apply to significant portions of the hazards that the agency or party seeks to abate. First, most of these regulations specifically address the health effects of relatively few substances.[352] Second, most of the regulatory standards govern present levels of contamination and therefore will not always provide a sufficient basis for determining remedial measures even where the standards are nominally applicable. For example, if drinking water is drawn from an aquifer that is contaminated with a low level of a substance for which regulatory standards exist, but a threat of increased contamination exists, the appropriate type or extent of remedial response is not governed solely by the regulatory standard addressing existent levels of the substance. In determining what response is appropriate, an agency must also consider the probability of exposure to future contamination.[353] There are thus two sources of uncertainty in using other environmental acts to formulate standards for the necessity and adequacy of responses under the National Contingency Plan: the uncertainty concerning the health effects of many of the substances regulated, and the factual uncertainty in predicting future exposures.[354]

This is not to imply that the standards from other acts are deficient for the purposes of those acts, but only to suggest that, alone, they may be insufficient for the purposes of CERCLA. In determining the

352. *See supra* note 346. Although several hundred substances have been designated as hazardous under one act or another, and hence under CERCLA § 101(14), 42 U.S.C. § 9601(14) (1982), *see* Notification Requirements, 48 Fed. Reg. 23,552, 23,570 (1983) (proposed 40 C.F.R. pt. 302), these designations have generally been made without detailed consideration of the substances' risks to health and the environment, especially where the substance is present at low concentrations. *See* 40 C.F.R. §§ 261.3-.24 (1983) (defining hazardous waste for purposes of RCRA § 3004, 42 U.S.C. § 6924 (1982)). Generally, designation of a substance as hazardous, without more, is an insufficient basis on which to decide the extent to which such a substance, once released, should be removed from the environment.

353. *See* CERCLA § 101(24), 42 U.S.C. § 9601(24) (1982).

354. The problems of uncertain future exposures are not considered by other environmental acts. Under § 109 of the Clean Air Act, 42 U.S.C. § 7409 (1982), for example, National Ambient Air Quality Standards (NAAQS) consist of the levels of certain air-borne pollutants to which exposure must be limited to protect the public health. 40 C.F.R. pt. 50 (1983). In setting primary NAAQS, the major consideration and source of uncertainty is the ambient level of each pollutant at which health is adversely affected. *See* Lead Industries Ass'n, Inc. v. EPA, 647 F.2d 1130, 1152-56 (D.C. Cir.), *cert. denied*, 449 U.S. 1042 (1980) (lead NAAQS); American Petroleum Institute v. Costle, 665 F.2d 1176, 1186-87 (D.C. Cir. 1981), *cert. denied*, 455 U.S. 1034 (1982). By equating an unsafe ambient concentration with protection of the public health, the regulatory process implicitly assumes that the probability of exposure to this concentration is uniform. Other executive determinations of "safe" concentration, such as Water Quality Criteria, have been determined in much the same fashion. *See, e.g.*, 45 Fed. Reg. 79,318, 79,318-21 (1980); 46 Fed. Reg. 40,919 (1981) (correction notice).

proper response under CERCLA to a release or threatened release of hazardous waste, the uncertainty inherent in health-based decision-making is compounded by the factual uncertainty about the probability of exposure to hazardous wastes.[355] However, where an agency has determined "safe" levels of exposure to substances of concern under the authority of other statutes, the use of that determination in deciding the appropriate extent of remedial response under CERCLA will help reduce the uncertainty involved.

On the other hand, a requirement in the National Contingency Plan that the uncertainties about health and environmental effects and exposures be significantly reduced before remedial action is begun[356] would probably prevent the achievement of CERCLA's goals.[357] Since a lead agency would need a large quantity of complex information in order to determine risk accurately, it is likely to be uncertain about the actual threat a site poses when it determines the appropriate response.[358] Reduction of these uncertainties to levels at which an agency could confidently assess quantitative risk would be either theoretically impossible or so time consuming as to cause excessive delay in cleanup.[359] In addition, the required investigations would be prohibi-

355. *See supra* note 169.

356. For example, the Plan could require that a threat of significant harm to health or the environment be more likely than not before remedial action is begun. In recent litigation concerning the OSHA standard for worker exposure to benzene vapor, the Supreme Court used such a burden of proof requirement to reject the OSHA exposure limit. Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 653 (1980) (plurality opinion). This decision has been the subject of significant criticism. *Id.* at 708-713 (Marshall, J., dissenting); Goldsmith and Banks, *Environmental Values: Institutional Responsibility and the Supreme Court*, 7 HARV. ENVTL. L. REV. 1, 23-28 (1983); Latin, *The "Significance" of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty*, 10 ECOLOGY L.Q. 339, 390-94 (1982). The Supreme Court may have retreated from this requirement. *See* American Textile Mfrs. Inst. v. Donovan, 452 U.S. 490, 522-23 (1981) (OSHA cotton dust exposure standard judged by substantial evidence test, based on administrative record as a whole); *see* Goldsmith and Banks, *supra*, at 28-30. To the extent these decisions depend on the OSHA statutory language, they are largely inapplicable in the context of CERCLA. *Compare* 29 U.S.C. § 655(b)(5) (1982) (regulation "to the extent feasible, on the basis of the best available evidence," that "adequately assures" "no employee will suffer material impairment of health . . . ") *with, e.g.,* CERCLA, §§ 101(23) and (24), 42 U.S.C. §§ 9601(23) and (24) (1982) (definitions of "removal" and "remedy," quoted *supra* at note 49).

