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# Effects of Hazardous Waste Risks on Property Transfers: Legal Liability vs. Direct Regulation

## ABSTRACT

*Given the probable large number of sites contaminated with hazardous wastes, there could be significant benefits from a statutory system that effectively deters future contamination and encourages private remediation of existing sites. We compare the effectiveness of Superfund liability rules with New Jersey's ECRA regulatory program to clean up contaminated sites at the time of property transfers. Our analysis indicates that regulatory delays raise private costs under ECRA relative to Superfund alone, but that external benefits of ECRA cleanup activities are greater as well. Furthermore, it is likely that unmitigated damages are less under ECRA.*

## INTRODUCTION

Many areas of the United States are contaminated by hazardous substances. As of May 31, 1988, EPA's list of hazardous waste sites included 31,000 sites that are potentially in need of treatment.<sup>1</sup> About 1,200 of these sites were listed on, or proposed for, EPA's National Priorities List (NPL),<sup>2</sup> making them eligible for government enforcement action or cleanup under the Superfund remedial action program. The General Accounting Office (GAO) has stated that EPA underestimated the number of sites that may need remedial action. GAO estimated that a minimum of 130,000 sites should be considered potentially hazardous.<sup>3</sup>

The first major national response to the dangers associated with aban-

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\*\*Economics Department, U.S. Naval Academy, and Office of Policy Analysis, U.S. Environmental Protection Agency. Paul Locke and an anonymous referee provided useful comments on earlier drafts. Leila Yim provided research assistance. The views expressed here are those of the authors and are not to be attributed to the Environmental Protection Agency or the Department of the Navy.

1. U.S. Environmental Protection Agency Office of the Administrator, A Management Review of the Superfund Program (1989) (U.S. Government Printing Office 1989-623-682/10263) [hereinafter Management Review].

2. The "National Priorities List," established pursuant to 42 U.S.C. § 9605 (a)(8)(B) (1982 and Supp. V 1987) and codified at 40 C.F.R. Part 300, Appendix B (1987) lists the sites that EPA intends to address by conducting remedial action. See also Management Review, *supra* note 1, at 2.

3. U.S. General Accounting Office, *Superfund: Extent of Nation's Potential Hazardous Waste Problem Still Unknown*, RCED-88-44 (Dec. 1987).

done hazardous waste sites was the passage of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).<sup>4</sup> CERCLA provided the President with authority to make "responsible parties" pay for cleanup of sites contaminated by hazardous substances.<sup>5</sup> It required that EPA compile the NPL, which lists sites in need of remedial action. In addition, CERCLA set up a \$1.6 billion Hazardous Substance Response Fund to support remedial cleanups in cases where responsible parties could not be held accountable, and for responding to emergency situations involving hazardous substances. CERCLA was reauthorized in 1986 with the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA).<sup>6</sup> SARA contains extensive amendments, additions, and revisions to CERCLA. SARA also is designed to raise the Hazardous Substance Response Fund to \$8.5 billion over a five-year period.

Although the Superfund remedial action program has made some progress cleaning up sites, the magnitude of the task is formidable. By spring 1988, 36 sites had been cleaned up, with 26 of those actually removed from the NPL, and remedies were under way at 400 more sites.<sup>7</sup> A recent review of the program notes that:

Superfund [is] the most far-reaching national engineering program ever mounted without the benefit of a single field trial. In such a program, the most important early products must necessarily include learning. In that respect, after nine years of experience the most important lesson may be that the Superfund program faces a workload stretching well into the next century, and would do so even if everything had gone right from the very start.<sup>8</sup>

The process of cleaning up sites through the Superfund program is clearly slow and expensive.

Given the number of potentially contaminated sites and the time and expense involved in cleaning up those sites through the Superfund program, there would be great potential benefits from a system designed to deter future contamination and to encourage companies to undertake cleanup themselves at existing sites. This article examines the effectiveness of Superfund liability rules and a regulatory program adopted by the state

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4. 42 U.S.C. §§ 9601-9675 (Supp. V 1987).

5. Pursuant to 42 U.S.C. § 9607(a), four classes of "responsible parties" are listed: the present owner and operator of the facility; the past owners and operators of the facility at the time of disposal; any person, including a generator, who arranged for disposal or treatment, or arranged with a transporter for disposal or treatment of hazardous substances at the facility; and the transporters of the hazardous substances to the facility.

6. Pub. Law No. 99-499, 100 Stat. 1613 (1986) (codified in scattered sections of 10, 26, 29, & 42 U.S.C.).

7. Management Review, *supra* note 1, at 3, 4.

8. *Id.* at 3.

of New Jersey in motivating environmental cleanups at the time of property transfers. The legislation that defines the Superfund program (CERCLA and SARA) establishes liability rules. These liability rules guide the enforcement actions that the government may take. However, the direct effect of the liability rules on the ability of the government to take enforcement actions exceeds the scope of this article. Instead, the focus here is on the secondary benefits of these liability rules in motivating cleanup at non-NPL sites and the costs that such liability concerns generate.

