Rethinking Risk-Based Environmental Cleanup†

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I. INTRODUCTION

Sixty years ago the Printer's Row area just south of the Loop in Chicago was dominated by a mix of industrial and commercial properties including, as its name implies, a large number of printing companies.[1] While the area was thriving, it is

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1. Printing House Row, as it is formally known, is located in the center of a large commercial and industrial region just south of the Chicago Loop that developed shortly after the Great Fire of 1871. CITY OF CHICAGO, PRINTING HOUSE ROW DISTRICT: PRELIMINARY SUMMARY OF INFORMATION 1 (rev. ed. 1983). As the land uses of the region became differentiated, the State Street area just east of Printer's Row developed into a commercial retail district with the establishment there of such stores as Marshall Field's, while the LaSalle Street area to the west emerged as the city's financial center. *Id.* The area bordering Printer's Row to the south became dominated by railroad yards and the newly constructed Dearborn Station

likely that some of its inhabitants were also polluting. Although there were no laws like Superfund[2] back then, the inks and thinners used by printers would be considered hazardous and their release into the environment would be subject to cleanup today. Since that time Printer's Row has gone through an unanticipated change. First, shortly after World War II the printing companies began to leave the city[3] and by the 1960s the area became almost completely derelict.[4] Recently, however, a new wave of residents has come to the area and it has been reborn.[5] The various printing houses have been turned into residential lofts, and accompanying commercial uses—such as the café I am writing this Article in at the moment—have joined the loft operations to create a thriving community. In short, the ability to change the industrial buildings to residences has revitalized the area.

There are, of course, numerous areas in cities around the country that have experienced similar changes. One wonders what Printer's Row would look like today if fifty years ago—a time when no one would have likely thought that Printer's Row would be anything but printing houses—printing companies were allowed to clean the hazardous substances they had released by removing some of the toxins and then pledging not to change the use of their property to anything but industrial use. This concern is a reality today as environmental regulators begin considering a new cleanup program that will have such an effect.

The new use-restricted cleanup paradigm is the latest of the cost-saving devices that have come to dominate the skyline of environmental regulation. While traditional cleanup under the Comprehensive Environmental Response Compensation and Liability Act of 1980[6] ("CERCLA") generally protected health and the environment by requiring full detoxification or removal of contaminants at a site,[7] use-restricted

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Railroad Terminal. *Id.*

2. Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, 42 U.S.C. §§ 9601-9675 (1994 & Supp. IV 1998).

3. CITY OF CHICAGO, *supra* note 1, at 8. The reasons for this departure were varied:

> After World War II, photo offset began to replace the traditional letterpress printing method. The new heavier presses created a substantial strain on the floorload of the older buildings, causing many printers to move to one-story concrete structures. Additionally, the narrow streets of the district could no longer handle the volume of truek traffic needed to supply paper to the speedily productive offset presses. These changes in technology as well as a more advantageous tax situation prompted many companies to relocate to the suburbs. Parallel to this trend was the decline of the railroad as the nation's primary transportation system. With the boom of the airline industry, the Dearborn Street Station gradually ceased to be a major transportation facility.

Id. at 8-9.

4. *Id.* at 9.

5. One of the main influences on this revitalization was the transformation of the railroad yards on the south end of Printer's Row. *Dearborn Park Construction Starts: First Families to Move In Next Fall*, DEARBORN PARK NEWS (Dearborn Park Corp., Chicago, Ill.), Fall 1977, at 1, 8. This area had, like Printer's Row, fallen into disrepair by the early 1970s. *Cf. id.* at 1. In 1977, however, ground was broken for the development of Dearborn Park, a planned 3000 unit development intended to provide affordable housing to middle-class minorities. *Id.*

6. 42 U.S.C. §§ 9601-9675.

7. *See infra* note 11 and accompanying text.

cleanup pairs reduced removal or detoxification of materials at a contaminated site with a limitation of use ensuring that the site will not be used in ways that will expose people to the remaining contaminants.[8] By ensuring that property will be used only for the types of uses that carry with them limited exposures to contaminants—primarily industrial and commercial—more contamination can be left in the ground while the same level of health protection can be maintained. The use-restricted cleanup program thus aims to protect the same amount of health for less cost.

The new cleanup paradigm restricts property use through two different means. First, the program predicts the future use to which property will be put.[9] Second, it requires that the property use be legally restricted to ensure that it does not change to an unanticipated use in the future.[10] Cleanup, in turn, is done only to the level required by the anticipated future use.

This Article provides both a specific critique of existing programs and a general analysis of the policy concerns and tools necessary to implement a proper use-restricted cleanup program. First, it argues that there are no means available for either predicting or legally restricting the use of property as required by existing use-restricted cleanup programs. As a result, the use of partially cleaned property may change in an unanticipated way, resulting in greater exposure to contaminants and greater harm to human health than is currently allowed by law. While existing use-restricted programs fail to protect human health and the environment, the cost savings associated with restricted cleanups are substantial.

This Article thus also considers ways to implement properly a cleanup regime that considers future land use. It concludes that while there is no way to create a "pure" use-restricted cleanup program, regulators can protect health and the environment at substantial cost savings by internalizing potential future costs into current cleanup expenditures and focusing on cleaning property in the future instead of restricting its use. A number of examples of how this can be accomplished are considered.

The Article is organized in the following way. First it considers the traditional cleanup paradigm and the criticisms of its cost-effectiveness. It then introduces the concept of use-restricted cleanup, describing the way in which it responds to these criticisms.

Next, it turns to the Environmental Protection Agency's ("EPA") use-restricted program as an example of the new use-restricted cleanup regimes; analyzing the requirements that property use be predicted and proscribed in a manner that ensures use will not change in the future and, ultimately, examining the way in which current land-use prediction techniques and law fail to satisfy these needs. Finally, the Article turns its attention to alternative means for accomplishing use-restricted cleanup while satisfying the policy concerns implicated by the inability to predict and restrict property use.

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8. Different uses of property carry with them different routes of exposure to contaminants. With residential use, for example, we can assume that children may live at the property and eat or disturb contaminated soil while playing in it. Regulators would not assume a similar exposure for property being used for industrial purposes.

9. *See infra* Part II.B.

10. *See infra* Part II.B.

II. THE CHANGING TREND IN SITE REMEDIATION

A. The Existing Cleanup Program: Full Cleanup at Substantial Cost

Under CERCLA[11] and state Superfund statutes[12] remediation of toxic wastes has traditionally been accomplished by removing them from the environment, destroying or reducing their toxicity, or sealing them in place. The preference for this treatment method arose from a general concern that environmental laws not create a vicious cycle of inadequate disposal leading to new contaminated sites.[13] Such a cleanup further satisfied the requirement that once cleaned, land should be available for any type of post-remediation use whether that be industrial, residential, agricultural, or even recreational.[14]

This traditional cleanup paradigm has come under increased attack in recent years. In particular, critics of the existing paradigm argue that in a world of limited resources the money spent on such complete cleanups is wasteful and frequently unnecessary.[15] Justice Stephen Breyer captures much of this criticism with an example in his frequently cited book on risk-based regulation, *Breaking the Vicious Circle*:

> The first [example] comes from a case in my own court, *United States v. Ottati & Goss*, arising out of a ten-year effort to force cleanup of a toxic waste dump in southern New Hampshire. The site was mostly cleaned up. All but one of the private parties had settled. The remaining private party litigated the cost of cleaning up the last little bit, a cost of about $9.3 million to remove a small amount of highly diluted PCBs and "volatile organic compounds" . . . by incinerating the dirt. . . . [W]ithout the extra expenditure, the waste dump was clean enough for children playing on the site to eat small amounts of dirt daily for 70 days each year without significant harm. Burning the soil would have made it clean enough for the children to eat small amounts daily for 245 days per year without significant harm. But there were no dirt-eating children playing in the area, for it was a swamp. Nor were dirt-eating children likely to appear there, for future building seemed unlikely.[16]

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11. *See, e.g.*, 42 U.S.C. § 9621(b) (1994) (giving preference to remedial actions "in which treatment which permanently and significantly reduces the volume, toxicity of mobility of the hazardous substances, pollutants, and contaminants is a principle element").

12. *See generally* Linda K. Breggin et al., *State Superfund Programs: An Overview of the Environmental Law Institute's (ELI's) 1998 Research*, ALB. L. ENVTL. OUTLOOK, Winter 1999, at 1.

13. John S. Applegate & Stephen Dycus, *Institutional Controls or Emperor's Clothes? Long-Form Stewardship of the Nuclear Weapons Complex*, 28 Envtl. L. Rep. (Envtl. L. Inst.) 10,631, at 10,639 n.88 (Nov. 1998).

14. *See id.* at 10,639.

15. *E.g.*, STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE 11-19 (1993); Richard L. Revesz & Richard B. Stewart, *The Superfund Debate*, *in* ANALYZING SUPERFUND: ECONOMICS, SCIENCE, AND LAW 3, 14-16 (Richard L. Revesz & Richard B. Stewart eds., 1995); Gerald W. Phillips, *Rethinking Restoration: Risk Based Corrective Action and the Future of Economic Regulation*, 16 N. ILL. U. L. REV. 659, 660-63 (1996).

16. *See* BREYER, *supra* note 15, at 11-12 (footnotes omitted).

As Breyer's single example makes abundantly clear, traditional cleanup programs, particularly with their emphasis on making property clean enough to be used for any purpose, can result in exorbitant expenditures of resources for the protection of little, if any, further public health.[17]

B. The New Program: Protecting Health at Substantial Cost Savings

In the wake of the criticisms of the first generation of cleanup programs, a new remediation paradigm has arisen. According to this new vision, remediation goals are achieved by limiting exposure to hazardous substances instead of by removing them or decreasing their toxicity.[18] By limiting exposure one can maintain the same amount of protection of human health and the environment without undertaking costly removal efforts.[19]

The devices used to limit exposure to hazardous substances left in the ground are called institutional controls.[20] Institutional controls are restrictions on the use of land.[21] They are put in place to "ensure that the actual use to which such a site is put after cleanup is compatible with the level of cleanup completed."[22] Institutional controls can be very narrow and restrictive, such as prohibiting entry to an area with a fence, or restricting the use of contaminated groundwater. They can also be broad, such as restricting particular activities or classes of activities on or near a site.[23] As a general matter, institutional controls now play an important role in the remediation process. According to the National Contingency Plan ("NCP"), EPA "expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants."[24] Indeed, at EPA, institutional controls are now considered an integral component of a complete remedy.[25] While they are usually combined with active protections that actually

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17. Katherine D. Walker et al., *Confronting Superfund Mythology: The Case of Risk Assessment and Management*, *in* ANALYZING SUPERFUND: ECONOMICS, SCIENCE, AND LAW, *supra* note 15, at 25, 39-40.

18. *See* 42 U.S.C. § 9621(b) (1994).

19. *See* David F. Coursen, *Institutional Controls at Superfund Sites*, 23 Envtl. L. Rep. (Envtl. L. Inst.) 10,279 (May 1993); *see also* Applegate & Dycus, *supra* note 13, at 10,639-41.

20. Although not explicitly allowing for the use of institutional controls, CERCLA recognizes that remedial actions may "result[] in . . . hazardous substances . . . remaining at the site." 42 U.S.C. § 9621(c).

21. Coursen, *supra* note 19, at 10,279.

22. John Pendergrass, *Use of Institutional Controls as Part of a Superfund Remedy: Lessons from Other Programs*, 26 Envtl. L. Rep. (Envtl. L. Inst.) 10,109, at 10,110 (Mar. 1996).

23. Coursen, *supra* note 19, at 10,279.

24. 40 C.F.R. § 300.430(a)(1)(iii)(D) (2000).