357. *See supra* note 69, and accompanying text; *see also* 126 CONG. REC. 33,833-34 (1980) (post passage remarks of Sen. Randolph) (development and provisions of NCP not to hinder accomplishment of basic purposes of CERCLA).

358. *See supra* text accompanying note 169; NCP (preamble), 47 Fed. Reg. 31,180, 31,187-88 (1982) (discussion of amounts and costs of information necessary to rank sites, which is less than that arguably necessary to accurately assess the risk of each site).

359. NCP (preamble), 47 Fed. Reg. 31,180, 31,185 (1982); *see* OSHA Generic Cancer Policy, 45 Fed. Reg. 5002, 5008-15 (1980) (need for generic policy on workplace carcinogens rather than individualized regulatory proceedings); *See generally* McGarity, *Substantive and Procedural Discretion in Administrative Resolution of Science Policy Questions: Regulat-*

tively expensive.[360] Given the purposes of CERCLA and its funding limitations, an agency should be able to determine appropriate remedial responses even though both health effects data and predictions of exposure levels are somewhat uncertain.[361] The agency then would be justified in implementing the remedy even though uncertainty remains as to whether all parts of the remedial plan are essential to protect the public health and welfare and the environment.

CERCLA gave the Executive significant latitude within which to define appropriate remedial responses. This delegation is sufficiently broad to allow EPA both to incorporate regulations promulgated pursuant to other acts into the NCP and to make relatively broad policy judgments in cases where these regulations do not apply to the particular conditions at the waste disposal site or to the substances giving rise to those conditions. As long as the standards included in the Plan provide explicit notice of the procedures used by the Executive and some assurance that the lead agency can implement remedial responses according to the Plan while fulfilling the goals of CERCLA, the Plan will probably be an acceptable response to the congressional directive that it include methods and criteria for determining the appropriate remedial response.[362] The next part of this Comment will consider some of the possible standards and sources of standards by which the necessity and adequacy of a remedial response could be assessed.

B. Possible Remedial Approaches

There is probably no acceptable single environmental standard for hazardous waste cleanups that EPA could have incorporated in the Plan, although at least two such "single standards" for protecting the public health and welfare and the environment might seem possible. One such standard would require the party cleaning up the site to remove or neutralize hazardous substances or wastes or halt their migration to a point where the remaining contamination presents a predetermined, acceptable level of risk (a "no hazard" approach). A second "single standard" approach would require cleanup of all hazardous substances or pollutants to background levels of contamination,

---

ing Carcinogens in EPA and OSHA, 67 GEO. L.J. 729, 733-43 (1979); Gelpe and Tarlock, *supra* note 169, at 392-96.

360. OSHA Generic Cancer Policy, 45 Fed. Reg. 5002, 5008-15 (1980) (individual regulation of workplace carcinogens beyond the capacity of any agency); *see supra* note 334.

361. Agencies take regulatory action under other acts despite uncertain health effects data. *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1, 24-29 (D.C. Cir.) (en banc), *cert. denied*, 426 U.S. 941 (1976) (regulation under § 211 of Clean Air Act); Hercules, Inc. v. EPA, 598 F.2d 91, 107-08 (D.C. Cir. 1978) (regulation under FWPCA § 307); American Petroleum Inst. v. Costle, 665 F.2d 1176, 1184-85 (D.C. Cir. 1981), *cert. denied*, 455 U.S. 1034 (1982) (regulation under Clean Air Act § 109); Reserve Mining v. EPA, 514 F.2d 492, 537-38 (8th Cir. 1975) (en banc) (suit under former FWPCA § 504); and cases cited *supra* at note 356.

362. CERCLA § 105(3), 42 U.S.C. § 9605(3) (1982).

that is, to a point where contamination levels are at or below those occurring naturally or are undetectable. Both of these approaches are flawed, however, and neither is feasible for general use to assess the appropriateness of remedial actions. The third approach considered here integrates existing health-based regulations with administrative policies producing a generalized scheme for determining appropriate remedial actions.

1. A "No Hazard" Approach

The use of a "no hazard" standard for determining the appropriate extent of remedial response would have some advantages, at least superficially. The "no hazard" standard establishes an acceptable level of risk, a level which no site should exceed. EPA could set that risk level so that, at least statistically, no deaths or significant injuries would occur.[363] Analytically, the concept is straightforward, and by using it, EPA would appear to be fulfilling the statutory mandate.

A single risk level approach, although used under other Acts,[364] is too simplistic to be used for hazardous waste site cleanup. EPA probably could not justifiably have implemented it in the NCP. First, the difficulties and uncertainties involved in quantitatively estimating the absolute risk at each hazardous waste site would make the use of such a standard impossible.[365] Further, because the "no-hazard" standard is usually based on mortality statistics, it either neglects potential injuries which are sublethal, organoleptic,[366] or environmental, or requires the Agency to find some way to equate the "hazard" posed by such injuries to that posed by death. Finally, for individual substances for which no threshold level (below which no injury will occur) can be shown to exist,[367] EPA would have to make a policy judgment, possibly on an ad hoc basis, as to the level of risk beyond which no remedial cleanup

363. However, it cannot generally be shown that a threshold "no effect" level exists for tumor induction by carcinogens. *See, e.g.*, Water Quality Criteria (preamble), 45 Fed. Reg. 79,318, 79,323 (1980); OSHA Generic Cancer Policy, 45 Fed. Reg. 5002, 5137 (1980). Thus, low dose cancer risks are often expressed as a negative power of ten where, for example, a cancer risk of 10^{-6} is a one in a million (10^{6}) chance of tumor induction or death in an individual due to a given exposure level over a given amount of time. Water Quality Criteria (preamble), 45 Fed. Reg. 79,318, 79,323 (1980). If a target population of 1,000,000 is exposed to a cancer risk of 10^{-6}, statistically, only one person will die of cancer (although there is a significant likelihood that several other persons will also contract cancer at this risk level).