### METHOD AND LIMITATIONS

This article will outline an approach for evaluating the environmental benefits and costs associated with property transfers under federal liability rules (defined by CERCLA as amended by SARA, hereinafter referred to as "Superfund") and a regulatory approach to property transfers that went into effect in New Jersey in 1984. New Jersey's property transfer program is defined by the Environmental Cleanup and Responsibility Act (ECRA)<sup>9</sup> and its implementing regulations.<sup>10</sup> Ideally, one would compare the value of the contamination either avoided or cleaned up under the two statutes with the costs that are imposed, including cleanup costs, information costs, delay and transactions costs, and costs associated with any resulting market changes. Given the enormous information requirements of such a comparison, this article will explore a second-best approach.

First, the two statutes are described and the incentives to undertake cleanup actions that they create for parties involved in property transfers are analyzed. In addition, currently available information is used to draw inferences about costs and cleanup actions associated with the two statutes. Finally, a framework for a more systematic analysis is developed and suggestions for future research are provided. The inferences and comparisons made here are based on currently available data, published articles, and telephone interviews with environmental auditors rather than on a systematic legal or economic analysis. The purpose is to provide some initial insights and suggest an avenue for future research.

### PROPERTY TRANSFERS UNDER SUPERFUND

CERCLA defines liability based on relationships to the hazardous substances present on a given piece of property. An individual may be held liable if he/she falls into one of the four classes of responsible parties

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9. N.J. Stat. Ann. §§ 13:1K-6-13:1K-13 (West 1989).

<sup>10</sup> N.J. Admin. Code § 7:26B, reprinted in N.J. Reg. 2435(a) (1987).

listed in the statute.<sup>11</sup> Liability under CERCLA is strict, and joint and several.<sup>12</sup> This means that it is not necessary to prove negligence in order to impose liability, and each responsible party may be held liable for the full amount of the response costs,<sup>13</sup> including cleanup costs and damages, regardless of their share in the creation of the damage. CERCLA provides only three limited defenses to liability: (1) an act of God, (2) an act of war, or (3) an act or omission of a third party other than someone whose act or omission occurs in connection with a contractual relationship with the defendant.<sup>14</sup>

Purchasers of commercial and industrial property face the possibility of being held liable for environmental damage caused by previous owners since ownership provides one basis for liability under CERCLA. These purchasers may be eligible for an exemption to liability under the third party defense offered under CERCLA. A major barrier to this third party defense, however, is the requirement that there be no contractual relationship with the person who made the omission. Buyers obviously have a contractual relationship with sellers, and lenders enter into contractual relationships with buyers. Therefore, the third party defense under CERCLA prior to amendment by SARA offered little protection from liability to commercial and industrial property purchasers or to lenders involved in these transfers.

SARA expanded this third party exemption by offering a possible liability exemption to purchasers through the "innocent landowner" provision. Congress expanded the third-party defense by redefining the term "contractual relationship" to provide a defense for real property which was acquired by a purchaser after the placement of the hazardous substances. Purchasers are not liable if they can show that they "did not know and had no reason to know that any hazardous substance, being released or threatened to be released, had been disposed of at that facility" when they acquired the facility.<sup>15</sup>

A prerequisite for obtaining the innocent landowner exemption is that the buyer must conduct an environmental investigation. "[T]he defendant

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11. See *supra* note 4. These classes are referred to generally as "owner/operators," "generators," and "transporters." 42 U.S.C. § 9607(a) (Supp. V 1987).

12. See *United States v. Conservation Chem. Co.*, 14 *Env'tl. L. Rep.* (Env'tl. L. Inst.) 20, 207, 20, 209 (W.D. Mo. Feb. 3, 1984). See generally, Note, *Developments in the Law: Toxic Waste Litigation*, 99 *Harv. L. Rev.* 1458, 1518 (1986).

13. Response costs are defined as the costs associated with responding to a release of a hazardous substance. They include costs of cleanup, enforcement, testing and monitoring, and other costs. See *United States v. Conservation Chem. Co.*, 619 *F. Supp.* 162, 186 (W.D. Mo. 1985).

14. Schwenke, *An Overview of Issues of Landowner and Lender Liabilities*, 18 *Env'tl. L. Rep.* (Env'tl. L. Inst.) 10, 361-64 (Sept. 1988). These defenses are found at 42 U.S.C. § 9607(b) (1982).

15. 42 U.S.C. § 9601(35)(A) (Supp. V 1987). Purchasers also must satisfy the requirements set forth in § 9607(b)(3)(a)&(b) (1982); they must exercise "due care," and take precautions against foreseeable acts or omissions.

