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Deterring Irresponsible Use and Disposal of Toxic Substances: The Case for Legislative Recognition of Increased Risk Causes of Action

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Deterring Irresponsible Use and Disposal of Toxic Substances: The Case for Legislative Recognition of Increased Risk Causes of Action

I.	INTRODUCTION	790
	A. <i>Background Information on Toxic Substances</i>	791
	B. <i>The Need for Tort Law as a Supplement to Environmental Regulation</i>	793
II.	THE FAILURE OF ENVIRONMENTAL REGULATION TO DETER BEHAVIOR RESULTING IN HUMAN EXPOSURE TO TOXIC SUBSTANCES	797
III.	THE FAILURE OF CURRENT TORT RECOVERY STANDARDS .	801
	A. <i>Barriers of Traditional Tort Law</i>	802
	B. <i>Current Judicial Standards Governing Causes of Action for Increased Risk</i>	804
	1. Recovery for Medical Monitoring	805
	2. Recovery for Fear of Future Disease	806
	3. Outright Recovery for Increased Risk	809
IV.	IMPLEMENTING INCREASED RISK CAUSES OF ACTION	810
	A. <i>The Guam Toxic Substance Exposure Compensation Act</i>	812
	B. <i>Weaknesses of the Guam Statute</i>	812
	C. <i>Suggestions for Future Statutory Drafting</i>	813
	1. Establishing the Existence of an Injury	814
	2. Establishing Breach of a Duty of Care	815
	3. Defining the Underlying Causes of Action and Determining Damages	816
V.	IMPLEMENTING AND EVALUATING THE NEW SYSTEM	817
	A. <i>The Similarity Between Increased Risk Causes of Action and Other Instances in Which Courts Have Modified Traditional Causation Principles</i>	817
	B. <i>Weighing the Costs and Benefits of the New System</i>	819
VI.	CONCLUSION	822

I. INTRODUCTION

Increasing risk does not ordinarily result in tort liability. For instance, every speeding driver increases the risk of a traffic accident.¹ Tort liability, however, attaches only if the driver actually *causes* an accident. This means that of two reckless drivers who engage in exactly the same risky behavior, one might face great liability, while the other might escape with no liability at all. The difference between the two cases is in many ways a mere fortuity—whether timing and circumstance conspire to cause a traffic accident in a particular case or not. Many acts of reckless driving go unanswered in tort under this system. We accept this result in the case of the reckless driver, partly because the chance of an accident will probably deter potential defendants from engaging in risky behavior. Moreover, if no accident occurs, there is no plaintiff to compensate.

The typical case involving human exposure to toxic substances, however, presents an entirely different set of concerns. Injuries often remain latent for many years, creating procedural and evidentiary barriers to tort recovery.² Inherent difficulties in proving causation form an additional barrier.³ As a result, actual injuries may not result in appropriate tort liability. This calls into question current tort law's ability to deter behavior that results in human exposure to toxic substances. Moreover, when the reckless driver parks her car, the risk is over. We know at that point whether any injuries have occurred. People exposed to toxic substances, however, remain at increased risk for contracting a disease long after the risk-creating activity has ceased.⁴

Tort law has not effectively addressed the unique problems presented by toxic exposure cases. These cases challenge traditional tort principles in ways reminiscent of some of the most vexing tort problems courts have faced in the twentieth century—wrongful life cases,⁵ DES litigation,⁶ and loss of chance cases.⁷ As in those situations, toxic tort cases call for special rules. To ensure clarity, uni-

1. The speeding motorist is a common example used to illustrate the proposition that there is no tort liability for increasing risks. See, for example, Christopher H. Schroeder, *Corrective Justice and Liability for Increasing Risks*, 37 U.C.L.A. L. Rev. 439, 440 (1990).

2. See notes 103-13 and accompanying text.

3. See notes 109-13 and accompanying text.

4. Bartin C. Legum, *Increased Risk of Cancer as an Actionable Injury*, 18 Ga. L. Rev. 563, 565-66 (1984).

5. See notes 196-201 and accompanying text.

6. See notes 202-06 and accompanying text. DES litigation refers to the controversy surrounding diethylstilbestrol.

7. See notes 207-23 and accompanying text.

formity and fair application, these special rules should be developed and implemented by state legislatures.⁸ Specifically, causes of action based on increased risk—medical monitoring, fear of future disease, and outright recovery for increased risk⁹—should be recognized at law.

A. Background Information on Toxic Substances

In the years since World War II, American industries have become increasingly dependent on organic chemical technology,¹⁰ particularly chlorinated compounds.¹¹ These years have also seen marked increases in American cancer and birth defect rates.¹² Current science is unable to draw a connection between the two phenomena with absolute certainty.¹³ An ample amount of disturbing evidence exists, however, to show that chlorinated compounds do pose significant human health risks.¹⁴

Chlorine-based substances include some of the most notorious environmental threats—chlorofluorocarbons (“CFCs”),¹⁵ polychlorinated

8. See Part IV.

9. To clarify any confusion that might result from the use of the term “increased risk” to refer both to the underlying premise of all three claims and to one particular cause of action, it should be noted that the increased risk cause of action focuses on the main injury. Fear of future disease and medical monitoring claims constitute additional causes of action that might be brought independently, but that are ultimately premised on the existence of the increased risk injury.

10. See generally Joan A. Ferretti, *Looking for the Big Picture: Developing a Jurisprudence for a Biotechnological Age*, 10 Pace Envir. L. Rev. 711 (1993). Organic chemical research began during the war as industries attempted to find substitutes for rubber, pharmaceuticals, and aviation materials. *Id.* at 712-13. After the war, these new technologies were converted to peacetime uses. *Id.* at 713.

11. Bette Hileman, *Concerns Broaden Over Chlorine and Chlorinated Hydrocarbons*, Chem. & Eng. News 11 (Apr. 19, 1993). The analysis in this Note also applies to substances other than chlorinated compounds that might cause harmful health effects.

12. *Id.* at 13. A senior scientist at the National Research Council has reported “increases in cancer that cannot be explained solely in terms of aging, changes in coding [for individual diseases], or access to care.” *Id.* In addition to increases in cancer, sperm counts in men have fallen 42% since 1940. Certain chlorinated compounds may also have an effect on birth defect rates and on the immune, neurological, and endocrine systems of exposed fetuses. *Id.* at 14-15.

13. The two main ways of assessing whether a substance has harmful effects are animal testing and epidemiology. See generally Carl F. Cranor, *Regulating Toxic Substances: A Philosophy of Science and the Law* 29-40 (Oxford U., 1993).

14. See Hileman, Chem. & Eng. News at 13-16 (cited in note 11) (collecting and discussing data on the health effects of chlorinated compounds).

15. CFCs are primarily used in aerosol cans and in refrigeration systems. Under the Montreal Protocol on Substances That Deplete the Ozone Layer (“Protocol”), they must be phased out. The Environmental Protection Agency (“EPA”) issued a rule to implement the Protocol under the Clean Air Act. Protection of Stratospheric Ozone, 53 Fed. Reg. 30566 (1988). In 1978, the EPA prohibited almost all propellant uses of CFCs under the Toxic Substance Control Act. 40 C.F.R. 763.

biphenyls ("PCBs"),¹⁶ chlordane,¹⁷ dioxin,¹⁸ and trichloroethylene ("TCE").¹⁹ A number of chlorinated compounds have been classified as probable carcinogens by the Environmental Protection Agency ("EPA").²⁰ Animal tests²¹ and epidemiological studies²² have in many cases demonstrated that chlorinated compounds pose a threat to human health.²³ At the very least, these compounds present risky unknowns. Given this risk, we must ensure that companies exercise due

16. PCBs are a range of 209 compounds, generally taking the form of a heavy liquid, that are not water solids and conduct heat but not electricity. Eric Coppolino, *Pandora's Poison*, *Sierra Mag.* 43 (Sept./Oct. 1994). They have been employed in a variety of ways, but their primary use is as insulation in electrical transformers and capacitors. *Id.* Since the 1930s, it has been known that PCBs might produce adverse health effects in humans. *Id.* However, they remained unregulated until Congress passed the Toxic Substances Control Act in 1976. 15 U.S.C. § 2605(e) (1994 ed.). It is now illegal to produce PCBs for commercial use. The Toxic Substances Control Act provides: "[E]ffective one year after January 1, 1977, no person may manufacture, process or distribute in commerce or use any polychlorinated biphenyl in any manner other than in a totally enclosed manner." *Id.*

17. Chlordane is an insecticide used by extermination companies. The EPA has issued a registration suspension notice for all food crop and home and garden uses of chlordane. *Id.* The chemical may still be used for termite control. See generally Marshall Sittig, *Handbook of Toxic and Hazardous Chemicals and Carcinogens* (Noyes, 3rd ed. 1991).