364. *See, e.g.*, Comment, *EPA's High-Risk Carcinogen Policy*, 218 SCIENCE 975, 976 (1982) (absolute risk levels used to determine registrability of pesticides under the Federal Insecticide, Rodenticide and Fungicide Act § 3, 7 U.S.C. § 136a (1982)).

365. *See supra* text accompanying notes 192-212.

366. Organoleptic effects include bad taste, smell, or other primarily aesthetic (as opposed to health) injuries and are usually classed as "welfare" effects. *See* Water Quality Control Documents, 45 Fed. Reg. 79,318, 79,355 (1980).

367. *See supra* note 363.

will be undertaken. It would be, at best, unworkable for EPA to make such a policy judgment for all such substances. In sum, EPA can not feasibly include such a single risk-based standard in the National Contingency Plan nor use such a standard to evaluate the appropriateness of particular remedial responses.[368]

2. *Background Levels*

A "single standard" approach requiring that all wastes, or all wastes that have migrated from a site, be cleaned up to or beyond background levels is even more seductive than the "no-hazard" approach. Since no threshold exposure can be shown to exist for many substances,[369] reduction of contaminant levels to concentrations at or below those that exist naturally[370] or that can be detected[371] is perhaps the only way to assure that a site's incremental risk to public health and welfare and the environment has been eliminated.

However, this standard for determining appropriate remedial actions cannot be justified in most cases. First, it would frequently require cleanup beyond that necessary to protect the public health and

368. Another similar single standard approach would be to clean up a disposal site to a point where it would no longer be appropriate to list the site on the NPL. *See* Proposed NPL (preamble), 47 Fed. Reg. 58,476, 58,477 (1982) (rejecting proposal that actions already undertaken under CERCLA or other authorities be considered in ranking a site on the NPL); *accord* NPL (preamble), 48 Fed. Reg. 40,658, 40,660-61 (1983). This approach would be inconsistent with CERCLA's goal of protecting the public health and welfare and the environment. Since significant risk to health and the environment is present at many unlisted sites, "delisting" of sites would not abate all risk. Furthermore, because Congress intended the NPL to be continually updated, which may lower the degree of risk necessary for listing on the NPL, *see supra* text accompanying notes 216-17, such an approach would be inefficient; sites would conceivably have to be "cleaned up" more than once.

369. *See supra* note 363.

370. Definition of the appropriate "background" concentration of a substance may be more elusive than it would appear. It is unlikely that many tests of contaminant levels were made prior to the existence of the disposal site and it may be difficult to determine a comparable "uncontaminated" location with which to compare the site. In addition, contaminants present in the environment above "background" levels may have sources other than the hazardous waste dumpsite. For example, many inorganic substances are found naturally in water supplies at levels that may cause some health concern. 1 NATIONAL RESEARCH COUNCIL, DRINKING WATER AND HEALTH 251-380 (1977). Further, even for "synthetic" organic compounds such as dioxins, suggestions have been made that "natural" processes such as incineration of wood or municipal waste may be responsible for significant portions of observed contamination levels. *E.g.*, Hunt, Wolf and Fennelly, *Incineration of Polychlorinated Biphenyls in High Efficiency Boilers: A Viable Disposal Option*, 18 ENVTL. SCI. & TECH. 171, 172 (1984). Similarly, polycyclic aromatic hydrocarbons, known carcinogens, are produced in a variety of charring processes. G. GRIMMER, ENVIRONMENTAL CARCINOGENS: POLYCYCLIC AROMATIC HYDROCARBONS 64-84 (1983). This is not to suggest that these sources of contaminants are of no concern, but that if the incremental risk posed by a particular waste site *is* the concern, other sources of risk should be considered.

371. If a substance cannot be shown to exist at the site of concern, there is no legal authority to abate any health hazards that might be known to exist due to unmeasurable amounts.

the environment, and this is beyond the statutory authority granted to EPA by CERCLA.[372] Second, such a standard would deplete the Fund more quickly than would more specific, health-based standards because it would require more extensive remedial responses with rapidly decreasing marginal benefits and commensurately increasing marginal costs as the cleanup approached background concentrations.[373] Finally, this approach would not easily accommodate consideration of the possible environmental risks created by extensive remedial responses.[374]

3. An Integrated Approach

Given the complex goals and authorities of CERCLA, it is probably not possible to develop a single standard to assess the necessity and adequacy of remedial measures; however, EPA could devise a framework based on existing health-based regulations to guide remedial actions in the majority of situations. The EPA has already developed regulatory programs under numerous environmental acts which, like CERCLA, aim to protect public health, welfare, or the environment from a variety of hazards caused by chemical wastes.[375] Regulations developed under these acts thus have goals that are similar to CERCLA's requirements, at least as to the hazards covered by these

372. *See supra* text accompanying notes 40-53.

373. *See* R. STEWART AND J. KRIER, ENVIRONMENTAL LAW AND POLICY 134-35 (1978).

374. *See supra* text accompanying notes 294-96 and *infra* text accompanying notes 407-11.

