SELECTING REMEDIES AT SUPERFUND SITES: HOW SHOULD "CLEAN" BE DETERMINED?

A Proposal for Revising the Remedy Selection Process of the Comprehensive Environmental Response, Compensation, and Liability Act

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Selecting the most appropriate means of cleaning up hazardous substances in the environment is a little like selecting a remedy for treating a patient afflicted with a serious illness. Like a sick patient, the release of hazardous substances must be carefully diagnosed. The nature and extent of the contamination must be characterized just as the nature and extent of the disease must be identified. Different remedies for the release—or the illness—must be evaluated and compared based on their effectiveness, side effects, short and long term results, and cost.

The diagnosis of an illness and the analysis of alternative means of treatment require the specialized expertise of a physician. Ultimately, however, the sick patient must decide what remedy should be pursued to treat the illness. Although the doctor's advice must be carefully considered, it is the patient who must weigh the trade offs associated with different alternatives. Side effects associated with a certain remedy might be insignificant to one patient but debilitating for another patient. Likewise, constraints on future activities related to one treatment alternative might be perfectly acceptable to one patient but unbearable for another patient. The remedy that is most suitable for a patient depends as much on the subjective judgment of the patient as it does on the objective expertise of the doctor.

The process of selecting the most appropriate remedy to clean up hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Superfund")[1]—like the process of choosing a treatment for a

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1. Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 (1988 & Supp. III 1991). CERCLA was enacted in 1980, largely in response to concerns over risks to health and the environment posed by releases of chemicals into the environment at the infamous Love Canal site near Niagara Falls, New

serious illness—should be based on the interests and goals of the parties most affected by the hazardous substances as much as the technical expertise of regulators. This article, therefore, proposes changes to the process by which remedies at Superfund sites are selected. The intent of these changes is to correct the imbalance of the current remedy selection process, which precludes effective participation by many individuals and organizations with a stake in the remedy selected for the site.[2] Improving the ability of all such "stakeholders" to influence remedy selection decisions will lead to a process of reaching decisions which achieve greater acceptance and better results.

The process for selecting remedies at CERCLA sites should be revised to focus remedy selection on attainment of concrete future use objectives. To do this, input of stakeholders must be incorporated more effectively throughout the remedy selection process. Specifically, two principles should be followed. First, the major factor driving the selection of remedies at Superfund sites should be the achievement of well-defined, site-specific clean up objectives. These clean up objectives should be based on explicit understandings of the uses of sites, surrounding properties, and connected resources after clean up. Second, defining such future

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York. CERCLA provides broad authority for the United States Environmental Protection Agency ("EPA") to eliminate or mitigate risks to health and the environment associated with unpermitted releases of "hazardous substances" into the environment. *See id.* § 9604. EPA has compiled a list, known as the National Priorities List ("NPL"), which contains more than 1200 sites that EPA has determined pose the most significant risks to health and the environment. Only sites on the NPL are eligible for clean up using funds from the Superfund, but the response authority provided in CERCLA may be employed at any site where there is a release or threatened release of a hazardous substance into the environment, subject to the conditions and requirements specified in CERCLA. *See, e.g.*, 40 C.F.R. § 300.425 (1992).

2. These individuals and organizations are referred to throughout this article as "stakeholders." They include the following: the site owner and other potentially responsible parties ("PRPs") that may be liable for paying for the clean up; nearby residents, homeowner associations, and neighboring property owners; national, state, and local environmental organizations; state and local business or trade associations, chambers of commerce, or economic development groups; state and local government agencies and officials; natural resource trustees including states, Native American tribes, and federal land managers; and any others that can demonstrate a stake in the outcome of the remedy selection process. While the term "stakeholders" does not originate from or have any basis in CERCLA itself, the term increasingly has been used to refer to parties demonstrating an interest in the outcome of remedy selection decisions at Superfund sites. EPA also uses the terms "local public," "communities," "citizens," and "interested parties" to refer to the universe of affected and interested individuals at Superfund sites. *See, e.g.*, OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROTECTION AGENCY, COMMUNITY RELATIONS IN SUPERFUND: A HANDBOOK (1992).

uses, making the compromises, and balancing the trade offs inevitably required in selecting Superfund remedies should be done, not by the Environmental Protection Agency ("EPA") or other regulators, but through an inclusive process that effectively involves the individuals and organizations with demonstrated interests in the outcome.

Congress has begun again the arduous process of reauthorizing and amending CERCLA. During this reauthorization process, which is likely to continue at least until 1995, Congress will confront the difficult issues surrounding the process by which the Superfund Program will achieve its foremost goal of protecting human health and the environment from releases of hazardous substances. This article examines the last congressional debate over this issue and the results of that debate.[3] In particular, this article analyzes the statutory language adopted by Congress concerning the evaluation and selection of remedies at Superfund sites, the legislative history underlying this language, and EPA's implementation of this language in the National Oil and Hazardous Substances Response Contingency Plan, which is more commonly known as the National Contingency Plan ("NCP").[4] This article does not attempt to address the many complex technical issues associated with selecting remedial actions.[5] Instead, this article focuses on the *process* and criteria by which remedies are selected and analyzes the policy issues associated with the contradictory objectives established by Congress that remedies be cost effective and utilize treatment technologies to the maximum extent practicable.

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3. *See infra* notes 32-60 and accompanying text (discussing the congressional debate in 1986). Congress last made substantial amendments to CERCLA in 1986. *See infra* note 6 and accompanying text.

4. 40 C.F.R. § 300.430 (1992).

5. For instance, this article does not analyze the complex process for identifying and evaluating attainment of applicable or relevant and appropriate requirements ("ARARs"), the scientific issues involved in quantifying risk, or the technical dimensions of hydrology, geology, climatology, and a host of other scientific disciplines that must be utilized in the evaluation and selection of remedies. These, and other technical issues, are beyond the scope of this article. EPA has developed several documents that analyze the spectrum of technical issues associated with public health risk assessments at Superfund sites, exposure and toxicity assessments, risk characterization, and environmental effects of contamination. *See, e.g.*, 1 OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROTECTION AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, HUMAN HEALTH EVALUATION MANUAL (1989); 2 OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROTECTION AGENCY, RISK ASSESSMENT GUIDANCE FOR SUPERFUND, ENVIRONMENTAL EVALUATION MANUAL (1989).

This article is organized into three sections. Section I describes the approach to remedy selection in the original Superfund legislation enacted in 1980. Section II analyzes the statutory amendments to the remedy selection process made by Congress when it reauthorized CERCLA with the enactment of the Superfund Amendments and Reauthorization Act of 1986 ("SARA").[6] Specifically, this section outlines the statutory language of section 121 of CERCLA, reviews the legislative history behind enactment of section 121, and analyzes pertinent sections of the NCP developed by EPA to implement the remedy selection process established by SARA.[7] Section III proposes that Congress enact specific changes to the process by which Superfund remedies are selected.

I. REMEDY SELECTION UNDER THE ORIGINAL CERCLA

As enacted by Congress in 1980, CERCLA provided broad authority with very little direction concerning the degree of clean up expected of Superfund remedies or the process by which clean up was to be achieved. In most respects, the authority provided by Congress for EPA to take remedial action[8] addressing releases of hazardous substances was quite broad. EPA's remedial action authority encompassed actions such as the following:

> storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazardous substances or contaminated materials, recycling or reuse, diversion, destruction, segregation

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6. Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (codified as amended at 42 U.S.C. §§ 9601-9675 (1988 & Supp. III 1991)). Through SARA, Congress enacted sweeping changes to CERCLA including the creation of certain liability provisions and changes to existing ones, 42 U.S.C. § 9607, civil penalty provisions, *id.* § 9609, civil jurisdiction provisions, *id.* § 9613, schedule requirements, *id.* § 9616, public participation requirements, *id.* § 9617, protection of drinking water requirements, *id.* § 9618, liability and indemnification of response action contractors, *id.* § 9619, federal facility requirements, *id.* § 9620, cleanup standards, *id.* § 9621, and settlements, *id.* § 9622.

7. 42 U.S.C. § 9621.

8. This article does not address "removal action" authorities, focusing instead solely on remedial action. Removal action authority was also quite broad, with some limited exceptions. *See, e.g.*, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Pub. L. No. 96-510, § 101(23), 94 Stat. 2767, 2770 (current version at 42 U.S.C. § 9601(23)).

> of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment.[9]

The principle statutory restrictions on what constituted remedial action were that the action:

- be "consistent with permanent remedy,"
- "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," and
- not "include offsite transport of hazardous substances, or the storage, treatment, destruction, or secure disposition offsite of such hazardous substances or contaminated materials unless" certain specified conditions were present.[10]

Section 104 authorized the utilization of remedial actions "which the President deems necessary to protect the public health or welfare or the environment."[11] Section 104(c)(4) provided limited guidance regarding how this authority should be executed:

> The President shall select appropriate remedial actions determined to be necessary to carry out this section which are to the extent practicable in accordance with the national contingency plan and *which provide for that cost-effective response which provides a balance between the need for protection* of public health and welfare and the environment at the facility under consid-

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9. *Id.* § 101(24).

10. *Id.*

11. *Id.* § 104(a)(1). This section also required such remedial action to be "consistent with the national contingency plan." *Id.* In any case where a release or threatened release of a hazardous substance presented an imminent and substantial endangerment to the public health or welfare or the environment, the President also was authorized "to secure such relief as may be necessary to abate such danger or threat . . . as the public interest and the equities of the case may require." *Id.* § 106(a). Such relief could be obtained from the United States district court for the district in which the threat occurred, or through EPA's issuance of administrative orders. *Id.* § 106(b).

> eration, *and the availability of amounts from the Fund* established under title II of this Act to respond to other sites which present or may present a threat to public health or welfare or the environment, taking into consideration the need for immediate action.[12]

Only a few explicit constraints were placed on the broad authority delegated to EPA to pursue remedial action. Such action was warranted if necessary to protect public health, welfare, or the environment, and if it prevented or minimized the release of hazardous substances.[13] Remedies were to provide "cost-effective response" that "balance[d]" the need for protection with the availability of money in the Fund.[14] Finally, the offsite transfer, treatment, storage, or disposal of hazardous substances was discouraged.[15]

Congress delegated such broad authority in the belief that it would enable EPA to clean up releases quickly and effectively. In the words of Senator Lloyd Bentsen:

> [W]hen we first enacted Superfund, we believed that we were putting in place a law that would allow the Federal Government to respond quickly and expeditiously to a wide variety of releases of hazardous substances and, in particular, to create a program which would clean up numerous abandoned hazardous waste sites around the country. We gave the President sweeping authority to respond to virtually any type of release of virtually any harmful substances whether it is released or only threatened to be released.[16]

These expectations were largely frustrated.[17] After a long and

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12. *Id.* § 104(c)(4) (emphasis added).

13. *Id.* § 104(a)(6), (c)(4).

14. *Id.* § 104(c)(4).

15. *Id.* § 101(24).

16. 132 CONG. REC. 28,421 (1986) (statement of Sen. Bentsen).

17. The Reagan administration's implementation of the Superfund Program, particularly during Rita Lavelle's tenure as head of the Program, is generally acknowledged as a principal reason for the Program's slow and stormy start. For example, in Administrator Reilly's initial assessment of the Superfund Program, he acknowledged that "Superfund has drawn a lot of negative attention in the years since its passage in 1980" and that "much of the criticism is appropriately grounded in a perception of slow progress

laborious congressional process,[18] major amendments to CERCLA were enacted by Congress in 1986.[19] One of the most significant of these amendments was section 121 of SARA, which created a new section entitled "Cleanup Standards."[20]

II. THE REMEDY SELECTION PROCESS ESTABLISHED BY SARA

When Congress reauthorized and revised CERCLA with the enactment of SARA, one of the most bitterly debated and carefully drafted amendments was section 121 of SARA.

The original Superfund statute failed to answer the following two questions: how clean is "clean" and how should "clean" be accomplished?[21] Section 121 of SARA was the congressional

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and questionable management early in the program." WILLIAM K. REILLY, U.S. ENVTL. PROTECTION AGENCY, A MANAGEMENT REVIEW OF THE SUPERFUND PROGRAM at i (1989).