18. Dioxin is produced as a contaminant in certain industrial processes like bleaching pulp to make paper. Sharon Begley, *Don't Drink the Dioxin*, *Time* 57 (Sept. 19, 1994). After dioxin was spread over the streets of Times Beach, Missouri in an attempt to control dust, the federal government ordered the town evacuated. *Id.* Dioxin is also the chemical at issue in the Agent Orange controversy. See generally Liane Clorfene Casten, *The Dioxin File: Anatomy of a Coverup*, *The Nation* 658 (Sept. 30, 1992).

19. TCE is the chemical most often detected at Superfund sites and is used primarily in metal cleaning. Philip H. Abelson, *Volatile Contaminants of Drinking Water*, *Science* 141 (Jan. 12, 1990). Its properties make it particularly inclined to contaminate groundwater. *Id.*

20. See, for example, the substances listed as potential carcinogens in the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). 42 U.S.C. § 9601 (including chlordane, PCBs, TCE, and vinyl chloride).

21. Animal testing involves exposing laboratory animals to a maximum tolerated dose of the substance (a dose as high as possible without causing them to die from non-carcinogenic effects). Cranor, *Regulating Toxic Substances* at 17 (cited in note 13). Mathematical models are then used to extrapolate the level of toxicity for humans. *Id.* Testing in this manner has been criticized both for problems associated with making a simple linear calculation in this manner, and because a substance may not have the same effects on different species. See, for example, Stephen Breyer, *Breaking the Vicious Circle: Toward Effective Risk Regulation* 44-46 (Harvard U., 1993).

22. Epidemiology essentially uses statistical models to compare the rate of disease in an exposed population with the rate of disease in an unexposed population. See generally Bert Black and David E. Lilienfeld, *Epidemiological Proof in Toxic Tort Litigation*, 52 *Fordham L. Rev.* 732 (1964).

23. Chlorinated compounds have not always been found to be strongly carcinogenic in animals. Hileman, *Chem. & Eng. News* at 15 (cited in note 11). Epidemiological analysis, however, has drawn a link between the compounds and a "cancer epidemic in the industrialized world." *Id.* at 16. Animal testing and data from exposed wildlife have shown that the compounds can have adverse effects on the endocrine, nervous, and immune systems of exposed fetuses. *Id.* at 14-15. The data on dioxin is particularly strong, partly because an industrial accident in 1976 gave scientists a good database for epidemiological study. Marguerite Holloway, *Dioxin Indictment: A Growing Body of Research Links the Compound to Cancer*, *Scientific American* 25 (Jan. 1994).

care when using or producing these and other potentially toxic substances.

B. The Need for Tort Law as a Supplement to Environmental Regulation

Regulation encourages a company to exercise appropriate levels of care. An efficient and reliable tort system, however, is equally important. Indeed, without potential tort liability, profit driven entities may find it cost-effective to engage in behaviors that pose unreasonable threats to human society. For instance, in late 1979, the Union Carbide Corporation made a crucial decision to begin producing methyl isocyanate ("MIC"), a chlorinated substance, at its pesticide plant in Bhopal, India.²⁴ The plant, located in a residential neighborhood,²⁵ was in no way equipped to store safely the large amounts of the chemical that would be produced.²⁶ Union Carbide made no effort to update the plant facilities, provide adequate training to employees, develop emergency plans, or inform the public about possible risks.²⁷ Around midnight on December 2, 1984, water somehow infiltrated an MIC storage tank,²⁸ causing an explosion that killed or seriously injured thousands of people.²⁹ The Bhopal community continues to suffer long-term health effects from this disaster.³⁰

24. See generally Jamie Cassels, *The Uncertain Promise of Law: Lessons from Bhopal* (U. Toronto, 1993).

25. The plant was less than two kilometers away from the center of the city. *Id.* at 15. Most of the plant was surrounded by densely populated slums, with no buffer zone or greenbelt. *Id.*

26. The plant had been using MIC to formulate pesticides for years. *Id.* at 13-14. Manufacturing MIC, however, required the ability to store large amounts of the chemical. *Id.* at 14. A former Union Carbide employee who was initially in charge of the project claims to have warned the company of the dangers, but was overridden by the parent company. *Id.*

27. *Id.* at 13-18. Many lives could have been saved in the ensuing disaster if people had known to run against the wind, or place a wet towel over their faces. *Id.* at 16.

28. Union Carbide claimed the plant has been sabotaged. *Id.* at 8. The Indian government ascribed the accident to a misbandling of the pipe cleaning system, which caused water to build up high enough in the pipes to wash back through to the MIC tank. *Id.* at 8-9.

29. It is impossible to know the exact number of victims. *Id.* at 5. Several thousand were killed instantly, and thirty to forty thousand are estimated to have been seriously injured. *Id.* Many more suffered minor injuries, economic loss, or the loss of family members and friends. *Id.*

30. *Id.* Among the long term health effects reported are vertigo, fatigue, pain, respiratory problems, vision problems, and coughing up blood. *Id.* There have been unusually high rates of stillbirths, spontaneous abortions, birth defects, and infant mortality in the community. *Id.* at 5-6. Other long term health effects are still being studied. *Id.* at 6.

Union Carbide eventually settled litigation over the incident for \$470 million³¹—much less than the \$3 billion originally sought, less than an offer Union Carbide had earlier extended,³² and hardly proportionate to the magnitude of the accident.³³ The \$470 million settlement was widely perceived as a Union Carbide victory. In fact, on the day the settlement was announced, Union Carbide's stock prices rose by two dollars a share.³⁴

Meanwhile, in the United States, Union Carbide built a similar plant in Institute, West Virginia.³⁵ Like the Bhopal plant, the West Virginia plant produced MIC. Unlike the Bhopal plant, however, the West Virginia plant contained computerized warning systems, equipment designed for higher capacities, and emergency evacuation plans.³⁶ Even so, the plant was underdesigned for safety.³⁷ It experienced a series of gas leaks, the most serious of which occurred only eight months after the Bhopal incident, and injured over one hundred people.³⁸ The Occupational Safety and Health Administration ("OSHA") subsequently found the plant in violation of hundreds of safety regulations.³⁹

In both Bhopal, India and West Virginia, potential liability failed to provide incentives for Union Carbide to take appropriate safety steps to prevent mass disaster. Not so coincidentally, India's tort system is underdeveloped and under-utilized.⁴⁰ There are no civil juries, contingency fee arrangements are not allowed, and little tort doctrine has evolved.⁴¹ In addition, litigants must pay prohibitively high fees to access the courts.⁴² As a result, even mass torts such as the Union Carbide disaster in India may have few legal conse-

31. *Id.* at 228. As of 1992, none of the victims had actually received final compensation. *Id.* at 289.

32. *Id.* at 223-24.