375. RCRA directs EPA to develop regulations for the treatment, storage, and disposal of hazardous wastes and the design and construction of disposal facilities "as may be necessary to protect human health and environment." RCRA § 3004, 42 U.S.C. § 6924 (1982). These regulations are codified at 40 C.F.R. pt. 264 (1983). *See also* 40 C.F.R. pt. 265 (1983) (interim standards for owners and operators of disposal facilities in existence when the regulations were promulgated (interim status sites)).

The Clean Air Act directs EPA to develop national primary and secondary air quality standards (NAAQS) to protect the public health and welfare, respectively. Clean Air Act § 109(a) and (b), 42 U.S.C. § 7409(a) and (b) (1982). These regulations are codified at 40 C.F.R. pt. 50 (1983). The Clean Air Act's definition of "welfare" includes several factors, such as soils, water, animals, wildlife, weather, and climate, which could be parts of "the environment" under CERCLA § 102(a), 42 U.S.C. § 9602(a) (1982); *see* CERCLA § 101(8), 42 U.S.C. § 9601(8) (1982) (definition of "environment").

The Safe Drinking Water Act (SDWA) provides for the development of primary drinking water standards to "protect the public health to the extent feasible." SDWA § 1412(a), 42 U.S.C. § 300g-1(a) (1982); *see* 40 C.F.R. pt. 141 (1983). Secondary drinking water standards, SDWA § 1412(c), 42 U.S.C. § 300g-1(c) (1982), are set to protect the public welfare. *See* 42 U.S.C. § 300f(2) (1982) ("public welfare" defined).

EPA has evaluated the health effects of a wide variety of substances pursuant to FWPCA § 304(a), 33 U.S.C. § 1314(a) (1982), to determine water quality criteria, which are maximum levels of the substances tolerated by freshwater and saltwater organisms and humans. 45 Fed. Reg. 79,318 (1980) (water quality criteria); 46 Fed. Reg. 40,919 (1981) (corrections); *see also infra* note 376. Water quality criteria have been used by courts to evaluate the severity of groundwater hazards. E.g., United States v. Price, 523 F. Supp. 1055, 1062 (D.N.J. 1981), *aff'd*, 688 F.2d 204 (3d Cir. 1982) (suit under RCRA); United

regulations.[376]

States v. Hardage, 18 Env't. Rep. Cas. (BNA) 1687, 1690 (W.D. Okla. 1982) (suit under CERCLA).

The National Research Council has also formulated advisory exposure limits, such as Acceptable Daily Intakes (ADIs) and Suggested No Adverse Response Levels (SNARLs), in studies required by SDWA § 1412(e), 42 U.S.C. § 300g-1(e) (1982). *See* 1 NATIONAL RESEARCH COUNCIL, DRINKING WATER AND HEALTH 14-16 (1977) (ADIs for organic compounds); 3 NATIONAL RESEARCH COUNCIL, DRINKING WATER AND HEALTH 70 (1980) (SNARLs for organic contaminants); 4 NATIONAL RESEARCH COUNCIL, DRINKING WATER AND HEALTH 154 and 203 (1982) (SNARLs for inorganic and additional organic contaminants). These advisory exposure limits represent levels "recommended . . . to protect the health of persons from any known or anticipated adverse effects . . . ." SDWA § 1412(e)(1), 42 U.S.C. § 300g-1(e)(1) (1982).

In addition, several of these Acts require or encourage the states to develop their own implementation programs. E.g., Clean Air Act § 110, 42 U.S.C. § 7410 (1982); FWPCA § 303, 33 U.S.C. § 1313 (1982); RCRA §§ 4001-07, 42 U.S.C. §§ 6941-49 (1982). These state plans may include more stringent standards than the federal regulations; when they do, remedial actions in the affected state should be conducted according to the more stringent state requirements. *See* 33 U.S.C. § 1370 (1982) (more stringent state standards to be enforced under FWPCA); 40 C.F.R. pt. 51 (1983) (allowing more stringent state standards to be developed under Clean Air Act); 48 Fed. Reg. 14,248 (1983) (to be codified at 40 C.F.R. pt. 171) (allowing more stringent state requirements in state hazardous waste programs under RCRA).

Similarly, states may have developed regulatory standards to protect public health and the environment independently of federal authority. These state standards could require remedial responses beyond those mandated by regulations promulgated under federal statutes. *See, e.g.*, CAL. HEALTH & SAFETY CODE § 4023.5 (West 1979) (authority to develop drinking water standards; associated regulations include CAL. ADMIN. CODE, tit. 22 §§ 64431-64439 and 64471-64475 (1983) (California standards analogous to federal Primary and Secondary Drinking Water Standards)); CAL. HEALTH & SAFETY CODE §§ 25150, 25200-25202.7, 25221, and 25245 (West 1979) (authorities to regulate hazardous waste site permitting, siting, construction, and closure; associated regulations at CAL. ADMIN. CODE, tit. 22 §§ 66370-66408, 66490-66560, and 66900-66935 (1983)); *see also* CAL. ADMIN. CODE, tit. 23 §§ 2500-2556 (1983) (regulations governing operation and closure of waste disposal facilities); ILL. ANN. STAT. ch. 111-1/2, §§ 1010, 1013, 1022, 1022.3, and 1022.4 (Smith-Hurd 1984) (authority to develop air quality, water quality, hazardous waste site development and monitoring, hazardous waste site closure, and RCRA-implementing regulations); N.J. STAT. ANN. §§ 58:12A-4, 13:1E-41, 13:1E-42, 13:1E-60, and 13:1E-61 (West 1982) (requiring drinking water standards, hazardous waste site monitoring and leachate collection systems, and establishing permitting and construction criteria for hazardous waste disposal sites). It is presently EPA policy to pay for cleanup using the Fund to meet state standards where they are more stringent than federal standards only if the state standards define the cost effective remedy. Draft EPA Policy on CERCLA Compliance with Other Environmental Laws, [14 Current Developments] ENV'T REP. (BNA) 1591 (Jan. 13, 1984).