The Program's early implementation was also a key factor in shaping Congress's approach to amending CERCLA with the enactment of SARA. As Representative John Dingell stated in his remarks during the House debate of the conference committee report:

> As a result of [Superfund's] unfortunate history of mismanagement, however, it is also the most beleaguered program the Environmental Protection Agency administers. The situation has led to 3 years of congressional debate, not only over the effective means of cleaning up Superfund sites, but also over the level of confidence we as a nation should place in the EPA.

132 CONG. REC. 29,715 (1986) (statement of Rep. Dingell). This lack of confidence in EPA management produced amendments to CERCLA that gave greater detail and direction to EPA with regard to its authority.

18. The legislative history recounting the House and Senate debate on the conference committee report is replete with references to the "long and difficult" process involved in the enactment of SARA. The conference committee, which convened to reconcile differences between the CERCLA reauthorization legislation enacted by the Senate and House, spent nearly a year on the process. According to Senator Bentsen (D-Texas), "It was . . . one of the most difficult and most meticulous and detailed conferences I have ever seen." 132 CONG. REC. 28,419 (1986) (statement of Sen. Bentsen).

19. Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1613 (codified as amended at 42 U.S.C. §§ 9601-9675 (1988 & Supp. III 1991)); *see supra* note 6 (providing list of changes).

20. Superfund Amendments and Reauthorization Act § 121 (codified at 42 U.S.C. § 9621).

21. Determining the level of clean up which is sufficient to eliminate unacceptable risks posed by hazardous substances released into the environment (i.e., how clean is "clean"?) is one of the most fundamental and contentious issues that confronts the Superfund Program. The scientific understanding of cause and effect concerning human exposure to hazardous substances and consequent health risks is fraught with uncertainty and widely divergent opinions. The scientific community's understanding of the short and long term impacts posed by hazardous substances on ecosystems is similarly limited and subject to significant differences of opinion. Accordingly, from a scientific standpoint, it is often difficult or impossible to define a level of exposure to a particular hazardous substance that is "safe."

response to its earlier virtual silence on these issues. In enacting CERCLA in 1980, Congress directed the President, through EPA, to respond to releases of hazardous substances into the environment in a manner that protected public health, welfare, and the environment.[22] Beyond this mandate, little guidance was provided in the original version of CERCLA. While filling this void with section 121 of SARA, Congress embedded a fundamental conflict into the foundation of CERCLA's remedy selection process. Remedies selected in accordance with section 121 were required to protect human health and the environment, attain compliance with ARARs, and be both "cost effective" and "permanent" through the use of treatment technologies to the "maximum extent practicable."[23] The conflict inherent in these directives lies in the fact that, at nearly every Superfund site, a remedy that permanently eliminates the risks posed by the hazardous substances through the use of treatment technology will be far more costly than a remedy that reduces risks by containing or limiting human exposure to the hazardous substances.[24]

Moreover, even when there is general consensus from a scientific standpoint about what level of exposure to a hazardous substance is safe, there may often be significant debate over the best means to accomplish clean up to ensure that potential exposures do not exceed such safe levels. This article focuses on the policy issues surrounding the question of how to select the means of clean up at Superfund sites. This article argues that the debate over the best means to protect human health and the environment from releases of hazardous substances was one that Congress was unable to resolve when it enacted SARA. This debate routinely confronts decision makers at specific Superfund sites as they evaluate alternative means of cleaning up hazardous substances at the site.

22. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 § 104(a)(1); *see supra* notes 8-15 and accompanying text.

23. 42 U.S.C. § 9621(b), (d) (1988).

24. For example, the feasibility study completed in October of 1993 for a portion of the Oak Ridge Reservation ("ORR"), owned and operated by the Department of Energy, identified seven alternative remedial actions to address risks to health and the environment posed by mercury-contaminated soils along the east fork of Poplar Creek, which runs through ORR as well as the town of Oak Ridge. SCIENCE APPLICATIONS INT'L CORP., FEASIBILITY STUDY-ENVIRONMENTAL IMPACT STATEMENT FOR THE EAST FORK POPLAR CREEK SEWER LINE BELTWAY, OAK RIDGE, TENNESSEE § 5 (1993) [hereinafter FEASIBILITY STUDY] (on file with author). Six of the seven alternatives were found to protect human health and the environment and comply with identified ARARs (alternatives 2, 3, 4, 5, 6, and 7). Of those six, two (alternatives 4 and 5) would have employed treatment technologies to permanently eliminate risks posed by the mercury. The estimated total costs of these two treatment-oriented remedies were $120 million and $118 million respectively. *Id.* §§ 5.3.4.7, 5.3.5.7. Three of the alternatives (alternatives 2, 3, and 7) would have removed some of the contaminated soils while leaving some contamination in place and restricting access to contaminated soils. The cost of these alternatives was estimated to be $95 million, $93 million, and $59 million respectively. *Id.* §§ 5.3.2.7, 5.3.3.7, 5.3.7.7. Alternative 6 would have left all contamination in place and relied solely

The conflict built into section 121 involves choosing between remedies that are cost effective through the use of containment or controls on access to the site, and remedies that are permanent through the use of treatment technologies that may be very costly. This conflict reflects a deeper conflict that existed within Congress. Unable to settle the disagreement between members worried about the huge potential costs of Superfund remedies and those worried about a perceived "band-aid" approach to remedy selection in the first few years of the Superfund Program, Congress employed language in section 121 that attempted to satisfy both concerns.[25] The result, however, was a remedy selection process guided by contradictory directives that raised more questions than they answered.

A. Clean Up Standards Established by Section 121 of SARA

Section 121 established four basic objectives to guide the selection of remedial actions at Superfund sites. Remedial actions must:

- protect human health and the environment,
- attain applicable or relevant and appropriate requirements,
- be cost effective, and
- utilize permanent solutions, and alternative treatment or resource recovery technologies, to the maximum extent practicable.[26]

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on restricting access to such contamination. The estimated cost of this alternative was $44 million. *Id.* § 5.3.6.7.

The substantial difference in cost between alternative 6 ($44 million), which relied exclusively on restricting access, and alternatives 4 and 5 ($120 and $118 million), which would have treated most or all of the contaminated soil, illustrates how significant the conflict between the statutory preference for treatment and cost effectiveness can be. *Id.* §§ 5.3.6.7, 5.3.4.7, 5.3.5.7.

25. *See infra* notes 32-60 and accompanying text.

26. *See generally* COMMITTEE OF CONFERENCE, 99TH CONG., 2D SESS., JOINT EXPLANATORY STATEMENT OF THE COMMITTEE OF CONFERENCE 243-51 (1986) [hereinafter JOINT EXPLANATORY STATEMENT]. Additionally, a number of conferees identified these four basic requirements in their statements during the House and Senate floor debates on SARA. For example, both Senator Bentsen, ranking minority member of the Senate Environment and Public Works Committee, and Representative Gene Snyder, ranking minority member of the Committee on Public Works and Transportation, identified these four basic requirements in their floor statements. *See* 132 CONG. REC. 28,421 (1986) (statement of Sen. Bentsen); 132 CONG. REC. 29,727 (1986) (statement of Rep. Snyder).

Specifically, section 121(b), which identifies "[g]eneral rules" for selecting remedies, provides that "[t]he President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable."[27]

Subsection (d) of section 121, which establishes the "[d]egree of cleanup" required of remedial actions, reiterates the idea that remedial actions "shall attain a degree of cleanup of hazardous substances . . . and of control of further release at a minimum which assures protection of human health and the environment."[28] In circumstances where any hazardous substance, pollutant, or contaminant will remain onsite, subsection (d) further specifies that remedial actions also must comply with any ARAR. Specifically, such remedial action must require "a level or standard of control for such hazardous substance or pollutant or contaminant which at least attains such legally applicable or relevant and appropriate standard, requirement, criteria, or limitation."[29]

Although section 121 specifies that the use of treatment to reduce the volume, toxicity, or mobility of hazardous substances is a "preference," remedies which do not utilize such treatment may be selected if the President "publish[es] an explanation as to why a remedial action involving such reductions was not selected."[30] In addition, the requirement that any particular ARAR be attained by a remedy may be waived by EPA under enumerated circumstances.[31]

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27. 42 U.S.C. § 9621(b)(1) (1988).

28. *Id.* § 9621(d)(1).

29. *Id.* § 9621(d)(2)(A). This includes any standard, requirement, criteria, or limitation promulgated under a state environmental or facility siting law that is more stringent than any comparable federal standard, requirement, criteria, or limitation. *Id.* § 9621(d)(2)(A)(ii).

30. *Id.* § 9621(b)(1).

31. Section 121(d)(4) enumerates six circumstances, any one of which will warrant a waiver of the requirement to attain a particular ARAR. EPA may select a remedial action that does not attain an ARAR if it finds that: (1) the remedial action is an interim action and that the final remedial action will attain the ARAR; (2) compliance with the ARAR poses a greater risk to human health and the environment than non-compliance; (3) compliance is "technically impracticable from an engineering perspective;" (4) the level of clean up achieved by the remedial action is equivalent to that required by the ARAR; (5) with respect to an ARAR established by a state, the state has not consistently applied the requirement at other sites within the state; and (6) with respect to remedial actions financed by the Fund established by CERCLA, the availability of money in the Fund

The problematic nature of evaluating and selecting remedies that satisfy these statutory directives is obvious when one considers the questions raised by the language of section 121: what constitutes sufficient "protection of public health and the environment," what does "cost effective" mean, and under what circumstances are permanent treatment technologies not "practicable"? In evaluating two alternative remedies, each of which can be shown to protect human health and the environment and attain ARARs, at what point should cost be the determining factor in which alternative is selected? How should the tension between cost and treatment be resolved?

In essence, how may the congressional intent that remedies be "cost effective" be reconciled with its preference for permanent treatment reducing the volume, toxicity, or mobility of hazardous substances to the "maximum extent practicable"? Under what circumstances should a permanent treatment technology be selected if it costs more than another remedy that does not include such treatment? The following section evaluates these questions based on the relevant legislative history.

B. Legislative History

Section 121 resulted from the need to compromise substantially different visions of the requirements and goals that should guide remedy selection. Like many compromises, it succeeded in garnering sufficient support to be enacted into law. It was, however, as one Representative described, "schizophrenic."[32] The personality of section 121, in particular, depended on the perspective of who was reading it. As Representative Norman Lent admitted during the House floor debate on SARA, "this legislation is not a clear congressional directive to those who must implement and abide by the program. Far too often the resolution of complex issues was to be 'fuzzy.'"[33]

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balanced against the need for protection of health and the environment at other sites to be cleaned up, indicates that the Fund should be allocated to address more pressing risks (the so-called Fund balancing waiver). *Id.* § 9621(d)(4)(A)-(F).

32. 132 CONG. REC. 29,725 (1986) (statement of Rep. Snyder).

33. 132 CONG. REC. 29,717 (1986) (statement of Rep. Lent).

1. Joint Explanatory Statement of the Committee of Conference

The explanation of section 121 provided by the congressional managers of the SARA Conference Committee carefully skirted key disagreements among the conferees concerning the issues of treatment and cost in the selection of remedial action.[34] The explanatory language agreed upon by the conferees confirmed that remedies must protect human health and the environment, but it offered little help in resolving the tension built into section 121 between permanent treatment technologies and cost effectiveness. Instead, the conference report merely echoed the statutory language of section 121 that remedies were to be cost effective and utilize permanent treatment technologies to the maximum extent practicable.[35]

The only absolute requirement Congress established for selecting remedial action is that the remedy selected protect public health and the environment. Attaining the degree of clean up established by each ARAR is required to the extent the ARAR defines what is necessary to protect public health and the

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34. *See generally* JOINT EXPLANATORY STATEMENT, *supra* note 26, at 243-51.