25. The regulatory language states: "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 of residuals and untreated waste." *Id.* § 300.430(a)(1)(iii)(C).

remove contaminants or reduce their toxicity, institutional controls can now be the sole component of a complete cleanup where active measures are determined to be impracticable.[26] One recent review of CERCLA records of decision has shown that institutional controls were used in thirty-three of the forty-two states reviewed.[27]

One specific means of limiting exposure ties the required level of cleanup of a property to the property's expected future use. Different uses of property result in different potential routes and durations of exposure to hazardous substances. For example, with residential use, children may play in the soil over a substantial portion of their childhood and be exposed to contaminants in the soil throngh dermal contact, inhalation of contaminants when soil is disturbed, or by ingesting soil. Similarly, agricultural use may result in significant exposure through both dermal contact and inhalation as contaminants are released when the soil is disturbed. Industrial use, on the other hand, is not likely to give rise to the same number of exposure routes because frequently any contamination will be covered over by concrete floors or asphalt driveways and most work is usually done inside a building.[28] Finally, recreational users may be exposed to contaminants through a number of routes, but their exposure will be limited to the times that they are in the recreational area.[29]

Limiting property's use may significantly limit the exposure to contamination that results.[30] For example, while residential property is likely to have a significant number of exposure pathways of long-term duration, industrial property may not. By ensuring that contaminated property could not be used for residential purposes in the future, a potentially responsible party ("PRP") would be able to leave more contamination in the ground without causing greater risk to human health or the environment simply because that same amount of contamination will not be exposed to man or nature in any meaningful amount.[31]

Substantial support for this type of land-use-restricted cleanup can be found in a

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26. The NCP states:

> [T]he use of institutional controls shall not substitute for active response measures (e.g. treatment and/or containment of source material, restoration of groundwaters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of a remedy.

Id. § 300.430(a)(1)(iii)(D).

27. Applegate & Dycus, *supra* note 13, at 10,461 n.110.

28. For a general analysis of exposure pathways, see James T. Hamilton & W. Kip Viscusi, *Human Health Risk Assessments for Superfund*, 21 ECOLOGY L.Q. 573, 585-889 (1994).

29. *E.g.*, OFFICE OF ENVTL. MGMT., U.S. DEP'T OF ENERGY, DOE/EM-0283, CHARTING THE COURSE: THE FUTURE USE REPORT 13 fig.6 (1996) (describing seven land-use categories and their exposure pathways).

30. For a general analysis of the rationale behind linking land use and cleanup, see ROBERT HERSH ET AL., LINKING LAND USE AND SUPERFUND CLEANUP: UNCHARTERED TERRITORY (1996).

31. Professor John Applegate has noted that "[i]n practice, the great divide in exposure values (and hence risk) falls between commercial or industrial exposures and residential or agricultural ones, mostly as a result of differences in duration and intensity of contact with soil and ground water." John S. Applegate, *Risk Assessment, Redevelopment, and Environmental Justice: Evaluating the Brownfields Bargain*, 13 J. NAT. RESOURCES & ENVTL. L. 243, 271-72 (1998).

study of risk assessments[32] of seventy-eight different CERCLA sites undertaken by Professors James T. Hamilton and Kip Viscusi.[33] The study analyzed the risks to human health and the environment created by contaminated sites. One principle guiding the risk assessments undertaken at these sites strongly encouraged the assessors to consider the risk that would arise if the property were to be used in the future for residential purposes.[34] The study found that the vast majority of risks created by the hazardous sites were not to existing users of the property. Rather, the greatest risks fell on potential future users of the property if the use was changed to residential. The authors conclude:

> Consideration of the risk assessments for Superfund sites indicates . . . that it is not the existing risks that are most salient. Rather, the dominant risks arise from future risk scenarios that generally involve alternative uses of the land. Indeed, these future risks account for 90% of all the risk-weighted pathways for the Superfund sites in our sample. Chief among these future risks is that of future residents living on-site. The underlying assumption driving the EPA risk analyses is that there will be new residential areas on existing future Superfund sites where there are currently no such residential areas.[35]

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> [The NCP] require[s] that a site-specific baseline risk assessment be conducted to "characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bioaccumulating in the food chain."
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> . . . .
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> The baseline risk assessment begins with the collection of site data, including samples taken to determine chemical concentrations at the site and to identify the potential chemieals of concern. Next an *exposure assessment* is conducted, where the risk assessor analyzes the contaminant data from the site, identifies exposed populations, determines petential exposure pathways, and estimates exposure concentrations and intakes by pathway. During the *toxicity assessment*, the next step, the analyst collects qualitative and quantitative information on the toxicity of the chemicals at the cite, often using information from EPA's Integrated Risk Information System (IRIS). Finally, the information on exposure and toxicity is combined in *risk characterization models* to estimate cancer risks and noncancer hazard quotients for the chemicals and exposure pathways at the sites.

James T. Hamilton & W. Kip Viscusi, *The Magnitude and Policy Implications of Health Risks from Hazardous Waste Sites*, *in* ANALYZING SUPERFUND: ECONOMICS, SCIENCE, AND LAW, *supra* note 15, at 55, 58-59 (emphasis in original) (quoting 40 C.F.R. § 300.430(d)(4) (2000)).

33. Hamilton & Viscusi, *supra* note 32, at 57.

34. EPA has stated that

> [b]ecause residential land use is most often associated with the greatest exposures, it is generally the most conservative choice to make when deciding what type of alternative land use may oceur in the future. Assume future residential land use if it seems possible based on the evaluation of the available information.

1 OFFICE OF EMERGENCY AND REMEDIAL RESPONSE, U.S. ENVTL. PROT. AGENCY, EPA/540/1-89/002, RISK ASSESSMENT GUIDANCE FOR SUPERFUND: HUMAN HEALTH EVALUATION MANUAL (PART A) 6-7 (1989).

35. Hamilton & Viscusi, *supra* note 32, at 78.

It, of course, follows from this analysis—and Professors Hamilton and Viscusi argue—that the majority of risks associated with a site could be eliminated simply by restricting the use of the site to nonresidential purposes.[36] That is, without spending any money to remove contaminants or decrease their toxicity, literally ninety percent of all potential health and environmental impacts could be avoided simply by ensuring that property could not be used as a residence in the future.[37] Restricting use in conjunction with remediation of contamination that threatens health and nature based on the way property is currently used could thus result in the same amount of health and environmental protection as removal and detoxification but at much less cost. Indeed, one author has reported that adoption of a commercial instead of residential use in one study showed a tenfold difference in the amount of contaminants that did not need to be removed and could instead be left in the soil.[38]

Land-use considerations were first used by states in promoting the development of brownfields.[39] "[B]rownfield[s] [are] best defined as 'abandoned or underutilized urban land and/or infrastructure where expansion or redevelopment is complicated, in part, because of known or potential environmental contamination.'"[40] One of the

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36. Hamilton & Viscusi, *supra* note 28, at 609.

37. In the use-restricted cleanup context, the institutional control that will be used to limit exposure is the land-use restriction. Restricting land use may be accomplished through a number of different means such as restrictive zoning, easements, and restrictive covenants. For a detailed analysis of the legal tools used to restrict land use and their viability, see *infra* Part III.B.

38. Applegate & Dycus, *supra* note 13, at 10,639 n.96. Similar results were found in a comparison of cleanup under the Resource Conservation and Recovery Act of 1976 ("RCRA"), 42 U.S.C. §§ 6901-6992 (1994 & Supp. IV 1998), when risk-based corrective action ("RBCA") was considered:

SITE	ORIGINAL REMEDIAL COST ESTIMATE	REMEDIAL COST AFTER RBCA
Pesticide Formulator	$40,000,000	$0
Solvent Recovery	$2,000,000	$0
Wood Treatment	$1,000,000	$0
Fuel Oil Storage	$600,000	$100,000
Refinery	$2,000,000	$500,000

Michael L. Gargas & Thomas F. Long, *The Role of Risk Assessment in Redeveloping Brownfields Sites*, *in* BROWNFIELDS: A COMPREHENSIVE GUIDE TO REDEVELOPING CONTAMINATED PROPERTY 214, 227 tbl.2 (Todd S. Davis & Kevin D. Margolis eds., 1997), *reprinted in* Applegate, *supra* note 31, at 274.

39. Applegate, *supra* note 31, at 271 (stating that Brownfields cleanups have placed increased reliance on land-use considerations).

40. Joel B. Eisen, *"Brownfields of Dreams"?: Challenges and Limits of Voluntary Cleanup Programs and Incentives*, 1996 U. ILL. L. REV. 883, 890 (1996) (quoting OFFICE OF TECHNOLOGY ASSESSMENT, U.S. ENVTL. PROT. AGENCY, STATE OF THE STATES ON

major obstacles to the development of brownfields is the high cost of cleanup associated with them. This cost frequently makes the development of a brownfield economically unfeasible as it increases the costs significantly above the costs of development of uncontaminated property. States have responded to the high cost of cleanup with a number of initiatives including low-interest loans, tax credits, tax incentives, and brownfields grants.[41] The federal government too has responded to this concern with the Brownfields tax incentives component of the Taxpayer Relief Act.[42] This program offers significant tax savings and other incentives to make brownfields redevelopment more attractive.[43]

Recently, a number of states have turned to land use considerations as a means of further reducing the costs of redeveloping brownfields.[44] Similarly, EPA, recognizing the value of such programs to decrease obstacles to such cleanup, has recommended considering actual land use in its own brownfields action agenda.[45] The perceived success of employing land use considerations in brownfields remediation has led to their rapid adoption for use in situations where liable parties, responsible for all costs of cleanup, do exist.[46]

EPA, Congress, and a growing number of states, have quickly adopted the new cleanup paradigm as an effective cost-saving measure to be employed in all

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BROWNFIELDS: PROGRAMS FOR CLEANUP AND REUSE OF CONTAMINATED SITES 1 (1995)).

41. *See generally* Linda K. Breggin & John Pendergrass, *Voluntary & Brownfields Remediation Programs: An Overview of the Environmental Law Institute's 1998 Research*, 29 Envtl. L. Rep. (Envtl. L. Inst.) 10,339 (June 1999), WL 29 ELR 10339 (describing the variety of tools used by states to respond to the Brownfields problem).

42. 26 U.S.C. § 198 (Supp. IV 1998).

43. Tara Burns Koch, Comment, *Betting on Brownfields—Does Florida's Brownfields Redevelopment Act Transform Liability into Opportunity?*, 28 STETSON L. REV. 171, 188-89 (1998).

44. *See* Breggin & Pendergrass, *supra* note 41, at *11; *see also* David L. Rieser, *A Practical Approach to Brownfields: An Overview of TACO and the SRP*, 86 ILL. B.J. 262 (1998) (discussing the Illinois rule that allows consideration of actual land use in remediating brownfields).

45. Koch, *supra* note 43, at 188 (noting that the EPA action agenda includes considering actual future land use in determining the remediation level required for that site).

46. It is not the intent of this Article to directly consider the policy implications of factoring land use into cleanup standards for brownfields redevelopment. While many of the arguments made herein are relevant to brownfields programs—particularly concerns regarding the ability of regulators to respond to future problems when land use changes in an unanticipated manner—the general equities of brownfields policy are distinct from those of cleanup when PRPs are identified. By their nature, brownfields are abandoned properties where development is unlikely due to the inability to find liable parties to clean the property. *See* Eisen, *supra* note 40, at 898 (noting that the problem is that nonliable parties do not want to assume the liability that comes with cleaning and owning property). The key to brownfields redevelopment is thus to create incentives for nonliable parties to clean a dirty property rather than develop a clean one. Without overcoming this initial obstacle, property will remain unused in any productive manner. This is not the case with cleanups where PRPs have been identified. There the question is not whether a cleanup will be done but "how clean is clean." In these cases concerns about internalizing the costs of cleanup into the costs of the activities creating contamination, as well as issues of equity, dominate.

environmental cleanups. Recent congressional attempts to reform CERCLA would require consideration of land use in remedy selection.[47] Even absent an express congressional mandate, EPA has already implemented land-use-restricted cleanup under CERCLA. A directive to regional offices from EPA's Office of Solid Waste and Emergency Response ("OSWER") directs that future use of land be given important consideration in determining the appropriate extent of remediation.[48] The OSWER directive explicitly recognizes the recent criticism of CERCLA cleanup costs, noting that EPA has been criticized for too often assuming that future use will be residential, a use that carries with it the greatest potential for exposure.[49] The directive thus strongly supports factoring future use into the choice of remedy. By incorporating future land use into CERCLA remedy selection, the directive aims to ensure that the most "practicable and cost-effective remedial alternatives" are developed and considered in the cleanup process.[50] Similarly, a number of states have adopted or are considering employing land-use restrictions in cleanups pursuant to their own state Superfund laws.[51]

The idea of how hazardous wastes are remediated is thus currently going through a drastic change. Rather than emphasizing removal or decontamination, regulators now consider whether exposure can be limited. In many cases limiting exposure will be accomplished simply by restricting the use of property. By ensuring that property is not used in a manner that will increase exposure, the amount of contamination that needs to be removed to protect human health and the environment will be minimized with substantial cost savings to PRPs.