376. "Regulations" includes both regulations promulgated according to normal administrative procedures (e.g., notice and comment), and criteria developed through other procedures to protect public health and the environment, since in undertaking remedial responses, the agency is primarily concerned with protecting health and the environment and not merely with enforcing regulations *per se*. The Water Quality Criteria in particular, although they have no real regulatory status, form the basis for FWPCA effluent limitations and water quality regulations and therefore are developed under procedures as rigorous as those for regulations. Water Quality Criteria (preamble), 45 Fed. Reg. 79,318, 79,319-21 (1980); *see* Hercules, Inc. v. EPA, 598 F.2d 91, 103, 109-10, 114-15 (D.C. Cir. 1978) (effluent limitations for toxaphene and endrin, formulated essentially by applying concentration factors directly to the Water Quality Criteria, upheld under substantial evidence standard of review); *accord* Environmental Defense Fund, Inc. v. EPA, 598 F.2d 62, 85-89 (D.C. Cir. 1978) (limitations

Such a framework could begin by dividing response actions into two categories: first, those where a release is only threatened or where, if a release has occurred, the substances involved are concentrated at or near their source, and second, those remedial actions where the waste has migrated sufficiently far from its original source that a single barrier would be insufficient to prevent further migration. This division is useful because EPA has promulgated extensive regulations under RCRA that pertain to wastes near the original disposal point. These regulations could also be applied under CERCLA to similar wastes.

Pursuant to RCRA § 3004,[377] EPA has devised comprehensive standards for the design, construction, operation, closure, and post-closure maintenance of hazardous waste disposal facilities.[378] This scheme applies to a variety of types of disposal facilities, including waste containers,[379] surface impoundments,[380] waste piles,[381] and landfills,[382] and prescribes standards for disposal of waste by incineration,[383] thermal treatment,[384] and chemical, physical, and biological treatment.[385] Since the RCRA regulatory scheme aims to protect the public health and welfare and the environment from waste disposal operations,[386] then assuming these regulations achieve their purpose,[387] they should be presumptively sufficient to assess remedial actions on waste that is at or near the source of contamination.[388]

The RCRA regulations are broad enough to guide responses under CERCLA at many hazardous waste sites. Because RCRA regu-

for PCBs); Mississippi Comm. on Natural Resources v. Costle, 625 F.2d 1269, 1273-78 (5th Cir. 1980) (oxygen demand).

377. 42 U.S.C. § 6924 (1982).

378. 40 C.F.R. pts. 264 and 265 (1983). Part 264 is applicable to all disposal facilities created after promulgation of the regulations; part 265 applies to interim status facilities.

379. 40 C.F.R. §§ 264.170-.199 and 265.170-.199 (1983).

380. *Id.* §§ 264.220-.230 and 265.220-.230.

381. *Id.* §§ 264.250-.258 and 265.250-.258.

382. *Id.* §§ 264.300-.316 and 265.300-.316.

383. *Id.* §§ 264.340-.351 and 265.340-.351.

384. *Id.* §§ 265.370-.382.

385. *Id.* §§ 265.400-.406.

386. *See* RCRA § 3004, 42 U.S.C. § 6924 (1982); 40 C.F.R. §§ 264.1(a) and 265.1(a) (1983).

387. In fact, the regulations may not achieve their purpose. One commentator has suggested, for example, that Hooker Chemical's Love Canal disposal site had been built in a way that would have complied with RCRA standards, had they been in effect at the time. Baeder, *Analysis and Risk Assessment: Key to Effective Handling of Hazardous Waste Sites*, in RISK ASSESSMENT AT HAZARDOUS WASTE SITES 33, 44 (F. Long and G. Schweitzer eds. 1982). In view of the statutory directives for these regulations, however, it should be assumed that they do achieve their purpose, at least until circumstances show otherwise.

388. The use of RCRA regulations for assessing on-site and source control remedial measures tracks the existing structure of the Plan fairly closely, *see supra* text accompanying notes 245-52; it is therefore surprising that such standards were not incorporated in the Plan. *See* 40 C.F.R. §§ 300.68(e)(1) and (2) (1983).

lations apply to such varied disposal facilities,[389] they could be used to evaluate remedial responses without hampering administrative efforts or unduly restricting the flexibility necessary to abate the hazards of widely differing waste disposal sites.[390] Making the regulations only presumptively applicable would increase this flexibility.[391] Where the regulations are inadequate, EPA could supplement them in specific cases. For example, since many of the sites to be cleaned up under CERCLA will have been constructed with insufficient investigation of the proposed site's topographic and geological characteristics,[392] or in locations where RCRA would not permit a disposal site,[393] remedial actions in accord with the RCRA regulations may at times be insufficient to achieve the goals of CERCLA. In these circumstances, remedial actions more stringent than those prescribed by the RCRA regulations could be used.[394] In addition, to insure that the wastes treated or contained using RCRA standards do not endanger the public health or welfare or the environment over the lifetime of the wastes involved, a remedial response should include long term monitoring of each site and nearby groundwater.[395]

RCRA regulatory standards are largely inapplicable when hazardous substances have migrated so far from the site that they cannot feasibly be contained or treated as part of the source of the waste,[396] or where a significant quantity of waste cannot be contained at the source and threatens to harm the public health, welfare, or the environ-

389. *See supra* text accompanying notes 379-85.