(buyer) must have undertaken, at the time of acquisition, all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice in an effort to minimize liability."<sup>16</sup> A key question for commercial and industrial purchasers is the meaning of "all appropriate inquiry." SARA states that when determining whether the requirement for "all appropriate inquiry" has been satisfied, the courts will take into account several factors, including the relationship of the purchase price to the value of the property if contaminated, available information about the property, the obviousness of the presence or likely presence of contamination at the property, and the ability to detect such contamination by appropriate inspection.<sup>17</sup> SARA provides no detailed guidance for determining what constitutes "all appropriate inquiry," such as when or what types of environmental audits are required. Thus, while SARA provides for potential relief from liability, it places a significant burden on buyers to fulfill the "appropriate inquiry" requirements. In addition, buyers are left with a significant amount of uncertainty concerning what constitutes "appropriate inquiry."

Kraakman has recently analyzed a class of regulatory programs that impose collateral liability on private "gatekeepers."<sup>18</sup> Gatekeepers are agents with a personal stake in the behavior of another party who prevent misconduct by withholding support. Under certain circumstances such agents as lending institutions, employers, accountants, and physicians may act as gatekeepers. Superfund liability provides buyers and lenders with an incentive to perform this role. Although they are not the primary parties that caused the contamination or benefited from it, they may be able to enforce cleanup by withholding a purchase offer or loan funds until the contamination has been remedied.

One major issue is whether Superfund liability creates sufficient gatekeeping incentives to clean up a site to the socially optimal level.<sup>19</sup> Ideally, the penalty for inadequate gatekeeping should be equal to the associated loss. The motivation of buyers and lenders to perform the gatekeeping

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16. 42 U.S.C. § 9601(35)(B) (Supp. V 1987).

17. *Id.* For a more detailed discussion of the issue of appropriate inquiry, see Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency, *A Review of Selected Current Practices in Property Transfer Assessments to Define "Appropriate Inquiry" Under the Superfund Amendments and Reauthorization Act (1988)* [hereinafter *Current Practices Review*]. (Prepared by Policy, Planning & Evaluation, Inc., Vienna, Virginia, and ENSR Corporation, Irving, California under EPA contract No. 68-01-7252, October 31, 1988.)

18. Kraakman, *Gatekeepers: The Anatomy of a Third Party Enforcement Strategy*, 2 J. L. Econ. & Org. 53 (1986).

19. The "socially optimal level" is the level of cleanup that would occur if the incremental social costs of cleaning up a site were equal to the incremental social benefits that the cleanup would generate, regardless of the distribution of those benefits. A free market is likely to result in a sub-optimal level of cleanup if the parties who bear the cleanup costs are different from the parties who receive the cleanup benefits and if the costs of negotiating between these two parties is high. The New Palgrave: A Dictionary of Economics 457 (J. Eatwell & M. Milgate eds. 1987).

role effectively may be influenced by such factors as their level of assets, the probability that they will actually be held responsible for cleanup costs and damages, and their ability to benefit from the sellers' failure to cleanup contamination.

In cases in which the buyer is a small enterprise, the firm's total asset value is the effective limit on liability. If assets are less than expected social losses, Superfund liability may provide buyers with inadequate gatekeeping incentives. In these instances, however, lenders may play an effective role in promoting environmental audits and cleanups. Since lenders are typically the "deep pocket" in a transaction involving a borrower (the lender's business partner), they potentially may be held liable for the total social cost of the damage.<sup>20</sup> Recent court cases in which lenders have been held responsible for environmental cleanup costs validate lenders' concerns about an increase in their exposure to risks.<sup>21</sup>

Lenders have, in fact, played an increasingly important role in promoting information collection on environmental contamination in conjunction with property transfers. The Federal National Mortgage Association (Fannie Mae) provides underwriting commitment to loans for multi-unit dwellings only if the lenders have conducted an environmental assessment of the property.<sup>22</sup> In addition, lenders for non-residential commercial property frequently require audits as a condition for loan approval.<sup>23</sup> However, further investigation is required to determine to what extent collection of this information leads to actual cleanup.

In cases of large industrial operations, the buyers themselves are likely to assume the primary role as gatekeeper. This is because some of the very large industrial deals are self-financed. If a lender is involved in such transactions, the lender's risk is somewhat lessened by the fact that the industrial borrower is sufficiently large to cover potential environmental liabilities. In these cases it is more likely that the internal policies of the buyer will determine the degree of monitoring and the terms of agreements about potential cleanup and damage costs.<sup>24</sup>

The effectiveness of both buyers and lenders as gatekeepers depends on whether they perceive themselves as being held responsible for cleanup costs and damages. Buyers and lenders have a strong motivation to assess

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20. McMahon, *Lender Perspectives on Hazardous Waste and Similar Liabilities*, 18 *Envtl. L. Rep. (Envtl. L. Inst.)* 10, 368-71 (Sept. 1988).

