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Does Minimizing Expenditures for CERCLA Site Remediation Increase the Future Public Abatement Costs?

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Does Minimizing Expenditures for CERCLA Site Remediation Increase the Future Public Abatement Costs?

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The purpose of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[1] and the Superfund Amendments and Reauthorization Act of 1986 (SARA),[2] is to give the federal government the power to clean up toxic waste sites and force the responsible parties to pay the cost. Expressed in regulatory language, the goal of the cleanup is to mitigate or minimize the actual or threatened release[3] and migration[4] of hazardous wastes,[5] pollutants, or contaminants from abandoned industrial hazardous waste sites in order to eliminate, reduce, or control the risk to human health or the environment.[6] In other words, CERCLA does not mandate that the hazardous waste be chemically neutralized or removed; it merely mandates that the waste

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[1] CERCLA § 101, 42 U.S.C. § 9601 (1988). CERCLA was reauthorized and extended for three years by the Omnibus Budget Reconciliation Act of 1990, Pub. L. No. 101-508, § 6301, 104 Stat. 1388-319 (1990).

[2] Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. No. 99-499, §§ 1-531, 100 Stat. 1613-1782 (1986) (codified at 42 U.S.C. §§ 9601-9675 (1988)).

[3] The term includes, inter alia, any spilling, leaking, or discarding. 42 U.S.C. § 9601(22) (1988).

[4] Definition of "Management of Migration," 40 C.F.R. § 300.5 (1992).

[5] Hazardous waste is usually a heterogenous mixture of various chemicals. It includes all substances that are ignitable, corrosive, reactive and toxic as defined under RCRA, 40 C.F.R. § 261.3 (1992) and the more than 700 different chemicals that are listed in 40 C.F.R. § 302 (1992).

[6] 40 C.F.R. § 300.430(a) (1992).

be contained so that the concentrations of toxins in the air, ground, and surface waters which emanate, or might emanate, from the site do not exceed certain health and environmental standards.

Since currently used containment materials, such as plastic sheet and concrete walls, have a limited lifetime, the containment barriers will eventually fail, and toxic wastes will inevitably leak from all sites on which hazardous waste is contained rather than removed or neutralized. As a result, about 60 percent of the sites which the Environmental Protection Agency (EPA) has "construction-completed"[7] and deleted from the National Priority List (NPL) require continued and perpetual monitoring and maintenance, until someone finds the funds to neutralize the wastes and complete the cleanup. Amazingly, the current public debate over how much "the polluter pays," "how clean is clean," and the distribution of costs among the affected parties omits any mention of the inevitably escalating future costs of more than $200 million per annum[8] that the states will incur for testing and monitoring construction-completed sites for the next century or more, or until someone finds the funds to neutralize the waste and complete the cleanup.

I. THE HISTORY AND GOAL OF CERCLA

Hazardous waste sites are not the result of negligence: the manufacturers of hazardous chemicals knew that, under the chemical law of mass preservation, toxic substances persist forever until they are chemically converted, and many of the chemicals, such as PCBs and DDT, which are now deposited in landfills were specifically designed to be persistent. In fact, waste generators selectively used land disposal and ocean dumping for the disposal of those wastes which were too noxious to be released into the water or air or were too costly to incinerate or otherwise neutralize. Furthermore, the manufacturers of the materials which now form the waste knew, or should have known: that the wastes were ignitable, corrosive and toxic; that the waste would gradually seep into soil

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[7] As presently used, the term "construction-completed" includes sites at which the cleanup objectives have been achieved, as well as sites at which continued long-term monitoring and maintenance action, such as continued soil, waste or ground water treatment are necessary. *See, e.g.*, GENERAL ACCOUNTING OFFICE (GAO), REPORT NO. GAO/RCED-93-188. SUPERFUND. CLEANUPS NEARING COMPLETION INDICATE FUTURE CHALLENGES.

[8] *Id.* at 45

and groundwater; that the sites would have to be eventually cleaned up; that the cleanup cost would be far larger than the cost of treatment prior to dumping;[9] and that in the future, someone would have to pay heavily for their short term gain.