III. FAILURE OF THE CURRENT LAND-USE-RESTRICTED PROGRAM

A. The Current Process for Restricting Land Use

The key to the success of land-use-restricted environmental cleanups is to allow them to be done ouly in situations where the use of the contaminated property will not

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47. H.R. 1300, 106th Cong. § 401(a)(2)(A) (1999) ("For purposes of selecting the method or methods of remediation appropriate for a given facility, the President shall identify the current and reasonably anticipated uses of land, water, and other resources at and around the facility and the timing of such uses.").

48. OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, U.S. ENVTL. PROT. AGENCY, OSWER DIRECTIVE NO. 9355.7-04, LAND USE IN CERCLA REMEDY SELECTION PROCESS 2 (1995), 1995 WL 457568 [hereinafter OSWER DIRECTIVE], *summarized in* 60 Fed. Reg. 29,595 (June 5, 1995). The process set out by the OSWER directive is considered *infra* at Part III.A.

49. *Id.* at *3.

50. *Id.* at *2.

51. Breggin et al., *supra* note 12, at 3, 6 (noting that a number of states have adopted a tiered approach to establish cleanup standards); Kenneth J. Pokalsky, *Reforming New York State's Superfund*, ALB. L. ENVTL. OUTLOOK, Winter 1999, at 32, 33 (proposing legislation that would allow cleanup requirements to be based on site-specific risk factors, which include the intended use of the property after remediation); James P. O'Brien, *The Tiered Approach to Corrective Action Objectives and the Site Remediation Program in Illinois*, 27 Envtl. L. Rep. (Envtl. L. Inst.) 10,611 (Dec. 1997).

change to an unanticipated use with greater exposures. If such a change did occur to a type of use with greater exposures than those anticipated, the cleanup would not be protective of human health.[52] Generally, use-restricted cleanup programs attempt to accomplish this task by both predicting the future use of a property and proscribing all other uses of it.[53] The EPA regime will serve as an example. The first element of the regime requires EPA to predict how a property may be used in the future.[54] I will refer to this as the predictive element of the regime. By identifying future uses, the predictive element allows regulators to determine the associated exposures to which the cleanup must respond.[55] The future use determination thus becomes the key to selection of the appropriate remedy for the site. It will be used to determine the amount and type of cleanup to be done, if any.

The future-use component plays another role in the use-restricted cleanup regime. Not only does it determine the uses that a property will be put to, but it also plays a part in ensuring that property use will not change in the future.[56] Simply put, if one knows that property will be used only for industrial purposes in the future, then one need not worry that the use will change to a type that will result in greater exposure to contaminants. If one has analyzed future use correctly, then market forces alone will continue to ensure that the property use does not change. Thus the predictive element of the regime both identifies the anticipated uses of property and helps to ensure that once the property is "clean," its use will not change.

Currently, EPA is directed to predict future use based on a variety of factors, including the land's current uses, local zoning laws, accessibility of transportation and public utilities, historical development patterns, cultural factors, the location of dangerous or environmentally sensitive geographical features, and environmental-justice concerns.[57] EPA is directed, however, not to let the determination of future use

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52. *Contra* 42 U.S.C. § 9621(d)(1) (1994) ("[R]emedial actions . . . shall attain a degree of cleanup . . . which assures protection of human health and the environment.").

53. For a general analysis, see Applegate, *supra* note 31, at 280-82 (establishing the prediction-control distinction and arguing that both prediction and control of future use can be flawed).

54. OSWER DIRECTIVE, *supra* note 48, at *3.

55. *Id.*

56. *Id.* at *5-6.

57. *Id.* at *4-5. The directive states that sources and types of information that may aid EPA in determining the reasonably anticipated future land use include, but are not limited to current land use; zoning laws; zoning maps; comprehensive community master plans; population growth patterns and projections (e.g., Bureau of Census projections); accessibility of site to existing infrastructure (e.g., transportation and public utilities); institutional controls currently in place; site location in relation to urban, residential, commercial, industrial, agricultural, and recreational areas; federal/state land-use designation (federal/state control over designated lands range from established uses for the general public, such as national parks or state recreational areas, to governmental facilities providing extensive site access restrictions, such as Department of Defense facilities); historical or recent development patterns; cultural factors (e.g., historical sites and Native American religious sites); natural resources information; potential vulnerability of ground water to contaminants that might migrate from soil; environmental justice issues; location of on-site or nearby wetlands; proximity of site to a floodplain; proximity of site to critical habitats of endangered or threatened species; geographic and geologic information and location of wellhead-protection areas, recharge areas, and other

"become an extensive, independent research project."[58] Instead, it is directed to rely on existing information as much as possible along with input from local planning authorities and the public.[59] Regulators will use this information to develop a future land-use determination. If they are "highly uncertain" of future use, then regulators are directed to develop a range of reasonably likely future land uses.[60] However, in most situations the directive anticipates that regulators can reach a specific conclusion about future use with certainty.[61] Indeed, if a site is currently used for a particular purpose, is in an area zoned for that use, and the comprehensive plan predicts the site will continue to be used for that purpose, the directive states that regulators can be certain that the land will be used for that purpose alone in the future.[62] Similarly, when the public and land-use agencies are in agreement over future use, EPA is directed that such agreement will ensure the certainty of the future land-use determination.[63]

The predictive element is to be used in conjunction with a second element of the current regime that requires the use of institutional controls to "prevent an unanticipated change in land use that could result in unacceptable exposures to residual contamination."[64] I will refer to this as the proscriptive element of the regime. Once the future use of a site is determined, cleanup levels of the site will be keyed to the determined future use of the property.[65] Although predicting future use alone should ensure that property use does not change in the future, regulators will still have to use institutional controls to ensure that future use does not, in fact, change. The OSWER directive envisions the use of a variety of institutional controls to accomplish this task. It identifies the types of institutional controls that may be used and the requirements for their success:

> [I]nstitutional controls will play a key role in ensuring long-term protectiveness and should be evaluated and implemented with the same degree of care as is given to other elements of the remedy. In developing remedial alternatives that include institutional controls, EPA should determine: the type of institutional control to be used, the existence of the authority to implement the institutional control, and the appropriate entity's resolve and ability to implement the institutional control. An alternative may anticipate two or more options for establishing institutional controls, but should fully evaluate all such options. A variety of institutional controls may be used such as deed restrictions and deed notices, and adoption of land use controls by a local government. These controls either prohibit certain kinds of site uses or, at a minimum, notify potential owners

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areas identified in a state's comprehensive ground-water protection program. *Id.* at *4-5.

58. *Id.* at *4.

59. *Id.*

60. *Id.* at *5-6.

61. *Id.* at *4.

62. *Id.* at *5.

63. *Id.* ("Where there is substantial agreement among local residents and land use planning agencies, owners, and developers, EPA can rely with a great deal of certainty on the future land use already anticipated for the site.").

64. *Id.* at *7.

65. The directive recognizes that in some situations, cleanup to a particular land-use level may not be cost effective or practicable, and thus allows for cleanup to be done to lesser levels than those required for future use in those situations. *Id.* at *6.

> or land users of the presence of hazardous substances remaining on site at levels that are not protective for all uses. Where exposure must be limited to assure protectiveness, a deed notice alone generally will not provide a sufficiently protective remedy. While the ROD need not always specify the precise type of control to be imposed, sufficient analysis should be shown in the FS and ROD to support a conclusion that effective implementation of institutional controls can reasonably be expected.[66]

Thus, the EPA program is built on two elements intended to ensure that property will not be used in unanticipated ways: first, by predicting the future use of properties, and second, by ensuring that, even if a change in use is desired by the property owner in the future, it cannot be achieved after the cleanup. This, in turn, will assure that humans will not be exposed to residual contamination at levels that impact health.

B. The Current Process Cannot Predict or Proscribe Land Use

As with all use-restricted cleanup programs, the current EPA use-restricted cleanup program's success hinges on the ability to restrict property to particular uses through a combination of predictive and proscriptive means. This section of the Article, however, argues that future property use cannot be predicted, nor can it be proscribed. As a result, current use-restricted cleanup regimes fail to protect public health. The inability to predict or proscribe future property use also carries significant policy implications for use restricted cleanup in general. These concerns are considered in the following section's argument for a revised use-restricted cleanup scheme.

1. Long-Term Future Use Cannot Be Predicted

While agency guidance seems to treat the issue passingly,[67] it is simply impossible to predict accurately the future use of property. For example, the process for determining future use of land set forth in the OSWER directive considers factors similar to those used by land-use planners in creating land-use plans.[68] Analysis of land-use planning techniques will thus provide useful insights into the limitations on the ability of even the most thorough planning process to predict future use.

A large and varied group of factors affect the use of property. The main factors that influence future property use are employment and population. "[P]lanners believe that changes in local and regional employment drive population changes, that population changes drive changes in the demand for housing, and that changes in employment and housing drive changes in many types of local land uses."[69] Thus, the number of people and jobs in the area are the most important factors in determining how land

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66. *Id.* at *8.

67. *See supra* text accompanying note 58 (noting that the future use determination should not become an "extensive independent research project").

68. "Comprehensive plans, sometimes known as 'general' or 'master' plans . . . plan for the physical development of the community. They are future-oriented and project the development of a community to a future point in time or a future point in the community's growth." DANIEL R. MANDELKER, LAND USE LAW 77-78 (4th ed. 1997).

69. LARZ T. ANDERSON, GUIDELINES FOR PREPARING URBAN PLANS 101 (1995).

is used. Other factors, such as the property's proximity to transportation as well as the location and types of available utilities and community services will also significantly impact property use. For example, planners will consider the quality of educational facilities, existence of recreational and cultural outlets, number of religious institutions, proximity of hospitals, and level of public safety in determining whether property may be used for residential purposes.[70] In addition to community institutions and services, the potential use of land can be affected by the regulatory policy of the local government. For example, a policy of restricted growth will put more pressure on existing structures to adapt to the needs of the community.[71] On the other hand, some municipalities may create tax abatements for certain uses of property, thus creating an incentive for their creation.[72] Finally, the character of the land will also affect how it is used. Considerations such as the land's basic geology, drainage features, and topography are all relevant to the land's ability to be used for different functions.[73] For example, property may not have the drainage or geology to support the construction of large commercial buildings.

Determining future use requires planners to gather information on planned changes in employment and population, as well as all other relevant factors, such as planned institutional development or changes to infrastructure and to determine how these changes will influence land use in the future. Predicting future population and employment trends is accomplished through gathering a wide variety of data and applying this data to a predictive model.[74] The types of data used in forecasting population, for example, include the following:

> records of historical population growth in the study area; zoning and density constraints; records of historical population growth in similar geographical areas or in larger ones of which the study area is a part; crude birth and death rates; age-sex population breakdowns; fertility rates; and symptomatic data. . . . such as . . . tax returns, voter registration, school enrollment, telephone installations, utility meter connections, [and] occupancy permits issued . . . .[75]

This information is then applied to one of a number of potential future population models in order to determine future population trends.[76] Once future trends in

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70. *Id.* at 69-70.