21. See e.g. *United States v. Mirabile*, 15 *Envtl. L. Rep. (Envtl. L. Inst.)* 20,992 (E.D. Pa. Sept. 4, 1985); *United States v. Maryland Bank & Trust Co.*, 632 *F. Supp.* 573 (D. Md. 1986). A discussion of these cases and others is found in James, *Financial Institutions and Hazardous Waste Litigation: Limiting the Exposure to Superfund Liability*, 28 *Nat. Res. J.* 329 (1988).

22. *Current Practices Review*, *supra* note 17, at 13.

23. Personal conversations with Tom Duffey and Dean Buss of Camp, Dresser and McKee; Alan Kibler and Bart Jermond of Law Environmental; and Steve Poltorzycke of Arthur D. Little (Sept. 1988.).

24. Personal conversations with Jim Guston of Law Environmental and Steve Poltorzycke of Arthur D. Little (Oct. 1988).

the extent of environmental contamination prior to sale. However, if they believe the damage is too small to actually trigger federal enforcement action, or if they believe they can evade cleanup and damage costs via such protection mechanisms as indemnification, they will lack motivation to ensure actual cleanup.

Finally, the possibility of buyers and lenders sharing the benefits of polluting activities may compromise their effectiveness as gatekeepers. The willingness of sellers to pass along benefits such as a reduced sale price decreases gatekeeping incentives, particularly if the reduced sale price outweighs expected liability.

In addition to incentive problems, reliance on a gatekeeper strategy to promote socially desirable site cleanup has a further limitation. Such a strategy can be effective only for property that is put on the market for sale and, therefore, comes under the purview of buyers or lenders. The higher the turnover in ownership of sites, the greater the potential effectiveness of gatekeeper liability. If a site is contaminated to the extent that the costs of cleanup exceed the profits from sale, its owner may choose to hold on to the site indefinitely. Therefore, the worst sites may not be affected by gatekeeper liability.

CERCLA can provide strong incentives to mitigate the effects of past contamination and to prevent future contamination. Nevertheless, there is reason to think that some sites may remain unmitigated and that incentives to prevent future damage may be weak in some situations. The state of New Jersey has established a direct regulatory program linked to property sales. The next section describes the implementation of the New Jersey ECRA.

### PROPERTY TRANSFERS UNDER ECRA

New Jersey's ECRA went into effect in January 1984.<sup>25</sup> ECRA does not replace Superfund, but defines property transfer requirements that supplement the liability established by federal legislation. ECRA establishes as a precondition to real property transfer that every industrial establishment undergo cleanup, if necessary. Our discussion of the effects of ECRA refers to that program in conjunction with Superfund, since the federal liability rules are still relevant.<sup>26</sup> ECRA applies to establishments

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25. New Jersey Department of Environmental Protection, Hazardous Waste Management, 1988 ECRA Progress Report (1988) [hereinafter ECRA 1988 Report].

26. Although ECRA applies to closures as well as property transfers, in this study we will only discuss the case of property transfers. *Id.* at 5. It should also be noted that ECRA applies to only one subcategory of property covered by CERCLA. CERCLA liability is not limited to any category of property. Therefore environmental problems discovered at commercial, residential, or public sites, as well as industrial sites are subject to Superfund liability rules. Such environmental problems as leaking underground storage tanks at retail service stations in New Jersey are not subject to ECRA regulations, which apply only to industrial sites. *Id.* Like CERCLA, ECRA applies both to on-site contamination and any contamination of neighboring property that originates at the site.



falling into certain major Standard Industrial Classification (SIC) categories, primarily industrial facilities. In addition, the industrial establishments must be engaged in operations involving the generation, manufacture, refining, transportation, treatment, storage, handling, or disposal of hazardous substances and wastes. Finally, the industrial establishments must be closing or transferring the ownership of the property or business, or causing the business to cease operations. All three conditions must be present for ECRA to apply.<sup>27</sup>

ECRA mandates that a site be free of contamination at the time that ownership is transferred.<sup>28</sup> Under ECRA, the seller is required either to submit a "negative declaration," certifying that the site is free of environmental problems, or to develop a remediation plan for the site.<sup>29</sup> This cleanup plan must be approved by the New Jersey Department of Environmental Protection (NJDEP) prior to settlement.<sup>30</sup> The seller must provide financial assurance that the cleanup will be completed.<sup>31</sup> If the seller does not comply with ECRA, it is strictly liable for all cleanup and removal costs.<sup>32</sup> NJDEP oversees all phases of the cleanup plan until it is completed, and is empowered to draw upon the seller's financial assurance if the seller fails to initiate or complete the work as specified.<sup>33</sup> In addition, ECRA has two severe sanctions designed to induce compliance: (1) the buyer or the NJDEP may void the sale of the property if the seller does not comply, and (2) the state may recover penalties and damages of up to \$25,000 per day.<sup>34</sup>

Between January 1, 1984 and June 30, 1988, over 2,200 ECRA cases were resolved—meaning that they reached the point of receiving either a negative declaration or an approved cleanup plan and were therefore cleared for sale.<sup>35</sup> Sixty-three million dollars have either been spent on cleanup or posted in the form of bonds to assure the availability of cleanup funds for the 2,200 resolved sites.<sup>36</sup> An additional 2,100 cases were still active, having not yet received either a negative declaration or approved cleanup plan.<sup>37</sup>

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27. See N.J. Stat. Ann. §§ 13:1K-8, 9 & 11 (West 1989). See also ECRA 1988 Report, *supra* note 25, at 5.