35. *Id.* at 245-46. As provided in the conference report:

> Under this new section [121], remedial actions must assure protection of human health and the environment, and must be in accordance with this new section, in accordance with the NCP, to the extent practicable, and cost effective taking into account the short- and long-term costs including operation and maintenance.
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> The provision that actions under both sections 104 and 106 must be cost-effective is a recognition of EPA's existing policy as embodied in the National Contingency Plan. The term *"cost-effective" means* that in determining the appropriate level of cleanup the President *first determines the appropriate level of environmental and health protection* to be achieved and *then selects a cost-efficient means of achieving that goal.* Only after the President determines, by the selection of applicable or relevant and appropriate requirements, that adequate protection of human health and the environment will be achieved, is it appropriate to consider cost effectiveness.
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> Remedial actions involving permanent treatment are preferred over those not involving such treatment, and off-site transport and disposal without such treatment is the least favored alternative. The President must assess the long-term effectiveness of various alternatives, including permanent solutions and alternative treatment technologies, taking into account specified factors, and must select remedial actions that utilize permanent solutions and alternative treatment technologies to the *maximum extent practicable.* If the President does not select such a remedial action, the President must publish an explanation.

Id. (emphasis added).

environment[36] or to the extent that it is not subject to one of the six ARAR waivers specified in section 121.[37] Only when these thresholds are achieved may a proposed remedy be selected.

The conference report does not specify the manner in which the objectives of section 121 are to be evaluated or satisfied after a range of alternative remedies, which protect health and the environment and comply with all identified ARARs, has been selected. The conference report specifies that remedies are to be cost effective, provided they are fully protective of public health and the environment, and that remedies shall utilize permanent treatment technology to the maximum extent practicable.[38] This is consistent with the language of section 121(b). The question raised is whether and to what degree the cost of a treatment technology will answer the question of whether such technology is "practicable."

2. Floor Debate

The floor debate on the legislation offered by the SARA Conference Committee reveals that members of Congress answered this question very differently. A group of conferees, perhaps best represented by Senator George Mitchell (D-ME), shared the view that cost should not be a factor in determining the practicability of using permanent treatment technologies.[39] A second group, represented most forcefully by Representative

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36. Defining what constitutes "protection of public health and the environment" and determining whether a particular remedy actually will achieve that objective are by no means straightforward problems. Wrestling with these issues is beyond the scope of this article. *See supra* notes 5, 8.

37. 42 U.S.C. § 9621(d)(4) (1988).

38. *See supra* note 35 and accompanying text.

39. The views of Senator Mitchell on the meaning and intent of § 121 appear to have been shared by a number of other conferees, as reflected by their floor statements on § 121. In fact, portions of Senator Mitchell's remarks were reiterated in the Congressional Record verbatim or in slightly abridged form by Senator John Chafee and Representatives Gerry Studds and Robert Roe. *Compare* 132 CONG. REC. 28,425 (1986) (remarks of Sen. Mitchell on the role of cost in selecting remedies and the use of water quality criteria as ARARs) *with* 132 CONG. REC. 28,437 (1986) (remarks of Sen. Chafee on the role of cost in selecting remedies) *and* 132 CONG. REC. 29,750 (1986) (remarks of Rep. Studds on the role of cost in selecting remedies); *compare* 132 CONG. REC. 28,427 (1986) (remarks of Sen. Mitchell on the use of water quality criteria as ARARs) *with* 132 CONG. REC. 29,754, 29,741 (1986) (remarks of Rep. Roe and Rep. Florio on the use of water quality criteria as ARARs).

Lent (R-NY), felt just the opposite.[40]

In his floor speech to the Senate, which explained his view of the meaning and intent of section 121, Senator Mitchell set the stage for the debate on the fundamental disagreement among conferees concerning the roles of cost effectiveness and the preference for treatment in the selection of remedial action. He stated that

> [a]n analysis of cost effectiveness begins only *after a remedial action has been selected* in compliance with the health and environmental protection requirements, permanent treatment requirements, and other standards, requirements, criteria or limitations imposed under the law. The cost effectiveness requirement here, as under current law, *does not apply to the selection of a remedial action* but rather applies to choosing the least costly alternative method of effectively implementing a remedial action once one has been selected. For example, the selection of a remedial action might involve a choice between various onsite containment alternatives and a permanent treatment technology. Under section 121(b), permanent treatment technologies must be chosen whenever they are *feasible and achievable*. . . .
>
> Once the remedy has been selected, the *cost-effectiveness requirement is applied to its implementation.* Implementation of the remedy would involve *choosing the least costly method and contractors* which will effectively carry out these alternatives.[41]

Senator Chafee (R-RI), in his remarks during the floor debate, echoed Senator Mitchell's views and carried them a step further.

> Permanent treatment technologies must be chosen whenever they are feasible and achievable. That is a *separate requirement that must be met before the cost*

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40. Included in this group, as reflected by the statements made in the floor debate on SARA, were Senator Bentsen and Representative Snyder. *Compare* 132 CONG. REC. 29,719 (1986) (remarks of Rep. Lent on importance of cost effectiveness criterion) *with* 132 CONG. REC. 28,422 (1986) (remarks of Sen. Bentsen) *and* 132 CONG. REC. 29,727 (1986) (remarks of Rep. Snyder).

41. 132 CONG. REC. 28,425 (1986) (statement of Sen. Mitchell) (emphasis added).

> *effectiveness test is applied.* Otherwise, remedies such as a cap over the site and a slurry wall to prevent further leakage would always be selected as a cheaper alternative. Such a result, and a decisionmaking process that produces such a result, would be contrary to the clear intent of Congress and illegal.
>
> . . . .
>
> The extent to which a particular technology or solution is feasible or *practicable is not a function of cost.*[42]

Senator Mitchell also articulated his views concerning what was required to meet the preference of section 121(b) for "permanent treatment" or "alternative treatment technologies." In his view, the preference for such technologies meant that preferred remedies should achieve "the minimization of volume, toxicity and mobility of [hazardous] substances to the *lowest levels achievable* with available technologies."[43] Toward that end, section 121(c) established a mandatory duty for the President to review at least every five years any remedy that did not result in a permanent solution.[44] The purpose of such review, according to Senator Mitchell, is twofold: 1) to determine whether the remedial action is sufficient to protect human health and the environment; and 2)

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42. 132 CONG. REC. 28,437 (1986) (statement of Sen. Chafee) (emphasis added).

43. 132 CONG. REC. 28,425 (1986) (statement of Sen. Mitchell) (emphasis added). Senator Mitchell also identified several requirements in § 121 that were included to ensure that the long-term costs of remedies utilizing containment, instead of treatment, were factored into the assessment of a remedy's costs. Specifically, § 121(b)(1)(A)-(G) requires that an assessment of alternative remedial actions consider the costs associated with the following:

(A) "the long-term uncertainties associated with land disposal;"

(B) the objectives and requirements of RCRA;

(C) "the persistence, toxicity, mobility," bioaccumulation propensity of certain hazardous substances;

(D) "short- and long-term potential for adverse health effects from human exposure;"

(E) the "long-term maintenance costs" necessary to monitor containment remedies;

(F) the potential for additional remedial action costs required when containment remedies fail; and

(G) "the potential threat to human health and the environment associated with the excavation, transportation, and redisposal, or containment." 42 U.S.C. § 9621(b)(1)(A)-(G) (1988).

Each of these factors represents an attempt to require the quantification and inclusion of potential future costs of containment strategies in the remedy selection decision. As reflected by Senator Mitchell's remarks, these factors were included in § 121 to tip the cost effectiveness balance in favor of permanent treatment remedies, which generally are immune from these costs.

44. 42 U.S.C. § 9621(c).

to determine whether the remedial action could be upgraded to take advantage of developments in technology.[45]

Representatives Lent and Snyder had a very different understanding of the intent of section 121. Describing Senator Chafee's argument, that the practicability of a remedy was not a function of cost, as a "very important error,"[46] Representative Lent argued:

> This statement has two fundamental flaws. First it defines the word "practicable" in a way that has not been agreed to by the conferees. It is our intent that the Administrator take into account several factors in determining whether a solution is practicable, including technical feasibility, cost, State and public acceptance of the remedy, and other appropriate criteria.[47]

According to Representative Lent, section 121 required that "four basic requirements must be met . . . . First, protect public health and the environment; second, be cost effective; third, use permanent solutions or alternative treatment technologies to the maximum extent practicable; and fourth meet applicable or relevant and appropriate standards under Federal or State environmental law."[48]

Under this view, protection of health and the environment and cost were essentially equal components of the same threshold requirement. The use of permanent technologies and attainment of ARARs were accorded somewhat lesser weight. As Representative Lent stated: "The most important *standard* in section 121 requires the Administrator to *select cost-effective remedies that*

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45. 132 CONG. REC. 28,426 (1986) (statement of Sen. Mitchell). In Senator Mitchell's words:

> The periodic review provision is intended to assure that Superfund cleanups keep pace with developing technologies and that remedial actions are *upgraded to take advantage of such developing technologies*. It is another technology-forcing provision. The *ultimate goal of the Superfund Program must be to implement permanent solution* [sic] at all national priorities list sites. One way to accomplish this goal is to require periodic review and to assure that sites are not removed from the ambit of the program until such permanent solutions have been implemented.

Id. (emphasis added).

46. 132 CONG. REC. 29,718 (1986) (statement of Rep. Lent).

47. *Id.* (statement of Rep. Lent).

48. *Id.* at 29,719 (1986) (statement of Rep. Lent).

protect the public health and the environment. . . . The Administrator must select the *most cost-effective* remedy that achieves this level of protection."[49]

A third view of these issues emerged during the floor debate through the statements of Representatives Al Swift and Dennis Eckart. In some respects, this third interpretation adopted the views of Representative Lent. In other respects, however, those views were rejected and the perspective of Senator Mitchell was supported. In a colloquy during the House floor debate, Representatives Swift and Eckart first argued that the preference for permanent remedies did not require remedies to attain the "lowest levels achievable with available technology."[50] Second, they rejected the contention of Senators Mitchell and Chafee that the determination of whether a permanent treatment technology was "practicable" centered solely on its technical feasibility.[51]

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49. *Id.* (statement of Rep. Lent) (emphasis added). Representative Lent went on to recognize: "This section, however, further requires the use of permanent and alternative treatment technologies or resource recovery technologies to the maximum extent practicable." *Id.* But according to Representative Lent:

> This language and the language in section 121(b) preferring remedial action in which a principal element is treatment which permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances does not require the selection of the *"lowest levels achievable with available technology." Rather, it requires the EPA to carefully consider permanent remedies* and select a permanent solution, to the maximum extent practicable, if it provides for a cost-effective response and *if it protects the public health* and the environment. This does not require the selection of the *"most permanent"* remedy available: it is not intended that EPA spend millions of dollars incinerating vast amounts of slightly contaminated materials where other cost-effective alternatives would provide a high degree of permanence and protection of the public health and the environment. . . .
>
> In other words, although this section establishes strict standards for cleanups, it does not direct the selection of foolish, costly remedies where alternative cost-effective remedies protect the public health and the environment.

Id. at 29,720 (statement of Rep. Lent) (emphasis added).

50. 132 CONG. REC. 29,743 (1986) (statement of Rep. Swift).

51. Representative Swift stated:

> Mr. Speaker, am I correct that the conference agreement requires the President, in selecting a remedial action, to select a cost-effective remedial action that assures protection of human health and the environment, and that permanently solves the problem to the maximum extent practicable. As I understand the statutory language, a permanent treatment or alternative technology is one in which the permanent and significant reduction of the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element. I do not understand the statute to require, as was suggested in the other body, that this means "the minimization of volume, toxicity and mobility of such substances to the lowest levels

Third, Representatives Eckart and Swift rejected Senator Mitchell's contention that the five year review established by section 121(c) required the initiation of a new remedial action in the event a permanent treatment technology had been developed since the selection of the original remedial action.[52] Representatives Eckart and Swift also rejected the Lent position[53] that section 121 granted EPA unconstrained "flexibility" to select a remedy that protected human health and the environment and was cost effective.[54]

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achievable with available technologies," or that such technologies must be chosen whenever they are feasible and achievable. Am I correct?