33. *Id.* at 223. The settlement vastly underestimated the number of victims and the adequacy of the awards to the known victims has also been questioned. *Id.* at 228-32.

34. *Id.* at 223.

35. *Id.* at 18-19.

36. *Id.* at 19.

37. *Id.* at 18.

38. *Id.*

39. *Id.*

40. See generally Marc Galanter, *Legal Torpor: Why So Little Has Happened in India After the Bhopal Tragedy*, 20 *Texas Intl. L. J.* 273 (1985).

41. *Id.* at 275-78. Other factors contributing to lack of tort accountability in India include the burden placed on the client to conduct factual investigation instead of the lawyer, the lack of a respectable way for lawyers actively to recruit clients, and a general lack of tort consciousness among the public. *Id.*

42. *Id.* at 274. British colonial rules imposed this requirement through the Indian Courts Fees Act of 1870 specifically to restrain litigation. *Id.*

quences.⁴³ Lack of effective tort accountability in India surely influenced Union Carbide's decision to manufacture MIC at an inappropriate site, virtually ignoring the very real risks associated with its actions.⁴⁴

American tort law is more potent than India's, but has nonetheless failed to address the special challenges posed by chemical accident and toxic tort litigation.⁴⁵ Lack of full tort accountability is less extreme than in India, but the American tort system has also proved unable to ensure responsible safety decisions. Although the safety decisions made for the American plant were somewhat better than those made in India, the hundreds of OSHA violations suggest that safety measures were still not completely satisfactory.⁴⁶

Union Carbide may be an unusually egregious example, but potential liability can have a substantial effect on any company's safety decisions. To encourage responsible decision-making, our tort system must therefore articulate fair and predictable recovery standards with no significant gap in liability. A significant gap currently exists, however, in corporate liability for exposing people to toxic or potentially toxic substances through chemical accidents,⁴⁷ inadequate occupational health standards,⁴⁸ and improper waste disposal.⁴⁹ Specifically, current tort law fails to address the particular issues raised by delayed manifestation⁵⁰ and causation⁵¹ in toxic tort litigation.

Although persons exposed to toxic substances may experience immediate physical symptoms, more often exposure increases one's risk of contracting a serious disease in the future.⁵² The disease may

43. *Id.* at 280. For example, no claims were brought in India regarding an airline crash in 1972, which killed hundreds, or a 1982 incident of liquor contamination, which killed 365. *Id.* at 280, n.33 (citation omitted).

44. Cassels, *The Uncertain Promise of Law* at 25 (cited in note 24).

45. See Marc Galanter, *Bhopals Past and Present: The Changing Legal Response to Mass Disaster*, 10 *Windsor Yearbook of Access to Justice* 151, 154 (1990) (contrasting America's "high accountability/high remedy" system with India's "low accountability/low remedy" system, but noting problems with the American legal system's response to industrial accidents and mass disasters).

46. Cassels, *The Uncertain Promise of Law* at 18 (cited in note 24). Union Carbide illogically claimed both that the safety of the plants were identical, and that the Bhopal accident could not have happened in America. *Id.*

47. See note 71 and accompanying text.

48. See note 70 and accompanying text.

49. See notes 80-85 and accompanying text.

50. See notes 102-12 and accompanying text.

51. See notes 108-12 and accompanying text.

52. Cranor, *Regulating Toxic Substances* at 3 (cited in note 13).

remain latent for many years after exposure.⁵³ When the disease finally manifests itself, the statute of limitations may have run, the responsible company may be out of business, or other circumstances barring suit may have arisen.⁵⁴ Most importantly, it may be impossible for a plaintiff to prove that a disease which arose twenty or thirty years after exposure was in fact caused by that exposure.⁵⁵ In most cases, a potential plaintiff had some statistical chance of contracting the disease before being exposed to the toxic substance.⁵⁶ The potential defendant's actions merely increased that risk.

This Note argues that increasing a person's risk of contracting a serious illness by exposing that person to a toxic substance should constitute a legally actionable injury. The Note suggests ways in which increased risk causes of action, including medical monitoring, fear of future disease, and outright recovery for increased risk, can be sensibly and effectively defined by state legislatures. Effective drafting will ensure that courts apply these causes of action in ways that will deter environmentally irresponsible behavior without unfairly interfering with commercial function and progress. Part II discusses environmental regulation's failure to prevent human exposure to toxic substances, and suggests that this failure is primarily due to difficulties in assessing risks and enforcing the regulations. Part III examines traditional tort law and current judicial standards governing increased risk causes of action and highlights the ways in which these causes of action have failed to fit the realities of toxic tort litigation. Part IV issues a call for legislative recognition and definition of increased risk causes of action. To this end, this Part evaluates the Guam Toxic Substance Exposure Compensation Act of 1990⁵⁷ and outlines issues to be addressed in drafting similar legislation in other jurisdictions. Part V discusses the integration of increased risk causes of action into existing tort law and balances the costs of such a system against the costs of the current system. This Note ultimately concludes that if carefully defined, the benefits of recognized increased risk causes of action outweigh the risks and costs.

53. Bill Charles Wells, *The Grin Without the Cat: Claims for Damages from Toxic Exposure without Present Injury*, 18 Wm. & Mary J. Envir. L. 285, 289-90 (1994).

54. See notes 101-06 and accompanying text.

55. See notes 107-11 and accompanying text.

56. Many factors can cause cancer and other health problems. Cranor, *Regulating Toxic Substances* at 3 (cited in note 13). Epidemiologists must therefore compare an expected rate of a given disease to incidence of the disease after exposure. See generally Black and Lilienfeld, 52 *Fordham L. Rev.* at 736 (cited in note 22).

57. Guam Code Ann. §§ 41101-07 (1993).

II. THE FAILURE OF ENVIRONMENTAL REGULATION TO DETER BEHAVIOR RESULTING IN HUMAN EXPOSURE TO TOXIC SUBSTANCES

Toxic exposure typically impacts workers,⁵⁸ users of contaminated groundwater,⁵⁹ and victims of chemical accidents.⁶⁰ Exposure may also occur as a result of a person's physical presence in a contaminated area.⁶¹ OSHA regulates worker exposure in most industries.⁶² The Environmental Protection Agency ("EPA") regulates groundwater and land contamination through the Clean Water Act,⁶³ the Clean Air Act,⁶⁴ the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"),⁶⁵ the Toxic Substances Control Act ("TSCA")⁶⁶ and other environmental statutes. These federal agencies seek to identify and control the risks associated with toxic substances in American commercial enterprises.⁶⁷

Current environmental regulation has failed to deter companies from polluting the environment.⁶⁸ Improper disposal of hazardous waste,⁶⁹ failure to take reasonable safety measures to protect employees,⁷⁰ and an unacceptably high number of chemical spills and

58. See, for example, *Hagerty v. L & L Marine Services, Inc.*, 788 F.2d 315, 317 (5th Cir. 1986) (involving a seaman doused with toxic chemicals on two separate occasions while working as a tanker man on a barge being loaded with chemicals).

59. See, for example, *Sterling v. Velsicol Chem. Corp.*, 855 F.2d 1188, 1192-93 (6th Cir. 1988) (involving plaintiffs' groundwater contaminated with chlorinated hydrocarbons from the defendant's chemical waste burial site).

60. See notes 24-44 and accompanying text (discussing the Union Carbide incidents).

61. See, for example, *In re Paoli Railroad Yard PCB Litigation*, 916 F.2d 829, 835 (3rd Cir. 1990) (involving claims by plaintiffs who lived near an electric rail car facility claimed exposure to PCBs that were found in high concentration at the rail yard and in the ambient air and soil).

62. Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, 84 Stat. 1590, codified at 29 U.S.C. 651(b)(3) (1988 ed.).

63. 33 U.S.C. §§ 1251 et seq. (1988 ed.).

64. 42 U.S.C. §§ 7401 et seq. (1988 ed.).