What the individual generators did not fully realize was the scale on which their fellow polluters joined them in dumping toxic wastes. Nor did they realize that the public outrage over the harm suffered by neighbors of the sites would prompt Congress to swiftly pass CERCLA without disabling amendments, to allocate the funds necessary to trace the generators and to hold them accountable for the horrendous costs which they generated for the public. Details of the history[10] and the size[11] of the hazardous waste disposal problem,[12] the inadequacy of law prior to CERCLA,[13] the events that lead to the legislation,[14] the provisions of the law,[15] the role which CERCLA plays within the framework of other environmental laws,[16] and the legal,[17] managerial,[18] and technical[19] problems encountered in the implementation of CERCLA have been thoroughly documented.

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[9] The approximate comparative costs for various hazardous waste disposal are: ocean dumping, $5/ton to $50/ton; landfill, $25/ton to $150/ton; stabilization in landfill, $100/ton to $740/ton; and incineration, $100/ton to $1,500/ton. *See* JESSE R. CONNOR, CHEMICAL FIXATION AND SOLIDIFICATION OF HAZARDOUS WASTES (1990).

[10] Carl B. Meyer, *The Environmental Fate of Toxic Wastes, the Certainty of Harm, Toxic Torts and Toxic Regulation*, 19 ENVTL. LAW 321 (1988).

[11] SAMUEL S. EPSTEIN ET AL., HAZARDOUS WASTE IN AMERICA (1982).

[12] *See, e.g.*, William David Bridgers, Note, *The Hazardous Waste Wars: An Examination of the Origins and Major Battles to Date, with Suggestions for Ending the Wars*, 17 VT. L. REV. 821 (1993).

[13] *See, e.g.* Joseph K. Brennan, *Liability for Generators of Solid Waste: the Failure of the Existing Enforcement Mechanisms*, 69 GEO. L.J. 1047 (1981).

[14] ALFRED R. LIGHT, CERCLA LAW AND PROCEDURE COMPENDIUM (1992).

[15] *See also* 126 CONG. REC. H9154 (daily ed. Sept. 19, 1980) (remarks of Rep. Florio); S. REP. No. 848, 96th Cong., 2d Sess. 2 (1980); SENATE COMM. ON ENVIRONMENT AND PUBLIC WORKS, A LEGISLATIVE HISTORY OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980, PUB. L. No. 96-510 (1980).

[16] WILLIAM H. RODGERS, JR., *Environmental Law, in* 4 HAZARDOUS WASTE AND SUBSTANCES, (1992).

[17] SUSAN M. COOKE, THE LAW OF HAZARDOUS WASTE (1993).

[18] Don R. Clay, *Ten Years of Progress in the Superfund Program*, 41 AIR & WASTE 144 (1991); *Study by Former Top Agency Official Says Fair, Efficient Cleanups Impossible*, 24 Env't Rep. (BNA) No. 26, at 1209 (Oct. 29, 1993).

[19] HARRY M. FREEMAN, STANDARD HANDBOOK OF HAZARDOUS WASTE TREATMENT AND DISPOSAL (Harry M. Freeman, ed., 1988).

II. THE IMPLEMENTATION OF CERCLA

During the first dozen years of CERCLA, the EPA and its contractors rapidly adjusted to the overwhelming task of cleaning up the legacy of fifty years of toxic waste dumping. Thus far, the EPA has accomplished the following: it has identified more than 10,000 sites; it has sent more than 15,000 letters to potentially responsible parties (PRPs); it has placed more than 1,200 sites on the NPL and anticipates that it will add about 100 new sites per annum; it has construction-completed and deleted more than 200 sites from the NPL; and it has prepared a list of more than 700 toxic chemicals that need to be removed from sites. Furthermore, the Agency for Toxic Substances (ATS), which was formed to assist the EPA, has prepared 130 toxicological profiles[20] which thoroughly review the properties of individual substances. In addition, CERCLA has spawned a hazardous waste management industry comprised of more than 3,000 consultant and contracting companies with annual gross sales of more than $13 billion.[21] The scientists and engineers specializing in hazardous waste remediation have organized several professional organizations which publish peer-refereed technical journals and hold annual technical conventions.

It takes two to three years and an average of $750,000 to prepare a remedial investigation/feasibility study (RI/FS).[22] It takes an average of seven to ten years from the listing of a site to completion of the cleanup. About 217 sites, that is, about 10 percent of the sites, were construction-completed[23] at the end of 1993. It has been predicted that even if Congress would provide all requested funding,[24] only half of the presently listed sites can be completed by the year 2000. Furthermore, as the EPA com-

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[20] *See Legislative Changes on Health Risks Needed*, 24 Env't Rep. (BNA) at 380 (July 2, 1993). The current goal is 275 profiles; the investigation has revealed critical gaps in the date for 37 important toxins.