Id. (statement of Rep. Swift). Representative Eckart responded:

> If the gentleman will yield, you are correct. First of all, the statute refers to the significant reduction of volume, toxicity or mobility—using the disjunctive "or" rather than the conjunctive "and." Second, neither the statute nor the joint statement includes a standard requiring such reductions to the lowest levels achievable with available technologies. *A technology may be available but not be a cost-effective remedial action* under the circumstances, and would therefore be ineligible for consideration under section 121. Finally, neither the statute not the joint statement refer to a standard of "feasible and achievable." The statutory standard agreed upon by the conferees is the utilization of "permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable." *Unlike a "feasible and achievable" standard, this standard requires the consideration of both technical and nontechnical factors.*

Id. (statement of Rep. Eckart) (emphasis added).

52. Representative Swift stated:

> Does that section [121(c)] require the President, as was stated in the other body, to initiate a new remedial action if, as a result of one of these reviews, he determines that a permanent or alternative treatment technology has been developed since the remedial action was first selected, and to implement such technologies wherever possible?

Id. (statement of Rep. Swift). Representative Eckart responded: "No. There is no such requirement in section 121(c) or elsewhere in the Act. The purpose of the 5-year review is to assure that human health and the environment are being protected by the remedial action being implemented." *Id.* (statement of Rep. Eckart).

53. Particularly as expounded by Senator Bentsen and Representative Snyder.

54. For example, Senator Bentsen stated that "this language [expressing a preference for permanent remedies] should not be read to constrain the Administrator's flexibility in selecting a cost-effective remedy appropriate for the specific site." 132 CONG. REC. 28,422 (1986) (statement of Sen. Bentsen). Similarly in the House debate, Representative Snyder stated that "this language should not be read to constrain the Administrator's flexibility in selecting a cost-effective remedy appropriate for the specific site." 132 CONG. REC. 29,727 (1986) (statement of Rep. Snyder).

According to the view of Representatives Eckart and Swift, this interpretation was incorrect. Representative Swift commented:

> It was also stated in the other body that the statutory requirement for permanent solutions should not be read to constrain the Administrator's flexibility in selecting a cost-effective remedy appropriate for the specific site.

On these questions, the views expressed by Representatives Swift and Eckart offer a more accurate reading of the language of section 121 than the views of Senators Mitchell and Chafee. The congressional preference for permanent solutions and alternative treatment technologies expressed in section 121(b) must be read to require the selection of such solutions and technologies *in certain circumstances*. Permanent treatment technologies are only required when "practicable."[55] The explicit requirement of section 121 that remedies be cost effective must be construed to influence what constitutes practicable treatment technology. Senator Chafee's view, in effect, ignores that explicit requirement.[56] Likewise, Representatives Lent and Snyder's argument ignores the section's explicit and detailed explanation of the preference for permanent treatment technologies. While Senators Mitchell and Chafee argued for the most permanent remedy feasible,[57] Representatives Lent and Snyder argued for the most cost effective remedy that was "protective."[58]

None of the legislative history provides a satisfactory resolution to the contradictory views of the Mitchell and Lent camps over the preference for permanent treatment and the requirement that remedies be cost effective.[59] In an attempt to

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> It was my understanding of the conference agreement that it does indeed constrain the Administrator's flexibility, and that the statute *requires the selection of permanent solutions in many cases where we haven't seen such solutions in the past.* Is that a correct understanding?

132 CONG. REC. 29,743 (1986) (statement of Rep. Swift) (emphasis added). Representative Eckart answered:

> That is a correct understanding. As an example of how this statute constrains EPA's flexibility, EPA has in the past been deterred from choosing more permanent remedial actions because the costs of such actions are usually greater than the costs of land disposal. This has sometimes been the case even when long-term costs are considered. The conference agreement requires EPA to consider permanent solutions even though they may be very costly, and makes it clear than [sic] EPA *may not reject a permanent solution just because it may cost more* than land disposal.

Id. (statement of Rep. Eckart) (emphasis added).

55. 42 U.S.C. § 9621(b)(1) (1988).

56. *See supra* note 42 and accompanying text.

57. *See supra* notes 41-43 and accompanying text.

58. *See supra* notes 46-49 and accompanying text.

59. On this point, Representative Eckart argued:

> This preference for remedies incorporating permanent solutions and alternative treatment technologies means that such remedies are presumed to be appropriate cost-effective remedial actions and should be selected to the maximum extent practicable.

explain the evaluation process required by section 121 and the circumstances in which cost effectiveness should outweigh the preference for permanent treatment technologies, Representative Swift offered the following:

> Any remedial action selected by EPA is required under section 121 to be, first and foremost, "protective of human health and the environment . . . ." After identifying alternative remedial actions that achieve this fundamental goal, EPA is required to determine which alternatives are "cost-effective." . . . Finally, choosing from those cost-effective remedial actions that are adequately protective of human health and the environment, EPA must select that cost-effective remedial action that provides the greatest degree of permanency.
>
> EPA has no authority to reject a cost-effective permanent solution just because it is more expensive than another cost-effective action. Frequently, this may mean that the remedial action will require large sums of private party money or even moneys from the Fund; but if the permanent solution is a cost-effective solution, it must be applied. In other words, EPA may never select a non-permanent remedial action where there is a cost-effective permanent solution.[60]

In essence, Representative Swift highlighted the critical conflict between cost effectiveness and permanent treatment remedies, but did not describe how EPA was to determine the circumstances in which a particular remedy that utilized permanent treatment technology was cost effective.

The compromise reached by Congress in 1986 produced a remedy selection process that inevitably results in inconsistent implementation, confusion, and controversy. The primary reasons for this are not difficult to identify. The congressional directives for remedies to be both cost effective and utilize permanent

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> . . . Some have suggested that EPA should evaluate the selection in terms of "overly costly remedies where alternative cost-effective remedies provide comprehensive protection of public health and the environment." Whether it is "overly costly" is not the proper criteria and does not in this Member's opinion represent the intent of the conferees.

132 CONG. REC. 29,778 (1986) (statement of Rep. Eckart).

60. 132 CONG. REC. 29,760 (1986) (statement of Rep. Swift).

treatment technology to the maximum extent practicable sets up a collision course at most Superfund sites. Whether a remedy is "cost effective" and whether a treatment technology is "practicable" often are subjective questions that will be answered differently by individuals and organizations with different perspectives, interests, and objectives. Since most Superfund sites will involve a wide range of stakeholders who bring divergent perspectives to the problem, it is inevitable that what some consider practicable, others will view as cost-prohibitive. Further, remedies that some believe are sufficiently permanent, others will perceive as prescriptions for future problems. Residual contamination which some people feel poses no significant risk to health, others will view with alarm.

Perhaps the only thing made clear by the legislative history concerning the language of section 121 was that there was no consistent intent shared by the conferees. The legislative compromise enacted in section 121 established that remedies should be protective of human health and the environment, cost effective, and utilize permanent treatment technologies to the maximum extent practicable. Some conferees intended for permanent remedies to be selected whenever feasible, irrespective of cost. Others intended that permanent remedies be selected only if they were the most cost effective option. Some probably recognized that the language of section 121 perpetuated the basic conflict inherent in selecting a remedy: how much should the remedy cost? The responsibility to determine how to answer this question was left to EPA.

C. The National Contingency Plan

When EPA revised the NCP[61] in response to the enactment of SARA, its interpretation of section 121 was an issue of major significance. Predictably, EPA's interpretation of the remedy selection factors established in section 121—factors that were subject to widely different interpretations among the members of Congress most responsible for their drafting—was ambiguous at best.

Section 300.430 of the NCP establishes the regulatory parameters for identifying, developing, evaluating, and selecting

61. 40 C.F.R. § 300.430 (1992).

a proposed remedy for cleaning up a CERCLA site.[62] Section 300.430(e) identifies the requirement of a feasibility study ("FS") for developing and evaluating a range of remedial action alternatives.[63] Section 300.430(f) defines the factors to be used in selecting a preferred remedy from among the range of alternatives developed in the FS.[64] Together, these two subsections establish the heart of EPA's regulatory approach to implementing the remedy selection provisions of section 121 of SARA.

In proposing revisions to the NCP in response to the newly enacted section 121, EPA engendered opposition to its proposed approach from

> [t]wo distinct groups of commenters who have sharply contrasting views on the goal of the Superfund [P]rogram .... One group of commenters believes EPA should establish a remedy selection process that adopts as its goal full site restoration and treatment of all material to the extent technically feasible. This approach would limit consideration of cost to the selection of the less expensive of comparably effective treatment technologies. Under this approach, methods of protection that rely on control of exposure (i.e., engineering controls such as capping or other containment systems and institutional controls) could only be used when treatment was technically infeasible. . . .
>
> The other group of commenters critical of the proposed approach believes the Superfund [P]rogram should seek to achieve protection primarily by controlling exposure to current risks through use of engineering and institutional controls. Treatment would be used only if other controls are not expected to be reliable or greater protection can be achieved through treatment without a significant increase in cost.[65]

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62. *Id.*

63. *Id.* § 300.430(e).

64. *Id.* § 300.430(f).

65. 55 Fed. Reg. 8701 (1990). It is interesting to compare this characterization of these "sharply contrasting views" with the floor statements of Senator Chafee and Representative Lent. Senator Chafee stated that "[p]ermanent treatment technologies must be chosen whenever they are feasible and achievable. That is a separate requirement that must be met before the cost effectiveness test is applied. . . . The extent to which a particular technology or solution is feasible or practicable is not a function of cost." 132 CONG. REC.

In other words, the fundamental conflict that characterized the debate in Congress continued in the rulemaking process. EPA's response to these "sharply contrasting views"[66] was an attempt to split the difference in a manner that did not satisfy either group. "The approach EPA promulgates today sets a course for the Superfund [P]rogram between the two ends of the spectrum reflected in these comments. EPA is establishing as its goal remedial actions that protect human health and the environment, that maintain protection over time, and that minimize untreated waste."[67]

In pursuing this middle course, EPA translated the statutory requirements and preferences of section 121 into nine criteria for use in evaluating alternative remedies. Remedial alternatives that survive an initial screening are subject to a detailed comparative and objective assessment.[68] Remedies are evaluated based on the following nine criteria:

1. Overall protection of human health and the environment;
2. Compliance with ARARs;
3. Long-term effectiveness and permanence;
4. Reduction of toxicity, mobility, or volume through treatment;
5. Short-term effectiveness;
6. Implementability;
7. Cost;
8. State acceptance; and
9. Community acceptance.[69]

EPA organized these criteria into three categories. The first two criteria, protectiveness and compliance with ARARs, are "[t]hreshold criteria," which an alternative must satisfy to be

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28,437 (1986) (statement of Sen. Chafee); *see supra* note 42 and accompanying text. Representative Lent replied: "The most important standard in section 121 requires the Administrator to select cost-effective remedies that protect the public health and the environment. . . . The Administrator must select the most cost-effective remedy that achieves this level of protection." 132 CONG. REC. 29,719 (1986) (statement of Rep. Lent); *see supra* note 49 and accompanying text.

66. 55 Fed. Reg. 8701.

67. *Id.* Compare this goal to that expressed by Senator Mitchell in his remarks in the SARA floor debate: "The ultimate goal of the Superfund Program must be to implement permanent solution [sic] at all national priorities list sites." 132 CONG. REC. 28,426 (1986) (statement of Sen. Mitchell); *see supra* note 45 and accompanying text.

68. 40 C.F.R. § 300.430(e)(9).