390. *See* CONG. REC. 33,833 (1980) (post passage remarks of Sen. Randolph).

391. The party wishing to deviate from these standards could bear the burden of showing their insufficiency. *See infra* text accompanying notes 412-15.

392. *See* 40 C.F.R. § 264.18(a); H.R. REP. NO. 1016, Part I, 96th Cong., 2d Sess. 30, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6133.

393. *See* 40 C.F.R. § 264.18 (1983) (facility location standards under RCRA).

394. *See* Village of Wilsonville v. SCA Servs., Inc., 77 Ill. App. 3d 618, 396 N.E.2d 552 (1979), *aff'd*, 86 Ill. 2d 1, 426 N.E.2d 824 (1981). In *Wilsonville*, the court held that the remedy for a public nuisance created by a hazardous waste disposal site would not be limited by a soil permeability standard adopted by the Illinois EPA for waste sites. Because the site was in danger of subsiding, the court found that the risk of escape of the waste was not limited to soil migration. 77 Ill. App. 3d at 628-31, 638-39, 396 N.E.2d at 559-60, 566. *See also* United States v. Chevron Oil Co., 583 F.2d 1357, 1363-64 (5th Cir. 1978) (FWPCA "oil sheen" test established by regulation creates rebuttable presumption of danger to environment in FWPCA § 311 civil penalty assessment).

395. 40 C.F.R. §§ 264.90-.100 and 265.94 (1983). *Accord* ILL. ANN. STAT. ch. 111-1/2, § 1022.3 (Smith-Hurd 1983) (requiring ground water monitoring for 20 years after site closure); CAL. HEALTH & SAFETY CODE § 25245 (West 1984) (30 year monitoring). *See also* 126 CONG. REC. 30,936 (1980) (remarks of Sen. Stafford concerning use of CERCLA's post-closure liability fund). *See generally* Schweitzer, *Monitoring to Support Risk Assessments at Hazardous Waste Sites*, in RISK ASSESSMENT AT HAZARDOUS WASTE SITES 73 (F. Long and G. Schweitzer eds. 1982).

396. *But cf.* 40 C.F.R. § 264.100 (1983) (RCRA requires groundwater corrective measures when monitoring reveals excessive contamination).

ment.[397] In these situations, designers of remedial responses face the problem of protecting the public and the environment from potentially dangerous levels of exposure. This problem can be divided into two subproblems: determining the possible future levels of exposure, and determining the harm that is possible as the result of a particular exposure level. It is easier to solve the second subproblem than the first, because the EPA has previously determined "safe" levels for a variety of air and waterborne substances.[398] In contrast, EPA has developed no standards to assess the accuracy of predictions of future exposure levels or to judge whether a given probability of exposure to an "unsafe" level of contamination is sufficient to justify remedial measures to reduce or eliminate that probability. Both of these subproblems will be subject to significant uncertainties,[399] and, in many instances, the test for the adequacy of a remedial response may simply have to be whether it offers an acceptable level of uncertainty.[400]

Existing regulations[401] and past judicial treatment of environmental hazards offer at least some guidance on how much uncertainty is tolerable in determining the need for a particular remedial action. If it appears likely that any part of the public or the environment will be exposed to concentrations of substances deemed unsafe under any existing regulations, at least presumptively, EPA would be justified in mandating responses under the NCP to reduce this exposure.[402] If "safe" levels have not yet been established for the substances of concern in a release, EPA should not be required under CERCLA to promulgate regulations establishing ambient levels that will protect health and the environment before it can take remedial action to abate a potential health hazard.[403] Nor should a base of health and environmen-

397. *See, e.g.*, United States v. Reilly Tar & Chemical Corp., 546 F. Supp. 1100, 1103-04 (D. Minn. 1982); United States v. Hardage, 18 Env't Rep. Cas. (BNA) 1687, 1689 (W.D. Okla. 1982); United States v. Solvents Recovery Serv. of New England, 496 F. Supp. 1127, 1130-31 (D. Conn. 1980); New Jersey Dep't of Envtl. Protection v. Ventron Corp., 182 N.J. Super. 210, 216-219, 440 A.2d 455, 458-59 (1981), *modified on other grounds*, 94 N.J. 254, 463 A.2d 893 (1983).

398. This "variety" is actually rather small, *see supra* note 352; however, many chemicals of a type commonly found in waste disposal sites are regulated.

399. *See supra* text accompanying notes 353-55.

400. For some approaches to regulatory decisionmaking in these circumstances, *see* Page, *A Generic View of Toxic Chemicals and Similar Risks*, 7 ECOLOGY L.Q. 207, 229-41 (1978); Tuohy, *Regulation and Scientific Complexity: Decision Rules and Processes in the Occupational Health Arena*, 20 OSGOODE HALL L.J. 562, 591-609 (1982); McGarity, *supra* note 359, at 780-96.

401. *See supra* notes 375-76.