[21] EARL B. ANDERSON, *Slower Growth for Environmental Business*, CHEM. & ENG. NEWS, June 28, 1993, at 13.

[22] OFFICE OF TECHNOLOGY ASSESSMENT, *Are We Cleaning Up? 10 Superfund Case Studies* (1988) (a special report of OTA's assessment of superfund implementation).

[23] *See Business Leaders Call for Program Overhaul, Concede that Reform Likely to Increase Costs*, 24 Env't Rep. (BNA) No. 23, at 1072 (Oct. 8, 1993).

[24] Memorandum from Don R. Clay, EPA Assistant Administrator Solid Waste and Emergency Response, to William K. Reilly (July 19, 1991) (making recommendations for Accelerating Cleanup and Managing Risks at Superfund Sites) (on file with the JOURNAL OF NATURAL RESOURCES & ENVIRONMENTAL LAW).

pletes site construction, there will be an increasing need to perpetually maintain and test sites at which hazardous waste is contained. The CERCLA trust fund now rotates liabilities in excess of $100 billion; its total cost has been estimated at $750 billion over a thirty-year period.[25] In fact, Congress approved expenditures of $5.1 billion for the EPA for the three-year period starting in 1991.[26] CERCLA settlements with PRPs have exceeded $1 billion.[27]

Partly due to the threat of cleanup costs and partly due to criminal sanctions,[28] the following has occurred: stockpiling of hazardous waste has now essentially stopped; the percentage of undocumented toxic disposal by commercial enterprises has dropped[29] from 90 percent to negligible; and the manufacture of persistent pesticides and chemicals such as DDT and PCB has been discontinued. These changes were possible because most of the major generators quickly responded to the challenge with technical innovation based on research and development in chemistry, chemical manufacturing, chemical engineering, toxicology and risk assessment.

III. THE DEBATE OVER THE NEED FOR FURTHER CERCLA AMENDMENTS

Considering the enormous sums that are at stake for the PRPs, it is not surprising that CERCLA and its implementation have triggered many proposals for amendments to CERCLA. For example, the chemical industry[30] would like to see increased efficiency, better supervision of the EPA contractors, and reduced costs. Hazardous waste consultants and contractors[31] would like to have more control over remediation decisions. The science policy

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[25] Keith M. Lyons, Jr., Comment, *Everyone Pays to Clean up America: A Discussion of CERCLA Section 107 (a) (3) and the Term "Arranged for Disposal,"* 28 WILLAMETTE L. REV. 589, 590 (1992).

[26] *See* OBRA, Pub. L. No. 101-508, § 6301, 104 Stat. 1388 (1990).

[27] Clay, *supra* note 18.

[28] *See, e.g.*, Adam Abensohn et al., *Eighth Survey of White Collar Crime: Environmental Crimes*, 30 AM. CRIM. L. REV. 565, 568-81 (1993); Edward F. Novak & Charles W. Steese, *Symposium: Environmental Criminal Law, Survey of Federal and State Environmental Crime Legislation*, 34 ARIZ. L. REV. 571 (1992).

[29] 126 CONG. REC. H9154 (daily ed. Sept. 19, 1980)(remarks of Rep. Florio).

[30] LIGHT, *supra* note 14, at VI-9.

[31] *See, e.g.*, Douglas J. Sarno *Making Decisions at Hazardous Waste Sites: The Clean Sites Approach*, 41 AIR & WASTE 1174 (1991).

establishment[32] would like to regain the influence over implementation of science which it enjoyed after World War II. The insurance industry[33] would like to shift cleanup costs from the generators to the public.[34] The National Association of Attorney Generals[35] and Governors would like to see more CERCLA money shifted to the states. Former EPA officials now criticize programs which they once supervised,[36] and the municipalities and the armed forces who have enjoyed virtual immunity from environmental laws are now asking for a cap on their cleanup contributions.[37] Also, the ongoing battle over CERCLA is reflected in more than 1,000 federal court decisions which have been analyzed in a similar number of law review notes and articles, as well as other scholarly publications.[38]

Although some of the debate is contradictory, two areas of criticism persist: one is that cleanup is excessively slow, and the other is that cleanup is excessively expensive. The average cost of cleanup is estimated to be between $15 to $30 million per site, of which 10 to 20 percent is due to transaction costs. The bulk of these costs are due to litigation between PRPs.[39] It is estimated that insurance companies currently expend $500 million per annum on CERCLA-related litigation.[40] These costs are blamed on exaggerated cleanup goals, ineffective procedures for selecting remediation techniques, unfair allocation of costs, excessive litigation, and ineffective procedures for selecting cleanup priorities.