65. Id. §§ 9601 et seq. (1988 ed.).

66. 15 U.S.C. §§ 2601 et seq. (1988 ed.).

67. See generally Office of Technology Assessment Task Force, *Identifying and Regulating Carcinogens* 1-22 (Lewis, 1988) (responding to a request for examination of federal testing of chemicals for carcinogenicity and subsequent use by regulatory agencies).

68. See Melissa Moore Thompson, Comment, *Enhanced Risk of Disease Claims: Limiting Recovery to Compensation for Loss, Not Chance*, 72 N.C. L. Rev. 453, 453 (1994) (prefacing discussion of increased risk claims with a catalogue of various toxic exposure fact patterns which, because of their frequent occurrence, "approach . . . the realm of archetype").

69. See Cassels, *The Uncertain Promise of Law* at 14 (cited in note 24).

70. For example, in 1992, a GE plant in Anaheim, California lost its PCB handling license because the plant posed an unreasonable risk to human health and the environment. Coppolino, *Sierra Mag.* at 43 (cited in note 16). According to testimony in a lawsuit filed by one of the workers, GE placed workers in direct, continuous contact with PCBs, located the employee eating lounge in the drum storage room, and failed to give any warning whatsoever about the substance's known risks. Id.

transportation accidents persist in the United States and worldwide.⁷¹ In addition, the current system fails to create strong incentives for companies to generate information about the chemicals they use or produce.⁷² Unlike food and drug regulations, which require companies to demonstrate affirmatively that a product is safe before marketing it, environmental regulations allow most toxic substances to be used or produced unless and until an agency imposes restrictions.⁷³ Companies therefore have an incentive to ignore information about the risks associated with a particular substance.⁷⁴

Effective regulation requires viable enforcement techniques and accurate risk assessment. The current regulatory system does not adequately address either element. Systematic under-enforcement significantly decreases the deterrence value of environmental regulation. For example, in the case of toxic waste dumping, the responsible party often cannot be identified, much less punished.⁷⁵ Typically, violations of environmental regulations result in fines.⁷⁶ If violations are detected, companies can factor fines and penalties into the cost of doing business.⁷⁷ Moreover, as with many crimes, a company may stand a good chance of avoiding detection altogether.⁷⁸

71. See Cassels, *The Uncertain promise of Law* at 25-28 (cited in note 24) (discussing the chemical accident rate and describing the high risks associated with the chemical industry).

72. See John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 Colum. L. Rev. 261, 299-300 (1991) (stating that "the industrial defendant is typically in the best position to create the necessary data, but its incentives are the reverse").

73. CERCLA and RCRA target specific lists of chemicals and empower the EPA to add to these lists when necessary. Office of Technology Assessment Task Force, *Identifying and Regulating Carcinogens* at 15 (cited in note 67). Under TSCA, chemical manufacturers must submit a "pre-manufacturing notice" to the EPA. *Id.* at 13-15. See Mary Lyndon, *Information Economics and Chemical Toxicity: Designing Laws to Produce and Use Data*, 87 Mich. L. Rev. 1795, 1823-25 (noting that since pre-manufacturing notices often contain no health or safety information, and since the EPA must show the chemical poses an unreasonable risk to human health before regulating it, TSCA essentially establishes a presumption of safety). Under the Federal Insecticide, Fungicide, and Rodenticide Act, however, the EPA can require toxicity testing of pesticide ingredients before they enter the market. Office of Technological Assessment Task Force, *Identifying and Regulating Carcinogens* at 13 (cited in note 67).

74. See note 71 and accompanying text.

75. Kip W. Viscusi, *Toward a Diminished Role for Tort Liability: Social Insurance, Governmental Regulation, and Contemporary Risks to Health and Safety*, 6 Yale J. Reg. 65, 92 (1989).

76. See generally Keith Meyer, *The Environmental Fate of Toxic Waters, the Certainty of Harm, Toxic Torts and Toxic Regulations*, 19 Envir. L. 321, 377-82 (1988).

77. *Id.* at 379.

78. OSHA guidelines are enforced with rare on-site inspections. Viscusi, 6 Yale J. Reg. at 92 (cited in note 75).

In a climate devoid of moral consensus,⁷⁹ toxic substance regulation will succeed only if companies find that adhering to a regulation is cheaper than violating it. In making this determination, companies will naturally discount the amount of any potential fines by the probability that they will escape detection. This reduced penalty cost may prove to be less than the cost of preventing exposure or using non-toxic substances where possible.

A noted case, *Potter v. Firestone Tire and Rubber Co.*,⁸⁰ provides an example of such a calculation. Firestone contracted with two companies to dispose of its industrial waste at a particular landfill.⁸¹ Firestone was aware that California law prohibited the disposal of toxic substances and liquids at this particular landfill because of the danger that they could leach into groundwater.⁸² For years, Firestone nonetheless sent toxic substances to the landfill, because it considered proper disposal of the wastes to be too costly.⁸³ Ultimately, the groundwater and the domestic well water of nearby residents were contaminated with a number of strongly suspected carcinogens.⁸⁴ Firestone's blatant policy of non-compliance suggests that the company believed it would be cheaper in the long run to violate California environmental laws than to dispose of its waste properly.⁸⁵

Systematic under-enforcement of environmental regulations partly explains the failure of current regulations to deter environmentally irresponsible behavior. The equally vexing problem of agency risk assessment not only contributes to current failures but also raises serious doubt about the deterrent value of environmental regulation. Agencies must make both qualitative and quantitative risk assessments.⁸⁶ That is, an agency must decide whether a substance qualitatively poses a risk, and if so, must measure that risk and possible reactions to it quantitatively.

79. Unlike most crimes, there is not a secure moral and political consensus about the goals of environmental regulations. Keith Hawkins, *Environment and Enforcement: Regulation and the Social Definition of Pollution* 12-13 (Clarendon, 1984).

80. 25 Cal. Rptr. 2d 550, 863 P.2d 795 (1993).

81. *Id.* at 801-02.

82. *Id.*

83. *Id.*

84. *Id.* The chemicals found in the water included benzene, toluene, chloroform, 1,1-dichloroethene, methylene chloride, tetrachloroethene, 1,1,1-trichloroethane, trichloroethene and vinyl chlorine. *Id.*

85. The court held Firestone liable for medical monitoring costs, and remanded the case for a determination of whether Firestone had acted with "oppression, fraud or malice," thereby incurring liability for emotional distress. *Id.* at 827.

86. Office of Technology Assessment Task Force, *Identifying and Regulating Carcinogens* at 7-8 (cited in note 67).

The EPA considers a substance qualitatively toxic if it causes harmful effects in animals.⁸⁷ Animal testing is itself highly controversial. Even if the process were free from controversy, however, the vast number of potentially toxic substances would still make qualitative risk assessment a very difficult endeavor.⁸⁸ The EPA and OSHA lack the resources to evaluate every chemical used in American industry.⁸⁹ Even if eventually tested, a chemical will likely be in use for a significant amount of time before it attracts agency attention.⁹⁰ In fact, the chemical might not attract any notice until it causes significant harm.⁹¹ Even when agencies have identified chemicals associated with adverse health effects, the agencies may find it difficult to prioritize.⁹² Various agencies may also have conflicting goals and methods, resulting in confused messages to the public about priorities and risk.⁹³ One agency might even promote an environmental goal by promulgating rules that directly impinge on the environmental objectives of another agency.⁹⁴

Once a qualitative evaluation has been made, the agency begins the quantitative aspect of risk assessment. First, the agency creates a mathematical model of animal response to high dosages of a substance and extrapolates a human response from this model.⁹⁵ Next, the agency gathers information about exposure levels and uses this information to estimate individual risks and to project the number of harmful effects that a substance will cause in a given population.⁹⁶ This is a general determination, which, when applied to a

87. *Id.* at 7.