71. Such a policy may include a limitation on building permits given per year.

72. For example, a municipality may give tax abatements to commercial uses for a period of time in hopes of bringing employment opportunities and a larger future tax base to the community.

73. ANDERSON, *supra* note 69, at 58-59.

74. *See generally* MICHAEL R. GREENBERG ET AL., LOCAL POPULATION & EMPLOYMENT PROJECTION TECHNIQUES (1988).

75. *Id.* at 7-8.

76. Population change involves three separate components: births, deaths, and migration. Models can consider these directly or focus on other indicators:

> Models that consider the separate effects of each of these components are known as component models. Component models require comprehensive and detailed data sets which are usually not available at the local government scale. Models that directly use the net effects of the three components are noncomponent models. Because of data limitations, most models that project population at scales

population and employment are forecast, planners must then consider how these factors will both affect, and be affected by, potential changes in all other relevant factors and ultimately determine how these changes will influence housing needs in the particular area.

On its face this process, although cumbersome, seems a viable means for the prediction of future property use. However, in the context of use-restricted cleanup, there are a number of reasons why the process fails to adequately accomplish this task. The most basic problem is, of course, the fact that the data necessary to predict future population and employment is not usually available or is inadequate. For example, planners recognize that "[t]he quality of employment data varies greatly."[77] Factors that will influence the quality of data include legal mandates that may restrict information provided by employers and the fact that most small employers, the major source of employment in most regions, are not required to report statistics to the various agencies that gather this data.[78]

Similarly, "[t]he quality and availability of basic population information are quite variable."[79] This is particularly the case when attempting to project population for small geographical areas, which requires the use of data compiled at the municipal level.

> Symptomatic data, which are utilized at county and local levels, are usually maintained by various public agencies for their own purposes. As such, the data are much more subject to bias, gaps, inaccuracies, or sudden changes in recording procedures that make their use for another purpose—population estimates and

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below the state scale are noncomponent models.

Noncomponent models may be based on past patterns of net population growth or they may relate net population growth to indicator information, such as changes in housing or voter registration. Noncomponent methods lack detailed age-sex breakdowns which are useful in planning for schools, community services, and different types of housing units. Overall, it is desirable, though not always possible, to consider the three components of population change separately and combine, not average, their effects. This is particularly true for mid- and long-range projection periods because the forces driving births, deaths, and migration may not be correlated.

Id. at 6.

77. *Id.* at 153; *see also* ARTHUR C. NELSON, ESTIMATING LAND USE AND FACILITY NEEDS 1-7 (1996) (noting the differences in various employment and population data and the difficulty of determining which set to use).

78. See GREENBERG ET AL., *supra* note 74, at 153. Agencies that gather this information include the Bureau of the Census, U.S. Department of Commerce (*County Business Patterns* and *Economic Census*); Bureau of Labor Statistics, U.S. Department of Labor (*Employment Earnings, Employment & Wages* and *Monthly Labor Review*); and a variety of local agencies. *Id.* at 189-95.

79. *Id.* at 8. The different groups that provide population information include state population centers usually affiliated with a major university; offices of labor or economic development in state departments of commerce; regional planning agencies; utility companies; the Bureau of the Census; the Bureau of Economic Analysis, U.S. Department of Commerce; Woods & Poole (a private firm that generates socio-economic projections for up to 50 years); and regional councils of government. NELSON, *supra* note 77, at 2-3.

projections—difficult. [80]

An example of how the differences in quality and type of information can affect projections has been cited by the authors of one text:

> A case in point is a controversy noted by the New York Times (20 June 1976) between the Federal Bureau of the Census and the New Jersey Department of Labor and Industry. Federal estimates, which work from the national totals down to the county level, showed a loss of 84,000 persons in eight counties in the northern part of New Jersey from 1970 to 1974. The Bureau of the Census' method was based on births, deaths, employment totals, and school enrollment figures. New Jersey State's figures, based on a summation of minor civil division estimates, indicated a gain of 93,000 persons in those same counties during the same period. The state's method was based on births, deaths, utility connections and residential building permits.[81]

Thus, an analysis of similar factors using federal information on the one hand and information from municipal subdivisions on the other resulted in completely different information on historical population growth. While it is impossible to determine which source is correct, the conflict in these population determinations highlights the types and magnitude of differences that may result in projections due to information problems.

Further exacerbating the information limitations, and perhaps the most significant obstruction to valid prediction of the future use of property, is the long period of time such predictions must account for.[82] The hazardous substances found at Superfund sites vary in the degree of ease with which they will move through soil or groundwater. Some materials, such as volatile organic compounds, can be separated from soil or water relatively easily, while others are hard to separate from the media to which they are attached. These contaminants cannot be easily leached out of the soil or diluted by percolating rainwater and thus will remain in high concentrations at a site for a long period of time. Moreover, man-made impediments such as parking lots or buildings, intended to decrease exposure to contaminates by insulating them from human contact, will further limit the ability of groundwater or rainwater to either attenuate or dilute contamination over time. Parking lots or buildings, for example, will stop rainwater from percolating through the ground and, in essence, act as a shield for the contamination below. The result is that contamination left at such sites will remain there at high levels for long periods of time.

As land-use planners recognize, long-range projections of land uses are unreliable for the simple reason that the further into the future you project, the greater the uncertainties about the factors that will influence future property use become.[83] For example, in the future local legislators may decide to build a cultural center or park complex and regulators may decide to build new roads near a property or extend a

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80. GREENBERG ET AL., *supra* note 74, at 8.

81. *Id.* at 9.

82. Applegate, *supra* note 31, at 282 (noting that the ability to predict or control land over long periods of time may be extremely problematic).

83. ANDERSON, *supra* note 69, at 16, 102.

commuter railway.[84] All of these things may in turn affect the desirability of a potential site to be used as residential property. The individuals who will make such decisions in the future may not be elected and, in some cases, may not even be born at the time a regulatory determination of the future use of contaminated property is made.

Moreover, the long-term nature of the decision in the use-restriction context also limits the accuracy of predictive population and employment models over time.[85] Such models cannot be used for making long-term predictions because they only summarize past data. They do not measure or identify the underlying causal factors that influence population growth.[86] These analyses are thus ouly good predictive tools as long as such things as the demographics, wealth, and taste of the underlying populations do not change.[87] For example, a recent unprecedented trend of families and individuals moving back into cities has sparked the redevelopment of a large number of industrial properties for residential use.[88] Factors such as long-term economic prosperity or a desire of working people to decrease their time commuting to and from work may have, in turn, influenced this trend. Predictive models cannot foretell these types of future changes. Thus population and economic projections over long periods of time are of little value for purposes of predicting future property use.[89] One final aspect of the planning process further exacerbates the problem of predicting future land use. While extrapolations from data may be potentially useful when considering the land uses of a large geographical area—for example the land uses of an entire city or region—determining future trends for a small geographical area is impossible. As one well-regarded planning text explains:

> [S]mall areas are more difficult [to project future land use for]. . . . [D]ata [are]

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84. *Id.* at 124 (noting that conditions can change quite rapidly and often).

85. EDWARD J. KAISER ET AL., URBAN LAND USE PLANNING 124-268 (4th ed. 1995).

86. *Id.* at 128 ("The basic problem with all trend extrapolation models is that they do not measure or identify underlying causal forces. The model only summarizes the net effect of many forces acting on population for the past period for which the model is calibrated.").

87. NELSON, *supra* note 77, at 2-16; *see also* GREENBERG ET AL., *supra* note 74, at 2 (noting that population projections are built on assumptions that may or may not come true).

88. Peter Behr, *Tax Cuts: Seeds of a Dilemma: If the Local Economy Slows, D.C. Could Face Difficult Choices*, WASH. POST, July 5, 1999, at F25; Anthony Flint, *New Attitude: Boston Is Growing on a Fresh Appreciation for City Living*, BOSTON GLOBE, May 23, 1999, at A1; John Handley, *Urban Revival: Downtown Residential Rebirth Isn't Just a Chicago Phenomenon*, CHI. TRIB., Nov. 1, 1998 (Real Estate), at 1; Kenneth R. Harney, *Tax Law Change Gives Boost to Home Sales: The Nation's Housing*, L.A. TIMES, Jan. 24, 1999, at K1; John Laidler, *As Suburbs Build Out, Luster Returns to Cities*, BOSTON GLOBE, June 27, 1999 (Northwest Wkly. ed.), at 1; Patricia J. Mays, *Atlanta Suburbanites Beginning to Move Back into the Center of City*, CHI. TRIB., Oct. 6, 1998 (Evening Update ed.), at 2, LEXIS, News Library, CHTRIB File; Carlos Tejeda, *For Many City Dwellers, Home Values Finally Head Up*, WALL ST. J., Aug. 12, 1999, at B1.

89. Land-use planners account for these limitations by creating a variety of projections based on different potential changes in these underlying factors. Land-use planners then choose the projection based on the factors they deem most likely to occur. Should such changes not occur, planners provide a certain amount of flexibility to change their plans. *See infra* notes 92-94 and accompanying text.

> more difficult to obtain [and] the dynamics of small areas are also much more volatile and difficult to predict. Movement in and out of the area is greater as a percentage of the population or employment; the closing or opening of a single large firm might change employment significantly.[90]

Because of these concerns, plans for small area—particularly long-range plans—are often met with skepticism by the planning community.[91]

Thus, any claim that one can determine the long-term future use of a specific property, or even the land-use needs of the particular neighborhood in which that property is located, must be discounted, if not completely disregarded, based on limitations inherent in the land-use planning process. The decision required to be made under the current EPA cleanup process implicates a substantial number of planning-process limitations. Not only does it generally rely on a variety of factors for which there is no valid information, but also it is a decision regarding long-term future use of a very small geographical area. The idea that such future use can be accurately predicted for purposes of a use-restricted cleanup is thus simply a myth.

While land-use planners can account for limitations in their ability to predict future use, environmental regulators cannot. Planners account for the aforementioned limitations by restricting the duration of their long-range plans and revisiting their projections regularly. At most, land-use planners do not consider it possible to predict land uses for more than twenty to thirty years into the future[92] and thus limit their long-range plans to this time period. Even the twenty- or thirty-year period, however, is cousidered too long for planning purposes and thus it is recommended that planners gather new information on land use at five-year intervals to update their analyses.[93] Indeed, recognizing the limitations in their models, planners create a number of different "projections," all of which are plausible, based on different presumptions. Plans are built on the most likely set of projections. However, the planning process is itself made intentionally flexible so that when new information is received or assumptions proved false, the plan can be adjusted accordingly. Planners also have begun simply to create plans that endure for a period shorter than the twenty to thirty years associated with long-range plans. "This approach helps avoid planning errors arising from inaccurate projections. These so called 'middle-range' plans are now

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90. KAISER ET AL., *supra* note 85, at 118.

91. GREENBERG ET AL., *supra* note 74, at 118. Similar observations have been made regarding the ability to project population and employment:

> Population and employment projections have been most accurate when extended by only five, ten or fifteen years into the future. Longer-run extensions . . . must be regarded as grossly speculative. Forecasting populations, especially of small areas, beyond fifteen years ideally requires an encyclopedic knowledge of the national, regional, and local socioeconomic, political, and physical environments, combined with a large measure of imagination. The difficulty of assembling this combination of attributes . . . [has] resulted in a dearth of long-range projections.

Id. at 2.

92. *Id.* at 2, 117.