402. *See* United States v. Chevron Oil Co., 583 F.2d 1357, 1363-64 (5th Cir. 1978) (presumptive use of "oil sheen" test rebuttable by evidence of absence of danger to health or environment); *accord* ILL. ANN. STAT. ch 111-1/2, § 1022.4 (Smith-Hurd 1983) (compliance with regulations is prima facie defense to any suit for any violations of state statute paralleling RCRA, even for unpermitted site).

403. *See supra* text accompanying notes 356-61.

tal effects data sufficient to support regulatory action be required. Where some data is available showing that a particular substance is substantially likely to cause significant harm,[404] a remedial response appears to be justified, although EPA should be cautious in making this determination.[405] If no evidence is available to indicate that a substance is harmful at the likely level of exposure, remedial action is probably not justified.[406]

Under some circumstances, agencies fashioning remedial responses should balance environmental harms against possible health benefits. Congress incorporated this balancing process into CERCLA's definition of "remedy," which allows the agency or party "to prevent *or minimize* the release of hazardous substances . . . ."[407] This balancing is especially appropriate where the environmental and health benefits of a particular remedy are uncertain.[408] Where exposures will be low or there is relatively little evidence of a health threat, extensive cleanup measures to further reduce the potential risk could conceivably increase the chance of environmental harm elsewhere.[409] For example,

404. This would include extrapolations based on similarity in chemical structure. *See* 44 Fed. Reg. 68,624, 68,659 (1979) (regulation of chlorobromomethanes in drinking water on the basis of structural and pharmacokinetic similarities to chloroform); OSHA Generic Cancer Policy, 45 Fed. Reg. 5002, 5174-78 (1980) (structural similarity a factor to be considered in regulatory rulemaking for carcinogens).

405. The difference between agency action that is justified on the basis of relatively complete data and action that is not is one of degree and not kind. Governmental actions based on incomplete data are commonplace, and actions based on incomplete data may be more tolerable when taken to protect health and the environment than for other purposes. *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1, 37-38 (D.C. Cir. 1976) (en banc), *cert. denied*, 426 U.S. 941 (1976); Reserve Mining v. EPA, 514 F.2d 492, 537-38 (8th Cir. 1975); *see generally* Latin, *The "Significance" of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty*, 10 ECOLOGY L.Q. 339 (1982). In a broad sense, nearly all health regulations are based on data that is not literally applicable to the hazard to be regulated, and extrapolations from data determined under dissimilar conditions must be used. *See id.* and *supra* note 400.

406. In many situations EPA will not have to face the problem of whether to clean up substances whose health effects are not well documented since the treatments employed for the better characterized substances at the site will also reach the less well documented substances. For example, treatment of wastewater with granular activated carbon, the method of choice for removal of trihalomethanes from contaminated water, 44 Fed. Reg. 68,624, 68,646-47 (1979), will remove a broad spectrum of organic chemicals from the treated water. 2 NATIONAL RESEARCH COUNCIL, DRINKING WATER AND HEALTH 251-380 (1980). Similarly, precipitation with slaked lime at a slightly basic pH will effectively remove many types of heavy metals from water. G. CULP & R. CULP, NEW CONCEPTS IN WATER PURIFICATION 221-23 (1974).

407. 42 U.S.C. § 9601(24) (1982) (emphasis added); *see supra* text accompanying notes 294-98.

408. *See* Page, *supra* note 400, at 236-39.

409. For suggestions that the environmental harm caused by certain processes of pollution control might outweigh the benefit, *see* 44 Fed. Reg. 68,624, 68,627 (1979) (potential hazards associated with the use of activated carbon beds to remove trihalomethanes from water); B. ACKERMAN AND W. HASSLER, CLEAN COAL/DIRTY AIR 15-16 (1981) (problems associated with the use of SO_2 scrubbers on smokestacks).

extensive transport of contaminated materials over public highways or decontamination procedures that produce sludges or other by-products requiring subsequent disposal could pose significant environmental hazards. CERCLA'S statutory balancing requirement may allow EPA to take uncertainties into account in determining the appropriate remedy, but the Agency should stop short of complete abatement only when fairly heroic efforts will be necessary to reduce contamination[410] or when the net environmental harms clearly outweigh the possible health benefits.[411]

Where there is some evidence of risk but the exposure level or the significance of effects is uncertain, allocation of the burden of proof in CERCLA § 107[412] could help to alleviate the problem of justifying a particular remedial response. The EPA could adopt a strategy requiring the Executive to show that each risk it seeks to abate is both significant and certain.[413] If this burden of proof is too stringent, however, neither the public nor the environment will be protected from serious risks which, due to their remoteness in time and the frequent difficulty of obtaining supporting data, are capable of only uncertain proof. EPA or the courts would be more likely to effectuate CERCLA's purposes by requiring responsible parties to show that an uncertain risk is actually low or non-existent[414] or that the environmental harms arising

410. For example, the decontamination of the James River and Chesapeake Bay is cited by the Senate as a situation where it would be appropriate merely to minimize the risk instead of fully abating it. S. REP. No. 848, 96th Cong., 2d Sess. 55 (1980).

411. It is important to note that CERCLA provides for no economic cost considerations in EPA's determination of the appropriate extent of remedy, except when the remedy will be financed solely by the Fund. *See supra* notes 256-57 and accompanying text and note 295. Where the responsible parties fund the remedial response, or where a response is paid for initially by the Fund but the chance of recovery of the costs from responsible parties is good, the only economic consideration permitted in the selection of a remedy is cost-effectiveness, and that only after the appropriate extent of response has been determined. *See supra* text accompanying notes 102-17.