69. *Id.* § 300.430(e)(9)(iii)(A)-(I).

eligible for selection.[70] The next five criteria are "[p]rimary balancing criteria."[71] The final two criteria, state and community acceptance, are "[m]odifying criteria."[72] As EPA explained in the preamble to the final rule, which revised the NCP following the enactment of SARA:

> The various criteria have been categorized according to their functions in the remedy selection process as threshold, balancing and modifying criteria. This designation demonstrates that protection of human health and the environment will not be compromised by other factors, including cost. Revisions also clarify that trade-offs among alternatives with respect to the long-term effectiveness and permanence they afford and the reductions in toxicity, mobility, or volume they achieve through treatment are the most important considerations *in the balancing step by which the remedy is selected.*[73]

These criteria reflect the clear statutory mandates that remedies "protect" health and the environment and attain compliance with ARARs. In an attempt to address the contradiction between the preference for treatment and the requirement of cost effectiveness, EPA expanded these two conflicting statutory objectives into five "balancing" criteria by which remedial alternatives are assessed. Finally, EPA determined that state and community acceptance of a proposed remedy are the least significant of the relevant criteria used to select a remedy.

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70. *Id.* § 300.430(f)(1)(i)(A).

71. *Id.* § 300.430(f)(1)(i)(B). These "criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost." *Id.*

72. *Id.* § 300.430(f)(1)(i)(C). The NCP's treatment of state and community acceptance as modifying criteria lies at the heart of the remedy selection problem. After significant time and resources have been spent developing a proposed remedy, the role of attempting to modify that proposal is far too limited to provide for effective citizen input. Other provisions for identifying and incorporating public input in remedy selection, including §§ 117, 120(f), 121(f), 122(d)(2), are similarly limited. In short, the opportunity for public involvement in the remedy selection process is "too little, too late." This argument is discussed in greater depth in section III. *See infra* notes 99-137 and accompanying text.

73. 55 Fed. Reg. 8702 (emphasis added).

1. Defining "Cost" and "Practicability"—Balancing Competing Objectives

Evaluating whether alternative remedies are protective of health and the environment and comply with all ARARs is not a simple or straightforward proposition.[74] Moreover, since eliminating risks to health and the environment is the overarching purpose of CERCLA,[75] determining whether a remedy achieves this protection and compliance with ARARs is of fundamental importance. To a large degree, however, determining whether alternative remedies are "cost effective" and which alternatives use permanent treatment technologies to the "maximum extent practicable" are more significant issues in terms of selecting the ultimate remedy.[76] In promulgating the NCP, EPA acknowledged the significance of cost effectiveness and practicability in the remedy selection equation when it recognized that, "in most cases, there will not be one level or standard—e.g., one contaminant-specific ARAR—that defines protectiveness, but rather, there will be a range of protective, ARAR-compliant alternatives eligible for selection that vary in their costs and effectiveness."[77] In such circumstances, defining cost effectiveness and the practicability of permanent treatment technologies will determine the remedy selected from the range of protective remedies identified.[78]

In order to give meaning to the dueling mandates of section 121, cost effectiveness and use of permanent treatment technolo-

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74. The complexity of these issues makes it impossible to address them within the scope of this article. *See supra* note 5 and accompanying text; *see also* OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROTECTION AGENCY, GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA (1988) (discussing the specific process and requirements established by EPA concerning the evaluation of remedial action alternatives with respect to protection of health and the environment and attainment of ARARs).

75. 42 U.S.C. § 9621(b) (1988); *see supra* notes 21-23 and accompanying text.

76. *See* 42 U.S.C. § 9621(b). An alternative must satisfy the "threshold criteria" of protection of human health and the environment and attainment of ARARs to remain a viable candidate following the initial screening of remedial action alternatives. *See* 40 C.F.R. § 300.430(f)(1)(i)(A). Accordingly, only alternatives which protect human health and attain ARARs are considered in the comparative assessment of remedial action alternatives required by the NCP for selecting a remedy. The critical issue, therefore, is by what *means* protection of health and attainment of ARARs will be achieved. For this issue, the NCP identifies five "balancing criteria." Of these criteria, cost effectiveness and use of treatment technologies are the key factors. *See supra* note 73 and accompanying text.

77. 55 Fed. Reg. 8727 (1990).

78. *See supra* note 76 and accompanying text.

gies, the NCP establishes a process to "balance" the strengths and weaknesses of alternative remedies when assessed against these competing considerations.[79] This balancing act features the five "balancing criteria" selected by EPA for evaluating alternative remedies:

1. Long-term effectiveness and permanence;
2. Reduction of toxicity, mobility, or volume through treatment;
3. Short-term effectiveness;
4. Implementability; and
5. Cost.[80]

Utilizing these balancing criteria, the NCP establishes a two-step process by which the "lead agency"[81] first identifies the preferred alternative and then selects a final remedy.[82] After meeting the statutory requirements that remedies be protective of health and the environment and comply with ARARs, the NCP provides that any remedy selected "shall be cost-effective,"[83] and "shall utilize permanent solutions and alternative treatment technologies . . . to the maximum extent practicable."[84]

To determine whether a remedy is cost effective, the NCP instructs:

> *Cost-effectiveness is determined by evaluating* the following three of the five balancing criteria . . . to determine *overall effectiveness*: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. *Overall effectiveness is then compared to cost* to ensure that the remedy is cost-effective. A remedy shall be cost-effective if its

79. 40 C.F.R. § 300.430(f)(1)(ii)(E).

80. *Id.* § 300.430(f)(1)(i)(B).

81. *Id.* § 300.5. The lead agency is usually, but not necessarily, EPA. The NCP identifies the lead agency as the agency from which the on-scene coordinator or remedial project manager, responsible for planning and implementing the remedy, will be selected. The NCP provides that the lead agency may be EPA, U.S. Coast Guard, another federal agency, or a state. The state would operate pursuant to a cooperative agreement or memorandum of agreement as authorized by CERCLA and the NCP. *Id.*

82. *Id.* § 300.430(f)(1)(ii).

83. *Id.* § 300.430(f)(1)(ii)(D).

84. *Id.* § 300.430(f)(1)(ii)(E).

> *costs are proportional to its overall effectiveness.*[85]

In essence, the NCP offers a tautology to define cost effectiveness. A remedy is effective if, overall, it is effective, based on its long- and short-term effectiveness and the reduction of hazards posed by the hazardous substances. Further, the remedy is cost effective if its costs and effectiveness are "proportional."

The NCP defines a process for determining the maximum extent to which permanent treatment technologies are practicable that is similarly circular and ambiguous. The remedy will be found to utilize such treatment technologies to the maximum extent practicable if it

> provides the *best balance of trade-offs among alternatives* in terms of the five primary balancing criteria . . . . The balancing shall *emphasize* long-term effectiveness and reduction of toxicity, mobility, or volume through treatment. The balancing shall also *consider* the preference for treatment as a principal element and the bias against off-site land disposal of untreated waste.[86]

Thus, pursuant to the NCP, a treatment technology, or remedy which employs such a technology, may be found *impracticable* if the "trade-offs" that arise from a consideration of the five balancing criteria are "worse" than those that arise from another remedy. Conversely, if the trade offs seem "better" than those trade offs posed by other remedial alternatives, a remedy that utilizes a permanent treatment technology may be determined to be practicable. Since the NCP requires that two of the balancing criteria be weighed in the balance initially, as well as given additional emphasis and consideration, remedies that incorporate treatment technologies may be more likely to be considered practicable.[87]

In addressing the issues of cost and practicability in the preamble to the NCP, EPA rejected competing suggestions from commenters that these factors be given threshold criteria weight

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85. *Id.* § 300.430(f)(1)(ii)(D) (emphasis added).

86. *Id.* § 300.430(f)(1)(ii)(E) (emphasis added).

87. *Id.* These two balancing criteria are: 1) long-term effectiveness and permanence; and 2) treatment. *Id.*

along with protectiveness and attainment of ARARs.[88] One commenter, in particular,

> argued that since the concepts of protection of human health and the environment, cost-effectiveness, and the preference for permanent . . . treatment technologies . . . are specifically grouped together by Congress [in section 121(b)(1)], these criteria should be balanced with each other in the same context in the remedy selection process of the NCP. The commenter urged elimination of the distinctions between the threshold and primary balancing criteria.[89]

EPA rejected this argument that the requirement to utilize permanent treatment technologies to the maximum extent practicable should be considered as a threshold evaluation criterion "because this mandate represents a conclusion reached about a remedy on the basis of several evaluation factors."[90] Likewise, EPA rejected the suggestion that cost effectiveness be elevated to the level of a threshold criteria.[91]

The preamble of the NCP offers very little insight into the tension between cost effectiveness and the practicability of using permanent treatment technologies. To clarify the proper analysis of the trade offs between, and weight to be given to, cost effectiveness and utilization of treatment technologies, the preamble states:

> Cost is considered in determining cost-effectiveness to decide which options offer a *reasonable value for the money* in light of the results they achieve. Cost differences must also be considered in the context of all other differences between alternatives to reach a conclusion as

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88. 55 Fed. Reg. 8729.

89. *Id.*

90. *Id.* at 8729-30. It is not clear why this disqualifies the treatment mandate from being a threshold criteria since the same flaw can be attributed to the mandate to protect public health.

91. *Id.* at 8728. The support for this conclusion is stronger since Congress explicitly endorsed the approach to cost effectiveness used by EPA in the 1985 NCP, which provided that cost be considered in selecting from among remedies that have already been found to protect health and the environment. *See* H.R. REP. NO. 962, 99th Cong., 2d Sess. 245 (1986); *see also* 55 Fed. Reg. 8726-30 (discussing the issue of cost in remedy selection).

> to *which alternative, all things considered, provides the most appropriate solutions* for the site or site problem. It is *this judgment that determines* the maximum extent to which permanent solutions and treatment are practicable for the site or site problem being addressed. Criteria other than cost that are also used to make both findings are long-term effectiveness and permanence, reduction in toxicity, mobility or volume through treatment, and short-term effectiveness. However, the determination of "practicability" also takes into account the implementability of the remedy and state and community acceptance.[92]

The ambiguous, and inherently subjective balancing process prescribed by the NCP stems directly from Congress's ambiguous, inherently subjective, and often conflicting mandates directing the selection of CERCLA remedies.[93] The result is a remedy selection process that does not lend itself to predictability or consistency, and often does not provide a clear rationale for the remedy ultimately selected. In many circumstances, two alternatives, one that employs permanent treatment technologies and one that employs containment barriers, can be shown to protect public health and the environment and attain ARARs.[94] As acknowledged by EPA:

> the NCP requires the development of alternatives that represent *distinct strategies* for cleaning up the site or site problem. These alternatives will achieve protection of human health and the environment through different methods (e.g., treatment, containment) or combinations of methods and will often involve different ARARs, particularly action-specific requirements. . . . Different methods of protection typically will vary in their costs and effectiveness (e.g., treatment residuals, short-term impacts). Where costs and effectiveness vary among protective and ARAR-compliant alternatives, it is necessary to evaluate the relationship of costs to effectiveness within and across alternatives to identify which options

92. 55 Fed. Reg. 8729 (emphasis added).

93. *See supra* notes 32-60 and accompanying text.

94. *See supra* note 77 and accompanying text.

afford overall effectiveness proportional to their costs.[95]

Using the balancing process established in section 300.430(f) will not necessarily produce a preferred remedy upon which all affected interests will agree. As a result, the remedy selection process often is highly contentious, drawn out, and ultimately unsatisfactory from the standpoint of some or all of the parties that hold a stake in the outcome.

The issues raised and decisions required by section 121 may often be as subjective and value-driven as they are objective and technical in nature. Determining whether a proposed remedy is sufficiently protective of human health and the environment is not purely a question of science. Likewise, determining how best to attain ARARs, or even defining those requirements, is often not a straightforward process. Even more difficult and subjective is the evaluation of the extent to which permanent treatment technologies are practicable or cost effective. Each of these statutory mandates requires judgments and evaluations that go well beyond the application of technical and scientific expertise.

Nevertheless, those were the mandates and issues with which EPA was confronted following the enactment of SARA. In the revisions to the NCP that incorporate SARA's changes, the subjective, value-laden judgments required by section 121 are obvious. For example, EPA acknowledged that in selecting remedies it attempts to identify the "best balance of trade-offs" among alternatives to identify a remedy that provides "reasonable value for the money" and that provides the "most appropriate" solution for the site.[96] In recent issue papers developed by EPA on the remedy selection process, EPA is considering defining the current process in these terms:

> Because CERCLA does not specify "how clean is clean," EPA makes two critical decisions regarding "how clean is clean" site-specifically. The first question is how much of the waste will be treated and how much contained, which determines how much of the site is *available for productive uses* and how much must be retained for managing waste. The second question is what cleanup level can be achieved, and consequently, *what*

95. 55 Fed. Reg. 8727-28 (footnote omitted).