88. See Applegate, 91 Colum. L. Rev. at 289 (cited in note 72) (noting that a majority of drugs and chemicals have not been subjected to adequate health testing).

89. *Id.*

90. See Lyndon, 87 Mich. L. Rev. at 1824 (cited in note 73) (explaining the process by which chemicals become regulated under TSCA). See also John M. Mindeloff, *The Dilemma of Toxic Substance Regulation: How Overregulation Causes Underregulation at OSHA* 261-67 (MIT, 1991) (explaining how the restricted flow of information to regulators and the possibility of court challenges to regulation contribute to OSHA delays); Cranor, *Regulating Toxic Substances* at 5 (cited in note 13) (arguing that present research intensive risk assessment policies contribute to delay).

91. See Ferretti, 10 Pace Envir. L. Rev. at 718-19 (cited in note 10) (showing that environmental statutes were reactive at best, passed only after the dangers posed by waste sites, water pollution, pesticides, and other chemicals were well-documented).

92. Applegate, 91 Colum. L. Rev. at 291 (cited in note 72). Agencies, in other words, must decide where to allocate resources and focus regulatory efforts. *Id.*

93. Breyer, *Breaking the Vicious Circle* at 22 (cited in note 21).

94. For example, the EPA's Office of Solid Waste and Emergency Response once discouraged the recycling of refrigerators, which contain CFCs, while the EPA's Office of Air and Radiation encouraged the recycling of refrigerators to save the ozone layer. *Id.*

95. Office of Technology Assessment Task Force, *Identifying and Regulating Carcinogens* at 7-8 (cited in note 67).

96. *Id.* at 8.

given situation, may result in either underregulation, which fails to control risky behavior, or overregulation, which discourages productive and safe use of industrial chemicals.

These risk assessment difficulties, combined with gaps in enforcement, have significantly lessened the deterrent effect of environmental regulation. Nor does regulation offer an independently viable solution to environmentally irresponsible behavior. There are simply too many chemicals and too many companies using them for agency regulation to effect complete control. Under-enforcement and limited evaluation of potentially toxic substances produce a system that fails to provide adequate incentives for companies to act responsibly.

III. THE FAILURE OF CURRENT TORT RECOVERY STANDARDS

Regulation alone, then, cannot adequately deter companies from engaging in behavior that may expose people to hazardous substances. Tort liability should work to bolster the deterrent effect of these regulations. Under existing tort law, however, plaintiffs encounter significant barriers to recovery for the kinds of harm caused by exposure to toxic substances. These barriers severely inhibit the deterrent function of tort liability.⁹⁷ Although some jurisdictions have recognized causes of action that have the potential to mitigate the unfairness of the traditional response to toxic torts, these causes of action have been so conservatively defined that they in many ways perpetuate existing problems. That is, courts have reduced the efficacy of these causes of action by attempting to make them conform to inapplicable, but familiar, tort standards.

97. In addition to the barriers discussed in Part III.A., difficulties presented by toxic tort litigation might include managing the size of some plaintiff classes, funding the preliminary investigations, scientific or otherwise, and meeting the standards for expert opinion in scientific matters. For a chronicle of the difficulties faced by seven families in Woburn, Massachusetts during their litigation of claims against W.R. Grace Co. and Beatrice Foods for contaminating their drinking water with TCE and significantly increasing the rate of leukemia in the town, see generally Jonathan Harr, *A Civil Action* (Random House, 1995). The district court judge required the plaintiffs to obtain a jury verdict that the defendants had actually contaminated the water before permitting them to proceed to the issue regarding increased risk of contracting leukemia. After months of trial and hundreds of thousands of dollars worth of expert testimony and research, the jury found W.R. Grace guilty only of contaminating the water. The plaintiffs no longer had the resources to litigate the claim, and were forced to settle for a disappointing amount. Their lawyer, who had devoted his attention exclusively to the case for years, eventually had to declare personal bankruptcy. Subsequently, an EPA report proved conclusively that both defendants had in fact contaminated the water. The plaintiffs had a good case, but were overwhelmed by the burdens of toxic tort litigation. *Id.*

A. Barriers of Traditional Tort Law

In theory, companies that engage in actions causing injury to others may be held liable in tort. Toxic exposure cases, however, present unique difficulties. In this context, injurious behavior may not result in appropriate liability, or indeed in any liability at all. This is largely because the plaintiff will be held to traditional tort standards.⁹⁸ She must prove that the defendant owed her a duty, that the defendant breached that duty, that she suffered an injury, and that the defendant's breach caused her injury.⁹⁹ In toxic exposure cases, the plaintiff may not be able to prove that she suffered a legally recognizable injury.¹⁰⁰ If she can prove injury, she may not be able to prove causation.¹⁰¹ Tort cases of this nature are extremely difficult to win under traditional principles. This makes the prospect of full tort liability so unlikely that it does not provide an effective supplement to environmental regulation.¹⁰²

The long latency periods of toxic exposure diseases¹⁰³ create a number of barriers to full tort recovery. If a disease does not manifest itself until ten, twenty, or thirty years after exposure, the statute of limitations on the plaintiff's claim may well have run, relieving the defendant of all liability.¹⁰⁴ Furthermore, by the time a disease manifests itself, a particular company may have reorganized,¹⁰⁵ gone out of business, or declared bankruptcy.¹⁰⁶ There is no guarantee, for instance, that a paper mill which releases dioxin into a nearby stream

98. See, for example, *Potter*, 863 P.2d at 816.

99. W. Page Keeton, *Prosser and Keeton on the Law of Torts* § 30 (West, 5th ed. 1984) (describing the elements of a cause of action in negligence).

100. In other words, increased susceptibility to disease or increased likelihood of contracting a disease may not constitute a legally recognizable injury in the same way that manifesting symptoms would.

101. See notes 109-13 and accompanying text.

102. This gap in tort liability is illustrated by the asbestos situation. Gregory L. Ash, Comment, *Toxic Torts and Latent Diseases: The Case for an Increased Risk Cause of Action*, 38 U. Kan. L. Rev. 1087, 1092-93 (1990).

103. Note, *Tort Actions for Cancer: Deterrence, Compensation and Environmental Carcinogenesis*, 90 Yale L. J. 840, 853 (1981).

104. See Note, *The Fairness and Constitutionality of Statutes of Limitations for Toxic Tort Suits*, 96 Harv. L. Rev. 1683, 1684 (1983).

105. See Terry Morehead Dworkin, *Fear of Disease and Delayed Manifestation Injuries: A Solution or a Pandora's Box*, 53 Fordham L. Rev. 527, 573 (1984) (noting that if the plaintiffs had a recognized present claim, such as a fear of future disease, they could be included in any reorganization plans).

106. David S. Pegno, Note, *An Analysis of the Enhanced Risk Cause of Action (or How I Learned to Stop Worrying and Love Toxic Waste)*, 33 Vill. L. Rev. 437, 445 (1988). For example, the Johns-Manville Corporation filed a Chapter 11 bankruptcy petition in 1982 to limit the potential liability it faced for asbestos related claims. Note, *The Manville Bankruptcy: Treating Mass Tort Claims in Chapter 11 Proceedings*, 96 Harv. L. Rev. 1121, 1121-23 (1983).

will still be operating twenty-five years later when people who swam in the stream actually contract cancer.