Although Congress wanted to avoid unduly burdening the chemical industry in implementing CERCLA, *see, e.g.,* 126 CONG. REC. 30,934 (1980) (remarks of Sen. Randolph), it considered industry burdens only in its determination of an assessment of taxes on feedstocks and the size of the Fund. *See, e.g.*, H.R. REP. No. 1016, Part I, 96th Cong., 2d Sess. 32-33, 69, 74-75, *reprinted in* 1980 U.S. CODE CONG. & AD. NEWS 6119, 6135-36, 6144-45, 6149-50; S. REP. No. 848, 96th Cong., 2d Sess. 69-71 (1980). Some expressions of congressional concern may suggest that the Executive should be required to utilize cost-benefit analysis under other environmental statutes, *see* Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 667-670 (1980) (Powell, J., concurring), but there is no indication that Congress intended use of any economic considerations other than the cost-effectiveness analysis in determining responsible party cleanups under CERCLA.

412. 42 U.S.C. § 9607 (1982). *See supra* note 331.

413. *See* Page, *supra* note 400 at 233-36; McGarity, *supra* note 359, at 795-96; Reukauf, *Regulation of Agricultural Pesticides*, 62 IOWA L. REV. 909, 918 (1977).

414. *See* Latin, *supra* note 405, at 349-50 and references cited therein; *see also* Environmental Defense Fund, Inc. v. EPA, 548 F.2d 998, 1003-05, 1012-18 (D.C. Cir. 1976), *cert. denied*, 431 U.S. 925 (1977) (burden of persuasion of safety of pesticide on manufacturer,

from its abatement would outweigh the possible benefits, assuming the challenged remedial action or plan is based on workable general criteria for determining the appropriate extent of response.[415]

There do not appear to be any simple ways to determine criteria for the appropriate extent of remedial responses. However, by incorporating into the National Contingency Plan relevant regulations from other acts and environmental standards developed by the states, and by designating relatively narrow policies that would supplement these regulations and standards, EPA could have adequately responded to CERCLA's directions that the Plan include criteria for the appropriate extent of remedial response. While such criteria cannot eliminate the factual uncertainty inherent in protecting against the present and future dangers of past hazardous waste disposal practices, the major defects of the Plan as it exists could have been avoided.

CONCLUSION

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 provided the Executive with broad authority to respond to threats to public health and welfare and the environment from hazardous substance spills and inactive or abandoned hazardous waste disposal sites. CERCLA also set up a fund to finance these response activities and created liability in responsible parties for the funds expended. Congress delegated the task of implementing the response authorities and the legislative goals to the President and, in turn, to the Environmental Protection Agency, by directing the Executive to revise the National Contingency Plan to guide response actions at hazardous waste sites.

EPA's revision of the National Contingency Plan, however, has major failings. It does not contain many of the elements mandated by CERCLA. The Plan's provisions for determining when removal action is warranted and when sufficient removal has been undertaken are likely to be adequate in practice. Similarly, the Hazard Ranking System and the National Priorities List are acceptable guides for determining when remedial actions should be authorized. The Plan's sections that determine the appropriate extent of remedial response, however, are entirely inadequate. First, they are insufficient to implement CERCLA's increased response authorities. Second, these sections provide no standards by which the Agency, a responsible party, or a court can judge the adequacy of a particular remedial response; instead, this is

once Administrator has gone forward with evidence); *accord* Industrial Union Dep't, AFL-CIO v. American Petroleum Inst., 448 U.S. 607, 652-53 (1980).

415. United States v. Chevron Oil Co., 583 F.2d 1357, 1363-64 (5th Cir. 1978); *accord* Unites States v. Atlantic Richfield Co., 429 F. Supp. 830, 841 and n.14 (E.D. Pa. 1977), *aff'd mem. sub nom* United States v. Gulf Oil, 573 F.2d 1303 (3d Cir. 1978).

left almost entirely to discretionary judgments by government officials on a case-by-case basis. Third, these provisions, taken literally, provide for a less stringent goal than Congress intended.

These shortcomings could pose major problems. Most important, EPA's revision of the Plan gives no assurance that the public health and welfare and the environment will be protected, as intended by Congress, from the hazards posed by a specific waste site cleanup or by chemical waste releases in general. Other effects are less immediately obvious. The Plan's inadequacies, particularly its lack of standards as to how clean "clean" is under CERCLA and the Plan, will discourage voluntary responsible party cleanup, leading to less efficient and possibly less effective use of the Fund. Also, other sections of CERCLA are keyed to the National Contingency Plan's intended standards and provisions, including section 111, which governs the use of the Fund, and section 107, which contains the Act's liability provisions and which will determine what costs are recoverable from responsible parties in court. Without adequate environmental and health standards in the Plan to determine what remedial actions are appropriate, courts will face two extreme alternatives: either they must review remedial actions de novo, or they must defer completely to agency judgments as to the appropriate remedies. Neither of these alternatives will promote adequate or uniform protection from chemical hazards.

Formulating health and environmental standards that could be used to assess the necessity and adequacy of particular remedial responses is complicated by the wide range of conditions likely to be encountered as CERCLA is implemented and by the uncertainties involved in determining the likely exposure of the public and the environment to hazardous wastes and in assessing the likely health and environmental effects of exposure. However, Congress gave the EPA broad authority to incorporate regulations from other environmental acts and policy judgments into the National Contingency Plan. By drawing on these acts and policies, the EPA could devise a framework of standards determining how clean a site is supposed to be after all removal and remedial responses are complete.