96. *See supra* notes 73, 76, 86-87, 92, 95 and accompanying text.

> *are the productive uses* that are available for the portion of the site that can be returned to productive use.
>
> . . . As these considerations vary from site to site (and from State to State), the Agency must be flexible in determining what constitutes "clean." This flexibility has given rise to a continuum of different degrees of "permanence" and "cleanliness" to account for these variations.[97]

"The point along this continuum appropriate for any particular situation is made on a site-specific basis."[98]

For the CERCLA remedy selection process to produce results that are better understood and that achieve greater acceptance among stakeholders, EPA or another lead agency should not be expected to balance the many ambiguous and subjective criteria inherent to remedy selection. Instead, a different approach should be developed that more effectively allows those whose interests are at stake to weigh the trade offs and strike the balance among competing objectives.

III. PROPOSAL FOR CHANGE

In 1986, Congress thought it had provided EPA with the guidance and directives for selecting remedies under CERCLA necessary to ensure consistent and effective clean up of releases

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97. U.S. ENVTL. PROTECTION AGENCY, HOW CLEAN IS CLEAN: REMEDIATION GOALS FOR THE SUPERFUND PROGRAM 1 (1993) [hereinafter HOW CLEAN IS CLEAN] (emphasis added) (on file with author).

98. U.S. ENVTL. PROTECTION AGENCY, SUPERFUND REMEDY SELECTION: AN INTRODUCTION 3 (1993) (emphasis added). This material is taken from two issue papers, entitled *How Clean is Clean: Remediation Goals for the Superfund Process* and *Superfund Remedy Selection: An Introduction*, distributed by EPA to the CERCLA Reauthorization Subcommittee of the National Advisory Committee on Environmental Policy and Technology ("NACEPT"), at the sub-committee's meeting in Arlington, Virginia on July 19-20, 1993. At the same NACEPT sub-committee meeting, EPA also distributed issue papers on clean up levels, ARARs, the preference for treatment, and cost. *See generally* U.S. ENVTL. PROTECTION AGENCY, SETTING CLEANUP LEVELS: GENERIC STANDARDS VERSUS SITE-SPECIFIC DECISION-MAKING (1993) [hereinafter SETTING CLEANUP LEVELS]; U.S. ENVTL. PROTECTION AGENCY, APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (1993); U.S. ENVTL. PROTECTION AGENCY, TREATMENT AND PERMANENCE (1993); U.S. ENVTL. PROTECTION AGENCY, THE ROLE OF COST IN REMEDY SELECTION (1993) (on file with author). Each of these issue papers was prepared by EPA for discussion purposes only and may not be cited as representing the position of EPA on any matter. Nevertheless, they provide an instructive indication of EPA staff's thinking on these issues as of July 1993, and are referenced in this article for such purpose.

of hazardous substances. Instead, the process by which SARA was enacted, and the language of section 121 which resulted from that process, demonstrate that the selection of remedies usually is a contentious and difficult decision.[99] While Congress added significant guidance and structure to the remedy selection process in 1986, section 121 also raised but failed to answer these three questions:

- What constitutes sufficient "protection of public health and the environment"?
- What does "cost-effective" mean?
- Under what circumstances are permanent treatment technologies not "practicable"?

The proposal described below does not definitively answer these questions. Instead, the proposal argues that a more focused and inclusive remedy selection process should be adopted so that these questions are answered primarily by affected stakeholders at each site, rather than the federal government. The approach described below is based on four basic premises:

1. The remedy selection process should focus more effectively on achieving CERCLA's programmatic objectives.
2. To achieve CERCLA's programmatic objectives, these objectives must be translated at each site into specific clean up objectives.
3. Site-specific clean up objectives must be based more explicitly on achieving defined future uses for the site.
4. Determining such future uses and developing clean up objectives from them should be done by key stakeholders at the site, not EPA.

A. The Remedy Selection Process Should Focus More Effectively on Achieving CERCLA's Programmatic Objectives.

An essential first step in selecting the remedy for a site is asking and answering the question: Why do we want to clean up the site? Thus, before a remedy can be chosen, the reasons for

99. *See supra* notes 32-60 and accompanying text.

cleaning up the site must be defined. While the sensibility of this approach seems obvious, it is a point that can be lost in the evaluation of the various statutory requirements, preferences, goals, regulatory criteria and objectives, and real world arguments that often dominate remedy selection.

The programmatic objectives of CERCLA remedial action may be defined in general terms as three-fold:

- protect human health,
- protect the environment, and
- restore the site to productive future uses.[100]

The real purpose of selecting a remedy at a CERCLA site is not to evaluate the different levels of "permanence" provided, nor the technology used by a remedy, nor the different levels of cost effectiveness of alternative remedies. Instead, the real purpose is to identify, select, and implement a remedy that will achieve these fundamental programmatic objectives. In other words, remedies should be evaluated initially on the basis of what they will accomplish, rather than on the basis of the cost or the type of technology used.[101]

This means that the issues of whether to utilize a treatment or a containment strategy and the relative costs of each, although relevant considerations in selecting remedies, should not be used as the principal criteria by which a remedy is selected.[102] This is because the purpose of the remedy is not to employ a treatment technology over containment or control costs, but to protect human health, protect the environment, and enable the site to be used for a beneficial purpose after clean up.

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100. *See* Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 (1988 & Supp. III 1991). Sections 104 and 121 embody these overarching programmatic objectives most succinctly. *Id.* §§ 9604, 9621. In addition to these values, compensating for damages to natural resources held in trust for the public can be identified as another programmatic goal of CERCLA. *See, e.g., id.* § 9607 (liability provisions). But recovery for natural resource damages is not an objective tied directly to remedy selection.

101. *See supra* notes 35, 41-42, 60, 70, 76 and accompanying text.

102. *See supra* notes 26, 27, 35, 46-49, 69, 73, 76, 82-87 and accompanying text; *see also supra* note 101 and accompanying text.

B. To Achieve CERCLA's Programmatic Objectives, These Objectives Must Be Translated at Each Site into Specific Clean Up Objectives.

The programmatic objectives of CERCLA—protecting human health, protecting the environment, and restoring sites to productive use—are meaningless until they are translated into specific terms by the circumstances at each specific CERCLA site. To achieve these programmatic objectives at each site, they must be defined by the conditions present at the site.[103]

For example, the level of clean up required to protect human health depends on several variables, most of which are site-specific. In very simple terms, the risks to health posed by a hazardous substance fluctuate based on three variables: the type of hazardous substance, the amount or concentration of the hazardous substance present, and the exposure of an individual to that hazardous substance.[104] For any given hazardous substance, decreasing the level of human exposure to the substance will decrease the potential health risk posed.[105] Similarly, with obvious exceptions, decreasing the concentration or amount of the substance present at the site will decrease the risk posed to health.[106] To protect human health, therefore, a remedy can reduce the concentration of the hazardous substance at the site, reduce the potential for human exposure to the hazardous

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103. *See supra* notes 96-98 and accompanying text. The development of distinct clean up strategies is driven primarily by the specific conditions present at each specific site.

104. The proposition that risk to health posed by a hazardous substance will vary based on the toxicity and amount of the substance and the potential for exposure to the chemical permeates EPA's approach to evaluating risks and selecting remedies at Superfund sites. *See generally* 55 Fed. Reg. 8700-35 (1990). In particular, the program "expectations" adopted by EPA to guide the evaluation and adoption of remedies reflect this basic approach. 40 C.F.R. § 300.430(a)(1)(iii) (1992). For example, these program expectations recognize that treatment is most appropriate for hazardous substances that are "highly toxic," present in high concentrations, or are "highly mobile," because these types of substances pose a greater risk, in general, than hazardous substances that do not meet any of these criteria. *Id.* § 300.430(a)(1)(iii)(A), (C). Similarly, the program expectations recognize the value and appropriateness in certain circumstances of using "institutional controls," which prevent or limit exposure to hazardous substances. This is based on the notion that effectively reducing exposure to a hazardous substance will effectively reduce the risk to health posed by the substance. *Id.* § 300.430(a)(1)(iii)(D).

105. *See generally* 40 C.F.R. § 300.430(a)(1).

106. *See generally id.*

substance, or achieve some combination of the two.[107]

The opportunity and feasibility of reducing the level of a hazardous substance, or the potential for exposure to it, depend inevitably on conditions at the site. For example, if the site is located in the heart of a residential community, limiting access to the site may not be desirable or even feasible. Similarly, if the hazardous substance has contaminated groundwater that is an essential drinking water source, limiting exposure to the contaminated water may be unrealistic. Under such conditions, reducing or eliminating the level of the hazardous substance in the environment may be the only means of protecting human health. Conversely, if the release of hazardous substances at the site does not pose any risk of contaminating drinking water supplies or reaching other pathways of human exposure, then human health may be protected by a remedy that leaves much higher amounts of hazardous substances in the environment at the site. In many cases, potential human exposure levels may be controlled but not eliminated, and the level of contaminant that can safely remain at the site will vary as the level of potential exposure increases or decreases.[108]

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107. *Id.* In particular, the NCP provides:

> EPA expects to use a combination of methods, as appropriate, to achieve protection of human health and the environment. In appropriate site situations, treatment of the principal threats posed by a site, with priority placed on treating waste that is liquid, highly toxic or highly mobile, will be combined with engineering controls (such as containment) and institutional controls, as appropriate, for treatment residuals and untreated waste.

Id. § 300.430(a)(1)(iii)(C).

108. *See generally* GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA, *supra* note 74, at 4-1 to 5-1 (discussing the process by which remedial action alternatives are developed and analyzed). Chapter four discusses in detail the means by which alternative remedial actions that utilize containment, treatment, institutional controls, and other actions, alone or in combination, should be identified and developed. *Id.* The range of alternatives developed by this process reflects the principle that protection can be achieved in different ways that vary based on the degree of treatment used or, conversely, containment or restrictions on exposure employed. *Id.* For example, with respect to controlling sources of hazardous substances, the following types of alternatives should be developed to the extent practicable:

- A number of treatment alternatives ranging from one that would eliminate or minimize to the extent feasible the need for long-term management . . . . Alternatives within this range typically will differ in the type and extent of treatment used . . . .
- One or more alternatives that involve containment of waste with little or no treatment but protect human health and the environment by preventing potential exposure and/or reducing the mobility of contaminants.

Id. at 4-7 (footnote omitted).

Similarly, what constitutes protection of the environment will depend on the nature of the hazardous substances present, the type and sensitivities of potentially impacted ecosystems, and the cumulative impacts arising from other sources of contaminants in the vicinity. A remedy that fully protects the environment at one site may fall woefully short of that goal at another site, based on the particular circumstances and conditions present at each site.[109]

Finally, the extent to which a remedy will restore the site to a beneficial use obviously depends on the range of potential future uses for the site.[110] Potential future uses will be impacted by the nature and extent of contamination at the site; the past and current uses of the site; current and anticipated uses of surrounding properties; the economic development and land use planning objectives of the community; and the goals of the site owner, neighboring property owners, community residents, state and local government representatives, and other parties with a stake in the clean up of the contaminated site.[111]

In each instance, determining whether a remedy will accomplish the broader, programmatic objectives of CERCLA can only be done after those programmatic objectives are translated into specific clean up objectives using relevant site-specific factors.[112] Moreover, in each instance, the foundation for defin-

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109. *Id.* at 4-7; *see supra* notes 103-07 and accompanying text; *see generally* 55 Fed. Reg. 8700-07.

110. Potential future uses may range from residential, agricultural, or park land to commercial, industrial, or waste management and disposal. A site for which the most beneficial future use is residential use, as opposed to industrial use, will not be restored to such beneficial use by certain remedies that do not allow for the level of exposure that would result from residential use. *See infra* note 121 and accompanying text.