Even if a plaintiff were able to recover in full for a disease manifested years after actual exposure, delay itself would undermine any deterrent effect.¹⁰⁷ The people operating a corporation who actually cause exposure or contamination may not be sufficiently motivated to modify their behavior for the sake of their corporate successors, who will face liability in future years.¹⁰⁸

Long latency periods also contribute to what is arguably the most problematic issue in toxic tort litigation—proving causation. Because diseases associated with toxic substances can typically be caused by a number of environmental factors,¹⁰⁹ it is often difficult if not impossible to prove that a particular corporate activity led directly to a particular disease.¹¹⁰ In most cases, medical science can establish no more than varying degrees of probability that a plaintiff's disease was caused by a certain defendant.¹¹¹ At most, expert testimony may show through epidemiological statistics that exposure is likely to cause or has caused increased incidence of a particular disease in a given group.¹¹² Legal commentators often refer to this causation difficulty as the "indeterminate plaintiff" problem.¹¹³ The problem is profound: if five people in a given community would develop cancer under any conditions, but ten will develop cancer if the defendant contaminates the drinking water, how can an individual plaintiff prove she has one of the five additional cases caused by the contamination? Clearly the defendant cannot fairly be held liable for

107. See Ash, 38 U. Kan. L. Rev. at 1101 (cited in note 102) (indicating that "[e]ven if delayed manifestation claimants are never barred from suit, they still will suffer from the problems associated with being forced to sue years after the exposure occurs"). But see Thompson, 72 N.C. L. Rev. at 479 (cited in note 68) (arguing that present recovery should be limited to emotional distress and medical monitoring and that a subsequent remedy should be allowed only if the disease manifests itself, i.e. no increased risk claims).

108. Legum, 18 Ga. L. Rev. at 585 (cited in note 4).

109. See Black and Lilienfeld, 52 Fordham L. Rev. at 745 (cited in note 22) (discussing medical approaches to diseases with multiple possible causes).

110. Defense counsel may attempt to show that the plaintiff voluntarily exposed herself to other toxic substances, or that such exposure is an unavoidable consequence of daily life. Terry Christevich Gay and Paige Freeman Resate, *Combating Fear of Future Injury and Medical Monitoring Claims*, 61 Def. Couns. J. 554, 562 (1994). See Pegno, 33 Vill. L. Rev. at 442 (cited in note 106) ("The intervening cause argument may pose particular difficulties for a plaintiff who smokes or lives in a particularly polluted area").

111. Black and Lilienfeld, 52 Fordham L. Rev. at 745-46 (cited in note 22).

112. *Id.* at 750. Epidemiology is statistically based, but is intended to provide the means to draw actual biological inferences related to causation. *Id.*

113. See, for example, Richard Delgado, *Beyond Sindell: Relaxation of Cause-in-Fact for Indeterminate Plaintiffs*, 70 Calif. L. Rev. 881, 903-04 (1982) (arguing that toxic tort cases present enough unfair barriers to recovery to justify relieving stringent cause-in-fact requirements).

all cases of cancer in the community, because it is statistically likely that it caused only some of them. Equally clearly, the defendant cannot be absolved of all responsibility, because the defendant caused five additional cancer cases.

The doctrines and procedures of the traditional tort system fail to address these particular problems presented by toxic exposure cases. Tort recovery, then, fails to provide the necessary deterrence supplement to environmental regulations. If tort law were adjusted to match the realities of the harm caused by toxic exposure, however, it could function more effectively in this capacity. Holding a defendant directly liable for the increased risk its behavior inflicts on the community could accomplish such a result.

B. Current Judicial Standards Governing Causes of Action for Increased Risk

Three main causes of action have emerged to deal with toxic tort issues: medical monitoring,¹¹⁴ fear of future disease,¹¹⁵ and out-right recovery for increased risk of disease.¹¹⁶ These three causes of action are conceptually distinct and require the plaintiff to meet different standards.¹¹⁷ All three, however, essentially allow the plaintiff to recover before it is known whether she will actually suffer a medical problem as a result of the defendant's conduct. As such, all three are essentially causes of action for increased risk, though only one is explicitly framed in these terms. In other words, the existence of increased risk of harm is the underlying theory behind each cause of action. Depending on individual circumstances, a plaintiff may be able to recover directly for the injury through the increased risk cause of action, for the emotional distress suffered as a result of the injury through the fear of future disease claim, and/or for any medical bills reasonably incurred as a result of the injury through the medical

114. See Part III.B.1. See generally Susan L. Martin and Jonathan D. Martin, *Tort Actions for Medical Monitoring: Warranted or Wasteful?*, 20 Colum. J. Envir. L. 121 (1995).

115. See Part III.B.2. See generally Glen Donath, *Curing Cancerphobia Phobia: Reasonableness Redefined*, 62 U. Chi. L. Rev. 1113 (1995).

116. See Part III.B.3. See generally Legum, 18 Ga. L. Rev. at 586-91 (cited in note 4).

117. Usually, medical monitoring claimants must show exposure to a toxic substance and that medical monitoring would be medically beneficial. See notes 126-28 and accompanying text. Fear of future disease claimants must show that their fears are reasonable and must usually show some sort of physical injury or impact. See notes 134-40 and accompanying text. Increased risk claimants typically must meet the much higher burden of showing that it is more likely than not that they will contract a given disease. See notes 151-52 and accompanying text. See also Dworkin, 53 Fordham L. Rev. at 570-71 (cited in note 105) (characterizing medical monitoring recovery as a "compromise solution" between the extremes of denying all toxic substance exposure recovery and allowing emotional distress recovery).

monitoring claims. Each of the three causes of action therefore has the potential to contribute in a unique way to providing full increased risk recovery.

The recognition of increased risk causes of action, however, has not been without significant qualification. Courts typically try to force these causes of action into the traditional tort paradigm, with the result that plaintiffs are faced with difficult and often insurmountable barriers to recovery. Such barriers result in an inefficient system of novel theories uncomfortably yoked to traditional tort principles. Significantly, courts may continue to conceptualize the underlying injury in these causes of action as the actual disease, virtually guaranteeing that causation will remain a vexing problem. In order to address the problems raised by toxic tort litigation more effectively, increased risk must be identified as the underlying injury. The distinction is subtle but crucial.

1. Recovery for Medical Monitoring

The leading case on medical monitoring recovery is *Ayers v. Jackson Tp.*¹¹⁸ In that case, a landfill operated by a township in New Jersey leached contaminants,¹¹⁹ including four suspected human carcinogens,¹²⁰ into the plaintiffs' drinking water.¹²¹ At trial, the jury found that the township had operated the landfill in an unreasonable manner.¹²² There was evidence that the township had simply disregarded the conditions the New Jersey Department of Environmental Protection had imposed on its permit to operate the landfill.¹²³ The plaintiffs sought, among other damages, recovery for the costs of medical surveillance to detect any future signs of cancer.¹²⁴ The Supreme Court of New Jersey allowed the plaintiffs to recover these costs on the theory that, because they would incur medical

118. 106 N.J. 557, 525 A.2d 287 (1987).

119. The contaminants were acetone, benzene, chlorobenzene, chloroform, dichlorofluoromethane, ethylbenzene, methylene chloride, methyl isobutyl ketone, 1,1,2,2-tetrachloroethane, tetrahydrofuran, 1,1,1-trichloroethane, and trichloroethylene. *Id.* at 292.

120. *Id.*

121. For a discussion of the process by which groundwater becomes contaminated, see Kevin A. LaValle, *Groundwater Contamination: Removal of the Constraints Barring Recovery for Increased Risk and Fear of Future Diseases*, 1988 *Detroit College L. Rev.* 65, 69-75 (1988).

122. *Ayers*, 525 A.2d at 292.