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[32] Philip H. Abelson, *Toxic Terror; Phantom Risks*, 261 SCI. 407 (1993); Philip H. Abelson, *Pathological Growth of Regulations*, 260 SCI. 1859 (1993); *see also* Carol M. Browner, *Protecting the Environment: EPA'S Role*, 261 SCI. 1373 (1993).

[33] Earl. K. Madsen et al., *Superfund Reauthorization: An Opportunity to Rectify Major Problems*, 24 Env't Rep. (BNA) No. 22, at 1020 (Oct. 1, 1993).

[34] The American International Group promotes a National Environmental Trust Fund as a no-fault approach. *See* LIGHT, *supra* note 14, at VI-11.

[35] *Id.* at VI-5.

[36] *Id.* at VI-14, VI-18; ELLIOT, SUBSTAINABLE ENVIRONMENTAL LAW (Barry Green ed., 1993); *see also Use of Indirect Risk Assessment Likely in Future Rule-Making*, 24 Env't Rep. (BNA) No. 6, at 262 (June 11, 1993).

[37] William D. Turkula, *Determining Cleanup Standards for Hazardous Waste Sites*, 135 MIL. L. REV. 167 (1992).

[38] Search of LEXIS, Genfed library, US File (Jan. 1, 1994); *see also A Decade of Superfund Litigation: CERCLA Caselaw from 1981 to 1991*, 21 Envtl. L. Rep. (Envtl. L. Inst.) 10367 (July, 1991).

[39] John L. Ropiequet, *Environmental Law Litigation Under CERCLA*, *in* 47 AM. JUR *Trials* 1 (1990).

[40] William N. Hedeman et al., *Superfund Transaction Costs: A Critical Perspective on the Superfund Liability Scheme*, *reprinted in* LIGHT, *supra* note 14, at VI-45.

Surprisingly, not a single report has analyzed the relationship and balance between the present and the future costs of cleanup and the tendency of the PRPs and the EPA to prefer temporary waste containment technology over chemical waste neutralization and conversion, even though the former compounds both the long-term and the overall cleanup costs.

A. Remediation

Hazardous waste is not only ignitable, corrosive, reactive, and toxic, but it will persist for thousands of years if it is not chemically neutralized. Furthermore, since it is more stable than its storage containers, hazardous waste will eventually leak from its containers, penetrate the soil, and enter into ground and surface water. Congress has provided the EPA with a large choice of remedial actions.[41]

1. Waste Containment Versus Waste Conversion

Cleaning up hazardous waste sites involves two separate tasks: (1) the containment or removal of toxic waste and debris, including leaky barrels, and (2) the cleanup of the surrounding soil and groundwater. The EPA has developed an entire arsenal of cleanup technologies for both[42] and maintains an innovative research and development program which yields new abatement choices.

From a long-term viewpoint, the most permanent and safest remediation method is waste extraction[43] followed by chemical conversion of the waste into a neutral and harmless product. For organic waste, the first remediation choice is high temperature incineration yielding environmentally compatible carbon dioxide and water. For heavy metals, the preferred method is extraction followed by precipitation in the form of insoluble compounds that

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[41] The term "remediation" derives from the term "remedial action" which means "those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the Environment to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare of the environment." CERCLA § 101, 42 U.S.C. § 9601(24) (1988).

[42] *See* 40 C.F.R. § 300, app. D (summarizing appropriate actions and methods); *see also* FREEMAN, *supra* note 19 (describing technology).

[43] *See* William L. Troxler et al., *Treatment of Pesticide Contaminated Soils with Thermal Desorption Technologies*, 43 AIR & WASTE 1610 (1993).

can be removed or embedded in a neutral matrix material. The cost of neutralization and incineration is usually higher than the initial cost of on-site waste containment by solidification or by storage in a plastic-lined, water-tight, capped landfill.[44] Since the responsible parties want to minimize short-term costs, they almost always chose containment over neutralization.

Recommendation: The provisions of CERCLA are contradictory as to the permanence of the remedies which it seeks.[45] CERCLA should be amended to provide that the future costs of testing, maintenance, and final cleanup must be determined and considered before a cleanup technology is selected.