93. ANDERSON, *supra* note 69, at 2, 13 (noting that "[a]s times change, economic conditions change; social values and priorities change," thus requiring planners to gather new information and update their plans regularly).

common."[94]

This type of flexibility is not available in the context of use-restricted cleanup. The future-use determination will affect the level of cleanup required of a site and will also establish the types of uses to which the site will be proscribed. In essence, the future-use determination "locks in" the use to which property can be put. Any attempt to revise the land use once a cleanup is completed, if possible, would require regulators to bring a completely new response action against PRPs[95] and, at the least, would require a complete reuse of resources to revise and implement a remedy consistent with a new land use.[96] Interestingly, this is the exact problem sought to be avoided by regulators in their initial decision to require cleanups that would allow for any land use.[97]

The inability to predict future use ensures that the desired use of a substantial number of restricted properties will actually change to a use unanticipated by regulators. This, of course, is not to suggest that every property subjected to a use-restricted cleanup will change its use in an unanticipated manner. There are properties, such as the swamp land identified by Justice Breyer in his argument for risk-based cleanup,[98] that are more likely than others not to change their use.[99] However, Justice Breyer's argument is based in part on the assumption that similar certainty regarding future use can be established for all contaminated properties.[100] As this section suggests, this presumption is simply not the case. Advocates of use-restricted cleanup must take account of the potential impacts that will result from

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94. MANDELKER, *supra* note 68, at 78. Thus, once a future-use determination is made and cleanup completed, EPA will not be able to change its land-use determination without significant consequences.

95. The OSWER directive recognizes that where a cleanup is complete, regulators have limited authority over the site and may be required to take a new response action to require further cleanup. OSWER DIRECTIVE, *supra* note 48, at *8. The directive states:

> If landowners or others decide at a future date to change the land use in such a way that makes further cleanup necessary to ensure protectiveness, CERCLA does not prevent them from conducting such a cleanup as long as protectiveness of the remedy is not compromised. (EPA may invoke CERCLA section 122(e)(6), if necessary, to prevent actions that are inconsistent with the original remedy.) In general, EPA would not expect to become involved actively in the conduct or oversight of such cleanups. EPA, however, retains its authority to take further response action where necessary to ensure protectiveness.

Id. at *9.

96. *See* Applegate & Dycus, *supra* note 13, at 10,639-40.

97. *Id.*

98. *See supra* note 15 and accompanying text.

99. Adam M. Finkel, *A Second Opinion on an Environmental Misdiagnosis: The Risky Prescriptions of Breaking the Vicious Circle*, 3 N.Y.U. ENVTL. L.J. 295, 314-15 (1995). Consider, however, that many properties are built on swamp land. Indeed, Justice Breyer's claim that the swamp property in *United States v. Ottati & Goss, Inc.*, 900 F.2d 429 (1st Cir. 1990), was not going to be used for residential purposes has itself been questioned. *See* Finkel, *supra*, at 314-15 (noting that during his confirmation Justice Breyer was questioned regarding his claim due to the fact that the Ottati property was actually zoned residential and thus might have been used for residential purposes).

100. Finkel, *supra* note 99, at 313.

these unanticipated changes. Currently, the EPA program deals with this potential occurrence by requiring that property use be legally restricted so that if such a change is desired, it cannot be accomplished without the consent of the parties holding the use restriction.[101] However, as this next section argues, there is no viable legal means for restricting use as required by EPA and other use-restricted cleanup programs.[102]

2. Future Use Cannot Be Proscribed

Neither CERCLA nor the RCRA contain provisions creating a program for the restriction of land uses by EPA or state environmental agencies.[103] Regulators must instead turn to a variety of existing legal and other devices to accomplish the goal of controlling land use as part of a permanent cleanup. Generally, there are four main categories of institutional controls: (1) governmental controls which rely on regulatory authority of a state or local government to proscribe property use; (2) enforcement tools;[104] (3) proprietary controls, which rely on state property law to proscribe use; and (4) nonenforceable informational devices.[105] In the context of use-restricted cleanup, these devices would be used to ensure that property use not be changed once a cleanup to a level consistent with a particular use is completed.

a. Governmental Institutional Controls

Governmental institutional controls are those that involve a government using its sovereign powers to impose restrictions on citizens or sites under its jurisdiction.[106] Governmental institutional controls are imposed and enforced by local and state governments by way of their police powers. Generally, governmental institutional controls involve "restrictions in respect of the use and occupation of private lands."[107]

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101. *See supra* notes 64-66 and accompanying text.

102. *See infra* text accompanying notes 103-38; *see also infra* text accompanying notes 193-200 (questioning whether restricting use is the best means for dealing with unanticipated changes in property use). Moreover, recent data suggests that a number of areas now dominated by industrial use will likely undergo changes to residential use over time. *See infra* text accompanying notes 194-201; *see also* Christopher P. Harris, Land Use Ratios 1992: A Trend Analysis (unpublished manuscript, on file with the Am. Planning Ass'n, Chicago, Ill.). Based on his reviews of data from sixty-six American cities, Harris concludes that "the amount of land used by industrial firms peaked in the late 1970s or early 1980s" and has started to decline. Harris, *supra*, at 22. For example, in large cities industrial land use dropped from twelve percent in 1983 to ten percent in 1992, while in small cities industrial use dropped from eight percent in 1983 to seven percent in 1992. *Id.* at apps. 2-3.

103. In contrast, CERCLA does provide the agency with the ability to take a temporary easement on neighboring property to allow equipment being used in the remediation of property to pass over the property. *See* 42 U.S.C. § 9604(e), (j) (1994).

104. Although enforcement tools are generally used by a government agency, they differ from governmental controls in that they are not regulatory. Examples of enforcement tools are consent decrees and administrative orders. *See* Coursen, *supra* note 19, at 10,280.

105. These categories are established and defined further in Coursen, *supra* note 19, at 10,280-82.

106. *Id.*

107. *Id.* (citing Vill. of Euclid v. Amber Realty Co., 272 U.S. 365, 386 (1926)).

The governmental control most likely to be employed to restrict property use is zoning.[108] Under zoning ordinances, the local government can delineate what activities are allowed for a particular piece of property. For example, a zoning body can "zone" a piece of contaminated property as "industrial" use, thus restricting its ability to be used for other purposes such as residential.

Governmental institutional controls cannot be relied on to permanently restrict the use of property. One characteristic common to governmental institutional controls is that they are created legislatively at the state and local level and thus can be changed legislatively as well.[109] For example, if a governmental control takes the form of a zoning regulation that restricts use to industrial in an area where the contaminated property is located, such a regulation can be changed simply through a subsequent legislative decision altering the use in that area.[110] The inability to eusure that zoning bodies will not redesignate the "use" of a particular area makes zoning an ineffective means for ensuring that property use does not change over long periods of time.

Another concern with the use of zoning to restrict land use is the fact that most zoning regulations provide different means for varying the use of particular properties. Typically, zoning regulations operate "down" rather than "up."[111] In districts zoned for less restrained uses, zoning ordinances generally permit, as of right, more restrained uses, such as residential, to replace less restrained uses, such as commercial or industrial.[112] Thus, an owner of property currently in an industrial zone could, in most cases, legally change the use of his or her property to residential without any need for a zoning permit.

These concerns are exacerbated by the fact that there is no means to ensure that decisionmakers and others know the consequences of their decisions before undertaking a rezoning. "[L]ocal planning commissions do not typically evaluate every deed in an area before altering the zoning for that area. Thus, they might inadvertently rezone restricted property from industrial to residential use."[113] Authors

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108. Zoning is defined as "legislative action, usually on the municipal level, which separates or divides municipalities into districts for the purpose of regulating, controlling, or in some way limiting the use of private property, and the construction and/or structural nature of buildings erected within the zones or districts established." BARRON'S LAW DICTIONARY 537 (3d ed. 1991).

109. Coursen, *supra* note 19, at 10,280.

110. David Coursen points out that this problem may be addressed by obtaining contractual assurances from the state or local government concerning the continued effectiveness of the control. *Id.* at 10,280-81. Indeed, in many cases the continued enforcement of an institutional control is characterized as an aspect of the operation and maintenance of the site that states generally undertake. However, the practical value of such assurance may be limited. *Id.* at 10,281. In particular, there may be limitations on a state government's ability to limit the exercise of legislative authority of future governments. *Id.* Moreover, since states are generally the parties that ensure the operation and maintenance of a site, yet generally delegate zoning authority to municipalities, the ultimate legislative body will not be a party to the agreement. *Id.*

111. JULIAN CONRAD JUERGENSMEYER & THOMAS E. ROBERTS, LAND USE PLANNING AND CONTROL LAW 83 (1998).

112. *Id.* at 83-84.

113. Robert A. Simons & Heidi Gorouitz Robertson, *Deed Restrictions and Other Institutional Controls as Tools to Encourage Brownfield's Redevelopment*, 7 ENVTL. L. &

have noted that memories regarding the limitations on property use may be short.[114] If there is no formal registry of use limitations, a change in zoning designation may result innocently as new zoning bodies and property owners may simply not have the knowledge necessary to ensure that a zone change or variance is not made or granted. Based on the inability to proscribe future legislative decisionmaking and granting of variances and the potential for restrictions on zoning to go unnoticed over time, the use of zoning as a means to restrict permanently the use of property would be ineffective.

b. Proprietary Controls

The type of legal restrictions most frequently mentioned as capable of restricting land use for extended periods of time are proprietary controls.[115] Proprietary controls involve property owners using their rights as owners to control the nse of their property.[116] Except for conservation easements, which are generally creatures of state statutory law,[117] the development, implementation, and enforceability of proprietary controls are a function of state common law. Types of proprietary controls include easements, covenants, and equitable servitudes. In the institutional control context, regulators will require a property owner to use one of these private tools to restrict the use of his or her property in order to qualify for a lesser cleanup standard.[118]

The most common and flexible proprietary control and the legal tool most frequently cited as the likely means for restricting property use is the easemeut.[119] An easement is "a right, created by an express or implied agreement, of one owner of land to make lawful and beneficial use of the land of another."[120] Common-law easements can be classifled in a number of ways.[121] They are usually "appurtenant" or "in gross"[122] and either "affirmative" or "negative."[123] Each type of easement has different requirements, which may vary by state, that must be met to make it

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PRAC. 31, 36 (1999).

114. *Id.* at 34.

115. *See, e.g.*, Coursen, *supra* note 19, at 10, 281; Pendergrass, *supra* note 22, at 10,111-12.

116. Coursen, *supra* note 19, at 10,281.

117. JUERGENSMEYER & ROBERTS, *supra* note 111, at 675.

118. *See* OSWER DIRECTIVE, *supra* note 48, at *7.

119. *See, e.g.*, Coursen, *supra* note 19, at 10,281; Pendergrass, *supra* note 22, at 10,111.

120. BARRON'S LAW DICTIONARY 152 (3d ed. 1991).

121. Lauri DeBrie Thanheiser, *The Allure of a Lure: Proposed Federal Land Use Restriction Easements in Remediation of Contaminated Property*, 24 B.C. ENVTL. AFF. L. REV. 271, 274 (1997).

122. Easements appurtenant are those which benefit the owner in connection with his ownership of neighboring land. ROGER A. CUNNINGHAM ET AL., THE LAW OF PROPERTY 441-42 (2d ed. 1993). The land benefited is the dominant land and the land burdened is the servient land. *Id.* Usually, the servient land is adjacent to the dominant land. *Id.* Easements in gross are easements which benefit someone without regard for his ownership of land; the benefit to the holder is instead, personal. *Id.*

123. The owner of an affirmative easement has the right to enter another's land and perform some act on that land. *Id.* at 440. The owner of a negative easement can prevent the owner of the servient land from doing an otherwise privileged act on the land. *Id.* Most easements are affirmative. JUERGENSMEYER & ROBERTS, *supra* note 111, at 665.

enforceable. Easements are generally thought of as good tools to restrict use not just because of their flexibility but also because of the relative ease with which they can be placed on land records and their ability to restrict property use almost indefinitely.[124]

An easement to restrict property to industrial uses could be given to EPA,[125] a state environmental agency, or a third party[126] before the cleanup plan would be accepted. The easement would limit the property's use to industrial purposes. Such an easement would be considered a negative easement in gross. It is negative because it restricts the owner of the easement from doing something on his or her property; namely from using the land for anything but industrial purposes.[127] It is in gross because the owner of the easement benefits personally and not as a result of his or her ownership of adjoining or nearby property.[128]

A use-restriction easement in this context would, however, be legally invalid and likely unenforceable after the sale of property, and thus would not be a viable means for restricting property use. The main problem arises from the unwillingness of courts to find negative easements to be legally valid.[129] As a general rule "[c]ourts in the United States seldom recognize negative easements."[130] The failure to recognize the legal validity of negative easements is traceable to English jurisprudence, which recognized only a small number of negative easements due to the fact that such easements are difficult to spot[131] and thus might be enforced against owners who bought property subject to an easement without knowledge that it is encumbered.[132] English courts thus recognized only four very specific types of negative easements:

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124. The rule against perpetuities states that "no interest is good unless it must vest, if at all not later than twenty-one years after some life in being at the creation of the interest." JOHN E. CRIBBET, PRINCIPLES OF THE LAW OF PROPERTY 79-82 (2d ed. 1975). This rule is used to prevent the tying up of land and removing it from commerce by creating an interest that prevents the alienation of land. The rule does not apply to present interest, so it does not apply to casements. *Id.*

125. One must take into account the willingness of EPA, as the holder, to enforce an easement or other proprietary interest due to the fact that federal attorneys tend not to litigate in state courts and that there may be no federal claim on which to base pendant jurisdictional claims.