123. *Id.* The conditional permit had limited the depth of waste deposit in an effort to keep the waste above the level of the groundwater. *Id.* The court found that the township had "ignored its duty to control and limit the depth of the trenches in which wastes were deposited." *Id.*

124. *Id.* at 291. The plaintiffs also sought damages for emotional distress and deterioration of quality of life. *Id.*

costs they would not otherwise have incurred, the plaintiffs had suffered presently identifiable injuries.¹²⁵

The *Ayers* court required the plaintiffs to prove medical monitoring to be reasonable and necessary based on: (1) the significance and extent of exposure, (2) the toxicity of the chemical, (3) the seriousness of the disease at stake, (4) the relative increase in risk, and (5) the value of early diagnosis.¹²⁶ Following *Ayers*, courts have continued to employ similar factors in assessing medical monitoring claims. The value of early diagnosis has proved to be of particular significance. In another important case, *In re Paoli R.R. Yard PCB Litigation*,¹²⁷ a federal district court predicted that the Pennsylvania Supreme Court would recognize a medical monitoring claim only if medical procedures existed which would make it possible to detect and treat any diseases associated with exposure early.¹²⁸

Indeed, medical monitoring liability is appropriate only when exposure creates risk such that early diagnosis is possible and is likely to improve the plaintiff's medical condition. That is, medical monitoring would be a futile response to risk of a disease that is incurable at any stage or undetectable until acute. Therefore, even though medical monitoring is properly defined as a present injury (in the form of increased cost for presently necessary medical treatment), it is of limited application. The medical monitoring cause of action is only appropriate in situations involving detectable and curable diseases.

2. Recovery for Fear of Future Disease

Fear of future disease claims are a species of emotional distress recovery.¹²⁹ Although the fear of future disease claim raises independent concerns, it is inevitably conditioned by the evolution of the emotional distress claim generally. Intentional infliction of emotional distress has long been recognized as an independent cause of action.¹³⁰ In contrast, recovery for negligent infliction of emotional distress has

125. *Id.* at 304.

126. *Id.* at 312. The court specified that these items must be shown through "reliable scientific testimony." *Id.*

127. 916 F.2d 829 (3rd Cir. 1990) (involving a claim for medical monitoring damages by 38 persons who lived near a rail yard owned by defendant sought medical monitoring damages after being exposed to PCBs).

128. *Id.* at 852.

129. See generally Dworkin, 53 *Fordham L. Rev.* at 570 (cited in note 105) (tracing the origins of the fear of future disease claims). See also Restatement (Second) of Torts §§ 436, 436A (1965) (summarizing the elements of emotional distress).

130. Restatement (Second) of Torts § 306 (cited in note 129).

traditionally been allowed only in conjunction with independent physical injury.¹³¹ Some modern courts, however, have recognized an independent cause of action for negligent infliction of emotional distress in limited circumstances.¹³² These courts seek to articulate a fair standard that allows legitimately injured plaintiffs to recover, without opening the floodgates to a sea of phony or de minimis claims.¹³³

To this end, courts have generally required the plaintiff to demonstrate a physical nexus with the defendant's conduct.¹³⁴ That is, the plaintiff must usually show either that she was physically impacted by the defendant's conduct or that she suffered a physical manifestation of the emotional distress.¹³⁵ In the absence of physical impact or manifestation, a negligent infliction of emotional distress claim is typically considered too speculative.¹³⁶

Some courts, however, have interpreted the physical impact requirement expansively.¹³⁷ For instance, courts have held that sub-cellular contact with a toxic substance constitutes a physical impact.¹³⁸ Some courts have similarly relaxed the physical manifestation requirement. In *Laxton v. Orkin Exterminating Co., Inc.*,¹³⁹ for example, the Tennessee Supreme Court held that the physical manifestation requirement was satisfied by the fact that the plaintiffs had been sufficiently worried about toxic exposure to consult a doctor.¹⁴⁰ In the toxic exposure context, courts that have relaxed the physical impact and manifestation requirements implicitly recognize that such requirements are ill-suited to the specific area of toxic exposure. Continuous low-level toxic exposure rarely leads to immediately identifiable effects.¹⁴¹ Often the plaintiff will not be able

131. Dworkin, 53 Fordham L. Rev. at 545 (cited in note 105).

132. *Id.* at 531.

133. See *id.* at 553 (noting that this concern becomes more compelling as the time period between impact and emotional injury increases).

134. Restatement (Second) of Torts § 436 (cited in note 129).

135. *Id.*

136. See Dworkin, 53 Fordham L. Rev. at 529 (cited in note 105) (stating that courts traditionally have viewed emotional distress claims with suspicion, since they are highly subjective and carry no meaningful market value).

137. See Scott D. Marrs, *Mind over Body: Trends Regarding the Physical Injury Requirement in Negligent Infliction of Emotional Distress and "Fear of Disease" Cases*, 28 Tort & Ins. L. J. 1 (1992) (describing the current state of the law in each state regarding the physical impact/physical manifestation rule).

138. See, for example, *Sterling v. Velsicol Chemical Corp.*, 855 F.2d 1188 (6th Cir. 1988).

139. 639 S.W.2d 431 (Tenn. 1982).

140. *Id.* at 434.

141. See Black and Lilienfeld, 52 Fordham L. Rev. at 744-49 (cited in note 22) (discussing the general course of toxic exposure).

to point to a bruise, broken bone, or injury to a particular organ. And yet, surely someone who has been exposed to a known toxic substance is justified in being distressed, even without a bruise or a broken bone.¹⁴² Moreover, the physical manifestation requirement can lead to arbitrary and seemingly inconsistent results.¹⁴³ The physical manifestation standard essentially rewards people who exhibit adverse physical reactions to stress and penalizes people who internalize stress well.

If increased risk were explicitly recognized as the injury underlying the fear of future disease claims, many of these inconsistencies could be reduced. In *Potter*,¹⁴⁴ the Supreme Court of California made an important move in this direction. In assessing whether or not the plaintiffs' fears of contracting cancer were reasonable, the *Potter* court looked not to the existence of a physical injury or manifestation, but to the probability that the plaintiffs would actually contract cancer.¹⁴⁵ The court, however, required the plaintiffs to show that the cancer was more likely than not to occur, an extremely difficult standard.¹⁴⁶ The court noted that a twenty or thirty percent risk of cancer would probably also cause genuine emotional distress,¹⁴⁷ but limited the plaintiffs' ability to recover for "public policy" reasons.¹⁴⁸

Although the *Potter* court set a difficult, if not impossible, standard, its willingness to examine the actual nature of the injury in determining the validity of an emotional distress claim represents an improvement in the legal response to toxic torts. From a common sense perspective, it is more reasonable to tie a plaintiff's emotional distress recovery to the amount of risk she faces than to whether or not the toxic chemical also caused a migraine headache or insomnia.¹⁴⁹ The *Potter* approach should be further refined for application to toxic

142. Courts sometimes recognize the reasonableness of a plaintiff's fear, but still decline to allow recovery. The *Potter* court, for example, indicated:

[W]e would be very hard pressed to find, as a matter of law, a plaintiff with a 20 percent or 30 percent chance of developing cancer cannot genuinely, seriously and reasonably fear the prospect of cancer. Nonetheless, we conclude, for the public policy reasons identified below, that emotional distress caused by the fear of a cancer that is not probable should generally not be compensable in a negligence action.

863 P.2d at 811.

143. See Donath, 62 U. Chi. L. Rev. at 1120-25 (cited in note 115) (arguing that both the physical injury and physical manifestation standards lead to arbitrary and confused awards).

144. For a summary of the facts in *Potter*, see notes 80-85 and accompanying text.

145. *Potter*, 863 P.2d at 810-11.

146. *Id.* at 817.

147. *Id.*

148. *Id.* at 816.

149. The focus on risk of disease also allays the concern that plaintiffs will exaggerate or make up symptoms such as migraine headaches and insomnia. *Id.* at 811.

tort litigation. Specifically, the validity of fear of future disease claims should be correlated to the actual increased risk of contracting a disease. The arbitrary fifty percent likelihood standard should not be employed. Rather, the question of whether the plaintiff's showing of increased risk is significant enough to warrant emotional distress recovery should be determined by the jury.