2. Cleanup Criteria

Because the cleanup of toxic sites involves not only the toxic waste but the surrounding soil, air, and surface and groundwaters, and because each barrel of waste and each shovel of soil may have a different chemical composition, no single "best" method exists for treating toxic waste sites. Consequently, the "scoring" criteria used to establish the NPL[46] and the RI/FS need to be quite lengthy. In addition, the selection of the most economical remediation method requires extensive site-testing,[47] which costs an average of about $750,000 and may take two years to complete.[48] The EPA has developed applicable or relevant and appropriate requirements (ARAR)[49] rather than single numerical standards. Sellers and buyers of industrial property need a forty-

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[44] CONNER, *supra* note 9.

[45] By way of example, 42 U.S.C. § 9601(24) uses the word "permanent," but many of the technical remedies listed are not permanent. Considering that the listed remedies include waste containment in dikes and relocation of people, it seems that Congress was more concerned about finding a permanent remedy for the current disputes among the affected parties than about the release of toxic waste.

[46] Hazard Ranking System (HRS) is a mechanism for selecting National Preference List (NPL). *See* 40 C.F.R. § 300, app. A (1992).

[47] Randall T. Ryti, *Superfund Soil Cleanup: Developing the Piazza Road Remedial Design*, 43 AIR & WASTE 197 (1993).

[48] Pieter N. Booth & Michael A. Jacobson, *Development of Cleanup Standards at Superfund Sites: An Evaluation of Consistency*, 42 AIR & WASTE 762 (1992); *see* RODGERS, *supra* note 16, at 622.

[49] 40 C.F.R. §300.430(e)(9)(iii)(A) - (I) (1992) (describing remedial investigation, feasibility study and selection of remedy).

seven-page ASTM questionnaire to assess the environmental quality of a property prior to any sale.[50]

Recommendation: The complaint by nontechnical people that the EPA should formulate simpler site-cleaning criteria is unrealistic because it ignores the intrinsic complexity of underlying natural phenomena at the heterogenous waste sites.

B. Risk Assessment

Two types of risks exist at remediated waste sites: (1) the risk of future spills, and (2) the risk of exposure to residual toxic emission from incompletely cleaned sites.

1. The Risk of Future Spills

The risk of future spills is eliminated at sites where hazardous waste has been chemically neutralized but continues to persist at containment sites. Therefore, contained waste sites will require perpetual monitoring and maintenance until someone provides the funding to remove or neutralize the wastes.

Recommendation: Hazardous waste should be chemically neutralized. When temporary waste containment is unavoidable, the future costs of maintenance and cleanup should be fully included in the original site evaluation, and responsibility for maintenance costs should be resolved before the site is taken off the NPL.

2. The Health and Environmental Risk Due to Residual Toxic Emission from the Soil and Debris on Incompletely Cleaned Sites

Risk methodology and toxic regulation have now been harmonized among the four lead federal agencies who now use a multiagency and multimedia approach. The formation of the Agency for Toxic Substance and Disease Registry (ATSDR) has resulted in a comprehensive review of toxicology of hazardous substances[51] benefitting all users of toxicological data.

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[50] AM. SOC'Y TESTING MATERIALS (ASTM). STANDARD PRACTICE E-1528, STANDARD PRACTICE FOR ENVIRONMENTAL SITE ASSESSMENTS: TRANSACTION SCREEN PROCESS 1384 (1993).

[51] ATSDR is a part of the U.S. Public Heath Service and is based in Atlanta, Georgia. Each toxic substance has its own toxilogical profile.

Risk assessment starts with an inventory of the toxic sources and includes the assessment of the source strength, exposure level, exposure path, and toxicity of the hazardous substances for each toxic pollutant, followed by multimedia and multipollutant integration. In many respects, the factors are similar to the scoring system which is used for ranking the sites on the NPL.[52] During the twelve years since CERCLA was introduced, the methodology for assessing the risk of acute, chronic, and indirect[53] exposure to carcinogens and neurological and other noncarcinogenic toxins has rapidly developed from a qualitative art to a more quantitative science. While it is intrinsically impossible to express the risk which the general population experiences with a single value, one can now determine the range of risk values for many toxic substances with reasonable reliability.[54] The complaints that "scientific uncertainty is the characteristic of toxic substance control"[55] and that the EPA succumbs to "phantom risks,"[56] as well as the demand for abolishing the "hypothetical expression of risks in powers-of-ten"[57] are all based on obsolete information.