126. An example of a third party that might be given an easement would be a long-standing public-interest environmental group or land trust in the state. Such groups, due to their location near the contaminated site and general vigilance may be best situated to ensure that the property is not reused for other purposes. However, such a group must have a long and stable history of working in the affected area and must also have the ability to enforce an easement or other use restriction in court.

127. CUNNINGHAM ET AL., *supra* note 122, at 440.

128. *Id.* at 441.

129. JUERGENSMEYER & ROBERTS, *supra* note 111, at 656; 7 THOMPSON ON REAL PROPERTY § 60.02(e)(1) (David A. Thomas ed., Michie Co. 1994) [hereinafter THOMPSON].

130. 7 THOMPSON, *supra* note 129, § 60.02(c)(1), at 395.

131. On the other hand, affirmative easements, the most common of which is the right to pass over someone's property, will generally be evidenced by a road or some other marks over property and, therefore, will be more easily discovered by future owners before purchase of the property.

132. *See id.*

air, water, light, and not to remove support from the easement holder's building.[133] Although the English courts' concerns regarding the purchase of property without knowledge of the easement are less valid in the United States,[134] state courts have accepted the English limitations and "with some exceptions . . . will not recognize purported negative easements beyond the traditional four."[135] In the vast majority of states use-restriction easements would thus not be a legally valid means for ensuring that property use would be restricted.

A second concern exists regarding the ability of a use-restriction easement to survive equitable challenges or to continue where property ownership is transferred. Easements are vulnerable to a number of equitable defenses such as laches and estoppel,[136] and may also be extinguished through transfer of the property, particularly through foreclosure.[137] Easements may not survive foreclosure by a party holding a security interest in the property prior to the creation of the easement. Thus, even if a negative easement were legally valid, it could still be avoided by equity or through foreclosure. Thus, in the context of use-restricted cleanups, easements through which a property owner promised to refrain from using the property in certain ways would not be viable tools for restricting the use of property.[138]

Another common type of nonpossessory interest is the restrictive covenant. Restrictive covenants are similar to easements but are usually subject to a different set of formal requirements.[139] A restrictive covenant is a clause in a deed that limits the landowner's use of property.[140] Restrictive covenants are governed by state

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133. *Id.*

134. Unlike the different states of the United States that maintain land recording statutes universally, England did not require that all easements be recorded in land records; thus it could not be ensured that notice would be received by future purchasers. *See id.* As a result, the negative easement would too easily arise by prescription. *See id.*

135. *Id.* § 60.02(e)(1), at 396.

136. *Id.* § 60.08(b)(4)-(5).

137. Krista J. Ayers, Comment, *The Potential for Future Use Analysis in Superfund Remediation Programs*, 44 EMORY L.J. 1503, 1526 (1995).

138. Many states have attempted to address the failures of easements and other land-use-restrictive devices to restrict land use over long periods of time through the creation of statutory "conservation easements." *See* 7 THOMPSON, *supra* note 129, at § 60.02(e)(4). Although such easements may solve a number of the problems set forth in this section of the Article, they also contain their own limitations for use in this context. Significantly, the type of use anticipated by use-restricted cleanup is not a permitted use of most conservation easements. Most conservation easement statutes allow easements to conserve open space, to preserve recreation, historic, cultural, and other natural values. *See id.* Easements serve primarily environmental purposes. They are not intended to be used to allow property to be maintained in a more contaminated state.

139. For an analysis of the relationship between negative easements and covenants, see CUNNINGHAM ET AL., *supra* note 122, at 440.

140. A restrictive covenant is defined as

> a promise included in an agreement restricting the use of real property or the kind of building that may be erected thereupon; the promise is usually expressed by the creation of an express covenant, reservation, or exception in a deed. In order for a grantor to enforce the covenant against remote grantees, the covenant must "run with the land."

property law and vary from state to state.[141] Usually, to create a successful restrictive covenant that "runs with the land" and is thus binding on all future owners,[142] four requirements must be met: (1) the covenant must be enforceable between the covenanting parties and satisfy the Statute of Frauds; (2) the covenanting parties must intend to bind their successors; (3) there must be "privity of estate";[143] and (4) the covenant must also "'touch and concern' the land."[144] All four elements must be met to create a valid restrictive covenant,[145] both the third and fourth requirements pose problems in the context of use-restricted cleanup.

First, it will be difficult to satisfy the requirement that a use-restriction covenant touch and concern the land because the benefit of the covenant is held in gross. If the benefit or burden does not touch or concern the land, the covenant will not be enforceable against future purchasers.[146] Just what amounts to "touching and concerning" the land has been the subject of significant debate and has led to the identification of a half-dozen different tests by a leading authority on real property.[147] The vast majority of states, however, take the position that the benefit of a real covenant must not be in gross to touch and concern the land.[148] This is particularly the case where the promisee, such as the government, owns no land that could be

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BARRON'S LAW DICTIONARY 419 (3d ed. 1991) (emphasis in original).

141. JUERGENSMEYER & ROBERTS, *supra* note 111, at 657.

142. *Id.* at 660.

143. There are two forms of privity: vertical and horizontal. *Id.* at 662. Privity is the mutual or successive relationship to the same rights of property. Vertical privity concerns the relationship between a party to the covenant, the promisor, and her successor. *See* CUNNINGHAM ET AL., *supra* note 122, at 475-77.

Horizontal privity concerns the relationship between the original parties.

> While a few cases reject the need for horizontal privity of estate between the contracting parties, most require it for the burden to run. There are three definitions of horizontal privity used in running burden cases. The English courts follow the most restrictive view, requiring a tenurial relationship. Less restrictive is the so-called Massachusetts view that requires a mutual and simultaneous interest in the land by both the promisor and promisee.

JUERGENSMEYER & ROBERTS, *supra* note 111, at 662-63.

144. RESTATEMENT OF PROPERTY § 537 cmt. a (1936) [hereinafter RESTATEMENT] (emphasis in original). A covenant touches and concerns the land when it enhances the enjoyment of a parcel of real property by burdening the enjoyment of another. *See id.* § 537 cmts. a, c.

145. *See* CUNNINGHAM ET AL., *supra* note 122, at 469; JUERGENSMEYER & ROBERTS, *supra* note 111, at 660.

146. JUERGENSMEYER & ROBERTS, *supra* note 111, at 660; Susan C. Borinsky, *The Use of Institutional Controls in Superfund and Similar State Laws*, 7 FORDHAM ENVTL. L.J. 1, 19 (1995).

147. *See* 7 THOMPSON, *supra* note 129, § 62.08 (listing and describing six different judicial tests for touch and concern).

148. JUERGENSMEYER & ROBERTS, *supra* note 111, at 662; Borinsky, *supra* note 146, at 17. A minority view is that restrictive covenants in gross are binding on subsequent owners. *See* Gillen-Crow Pharmacies v. Mandzak, 220 N.E.2d 852 (Ohio Com. Pl. 1964); Borinsky, *supra* note 146, at 19.

benefitted.[149] Thus, in a large majority of states, when the owner of property places a restrictive covenant into the deed to comply with environmental requirements, the burden falls on the land of the property owner but the benefit does not touch and concern the land and the covenant will not be enforceable against future owners of the property.

A number of other concerns will affect the validity of restrictive covenants in certain circumstances. The vertical privity element, for example, binds a successor to a restrictive covenant only when there has been succession to the same "estate or interest" or "an estate or interest corresponding in duration."[150] As a result, transfer of property to a lesser estate holder may result in the failure of a covenant.[151] For example, a transfer of a life estate from a promisor who had a fee simple absolute would not transfer the burden of a real covenant at law.[152] Many states also maintain statutes of limitation that terminate covenants and other servitudes after a period of years.[153] The limitations are based on a general belief that covenants become obsolete after the passage of time.[154] Restrictive covenants in the use-restricted cleanup context, however, may have to extend for hundreds of years. Thus, as with easements, covenants will be subject to a number of limitations that limit their validity, making them unable to proscribe the use of property as required.

A third type of nonpossessory interest in land is the equitable servitude.[155] Equitable servitudes are closely related to restrictive covenants and arise when courts of equity enforce agreements that do not meet all the requirements of a covenant. The elements of an equitable servitude are different from those of a restrictive covenant: (1) there must be a clear statement of intent to bind future owners; (2) actual notice must be given to subsequent landowners; and (3) the agreement must touch and concern the land.[156]

Many of the problems that arise with real covenants are also applicable to equitable servitudes. In particular, the traditional invalidity of interests held in gross has survived with equitable servitudes to an even greater extent than with restrictive covenants.[157] Because the benefit of a use-restriction servitude would be held in gross, the servitude would not survive the transfer of the property. Moreover, many equitable defenses, such as laches, unclean hands, estoppel and waiver, or

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149. *See, e.g.*, Garland v. Rosenshein, 649 N.E.2d. 756 (Mass. 1995); JUERGENSMEYER & ROBERTS, *supra* note 111, at 662.

150. RESTATEMENT, *supra* note 144, § 535.

151. City of Perrysburg v. Koenig, No. WD-95-011, 1995 Ohio App. LEXIS 5334 (Ohio Ct. App. Dec. 8, 1995); RESTATEMENT, *supra* note 144, § 535 cmt. c (requiring that there be a succession to the same interest or estate).

152. 7 THOMPSON, *supra* note 129, § 62.05.

153. *See id.* § 62.17.

154. *See id.*

155. Equitable servitudes are defined as building restrictions and restrictions relating to the use of land that are enforceable in equity by and between landlords. BARRON'S LAW DICTIONARY 162 (3d ed. 1991).

156. Russell R. Reno, *Covenants, Rents and Public Rights*, *in* 2 AMERICAN LAW OF REAL PROPERTY §§ 9.24-.30 (A. James Casner ed., 1952).

157. *See* Borinsky, *supra* note 146, at 19.

acquiescence may be applied when a party attempts to enforce the servitude.[158] As a result, any statement or action by the holder of the servitude to suggest that it has waived its right of enforcement or any delay in enforcement might void the servitude. Thus, it is extremely unlikely that an equitable servitude will be adequate as a means to ensure that property use is properly restricted.

c. Enforcement Tools

Enforcement tools alone cannot limit the use of property. Consent decrees and administrative orders, like contracts, are only binding on the parties to the decree or order. Thus, any use restriction contained within them will be enforceable only against the parties named in and signing the order. As a result, parties can avoid the use restrictions contained within enforcement tools simply by transferring the property to a party who is not subject to such an order.[159] The fact that a simple sale of property can avoid the proscription on use necessary to limit risk exposure pathways ensures that enforcement tools alone will not be able to proscribe future land use as required by the new cleanup program.

The inability to proscribe property use, in conjunction with the inability to predict future use, carries significant consequences for current use-restricted cleanup programs. The failure of both of these elements suggests that existing use-restricted cleanup programs cannot ensure that property use will not change in a way that will result in exposure routes greater than those anticipated by the cleanup. Existing programs thus fail to ensure that a cleanup will be protective of human health and the environment and also fail to ensure the permanency of cleanup.