28. N.J. Stat. Ann. § 13:1K-11.

29. N.J. Stat. Ann. § 13:1K-9.

30. N.J. Admin. Code tit. 7, § 268-51(c) (1987).

31. N.J. Stat. Ann. § 13:1K-9(a)(2).

32. N.J. Stat. Ann. § 13:1K-13(a).

33. N.J. Admin. Code tit. 7, §§ 268:6.2(e).

34. N.J. Stat. Ann. § 13:1K-13. See also ECRA 1988 Report, *supra* note 25, at 5.

35. Information provided by Terri Smith of the Bureau of Environmental Evaluation and Cleanup Responsibility Assessment (Sept. 1988).

36. *Id.*

37. Information provided by Terri Smith of the Bureau of Environmental Evaluation and Cleanup Responsibility Assessment (Oct. 1988).

While ECRA has induced a significant amount of actual or planned cleanup, the program has also imposed significant costs. All of the sites that are deemed to fall under the purview of ECRA are required to have an environmental audit, although not all of these audits require testing.<sup>38</sup> ECRA also requires payment of fees to the NJDEP.<sup>39</sup> These fees fund New Jersey's oversight role in the cleanup process, which had a budget of about \$5 million in fiscal year 1988.<sup>40</sup> The fees do not cover the actual audit and cleanup costs.

ECRA fees vary significantly, depending on the extent of the audit and the amount of cleanup required.<sup>41</sup> For example, a site that requires an audit without any sampling is estimated to incur a fee of \$1,600.<sup>42</sup> A site that requires an audit that includes groundwater monitoring and a cleanup of \$500,000 is estimated to incur fees of \$20,100.<sup>43</sup> If these companies were small businesses (defined as fewer than 100 full time employees), the estimated fees would be reduced to \$250 and \$18,850, respectively.

Delays related to the ECRA rules impose additional costs. From its start, ECRA has had problems with backlogs of cases and has been criticized for delays.<sup>44</sup> Although the program has greatly expanded and delays have been reduced, they are still an important factor. ECRA cases are divided into three categories: high environmental concern (HEC), medium environmental concern (MEC), and low environmental concern (LEC). It currently takes a minimum of 18 months to clear an HEC case, an average of six months to clear an MEC case, and 60-90 days for an LEC case.<sup>45</sup>

Delays may be reduced by obtaining extensions, or by obtaining an Administrative Consent Order (ACO). ACOs were designed to circumvent the problems caused by ECRA delays. Under an ACO the seller enters a legal agreement with the NJDEP that he or she will comply with ECRA and must provide financial assurance equal to the estimated level of the cleanup.<sup>46</sup> NJDEP estimates cleanup costs from the site and site history

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38. Information provided by Joseph Fallon, Chief, Bureau of Environmental Evaluation and Cleanup Responsibility Assessment (Nov. 1988)

39. ECRA 1988 Report, *supra* note 25, at 7.

40. N.J. Admin. Code tit. 7, § 268:1:10 (1987).

41. In calculating these fees, we assume that the following fees would apply: \$1,400 for the initial review notice and \$200 for the negative declaration review. N.J. Admin. Code tit. 7, § 268:1:10.

42. In calculating these fees, we assumed that the following fees would apply: \$5,400 for initial notice review with a sampling plan including groundwater monitoring, \$500 sampling plan data review, \$6,000 to review the cleanup plan, \$8,000 to oversee the cleanup, and \$200 for the negative declaration review. N.J. Admin. Code tit. 7, § 268:1:10.

43. Olson, *ECRA: New Jersey's Cleanup Statute*, 17 *Envtl. L. Rep.* (Envtl. L. Inst.) 10,395-99 (1987).

44. T. Smith, *supra* note 35.

45. N.J. Admin. Code tit. 7, § 26:b-7.

46. ECRA 1988 Report, *supra* note 25, at 13.

information applicants provide. Once the ACO is signed, the transaction may be completed. A fee of \$1,000 is charged for ACO applications, and the average processing time for them is three weeks.<sup>47</sup>

Although an ACO allows a transaction to proceed, final disposal of the ECRA application can take years in some cases. Such delays greatly complicate the industrial real estate market where transactions are traditionally made in a 60-day period.<sup>48</sup> Unfortunately, a recent study of these delays was flawed by failure to account for administrative consent orders.<sup>49</sup> A careful assessment of the costs ECRA imposes on property transfers must reflect administrative practices that ameliorate delays.