Recommendation: The EPA's handling of risk assessment procedures has produced good results and is on the right track. However, the EPA should make it clear to all parties that risk assessment and the balancing of risks are two separate activities. Risk assessment requires the collection, evaluation, and manipulation of scientific data and laws and is a task for experts. The balancing of risks, including the choice of what constitutes an acceptable risk, is not a task for experts but instead belongs to the affected people, the public and its representatives. It involves the fundamental right of persons to be free of unwanted bodily intrusion,[58] as well as the right for the autonomy of the individual to personally choose whatever risk he or she wishes to assume.[59]

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[52] *See* 40 C.F.R. § 300 app. A (1992).

[53] ENVIRONMENTAL PROTECTION AGENCY, EPA/600/AP-93/003, METHODOLOGY FOR ASSESSING HEALTH RISK ASSOCIATED WITH INDIRECT EXPOSURE TO COMBUSTOR EMISSIONS (1993).

[54] EPA Principles of Neurotoxicity Risk Assessment, 58 Fed. Reg. 41,556, 41,568 - 578 (1993).

[55] John S. Applegate, *Worst Things First: Risk, Information, and Regulatory Structure in Toxic Substances Control*, 9 YALE J. ON REG. 277 (1992).

[56] Abelson, *supra* note 32.

[57] Turkula, *supra* note 37.

[58] W. David Slawson, *The Right to Protection from Air Pollution*, 59 S. CAL. L. REV. 672 (1986).

[59] Christopher H. Schroeder, *Rights Against Risks*, 86 COLUM. L. REV. 495 (1986).

Knowingly exposing others to risks always requires informed consent.[60]

3. How Clean Is Clean, and How Safe Is Safe?

Once the health and environmental risks have been established, a realistic threshold target must be set for an acceptable contaminant level. This task involves a balancing of the following: overall protection of human health and the environment; compliance with existing laws and regulations; short-term and long-term stability of the chosen method; reduction of toxicity; whether the chosen level is affordable and technically feasible; and whether it is acceptable to the local community and government. These factors are similar to those listed in the ARARs.[61] It should be noted that there will always be a gap between the selected cleanup goal and the goal that is attained by the cleanup contractor. The reason for this gap is partly quality control and partly the limit of affordable technology.

Recommendation: The EPA should use experienced staff at its Washington headquarters to set consistent target goals for all sites and to implement quality control in the field rather than delegate these tasks to staff in regional offices who may not have sufficient access to the latest information.[62]

C. *The Costs of CERCLA*

The criticism that follows concerns: (1) the intrinsic efficiency of CERCLA and its implementation, (2) the allocation of costs, and (3) the question of whether we can afford the costs of the cleanup.

1. The Balance Between Current and Future Costs

CERCLA section 9621(a) provides in relevant part that "[i]n evaluating the cost effectiveness of proposed alternative remedial actions, the President shall take into account the total short- and long-term costs of operation and maintenance for the entire period

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[60] The law of informed consent has been extensively defined for the physician-patient relationship in state court decisions. *See, e.g.*, Mathis v. Morrissey, 11 Cal. App. 4th 332 (1992).

[61] 40 C.F.R. § 300.430(e) (1992).

[62] Walter W. Kovalick, Jr. et al., *Assessment of Needs for Technical Information in EPA's Hazardous and Solid Waste Programs*, 40 AIR & WASTE 1478 (1990).

during which such activities will be required."[63] Given a literal reading of the law and of the corresponding regulations,[64] one would expect that the EPA would exclude any form of remediation that necessitates large deferred costs. This exclusion includes techniques such as perpetual testing and monitoring, as well as additional future waste treatment, which is the case with most waste containment or stabilization treatment.

However, a review of projects where construction is completed shows that, in fact, the EPA uses the completion of construction as an artificial cut-off point for considering future costs. At present, at least 20 percent of the construction-completed sites will require continued future maintenance and testing at a cost estimated to be more than $1 billion during the next seven years,[65] not counting the cost of relocation or chemical conversion that will be inevitable at some future time. This situation arises because containment has lower short-term costs than waste neutralization.

Because everybody agrees that costs should be minimized, the minimizing of short-term costs is always politically expedient; those who will be responsible for the future costs are not yet identified and, therefore, cannot object. The irony is that remedial waste containment shifts the costs of the cleanup from the responsible parties to the public and third parties and, thereby, defies the intent of CERCLA that generators should pay for the cleanup costs.