111. *See supra* note 72 and accompanying text; *see infra* note 131 and accompanying text. The chief problem with the opportunities for significant stakeholder involvement under the current process is that such involvement comes after a preferred remedy has been identified.

112. EPA has considered, and PRPs have often urged, the development of generic cleanup standards that would be applied uniformly at sites contaminated by similar substances. *See generally* SETTING CLEANUP LEVELS, *supra* note 98. The goal of such national cleanup standards would be to reduce the time spent debating how to remedy a release of hazardous substances and reduce the prospects for different results at ostensibly similar sites. But this approach should not be adopted to the extent that site-specific factors are neglected. This is not to say that the development and identification of effective technologies, or concentrations of specific contaminants at which a significant health risk is no longer presented, should not be pursued. Rather, the point is that site-specific considerations that impact the risks posed, or reflect legitimate interests of stakeholders, should not be ignored or arbitrarily resolved in the name of speed or uniformity. *See supra*

ing specific clean up objectives lies in making future land use decisions for the site.

C. Site-Specific Clean Up Objectives Must Be Based More Explicitly on Achieving Defined Future Uses for the Site.

The most important factors in determining clean up objectives at a site are the future uses of the site, as well as the uses and values of surrounding properties and natural resources which have been impacted by the release of hazardous substances at the site.[113] Consequently, identifying the likely and potential future use or uses of the site and surrounding properties should be an early and explicitly required component of the remedy selection process. Determining the future uses of the land and natural resources that have been impacted by the release of hazardous substances is an essential step in defining whether a proposed remedy will protect health, protect the environment, and restore the site to a condition that will enable it to be used beneficially.

First, the future uses of the site after clean up should be the most significant factor in determining potential human exposure to residual contamination, and therefore, potential residual risks to human health. The manner in which a site will be used determines, in large measure, the degree of access humans will have to the site.[114] The extent of human access to a site plays

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note 98 and accompanying text.

113. One of the most effective advocates of this argument, that identifying future uses of a site is critical to identifying clear cleanup objectives, has been the non-profit organization Clean Sites, Inc. For example, an analysis conducted by Clean Sites influenced the Air Force to argue that "[t]he future use of land and natural resources is, without question, the clearest way to identify the objective of a contaminated site cleanup. It provides a clear representation of what can be expected from cleanup and how that result can be compared to the current condition of the site." ENVIRONMENTAL RESTORATION PROGRAM, U.S. AIR FORCE, FUTURE USE CONSIDERATIONS IN THE CLEANUP OF AIR FORCE INSTALLATIONS 4-5 (1992) [hereinafter FUTURE USE CONSIDERATIONS].

114. *See, e.g.*, Memorandum from Richard J. Guimond, Assistant Surgeon General, USPHS (Acting Assistant Administrator, Office of Solid Waste and Emergency Response, U.S. EPA), to Director, Waste Management Division of Regions I, IV, V, VII et al. (Apr. 30, 1993) [hereinafter Guimond Memorandum] (on file with author). This memorandum, which sets forth a draft land use directive, is a preliminary draft and may not be cited as representing the position of the EPA on any matter. Nevertheless, it provides an instructive indication of the EPA's thinking on these issues as of 1993, and is referenced in this article for such purpose. As described in this draft land use directive:

> Land use is an important consideration in determining the extent of remediation appropriate for Superfund sites. Land use affects the types of exposure at a site and the frequency at which such exposures are likely to

a major role in defining the level of potential human exposure to hazardous substances that remain following the remedial action.[115] Once a reasonably expected level of access is determined, the exposure variable in the risk assessment equation can be defined. After this exposure variable is defined, the level or concentration of hazardous substances that may safely remain after clean up can be determined. Then, alternative remedies can be evaluated on the basis of their ability to achieve that level or concentration of residual contamination. Remedies that will not achieve the level of clean up necessary for the access expected during the site's future use can be rejected for failing to protect human health. Remedies that will reduce residual contamination to levels sufficient to permit the desired future use will protect human health and then can be evaluated further on the basis of other relevant factors.

The current regulatory approach for determining potential exposure and potential risks fails to require or to consider explicitly a determination about the likely future use of the site following remediation.[116] The NCP specifies that EPA, or the lead agency responsible for clean up, must develop a "baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants . . . . The results of the baseline risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives in the [feasibility study]."[117] The lead agency is required to collect an assortment of data to characterize potential future threats.[118] These data focus on the physical characteristics of the site, the general characteristics of the hazardous substances present, actual or potential exposure pathways, and other site-specific factors.[119] While all of these data are critical to assessing actual and potential future risks,

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occur. The cleanups that result from the Superfund remedy selection process in turn significantly impact the ultimate land and ground water use.

Id. at 1.

115. *Id.*

116. *See* 40 C.F.R. § 300.430(d) (1992).

117. *Id.* § 300.430(d)(4).

118. *Id.* § 300.430(d)(1), (2).

119. *Id.* § 300.430(d)(2). For example, data required by a baseline risk assessment include information on soils, geology, hydrogeology, characteristics of the air, surface water, and groundwater, as well as the concentration, toxicity, persistence, mobility, and propensity to bioaccumulate of the hazardous substances present at the site. *Id.*

any consideration or determination of the likely future use of and access to the site is conspicuously absent.

Instead, the current process assumes that future use and access to the site will be unrestricted.[120] Although there are no explicit regulatory requirements concerning determination of future land use, the preamble to the NCP contains a brief discussion of this issue:

> In general, the baseline risk assessment will look at a future land use that is both reasonable, from land use development patterns, and may be associated with the highest (most significant) risk, in order to be protective. These considerations will lead to the assumption of residential use as the future land use in many cases. Residential land use assumptions generally result in the most conservative exposure estimates. The assumption of residential land use is not a requirement of the program but rather is an assumption that may be made, based on conservative but realistic exposures, to ensure that remedies that are ultimately selected for the site will be protective.[121]

EPA argues that an assumption of unrestricted future residential use is not a requirement for the FS; but, EPA has acknowledged, at least implicitly, that the current process presumes that future use will be residential and access unrestricted.[122] Although it is possible to overcome this presumption, this does not occur often in practice. As the organization Clean Sites and others have argued, determining the future use of the site is not an *explicit* element of defining potential future risks, thus "the default assumptions inherent to [risk assessment] will provide the future use of the site *implicitly*," which in most cases assumes the most

120. EPA's draft land use directive acknowledges: "In the past, the Agency frequently has assumed future land use to be residential in estimating reasonable maximum exposure. Although, generally the most conservative assumption, it may not be realistic to assume future residential use for all sites." Guimond Memorandum, *supra* note 114, at 2.

121. 55 Fed. Reg. 8710 (1990).

122. *See supra* note 120 and accompanying text.

exposed individual in a residential setting.[123]

Similar problems arise from the failure to explicitly require future land use determinations in attempting to evaluate whether alternative remedies enable the site to be restored to the most appropriate beneficial use.[124] A process for identifying and defining future uses of a site will also identify the natural resources and ecosystems impacted, or potentially impacted, by residual contamination and provide a clear mechanism for defining what is necessary to protect those resources and systems. Similarly, by definition, future use determinations are the most explicit means of identifying the most appropriate use, or uses, to which the site should be restored.

The current remedy selection process often focuses on evaluating different remedies based on "cost effectiveness" and "permanence" because there is no explicit requirement to define specific clean up objections for a site based on future land use.[125] However, whether a remedy is more cost effective than another should depend on how effectively it achieves the clean up objectives at the site relative to the cost. Similarly, whether the level of permanence achieved by a remedy is sufficient depends on what level of permanence is necessary to protect health and the environment and to restore the site to beneficial use. In each case, until the target land use is defined and brought into focus, it is impossible to assess how close each alternative remedy comes to hitting that target.

Presently, the technologies employed by alternative remedies

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123. FUTURE USE CONSIDERATIONS, *supra* note 113, at 3 (emphasis added); Douglas J. Sarno, *Making Cleanup Decisions at Hazardous Waste Sites: The Clean Sites Approach*, J. AIR AND WASTE MGMT. ASSOC., Sept. 1991.

124. For example, in the analysis of remedial alternatives for the east fork of the Poplar Creek at the Oak Ridge Reservation, alternatives 6 and 7 (the two least expensive alternatives) would have required significant limitations on access to, and thus the use of, much of the contaminated property. *See* FEASIBILITY STUDY, *supra* note 24, §§ 5.3.6.1, 5.3.7.1. Conversely, alternatives 4 and 5 (the two most expensive alternatives) would have allowed unlimited access to, and use of all of the property. *Id.* §§ 5.3.4.2, 5.3.5.1, 5.3.5.3. If the most appropriate future use is consistent with the level of restriction required by alternatives 6 and 7, then these alternatives may be considered acceptable. However, without an explicit understanding of the future uses for the contaminated property, it is impossible to evaluate whether alternatives 6 and 7 would enable the property to be restored to an appropriate beneficial use.

125. *See supra* notes 32-60 and accompanying text (analyzing the congressional debate concerning cost effectiveness and permanence); *see also supra* notes 116-20.

are the focus of evaluation, which causes significant problems.[126] The current detailed analysis of different remedies compares alternatives without any clear basis for comparison.[127] As a result, the fundamental objectives of cleaning up the site may be obscured.

D. Determining Future Site Uses and Developing Clean Up Objectives from Them Should Be Done by Key Stakeholders at the Site, not EPA.

The responsibility and right to determine the clean up objectives for a site should rest more explicitly with state and local governments, neighboring homeowner associations and property owners, local business groups, citizen and environmental organizations, the site owner, and other parties that can demonstrate a stake in the outcome of the remedy selection process. Enhancing the role of these stakeholders beyond its current level is imperative to effective reform of the remedy selection process.[128]

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126. *See supra* note 24 and accompanying text. The evaluation of alternative remedies proposed for the east fork of Poplar Creek at Oak Ridge focused on the strengths and limitations of treatment and containment technologies and access controls, such as various incineration and other treatment methods, types of cover material that could be used to contain the spread of contaminants, and methods of restricting human and animal access to contaminated soils. *See generally* FEASIBILITY STUDY, *supra* note 24, § 5.

127. *See generally* FEASIBILITY STUDY, *supra* note 24, § 5; *see also supra* note 113. As the Air Force argued:

> In lieu of a strong focus on site objectives, remedy selection has focused on the technology to be employed. Like risk assessment and ARARs, technology is a tool, in this case to achieve the cleanup objective. Without a clear objective, the cost-effectiveness of a particular technology cannot reasonably be evaluated. In the standard feasibility study, a number of different alternatives are presented; each one achieving a very different outcome. We are unable to evaluate the cost-effectiveness of a technology because we are not comparing alternatives to a uniform cleanup objective. The different benefits associated with these outcomes are never clearly delineated or evaluated. Ultimately, the cleanup requirements for sites are unclear.
>
> . . . As a result, the remedial investigation can become a surrogate for establishing clear objectives; its scope greatly expanded to compensate for all possible outcomes. Another result is that cleanups can become technology driven: selecting technologies in the absence of clear objectives which can result in excessive expense for little benefit.

FUTURE USE CONSIDERATIONS, *supra* note 113, at 3-4.

128. It is very clear that these reforms to the process for selecting remedies would require significant changes to the role EPA, or other lead agencies, currently play in the remedy selection process. EPA should not be stripped of the ultimate authority to approve

The conflicts at the core of virtually every remedy selection decision involve balancing a variety of competing concerns and interests: cost must be balanced against potential risks to health; achieving compliance with ARARs must be balanced against allocating resources to remediate quickly the highest priorities; and the statutory preference for permanent solutions must be weighed against technological and resource constraints. Each of these balancing acts has an inherently subjective nature which virtually guarantees disagreement among parties with divergent interests. While evaluating the proposed remedies against each objective requires substantial technical expertise, data, and experience, this evaluation also requires an assessment of subjective factors.[129] The balancing of trade offs must be informed and directed, not only by technical considerations, but also by the subjective interests of the individuals and organizations whose health may be threatened, whose environment may be damaged, and whose productive future will be affected by the remedy selected.[130]

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a remedy before it is implemented, and EPA, or other lead agencies, obviously would continue to implement and administer the program. But the level of participation by other players suggested by these reforms would necessarily reduce EPA's current role. While defining the most appropriate changes to EPA's role is beyond the scope of this article, it is clear that the most important functions EPA should retain in remedy selection should include oversight, development and improvement in science and research capabilities, facilitating and providing resources for the process, and retaining a right and a responsibility to resolve intractable disputes and veto decisions that did not comply with statutory requirements.