### COMPARISON OF STRUCTURE AND INCENTIVES UNDER SUPERFUND AND ECRA

An apparent difference between Superfund and ECRA is the locus of the incentive to investigate potential environmental problems. Under ECRA the seller is required to investigate the extent of the environmental damage and is held liable for damages and cleanup costs. Under Superfund, buyers and lenders have the incentive to investigate in order to protect themselves from liability. In reality, however, both the buyer and the seller may have an incentive to investigate the extent of environmental damage under both sets of rules.

While the seller has the responsibility of conducting the required ECRA audit, it is in the seller's interest for the audit to reveal that the site is clean. In order to ensure that the audit is objective or accurate, the buyer or the lender may hire his/her own environmental consultant to verify the results of the seller's audit. An accurate environmental assessment is important to buyers and lenders because ECRA approval does not absolve them from future liability. Some lenders in New Jersey contract for a verification directly, or require the buyer to do this as a condition of the loan.<sup>50</sup>

Under Superfund, buyers and lenders are motivated to conduct environmental assessments to protect themselves from liability; however, sellers may wish to conduct their own audits prior to putting the property up for sale. This allows them to assess the extent of the environmental damage and to conduct a cleanup in advance of sale, if desired. This strategy may prevent sellers from having to make costly concessions to buyers in the form of indemnification, a reduction in price, or a fast

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47. Guston, *supra* note 24.

48. D. Marino & M. Jurkat, *Land Use Impacts of New Jersey Environmental Cleanup Responsibility Act Legislation in Urban Industrial Transition Areas*, Department of Management, Proj. 12, Stevens Institute of Technology (1989).

49. Fallon, *supra* note 38.

50. Guston, *supra* note 24.

cleanup at the time of sale. That type of behavior is especially likely at industrial sites, when the seller suspects the presence of environmental damage.<sup>51</sup>

ECRA is a direct regulatory approach unlike Superfund, which relies on voluntary actions motivated by liability concerns. ECRA requires sellers to meet specified information and cleanup standards. Cleanups under ECRA are subject to the approval and supervision of the NJDEP.<sup>52</sup> In transfers not subject to ECRA, but in which the buyer and/or lender are motivated to protect themselves from potential liability under Superfund, no external authority requires or supervises a cleanup. This leaves more leeway for sellers, buyers, and lenders to work out their own solutions to environmental concerns. When an environmental problem is discovered, negotiations between the involved parties may result in a variety of solutions, including a division of liabilities based on the results of a site investigation, an indemnification for all or part of the environmental liability costs, a reduction in the price of the property, or the creation of a source of funds to cover future environmental liability.

Both Superfund and ECRA may create an incentive to retain highly contaminated sites. If the estimated cost of cleanup exceeds the gains from the sale of the property, then it may be in the seller's interest to hold onto the site rather than conduct a cleanup and sell the property. Conversely, knowledge of contamination could motivate owners to sell property sooner than they otherwise would. Such a response would be rational if future cleanup costs were expected to rise and contamination could be concealed from potential buyers and state officials. However, such an attempt to evade cleanup costs is not likely to succeed because liability may not be sold under CERCLA and an ECRA approval does not exempt the seller from future liability.

The institutional complexity of these two programs tends to obscure comparisons of advantages and disadvantages. The following section describes a somewhat simplified, formal framework for comparing their net benefits.

### A FRAMEWORK FOR QUANTIFYING NET BENEFITS

Both ECRA and Superfund have effectively changed the legal and economic context of commercial and industrial property transactions. The ideal approach for evaluating the impact of these changes would be to

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51. ECRA 1988 Report, *supra* note 25, at 7. Under ECRA parties are required to cleanup according to standards identified by the state. However, buyers or sellers engaged in cleanup to avoid future Superfund liability are not subject to any oversight. Therefore, there is less assurance that a total cleanup is undertaken.

52. Deadweight losses are costs incurred without any offsetting benefits. H. Varian, *Intermediate Microeconomics* 291 (1990).

quantify the net benefits of actual regulatory programs. Initially, it would be useful to identify differences in the regulatory regimes that might lead to unambiguous qualitative differences in net benefits. Such a comparison is undertaken here as a means of identifying areas for future research.

With some simplification, the following model captures important differences between the Superfund and ECRA programs. Let subscripts  $s$  and  $e$  refer respectively to Superfund and ECRA. Designate the probability that a given commercial or industrial site will be sold in a given period in the absence of hazardous waste regulations as  $\pi_0$ . Let the probabilities that the same site will be sold under Superfund and ECRA regulations be  $\pi_s$  and  $\pi_e$ , respectively. Such a transaction will occur if the joint, private net benefits to the buyer, seller, and lender,  $\beta$ , are greater than cleanup and transactions costs. Hence the values of  $\pi_s$  and  $\pi_e$  are functions of these costs. To simplify notation these arguments are suppressed in the following discussion. Designate the conditional probabilities that the site will subsequently be cleaned up under each program as  $p_s$  and  $p_e$ .