Recommendation: The ARARs should include in the primary balancing criteria the total future cost of the cleanup over the entire lifetime of a waste rather than merely the costs incurred up to completion of construction. This approach requires that Congress spell out in the CERCLA amendment that future costs of remediation beyond completion of construction, up to the final neutralization, must be included in evaluating cleanup technology choices.

2. Cost Efficiency

It is generally recognized that between 10 to 20 percent of the cleanup costs are transaction costs and that the bulk of the transaction cost is due to litigation among the PRPs to determine

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[63] CERCLA § 121, 42 U.S.C. § 9621(a) (1988).

[64] *Cf.* 40 C.F.R. § 300.430(e)(7)(iii) (1992) and other ARAR provisions.

[65] GENERAL ACCOUNTING OFFICE, *supra* note 7, at 45.

who is responsible under the CERCLA scheme. These costs are no different from costs in any other high-stake civil litigation among private parties. A large fraction of these costs is due to investigation and discovery battles. These costs could be reduced to less than half if Congress would pass, and all federal circuits would adopt, the changes[66] in Federal Rules of Civil Procedure 16 and 26 as presently proposed by the Senate.[67] Furthermore, a drastic method for reducing the cost of litigation, especially in the long-term future, would be to mandate public recording of all hazardous waste information within the title documents.[68]

3. The Allocation of Costs Among the PRPs and the Public

It has been proposed that transaction costs could be greatly reduced if the "polluter pays" principle would be replaced with a no-fault National Environmental Trust, which would be similar to the Federal Deposit Insurance Corporation. On the contrary, the result of this proposal would be to shift the cost from the generators to the public and to cause the generators to lose any incentive to minimize waste production by technological innovation.

The current public consensus remains that "the polluter should pay" for site remediation.[69] If the wastes are incinerated or otherwise chemically neutralized in this step, this approach is viable. However, if the remedial action merely consists of containment, the responsible party pays only for the initial remediation, and remediation merely perpetuates the process which started when the polluter abandoned the waste site for the purpose of shifting the costs to future third parties.

Recommendation: The EPA has now gained extensive experience with remedial actions. During the next few years, the rate of completion of site construction will greatly increase, and the costs for maintaining containment sites will do the same. Since the

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[66] PROPOSED R. CIV. P., *reprinted in* 1993 U.S.C.C.A.N. G169.

[67] This statement is based on our own experience with litigation in the federal and state courts in California and Nevada during the five years since NEV. R. CIV. P. 16.1, 26 have been in effect. The Nevada provisions are essentially the same as the duty to disclose under the proposed FED. R. CIV. P. 16, 26. The new provisions cut discovery time and costs in half because the slow and expensive reiterative string of pre-trial discovery requests and motions to compel which mark federal and California litigation is merged into one large discovery dispute resolution hearing which is held early in the litigation.

[68] Judith G. Tracy, *Beyond Caveat Emptor: Disclosure to Buyers of Contaminated Land*, 10 STAN. ENVTL. L.J. 169 (1991).

[69] Browner, *supra* note 32.

states do not have the technical and financial resources to test, maintain, and recycle the many hundreds of toxic waste sites which will have to be monitored and abated after construction is completed, Congress and the EPA need to press for an amendment to CERCLA that requires neutralization of all waste. Otherwise, the maintenance costs will quickly become unbearable, and the public will blame the EPA rather than the generators for the problem. We do not have space to recommend a solution for one of the most difficult remaining problems: the cleanup of military bases and municipally-owned toxic waste dumps.[70]

4. CERCLA Versus Sustainable Growth

Several groups have raised the following questions: whether CERCLA is given an exaggerated priority within the environmental and national agenda; whether industry is economically strong enough to absorb the CERCLA liability scheme; or whether CERCLA unduly decreases our national competitiveness. However, the speed with which the chemical industry has implemented new technology to eliminate the need of land disposition of hazardous wastes and the rapid development of novel hazardous waste remediation technology have shown that CERCLA has stimulated basic innovation that is of immediate and lasting value to the national economy. This experience is not unexpected.

CONCLUSION

The current debate over CERCLA and the slogans "how clean is clean," "the polluter pays," and "monitoring toxics from cradle to grave" miss an important point: the remedial costs do not automatically stop when construction is completed at a CERCLA site and the site is removed from the NPL. Toxic waste, unlike cadavers, does not biodegrade after it is buried. Buried lead, mercury, DDT, PCBs, and other toxins will persist until they are chemically neutralized.