129. *See supra* notes 73, 86, 92, 97 and accompanying text.

130. EPA has suggested that one means of improving the remedy selection process is to "narrow" the "protectiveness continuum" within which alternative remedies would be evaluated. If there were a narrower range of objectives to be considered in terms of identifying future uses for a site, the process of selecting a remedy would be shortened. As suggested by EPA, the remedy selection process is characterized by a substantial amount of "flexibility" in deciding "how clean is clean":

> This flexibility has given rise to a continuum of different degrees of "permanence" and "cleanliness" to account for [site-specific] variations . . . . Although this flexibility allows EPA to tailor the cleanup for a particular site based on specific information, it also takes more time to debate the merits of where on the continuum a site cleanup should be, and results in differing cleanup levels among sites.

See HOW CLEAN IS CLEAN, *supra* note 97, at 1.

The categories of options along this continuum range from "exposure prevention" to "resource restoration." Exposure prevention is the least protective category on the continuum while resource restoration is the most protective. In between these ends of the spectrum, EPA has considered identifying "risk reduction" and "beneficial use" as categories of clean up objectives subject to consideration in the remedy selection process. *Id.* at 4.

In short, addressing the conflicts between competing objectives can be done most effectively by the parties whose interests have been impacted and for whom the benefits of the remedy are intended. For example, determining what is required to protect public health depends as much on the views and interests of those whose health is threatened as it does on quantitative risk analysis and scientific data. While assessing and eliminating threats to health must use the best science available, science alone cannot answer whether a remedy protects public health. As with the doctor-patient relationship, in which the patient ultimately must choose the treatment, it is stakeholders who should select the CERCLA remedy. In addition to the *technical judgments* that must be made, local stakeholders must make *personal judgments* about the level of risk that is acceptable. Similarly, the questions of whether a remedy is sufficiently protective of the environment and whether it will allow the site to be restored to the most appropriate future use should be answered by a balanced combination of professional analysis and personal determinations made by those who have a stake in the protection of the resources and the future use of the site.[131]

Consequently, the process for determining whether a remedy

One means of reducing the time and debate over alternative remedies, according to this argument, is to identify one of these categories, or a narrower range of categories, to focus all remedy selection decisions around fewer options.

> Thus, the crux of the "how clean is clean" issue for reauthorization is whether or not the Agency should continue to consider a spectrum of points along this protectiveness continuum as possible cleanup goals on a site-by-site basis guided by the NCP's remedy selection expectations, or if a smaller range on this continuum should be chosen as a general goal, around which cleanups at all sites should cluster.

Id. at 1.

131. The concerns and interests of local communities and citizens in Superfund remedy selection have gained increasing recognition in recent years. One of the most significant examples of this trend is the emergence of the issue of "environmental justice." The Superfund Program has been one of the targets of critics who charge that U.S. environmental policy discriminates against people of color and low income communities. *See, e.g.*, Marianne Lavelle & Marcia Coyle, *Unequal Protection: The Racial Divide in Environmental Law*, NAT'L L.J., Sept. 21, 1993, at 2; Marianne Lavelle, *Environmental Racism Targeted*, NAT'L L.J., Mar. 1, 1993, at 3. Recognition that certain communities have been impacted unfairly or discriminated against by environmental policy decisions, including remedy selection decisions at Superfund sites, should not simply result in a determination by policy makers to attempt fairness. Instead, stakeholders should be *included* more effectively and earlier in decisionmaking. This is true regardless of the stakeholders' economic ability to organize and to participate effectively. In communities that are not well organized or involved in environmental decisionmaking, explicit steps to facilitate involvement should be made.

provides a reasonable value for the cost or is the most appropriate for the site should incorporate more explicitly and actively the views of those who will be impacted by the trade offs after the remedy has been implemented. Likewise, determining which productive future uses should be available after the site has been cleaned up should depend on the views and objectives of those whose lives and livelihoods will be most affected by the decision. While these problems will usually include technical or "objective" components, they must also be defined by the subjective factors and interests of the stakeholders at the site.[132]

The available opportunities for stakeholder involvement in the current remedy selection process are neither timely nor effective.[133] When public comments are considered on a plan for remedial action, that plan has already been chosen by the lead agency. While the possibility exists to modify or to reject the proposed remedial action before it is officially selected and implemented, this possibility falls far short of enabling stakeholders to participate in the remedy selection process from the outset.

The NCP specifies that "state acceptance" and "community

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132. For example, groundwater contaminated with certain concentrations of certain hazardous substances may be expected to cause or contribute to adverse health effects when consumed. The technical and science-based issues associated with this contamination must be understood and factored into the selection of the remedy, but the subjective and personal issues at stake must also be considered. In other words, the remedy selection process should identify the personal trade offs and issues raised by alternative remedies, in addition to identifying and eliminating health risks posed by groundwater contamination. For example, supplying bottled water to replace contaminated drinking water may eliminate the health risks posed by the contamination, but it may impose personal sacrifices or consequences that are unacceptable to the impacted individuals. Only if these individuals have an effective role in the remedy selection process can these consequences be identified and addressed adequately.

133. The opportunity for public participation in selecting a CERCLA remedy is required only *after* a preferred remedy has been selected. The primary statutory provisions for public participation in the remedy selection process are outlined in § 117 of CERCLA. 42 U.S.C. § 9617 (1988). Under § 117, the public is invited to respond to the proposed plan for remedial action through written and oral comments and may request a public hearing on the proposed remedial action. *Id.* § 9617(a). A notice of the final plan and any changes made from the proposed plan must be provided before commencement of the remedial action. *Id.* Limiting public involvement to comments on a proposed remedy is akin to inviting a guest to a dinner party in time for coffee and dessert. The guest may be able to see what was served for dinner from the leftovers on the other guests' plates, but the late invitee is not provided an actual opportunity to dine with the other guests.

Other provisions exist in CERCLA for state and community involvement. *See, e.g.*, §§ 9617(e), 9620(f), 9621(f), 9622(d)(2). None of these provisions, however, authorize or require a level of stakeholder participation sufficient to make stakeholders *part of* the decision-making process. Instead, the role of stakeholders is limited to reacting to the results of that process.

acceptance" are modifying criteria to be considered in remedy selection.[134] By definition, such modifying criteria are considered only *after* a range of alternative remedies have been developed, *after* these alternatives have been evaluated for protection of human health and the environment and attaining ARARs, *after* the cost effectiveness and permanence of these alternatives have been assessed, and *after* a preferred alternative has been selected.[135] The role of the community is then limited to "acceptance" of the preferred alternative. The NCP goes so far as to specify the community relations to support the selection of the remedy that the lead agency should pursue.[136] In essence, these community relations are limited to soliciting and responding to public comments on a decision that has already been made.[137] While it is not impossible that public comments could lead to revisions or even a reversal of the preferred remedy, stakeholder involvement occurs too late in the process. For the CERCLA remedy selection process to be more effective, stakeholders must become players in the process, not merely watchdogs over it.

CONCLUSION

Complex contamination problems require a long, difficult, and often expensive clean up process. The keys to ensuring that the process yields effective results are to focus the process on concrete

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134. 40 C.F.R. § 300.430(f)(1)(i)(C) (1992); *see supra* note 72 and accompanying text.

135. *See generally* 40 C.F.R. § 300.430(f).

136. *Id.* § 300.430(f)(3).

137. The NCP describes the remedy selection process following the identification of a preferred remedial alternative as a two-step process. The detailed identification, evaluation, and comparative assessment of alternatives occurs during the remedial investigation/feasibility study ("RI/FS") process without any meaningful public involvement. *Id.* § 300.430(e). Community acceptance ostensibly is one of the "modifying criteria" to be considered in the evaluation of alternatives, but the NCP provides for community comments only after the feasibility study is completed and a preferred alternative has been chosen.

"In the first step in the remedy selection process, the lead agency shall identify the alternative that best meets the requirements in §300.430(f)(1), above, and shall present that alternative to the public in a proposed plan." *Id.* § 300.430(f)(2). In other words, the public is presented with what the lead agency has already determined to be the best alternative. The identification of this preferred alternative may have been made without any significant community input. As the NCP acknowledges in describing the assessment of the "community acceptance" criterion, "[t]his assessment may not be completed until comments on the proposed plan are received." *Id.* § 300.430(e)(9)(iii)(I). So, while community comments may be modifiers in the selection of a preferred alternative, such comments often are not received until after that selection has been made.

objectives and to involve the stakeholders at the site effectively. This means explicitly defining what the site will be used for after clean up. It means providing that such future use is coordinated with the goals, interests, and objectives of the site owner, local residents, adjacent property owners, local and state officials, and environmental organizations. It also means incorporating into the remedy selection debate all of these divergent and conflicting interests and concerns, so that they may be a part of, rather than obstacles to, the resolution of difficult clean up issues. To effectuate these changes to the remedy selection process, Congress should revise section 121 to require that site-specific objectives are defined early in the process, based on future uses identified by stakeholders. In particular, two specific revisions should be made.

First, section 121 should require the establishment of a stakeholder advisory board at each site where a remedial investigation and feasibility study will be conducted. Such boards should be authorized to identify potential future uses of the site and affected natural resources, and to rank alternative uses in order of preference. In addition, such boards should be responsible for *selecting* the remedy, not merely "accepting" a remedy after it is selected. The authority of EPA or the lead agency to select remedies should be limited to ensuring that statutory requirements are met and to resolving intractable disputes where stakeholders are unable to reach an agreement.

When stakeholders are involved effectively in the remedy selection process, their interests will be better reflected in the remedy selected, and their understanding and acceptance of the remedy decision is much more likely. Effective stakeholder involvement and the resulting sharper focus on concrete clean up objectives, will facilitate:

- a better identification and inclusion of legitimate issues that are key in evaluating the subjective trade offs inherent to selecting a remedy; and
- a greater understanding and approval by the community of remedy selection decisions.

Second, section 121 should require that alternative remedies are evaluated primarily on their capability to enable the site to achieve future uses identified for the site. This will shift the remedy selection focus from one based on the performance of

technology to one based on the functional usefulness of the remedy. In other words, the evaluation of alternative remedies would be based on the effectiveness of each remedy in enabling the site to function in different capacities.

Using this sharper focus, answers should be clearer concerning whether a remedy will protect human health and the environment, whether it is cost effective, and under what circumstances permanent treatment technologies are not practicable. For example, two remedies that protect human health and the environment, based on exposure levels that can be expected as a result of a preferred future use identified for the site, can then be compared on the basis of cost effectiveness. In such circumstances, the less expensive of the two alternatives will be more cost effective. Similarly, the practicability of permanent treatment technologies can be assessed more clearly under the lens of specific use-based objectives. When a remedy protects health and the environment based on the site's preferred future use, but does not utilize permanent treatment technologies, then the use of treatment technologies may not be practicable if such technologies are considerably more expensive, are technically problematic, or pose significant additional risks.

These changes will enhance the overall success of the Superfund Program. The reforms proposed here, however, in all likelihood, will not produce faster decisions. Nor will these reforms produce consistent clean ups in the form of identical remedies at sites contaminated with similar substances. Instead of striving for faster decisions or uniformity among remedies, the Superfund Program should strive for decisions that better reflect and protect the range of specific interests at each site, achieving greater acceptance from the parties representing those interests. These types of decisions and the remedies they produce are the true measure by which the Superfund Program should be gauged.