IV. ALTERNATIVES TO THE CURRENT PROGRAM AND SOME POLICY CONSIDERATIONS

A. Inability to Predict Use and the Creation of Future Costs

The inability to predict and proscribe future property use raises serious policy concerns for the implementation of a use-restricted cleanup program. This section analyzes those implications and identifies programs that respond to them. It notes first that failure to predict future property use will result in the creation of costs that may be borne by future generations and argues that such costs should be internalized into the initial remedy-selection process. This section then cousiders potential means for internalizing these costs, ultimately arguing that either a private remedy requiring the responsible parties to post a bond for future cleanup or a publicly administered use-restriction cleanup fund could accomplish this task. In the process of examining the

158. 7 THOMPSON, *supra* note 129, § 62.16 (citations omitted).

159. The new owner will not be subject to a new order, either. It will be buying property that has been permanently cleaned in accordance with EPA regulations and with EPA's approval. Even if it were arguable that using the property in a way that violates a use restriction could be considered a release subjecting the new owner to CERCLA liability, this would be treated as a new release subject to new enforcement or otherwise would violate the requirement that the initial cleanup be permanent. *See* Ayers, *supra* note 137, at 1526.

way in which costs should be addressed, this section argues that cleanup rather than restricting use should be the goal for properties whose use has not been properly anticipated.

Failure to predict properly the future use of property in all circumstances creates future costs that regulators may consider in fashioning a use-restricted cleanup program. Where it could be proven to a high degree of certainty that property would be used for no other purpose, use-restricted cleanup would result in little or no future harm. In such cases the property would continue to be used for its highest and best use and there would be no basis by which exposure routes would be increased; thus, health would continue to be protected. However, as shown above, it is impossible to predict future property use.[160] Thus, it is necessary to consider the problems created by the fact that property may change to an unanticipated use in the future.

If future use of property cannot be predicted accurately, the desired use of property may change in an unanticipated manner. In the case of use-restricted property, a desire to change the use would have one of three potential results, each with its own related costs. On the one hand, the property's use may be allowed to change. Such a change may either result in increased risks to the potential residents due to the lower levels of cleanup that had originally been undertaken or, to avoid such harm, will require further cleanup to a level appropriate for the new use; the costs of cleanup being passed on from the responsible parties[161] to innocent developers or landowners in some cases.[162] In both situations the use of restrictions will result in harm being done to parties in the future, either through increased health risks or the cost of cleaning.[163]

On the other hand, the property use might be restricted so that it continues to be used in the same manner as it was previously. This option is the choice emphasized by existing cleanup programs.[164] In such a case environmental regulations serve to limit property to a use that is not its most valued. This, of course, also creates costs:

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160. *See supra* Part III.B.1.

161. By the time such further cleanup would be required, many PRPs may no longer be in business. Moreover, settlement with EPA and satisfactory remediation of the property will generally release parties from responsibility for the release. The OSWER directive specifically recognizes these limits, noting that should land use change and further cleanup be necessary, EPA would generally not expect to become involved in the oversight of the cleanup, but would "retain its authority to take further response action where necessary to ensure protectiveness." OSWER DIRECTIVE, *supra* note 48, at *11.

162. The OSWER directive recognizes this, stating that "landowners or others [may] decide at a future date to change the land use in such a way that makes further cleanup necessary." OSWER DIRECTIVE, *supra* note 48, at *10.

163. It is arguable that if property has not been abandoned, the parties would be able to internalize the costs of cleanup into the costs of sale. In such a case, a party seeking to use the building for residential purposes would require a much greater discount than another industrial user because of the costs of cleanup associated with a change to residential use. The fact that the property is more valuable to the seller if it continues in its industrial use (although, assuming the cleanup to residential levels, it would be more valuable for residential purposes) creates a large disincentive to ever change the use. In other words, one of the great disincentives of a scheme that proscriptively limits property's use is that it will keep the property from being sold for restricted uses even if those uses are more valuable.

164. *See, e.g.*, OSWER DIRECTIVE, *supra* note 48, at *6-7.

for restricting the use in such a case ensures that property will not be used for its highest and best purposes and may also impact the taxes recoverable from the property. Moreover, failure to allow a property use to change from a use such as "industrial" to a use such as "residential" may decrease the likelihood that other residential properties would be developed in the neighborhood as well as stigmatize existing nearby property.[165] Thus, no matter how use-restricted cleanup is accomplished, the inability to predict future use of property will ensure that some properties will change, or be sought to change, to a use that was unanticipated at the time of cleanup. No matter how this change is responded to, it will create substantial costs that may be borne by individuals who were not responsible for the pollution.

B. Should Use-Restricted Cleanup Address Future Costs?

That the future costs created by failure to predict accurately the use of property may fall on individuals who were not responsible for the creation of the contamination is neither efficient nor equitable. In terms of efficiency, the failure to internalize all costs into the price of the polluting activity creates, in essence, a subsidy to the polluter. This, of course, will result in the creation of an excessive amount of pollution. Further, traditional equitable concerns suggest that, for the properties that will change in an unanticipated manner, the polluter and not an innocent party should pay the full cost of his or her activity. As one author has noted, "[r]esponsibilities . . . have a moral component, which allows them to attach to particular individuals."[166] Failure to hold the specific parties who caused the contamination responsible for its complete remediation would violate this traditional notion of fairness. Together these concerns provide substantial support for the addition of a component requiring responsible parties to pay for the potential future harm.

However, before proceeding to an analysis of the means to achieve internalization of future costs, it is necessary to consider a separate set of factors that have been raised in criticism of use-restricted cleanup programs. These criticisms arise from the fact that the costs associated with the failure to predict future property use will be placed on future generations in derogation of our responsibilities to them.[167]

The idea that we owe obligations to future generations has a variety of justifications:

> One may view responsibilities toward future generations as analogous to an individual's prudent planning for later life, as an extended expression of love for our children, as the most appropriate manner of repaying our debt to past generations, as an outgrowth of our desire to see the accomplishments of humankind perpetuated, as the necessary teleological culmination of the race, as an inescapable consequence of one generation overlapping the next, and as a planetary trust, analogous to a charitable trust.[168]

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165. *See infra* text accompanying notes 193-200.

166. Jeffrey Spear, *Remedy Selection Under CERCLA and Our Responsibilities to Future Generations*, 2 N.Y.U. ENVTL. L.J. 117, 129 (1993).

167. *Id.* at 122.

168. *Id.* at 122-23 (footnotes omitted).

Advocates of intergenerational equity argue that future generations have a fundamental interest entitling them to receive, among other things, clean air, water, and land from preceding generations.[169] The extent to which current generations can use resources to the detriment of future generations is subject to significant debate. However, one standard commonly referred to suggests that, at the least, current generations must preserve natural resources so as to "prevent a worsening of the planet's environmental quality"[170] and to allow equal access to the "legacy of past generations" and "to not unduly restrict the options available to future generations."[171] Pursuant to this standard, advocates of intergenerational equity would argue a large-scale program of cleanup that leaves a substantial amount of contamination in the ground or creates other substantial costs[172] unduly benefits current generations at the expense of future ones.

It may of course be argued that the benefits of use-restricted cleanup far outweigh the costs and, thus, failure to predict future use accurately does not unduly burden future individuals. This is particularly the case when considering the fact that the benefits[173] are received immediately while the costs will be incurred[174] at a time in the future, requiring that such costs be discounted to current values in order to compare costs and benefits properly.[175] According to such cost-benefit techniques, the costs

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169. *Id.* at 129-30.

170. RICHARD L. REVESZ, FOUNDATIONS OF ENVIRONMENTAL LAW AND POLICY 307-08 (1997).

171. Edith Brown Weiss, *Intergenerational Equity: A Legal Framework for Global Environmental Change*, *in* ENVIRONMENTAL CHANGE AND INTERNATIONAL LAW: NEW CHALLENGES AND DIMENSIONS 385, 401-05 (Edith Brown Weiss ed., 1991); *see also* REVESZ, *supra* note 170, at 307-08.

172. *See, e.g.*, Michael B. Gerrard, *Demons and Angels in Hazardous Waste Regulation: Are Justice, Efficiency and Democracy Reconcilable?*, 92 NW. U. L. REV. 706 (1998) (arguing that there are more "costs" associated with contamination than those measured by cost discounters). The argument concerning "substantial costs" has been made regarding use-restricted cleanup in situations where property use is properly predicted. However, as this Article notes, in situations where property use will not change, such a program is relatively costless. *See supra* Part IV.A.

173. Benefits will primarily be the savings realized on the cost of cleanup.

174. The costs incurred would be based on the inability to use the property for its highest use (such as lost tax revenues, decreases in value of surrounding properties, and potentially decreased development) or for cleaning the property to allow for its use.

175. The rationale for discounting can be based on either the time value of money or consumer impatience. Liza Heinzerling, *Discounting Our Future*, 34 LAND & WATER L. REV. 39, 41 (1999).

> [T]he time value of money means that money received later is worth less than the same amount of money received earlier; while one waits for the later money to arrive, one could have been investing the earlier money in some other venture. In addition, one may simply prefer to receive money sooner rather than later because one is anxious to consume the goods money can buy. For both of these reasons (money is productive over time, and people are impatient), in order to compare two investments that pay benefits over different periods of time, one needs not only a common currency (here it is dollars), but one also needs to state that currency in common temporal terms. This leads to the idea of computing present

associated with the future-use change would likely be minimal. Indeed, it has been shown that costs of unfathomable size, when discounted over long periods of time,[176] are negligible in today's dollars.[177]

Critics, however, have recently begun to contest the validity of time discounting in the intergenerational context.[178] They note that the time discounting approach contains a bias in favor of future generations.[179] Further, such critics note that the traditional justifications for discounting that may be valid in the case of intragenerational decisionmaking break down in the intergenerational context.[180] Thus, it is highly questionable whether discounting is the correct standard on which to rest an analysis of the potential harm to future generations. Due to the failure to establish more than a rhetorical measure of intergenerational equity, it will be difficult to resolve the conflict between parties regarding the potential effect future costs would have on use-restricted cleanup measures. At the least, however, regulators should take notice of and attempt to understand more fully the extent and scope of the costs that a use-restricted cleanup program would leave to future generations. Potentially serious intergenerational equity concerns aside, the previously mentioned considerations of

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value through discounting.

Id.

176. The choice of a discount rate will, of course, play a significant role in the discounting process. The present value of $1 million received in ten years is $900,000 using a one percent discount rate but only $390,000 using a ten percent discount rate. *Id.* at 44 (citations omitted).

177. A few examples will demonstrate the effect of discounting over long terms. Michael Gerrard, for example, notes that "if human life is considered to be worth $8 million, and a ten percent discount rate is chosen, then the present value of saving a life one hundred years from now is only $581." Gerrard, *supra* note 172, at 742-43. On a broader scale, Derek Parfit notes, "At a discount rate of five percent, one death next year counts for more than a billion deaths in 500 years." DEREK PARFIT, REASONS AND PERSONS 357 (1984). Finally, Geoffrey Heal observes that "[i]f one discounts present world GNP over two hundred years at 5% per annum, it is worth only a few hundred thousand dollars, the price of a good apartment. Discounted at 10%, it is equivalent to a used car." Geoffrey M. Heal, *Interpreting Sustainability, in* SUSTAINABILITY DYNAMICS AND UNCERTAINTY 3-7 (Graciela Chichilnisky et al. eds., 1998).

178. Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 998 (1999) (arguing that the only discount rate that would fully account for the utility of future generations is a rate of zero percent and that any positive rate simply reflects a depreciation of the utilities of future generations).