The expected cost of cleanup is then

$$(1) \pi_r p_r C_r(q, f_r) \quad \text{for } r = s, e$$

where cleanup cost,  $C_r$ , is a function of the total amount of waste at or emanating from the site,  $q$ , and the fraction  $f_r$  that is cleaned up. The extent to which the programs precipitate actual cleanups also differs. The more stringent regulatory requirements of ECRA should cause  $p_s < p_e = 1$  (if  $q$  exceeds some maximum standard). Assume for the present that ECRA results in cleanup to the given standard, while Superfund may yield less than complete cleanup under some circumstances, so that  $f_s \leq f_e = 1$ .<sup>53</sup>

Total expected private costs to all parties to the transaction,  $C^p_r$ , also include expected transactions costs,  $T_r(q', p_r)$ , and deadweight losses related to deterred sales.<sup>54</sup>

$$(2) C^p_r = \pi_r p_r C_r(q, f_r) + \pi_r T_r(q', p_r) + (\pi_0 - \pi_r) \beta$$

where  $T_s < T_e$  and  $q'$  is the expected amount of waste. Transactions costs vary with  $q'$  because monitoring requirements are stricter for sites with a history that indicates a potential problem. Environmental audits are a requirement under ECRA and are commonplace under Superfund as well.<sup>55</sup>

53. Personal conversations with Tom Duffey and Dean Buss of Camp, Dresser and McKee; Alan Kibler and Bart Jermond of Law Environmental; and Steve Poltorzycke of Arthur D. Little (Sept. 1988). We abstract from such complicating factors as the toxicity of the particular waste, the nature of the exposure paths, and how many people are exposed.

54. *Supra* note 42. Parties to a transaction under Superfund are not required to report information on contamination or cleanup activities to either state or federal agencies.

55. See, e.g., Harris & Raviv, *Some Results on Incentive Contracts with Applications to Education and Employment, Health Insurance, and Law Enforcement*, 68 *Am. Econ. Rev.* 1, 20-30 (1978); B. Holmstrom, *On the Theory of Delegation in Bayesian Models in Economic Theory* (M. Boyer & R. Kihlstrom, eds. 1984).

In addition to audit costs, ECRA requires fees to be paid to the state of New Jersey and generates costs through delays and additional paperwork requirements. The costs of such delays can be significant. These costs are larger if cleanup actually takes place, so transactions costs are also a function of the probability of cleanup. The fact that both cleanup and transactions costs are likely to be higher under ECRA implies that  $\pi_s > \pi_e$ .

Expected unmitigated damage,  $U_r$ , from environmental exposure to hazardous waste at or emanating from the site arises when regulations deter a sale and cleanup that otherwise would have taken place, and when a sale takes place but no cleanup occurs or cleanup is incomplete.

$$(3) U_r = (\pi_o - \pi_r) \cdot p_r \cdot D(q) + \pi_r \cdot (1 - p_r) \cdot D(q) + \pi_r \cdot p_r \cdot (1 - f_r) \cdot D(q)$$

where monetized damages  $D$  are a function of the quantity of waste.<sup>56</sup>

Assuming that  $p_e = f_e = 1$ , the second and third terms are equal to zero for ECRA.

The expected social benefit,  $B_r$ , of each regulatory program is the sum of external benefits.

$$(4) B_r = \pi_r \cdot p_r \cdot f_r \cdot D(q) + \pi_r \cdot V_r$$

and  $V_r$  is the social value of information about exposure. Information about the quantity and nature of the wastes at a site and exposure patterns may enable affected individuals to take evasive or mitigating action to reduce damages. If such actions are undertaken, then such information is valuable. Both Superfund and ECRA appear to be successful in generating information about potential environmental contamination problems at the time of property transfer. An important difference is that this information is made public as part of a regulatory process under ECRA, but may remain confidential under Superfund.<sup>57</sup> Assume for simplicity that environmental audit data is not made public under Superfund regulations, so that  $V_e > V_s = 0$ .

Administrative or enforcement costs have not been explicitly modeled. ECRA is financed by the fees collected under the program. Including the administrative costs would result in a double-counting of costs. Superfund liability concerns do not entail any direct administrative costs; however, aggressive enforcement efforts at existing NPL sites increase the probability that liability concerns will motivate cleanup at non-NPL sites during property transfers. For the purposes of this analysis, assume that the level of enforcement effort at NPL sites is independent of the secondary benefits of the cleanup induced at non-NPL sites, and that it is not possible to attribute a share of these enforcement costs to those secondary benefits.

56. We abstract from such complicating factors as the toxicity of the particular waste, the nature of the exposure paths, and how many people are exposed.

57. Parties to a transaction under Superfund are not required to report information on contamination or cleanup activities to either state or federal agencies.