The present cost accounting procedures ignore the fact that waste storage sites will require perpetual maintenance and testing until someone finds the money to neutralize the toxic chemicals

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[70] The municipal cleanup will involve more than 1,200 of the 80,000 U.S. municipalities and is hampered by lack of funds, as well as the technical competence of the decision makers.

they contain. Waste containment not only defers costs but also increases the total cleanup costs and shifts them to future third parties. Now that the cleanup of the first generation of NPL sites has reached the construction-completed stage, the testing and maintenance of these and other burial sites will rapidly become a major cost factor. The responsibility for future testing, maintenance and abatement costs at containment sites should be resolved before the site is removed from the NPL.

CERCLA has stimulated significant advances in the methodology of risk assessment, the knowledge of the toxicological properties of hazardous chemicals, the implementation of site evaluation methodology, and remedial technology. Innovative remediation methods, such as vacuum extraction of soil and incineration of semivolatile organics, have made chemical conversion of wastes into harmless end products a more practical and attractive remedy than mere containment. The time has come to mandate a shift from waste containment to waste conversion.

The argument that the costs of high cleanup standards and the negligible residual risk interfere with sustainable national growth and the competitiveness of our economy erroneously presumes that costs always increase when cleanup standards are raised. The history of environmental regulation contradicts this assumption and shows that the chemical industry adjusts to regulation by changing process chemistry, process technology and by-products. Such innovation greatly benefits the economy because it opens new markets and breaks monopolies.

The English Alkali Act of 1865 did not cause the economic hardship that had been predicted because it triggered an immediate shift in technology which produced better end-products and higher profits. When the International Joint Commission, set up under the U.S. Canadian Boundary Waters Treaty, forced COMINCO in 1937 to capture sulfur dioxide emission from its copper smelter in Trail, British Columbia, COMINCO did not falter but instead started the manufacture of fertilizer. This business became more profitable than the smelting of ores because the availability of fertilizer made it possible for the Province of Alberta to become one of the world's largest wheat producers.[71] CERCLA and RCRA have already shown many similar direct

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[71] BEAT MEYER, SULFUR, ENERGY AND ENVIRONMENT 230-33 (1976); J. N. Robinson, *The History of Sulfur Dioxide Emission Control at COMINCO, Ltd*, 7B INT. J. SULFUR CHEM. 51 (1972).

and indirect benefits. Thus, DDT and PCBs have been replaced with new generations of better pesticides and insulating fluids, and CERCLA has given industry an incentive to practice pollution prevention.[72] This process could be enhanced if tax laws would be adjusted to encourage research rather than the repair of old plants.[73]

In summary, variances and lenient standards do not enhance industrial competitiveness; what chemical industry needs is firm standards and equitable nationwide and worldwide enforcement to deter unfair competition. The formulation and selection of CERCLA remedies involves a balancing of factors, including legal, economic, chemical, engineering, and toxicological factors, as well as public policy. Therefore, any rational and equitable resolution of issues related to CERCLA requires a comprehensive interdisciplinary and interregulatory approach. Conversely, the only parties who profit from balancing incomplete equations are those who wish to advocate partisan interests. Perhaps the most important task for improving CERCLA and many other environmental problems is to overcome the educational barriers which hamper rational dialogue over interdisciplinary issues such as risk assessment. The EPA and ATSDR are already making valuable contributions to make such interdisciplinary information available to the public.[74]

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[72] Harry Freeman et al., *Industrial Pollution Prevention: A Critical Review*, 42 AIR & WASTE 612, 625 (1992).

[73] *Basic Federal Income Tax Issues Attributable to Environmental Cleanup Costs*, 24 Env't. Rep. (BNA) No. 11, at 478 (July 16, 1993). Incentives could be increased if the tax laws would be adjusted to encourage investment in the application of better process chemistry and to discourage write-offs for fixing obsolete equipment and technology, *id.*

[74] The EPA regularly documents the scientific basis for its proposed rule making and ATSDR's Toxicological Profiles are valuable sources of technical information. *See, e.g.*, 40 C.F.R. § 300, app. A (1992); EPA Principles of Neurotoxicity Risk Assessment, 58 Fed. Reg. 41,556, 41,568 - 578 (1993). Furthermore, the EPA publishes a directory which identifies who holds what knowledge and responsibility. *See, e.g.*, ENVTL. PROTECTION AGENCY, EPA Report 220 B-92-014, ACCESS EPA (1992).