179. *Id.*

180. *See id.* at 987-1014. In one specific example, Revesz notes:

> Intragenerational discounting affects the timing with which a particular individual decides to expend a fixed amount of resources. It is merely a reflection of the individual's preferences and . . . does not raise any significant ethical questions. In contrast, intergenerational discounting affects the quantity of resources available to each individual.
>
> In an intergenerational context, one must initially decide how to allocate resources to individuals in different generations—a societal decision with ethical underpinnings. Then, each individual must decide how to time the consumption of resources across her lifetime—a personal decision with no ethical ramifications, other than a weak concern about excessive myopia.

Id. at 999 (citations omitted).

economic efficiency and equity suggest that regulators should address future costs in the design of use-restricted cleanup programs.

C. Methods for Internalizing Future Costs

Having discussed the fact that any use-restricted cleanup program that cannot correctly identify all future uses of property will create future costs that may be borne by innocent parties and the policy rationale for requiring regulators to internalize these costs into the original remedy, it is now necessary to consider the different means available for accomplishing this task. A number of environmental programs that require responsible parties to establish financial responsibility for potential cleanup of property in the future may serve as a model.[181] These programs generally require parties to determine the costs associated with the future cleanup[182] and provide the financial means to pay for the cleanup should it be required. The RCRA, for example, requires parties who own or operate hazardous waste treatment, storage, and disposal facilities ("TSDs") to demonstrate financial responsibility for, among other things, cleanup of hazardous waste that may be released from the TSD in the future.[183] The regulations enacting this requirement provide specific guidelines for determining the costs associated with the closure and postclosure activities of hazardous waste sites[184] and set forth in detail the requirements and specific language that any assurance of financial responsibility for these costs must contain.[185] Similarly, the Oil Pollution Act of 1990[186] requires vessel owners to establish their financial responsibility for potential oil spill liability.[187] The variety of financial devices that can be used to ensure payment of potential future costs include: insurance, guarantee, surety bond, letter of credit, or qualification as self-insurer.[188] This general model could easily be adapted to a use-restricted cleanup regime. Regulators could require PRPs to establish the costs that will result from a change in use and to provide

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181. *E.g.*, Resource Conservation and Recovery Act (RCRA) of 1976, 42 U.S.C. § 6924 (1994 & Supp. IV 1998) (requiring financial responsibility for potential future releases from hazardous waste treatment, storage, and disposal facilities); *id.* § 6991b (requiring financial responsibility for potential leaks from underground storage tanks); Oil Pollution Act of 1990, 33 U.S.C. § 2716 (1994 & Supp. IV 1998) (requiring financial responsibility for potential oil tanker spills).

182. *But see* Technical Standards and Corrective Actions Requirements for Owners and Operators of Underground Storage Tanks, 40 C.F.R. § 280.93 (2000) (setting the amount of financial responsibility at $1 million for owners and operators of petroleum underground storage tanks located at petroleum marketing facilities, or that average more than 10,000 gallons of petroleum per month and $500,000 for all other owners and operators).

183. 42 U.S.C. § 6924(a)(6) (1994).

184. *See* 40 C.F.R. § 264.142 (cost estimate for closure); *id.* § 264.144 (cost estimate for postclosure care).

185. *See id.* § 264.143 (financial assurance for closure); *id.* § 264.145 (financial assurance for postclosure care); *id.* § 264.151 (setting forth the specific language for financial assurance agreements).

186. 33 U.S.C. §§ 2701-2761 (1994 & Supp. IV 1998).

187. *Id.* § 2761.

188. *See, e.g.*, 42 U.S.C. § 6924(t).

adequate financial assurance for the costs should the unanticipated change occur.

A few differences between use-restricted cleanups and the existing programs would require some changes to existing programs. In particular, under the existing programs owners and operators are required to create financial assurance for a cleanup that they would undertake themselves while, in the case of use-restricted cleanup, the response would likely be undertaken by a third party or just one member of an originally large group of PRPs. Regulators must therefore ensure that third parties have access to the money[189] posted by the PRPs and must also ensure that cleaning parties do not attempt to "overclean" the property because they are using someone else's money to do so. This could easily be accomplished by making EPA the beneficiary of any financial assurance and requiring EPA to disburse the money only for activities taken in compliance with existing cleanup standards, such as those set forth in the NCP.

One final concern raised by these arrangements deals with the possibility that the money may not be needed for a very long period of time. As a result, many of the devices currently acceptable to ensure payment for future cleanups in other programs may not be durable enough to ensure cleanup in the use-restricted context. For example, the bonds currently posted by owners of TSD facilities are only required to endure for thirty years.[190] Use-restricted cleanup, because of its duration, may require a cleanup more than thirty years into the future. In such a case, regulators must be certain that the financial arrangements made with PRPs can endure for such a time period.

While it is important to consider private options, such as those listed above, one other program could ensure that financial arrangements last for the required period of time. Such a program would create a government fund that would be used to collect the money from PRPs and to pay it out to later applicants in case of an unanticipated change in use. Such an idea is behind the creation of such programs as the Superfund and the Leaking Underground Storage Tank Trust Fund (often referred to by its acronym "Lust").[191] These funds, particularly Superfund, are currently politically disfavored.[192] However, there is a significant difference between these and a potential use-restricted property cleanup fund. While the Superfund and Lust trusts are funded with moneys collected by taxes, the use-restricted fund ("URT") would be funded with money from PRPs. Moreover, the money used to fund the URT would be much less than the cost of cleaning a property to residential or agricultural levels immediately and thus would represent a significant savings to PRPs. These differences might make the proposal more politically palatable.

Finally, the question arises as to what future costs regulators should allow PRPs to consider in posting financial assurance. As previously discussed, regulators may

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189. This is not to suggest that a current owner could not access the money if he or she desired to change the use in the future.

190. *See* 40 C.F.R. § 264.117 (post-closure care and use of property).

191. *See generally* 42 U.S.C. § 6991b(h)(11); I.R.C. § 9508 (1994 & Supp. IV 1998); OKLA. STAT. ANN. tit. 17, § 365 (West 1999); 40 C.F.R. § 280.101 (state fund or other state assurance); 40 C.F.R. § 280.107 (local government fund).

192. *See Report Criticizes Superfund Program*, L.A. TIMES, June 12, 1999, at A7; *see also* Revesz & Stewart, *supra* note 15, at 3-4, 13-14.

respond to unanticipated changes in property use by either restricting or allowing the change.[193] Each response will create its own particular set of costs, which may include increased health risks to potential residents should the use change without further cleanup; costs of cleaning property to allow for the new use; or, the variety of costs that may result from restricting property to something other than its highest and best use.[194] The most efficient scheme would allow PRPs to estimate the costs associated with each response and to provide financial assurance to satisfy the least-costly alternative. There are, however, a number of arguments that favor requiring the property to be cleaned to allow the unanticipated use as the primary, if not sole, alternative.

Even if regulators did have the legal tools available to restrict the use of property,[195] the costs associated with this option are extremely difficult to identify and evaluate, and such a scheme would be difficult to administer. While the costs of cleaning property are well known,[196] the costs associated with restricting use may be diffuse and difficult to quantify. For example, the use restriction may affect other property values and even limit development. Consider the situation of a use-restricted property in a previously industrial area that has become residential. The fact that the property has been cleaned to only industrial levels may stigmatize other properties proximate to the blighted property.[197] In some cases the decrease in value will make the development of other residential properties in the neighborhood cost prohibitive. This will happen in cases where the stigma changes the amount a developer could charge for each individual unit to a point where the costs of development exceed the revenues that could be received from sale of the property.[198] Failure to redevelop will keep property value from being realized and, in turn, result in other costs such as the loss of taxes for the community and more blight to the neighborhood. Determining the size and extent of such costs for each property would be difficult, if not impossible, to accomplish. Moreover, administration of such a response would be costly. Such a response would generate a large number of parties harmed by the regulatory decision. Each party's claim would have to be reviewed and a final determination

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193. *See supra* Part III.A.

194. *See infra* note 198 and accompanying text.

195. As previously argued, even if regulators did choose the option of restricting future use, it is highly unlikely that existing legal tools would enable them to accomplish this goal. *See generally supra* Part III.B.2. Thus, a federal land-use restriction would be necessary before this option could be pursued further.

196. The average cost of cleanup of a CERCLA site is $30 million. Revesz & Stewart, *supra* note 15, at 14.

197. "The phenomenon known as stigma occurs when potential purchasers devalue the cost of property associated with environmental contamination due to their fear of contamination." Alex Geisinger, *Nothing But Fear Itself: A Social-Psychological Model of Stigma Harm and Its Legal Implications*, 76 NEB. L. REV. 452, 453 (1997). "Even when a particular piece of property has not been, and could never be, adversely impacted by nearby contamination, its value frequently will decrease in the eyes of potential purchasers as a result of their fear." *Id.*

198. This will be most likely to occur when the factors that create stigma are greatest. *Id.* at 475-83. In some cases, the reported stigma affect has decreased property value by as much as ninety-five percent. *Id.* at 486 & n.163.

of the amount made before it could be paid. Thus, if regulators should continue to focus on the existing alternative of restricting use, they will need to undertake a difficult and resource-consuming analysis of a variety of potential new costs as well as needing new legal tools, such as a legislatively created land-use restriction, to achieve their goal.[199]

Requiring PRPs to provide costs for the cleanup of their site, should it change in an unanticipated manner, will not require the creation of new legal tools nor result in the same amount of administrative cost. Administrative costs in this scheme would be minimized because only one party (the cleaning party) will be seeking to recover costs. Moreover, the future costs associated with this potential response will be the easiest to determine accurately. Existing technology and information would allow responsible parties to estimate the likely extent of contamination over various periods of time and to determine the costs of cleanup of that contamination using currently available or future technology[200] that is likely to exist. Indeed, much of the information informing the site analysis, such as the speed and direction of groundwater flow, existing contaminants, and contours of any aquifers, will have already been gathered by the responsible parties in their initial site analysis. Finally, in cases where property changes in an unanticipated manner, cleanup is the only permanent solution. Should, for example, a property use be restricted, potential costs such as future taxes will be incurred by every generation that lives in the blighted community. Similarly, increased health risks associated with not cleaning property will accrue to every person who comes into contact with the property until the contamination is completely diluted. For these reasons, should the costs of determining that option which is least costly require allowing for only one response to a change, regulators should require property that changes in an unanticipated manner to be cleaned.

In summation, EPA's land-use-restricted cleanup process fails to deliver on its promise of providing equal health protection to the existing cleanup scheme without further costs. There are however, a number of existing models that provide for internalizing potential future costs that could be adapted to a use-restricted cleanup program. To the extent that such a model is adapted to use-restricted cleanup, regulators should consider changing the existing scheme to

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199. This section of the Article does not consider in detail the option of letting the property be used for the new use without cleanup. Such a response would violate CERCLA's requirement that remedial schemes be protective of human health. *See* 42 U.S.C. § 9621 (1994). It should, however, be noted that allowing the changed use without further cleanup raises a number of similar concerns to the use-restricted scheme. The administrative costs associated with paying for the increased health risks would be extremely high. Indeed, regulators would not just have to consider claims from individuals exposed to the excessive risks but would also likely have to consider claims for property devaluation and other related costs brought by neighbors of the incompletely cleaned site. *See In re* Paoli R.R. Yard PCB Contamination, 35 F.3d 717 (3d Cir. 1994) (allowing neighbors' property devaluation claims because cleanup left residual risk of one in 100,000 instead of the generally accepted one in one million).

200. It may be arguable that future technology will come into existence that will drastically reduce the price of cleaning the contaminants at a site. *See* Revesz, *supra* note 178, at 990 n.246.

require future cleanup when property use changes in an unanticipated manner. Requiring cleanup, besides being perhaps the intuitively correct response, will also be much easier to administer and the most inexpensive choice in the long run.

V. CONCLUSION

The enormous pressure to find more cost-effective responses to contamination has led to the adoption of a new use-restricted cleanup regime without considering the regime's consequences in detail. While a majority of the cost savings from such a remedy may still be realized through a responsible regime, failure to consider the legal insufficiencies of the existing scheme and the potential for future harm will result in significant harm to human health and the environment.