TABLE I

## Benefits and Costs of Regulatory Programs Affecting Real Estate Transactions

	<i>Superfund</i>	<i>ECRA</i>	<i>Superfund &lt;&gt; ECRA</i>
Private net benefits of sale	$\beta - C_s - T_s$	$\beta - C_e - T_e$	>
External benefit of cleanup	$f_s D$	$D + V_e$	<
Private deadweight losses	$(\pi_s - \pi_e)\beta$	$(\pi_s - \pi_e)\beta$	<
Unmitigated external damage	$[(\pi_s - \pi_e)p_s + \pi_s(1 - p_s f_s)]D$	$(\pi_s - \pi_e)D$	>(?)

Table I compares the various components of net social benefit between programs and indicates likely relative magnitudes. The relative magnitudes are unambiguous for private net benefits, deadweight losses, and external benefits from cleanup. Private net benefits must be positive in order for a sale to take place, and for identical properties, cleanup costs are at least as large under ECRA as under Superfund, while transactions costs are clearly greater under ECRA. External benefits of a cleanup are higher under ECRA than Superfund because under ECRA a full cleanup is required ( $f_e = 1$ ) and information about the extent of contamination is made available to the public.

Given the assumptions, the relative magnitudes of unmitigated damage under ECRA and Superfund are ambiguous. Unmitigated damage occurs under ECRA only when the costs of the ECRA program discourage sales from taking place. In contrast, unmitigated damage has three sources under the Superfund program: discouraged sales, sales with no cleanup, and sales with partial cleanup. Although the relative magnitudes are ambiguous, it is likely that unmitigated damage is greater under Superfund unless the level of discouraged sales is quite large under ECRA.

This analysis indicates that private costs are unambiguously higher under ECRA, but that external benefits of a given cleanup are greater as well. In addition, it is quite likely that unmitigated damages are less under ECRA. Although this provides a clear picture of how the two programs compare on costs and benefits individually, the fundamental questions as to which program has greater net benefits is ambiguous. In short, it appears impossible to evaluate which program is more efficient without empirical estimates.

While this study provides some insights into the effects of liability under ECRA and Superfund on commercial and industrial property transfers, it clearly raises more questions than it answers. Resolving these questions will require gathering data on the value of damages avoided through cleanup and full cost information, including costs of environmental audits, legal costs, cleanup costs, fees, delay costs, and infor-

mation on the number of transactions discouraged because of potential cleanup and transactions costs. The amount of cleanup actually resulting from Superfund liability concerns is another important area for further investigation.

Although the information requirements of a complete analysis of the costs and benefits associated with Superfund and ECRA are severe, further analysis is possible. This study relied on available data, published articles and phone interviews with environmental auditors. While environmental auditors were useful in identifying the types of information being collected at the time of property transfers and the key players requesting this information, they provided only limited insight into what types of deals were being made based on audit information. Additional attempts to gather information on the extent to which liability concerns under Superfund are resulting in actual cleanup might utilize interviews with attorneys involved in commercial and industrial property closings.

This study has not addressed the effect of these programs on waste generators who alter their behavior in anticipation of a future sale of the property. Neither has it specifically discussed possible regulatory concerns with environmental auditors, although they have been given increasing responsibility under both programs. The principal-agent literature indicates potential problems of structuring incentives and monitoring compliance of such agents.<sup>58</sup> Both of these issues are important areas for future investigation.

A future study might also develop case studies for comparable industrial sites in New Jersey and in states without ECRA requirements. These case studies would compare both costs incurred and actual cleanup that takes place, and might provide insight into the impact of delays under ECRA. The ECRA program creates a wealth of information on transactions in New Jersey, including all the transactions that take place for property potentially under the purview of ECRA as well as information on the actual cleanup required at these sites. This information could form the basis for an evaluation of the net benefits of the program. Performing a similar analysis on sites in other states lacking comparable information on transactions could pose a greater challenge.

The many contaminated sites in the United States and the time and money it has taken to clean them up under the Superfund program indicate that there are large potential gains from motivating private agents to undertake such cleanup on their own. Superfund's liability rules may be one way of achieving this goal. However, New Jersey has chosen to supplement Superfund liability with a regulatory approach requiring industrial site owners to undertake necessary cleanups prior to the sale of

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58. See, e.g., *supra* note 55.



the property. The analysis indicates that both the extent of cleanup and the magnitude of the costs will be higher under ECRA than under Superfund alone because cleanup is actually required under ECRA. Without ECRA, buyers and sellers may negotiate such mutually advantageous solutions as indemnification schemes or discounting the selling price. Costs are even higher under ECRA because of the additional delays and fees caused by state involvement in the transaction. ECRA may also discourage sales from occurring in New Jersey.

While the framework presented here highlights the differences between Superfund and ECRA and identifies additional benefits and costs associated with the New Jersey program, these benefits and costs have not been quantified. Quantification is necessary to assess whether additional benefits more than compensate for additional costs under ECRA. A complete assessment of ECRA and Superfund awaits further research to estimate the net benefits of each approach.