3. Outright Recovery for Increased Risk

Conceptually distinct from the fear of future disease claim,¹⁵⁰ increased risk recovery is predicated on the idea that the defendant has inflicted a personal injury on the plaintiff by increasing her chances of contracting a disease.¹⁵¹ Increased risk is the most difficult claim on which to succeed, because courts apply traditional causation principles. These principles require a satisfactory showing that the actions of defendant X caused plaintiff Y to contract disease Z. Courts therefore require a plaintiff to show a greater than fifty percent likelihood of contracting the disease in question.¹⁵² Some courts also require evidence showing that the plaintiff likely falls within the percentage that will contract the disease.¹⁵³

A plaintiff rarely sustains the burden of showing it is more likely than not that she will contract a disease.¹⁵⁴ In *Gideon v. Johns-Manville Sales Corp.*,¹⁵⁵ the Fifth Circuit allowed recovery for increased risk, but the plaintiff already suffered from an advanced case of asbestosis, and his doctor testified that "he will die of asbestos disease, there's no doubt about it."¹⁵⁶ This case is not typical. More often, doctors and epidemiologists are able to testify only that the

150. Fear of future disease claims are based on the idea that exposure to a toxic substance is an event sufficient in and of itself to give rise to reasonable fear and anxiety. The amount of increased risk is relevant only insofar as it speaks to the reasonableness of the fear. Increased risk recovery, on the other hand, is predicated on the idea that increased risk is itself a definable injury. The amount of increased risk is therefore directly linked to the plaintiff's ability to recover, as well as to the amount of that recovery.

151. Legum, 18 Ga. L. Rev. at 589 (cited in note 4). Scholars have argued that this conceptualization is appropriate for situations in which risk of contracting a disease remains after the risk-creating activity has ceased. *Id.* at 564. See also note 4 and accompanying text.

152. See, for example, *Hagerty*, 788 F.2d at 319.

153. David Rosenberg, *The Causal Connection in Mass Exposure Torts: A "Public Law" Vision of the Tort System*, 97 Harv. L. Rev. 849, 857-58 (1984).

154. See, for example, *Hagerty*, 788 F.2d at 319 (involving a seaman who had been soaked with toxic chemicals and suffered a number of immediate physical symptoms, but failed to recover for increased risk).

155. 761 F.2d 1129 (5th Cir. 1985).

156. *Id.*

plaintiff is at risk, not that the disease will more likely than not occur.¹⁵⁷

The "more probable than not" standard is rather arbitrary: Is a plaintiff with a forty percent chance of contracting cancer so much better off than a plaintiff with a fifty-one percent chance of contracting cancer? Why should the latter receive full compensation, while the former receives nothing? In addition, the more probable than not standard is not scientifically sound.¹⁵⁸ Risks may be considered significant and unacceptable well below a fifty percent threshold.¹⁵⁹ Furthermore, a greater than fifty percent chance of contracting a disease is often difficult or impossible to prove.¹⁶⁰ Finally, the more probable than not standard fails to eliminate overcompensation.¹⁶¹ Indeed, it allows plaintiffs to recover for injuries they may never actually sustain. After all, a person with a fifty-one percent chance of contracting cancer also has a forty-nine percent chance of never contracting cancer.

The more probable than not standard reflects judicial unwillingness to accept increased risk itself as a compensable injury. Courts still focus on the disease as the underlying injury, and try to establish causation by tying the disease to the plaintiff with a greater than fifty percent probability. If the injury is reconceptualized as the creation of risk, however, the analysis changes. The causation issues becomes much more straightforward: "but for" the defendant's conduct, would the plaintiff be at an increased level of risk of contracting a disease? In other words, the probability of disease becomes the underlying fact to be established. This reconceptualization would greatly improve the ability of the tort system to deal with toxic substance exposure issues.

IV. IMPLEMENTING INCREASED RISK CAUSES OF ACTION

Theoretical alternatives for dealing with the problems posed by toxic substance exposure include social insurance, no fault compensa-

157. See Black and Lilienfeld, 52 *Fordham L. Rev.* at 745-77 (cited in note 22) (pointing out that doctors look for the "most likely cause," while the legal system requires them to testify as to whether a particular factor is "more likely than not" the cause and that this indicates that courts have not succeeded in "mesh[ing] law and epidemiology in a consistent way").

158. Ferretti, 10 *Pace Envir. L. Rev.* at 734 (cited in note 10).

159. *Id.*

160. See notes 107-11 and accompanying text (discussing the difficulty of proving causation).

161. See Part V.B.

tion schemes, and ad hoc judicial management of catastrophic events.¹⁶² Any of these alternatives is likely to provide adequate compensation to victims.¹⁶³ None of them, however, is effective in preventing catastrophes from occurring in the first place. They simply do not provide the proper incentives for companies to modify behavior, invest in safety measures, or investigate the toxicity of industrial chemicals.

One commentator, recognizing the need for deterrence, has proposed a "toxic death risk index tax."¹⁶⁴ Industries would pay a tax based on the number of people likely to be killed or injured in the case of a toxic accident.¹⁶⁵ The central virtue of such a system would be the imposition of liability "based upon the actual risk created by a polluter,"¹⁶⁶ providing an economic incentive for users and producers of toxic substances to emphasize safety.¹⁶⁷

Such an incentive could be imposed less radically through a system of increased risk liability.¹⁶⁸ One way to implement such a system effectively is through legislative mandates at the state level. If properly drafted, such mandates can help courts address and resolve the complexities of toxic tort litigation in a uniform and clear manner. One United States jurisdiction has in fact enacted such a law, which can serve as a starting point for drafting future state legislation. In 1990, the Guam legislature passed the Toxic Substance Exposure Compensation Act ("the Guam statute")¹⁶⁹ which attempts to address some of the more vexing issues connected with toxic substance exposure by recognizing a variety of causes of action for increased risk.¹⁷⁰

162. See Robert L. Rabin, *Environmental Liability and the Tort System*, 24 *Hous. L. Rev.* 27, 44-45 (1987) (discussing alternative strategies for addressing the legal issues raised by environmental harm).

163. No fault systems have an advantage in this regard. *Id.* at 43.

164. Bradford C. Mank, *Preventing Bhopal: "Dead Zones" and Toxic Death Risk Index Taxes*, 53 *Ohio State L. J.* 761, 762, 797-802 (1992). This idea derives from other environmental entitlement theories that require companies to pay in proportion to the harm they create, thereby creating economic incentives for companies to do less harm.

165. *Id.* at 765.

166. *Id.*

167. *Id.*

168. The possibility of a company declaring bankruptcy in the face of liability constitutes a major reason the tort system cannot cope with mass tort claims effectively. *Id.* at 764. A cause of action for increasing risks would mitigate this concern. See notes 107-08 and accompanying text.

169. Guam Code Ann. §§ 41101-07 (1993).

170. *Id.* §41104(2). This section of the code specifies that:

Recoverable damages shall include injury, increased risk of illness or injury, lost income, medical expenses, pain and suffering, emotional distress (attributed to the exposure), loss of ability to enjoy life, loss of consortium, loss of ability to procreate, medical

A. *The Guam Toxic Substance Exposure Compensation Act*

Legislative findings indicate that the Guam statute was intended to alleviate the burdens that toxic tort plaintiffs face in other jurisdictions.¹⁷¹ To address the problems associated with the typical delay between exposure and manifestation or discovery of the exposure, the statute requires an action to be brought within four years of exposure or two years of the date of discovery of the harm caused by the exposure, whichever is later.¹⁷² The statute also addresses the problem of risk assessment by specifying four chemicals as toxic substances covered by the act.¹⁷³ The statute, in other words, engages in legislative risk assessment.

Under the Guam statute, the plaintiff must show exposure above federally permitted levels to one or more of the listed toxic substances.¹⁷⁴ If the defendant manufactures the substance, or uses the substance in the manufacture of another product, it is strictly liable.¹⁷⁵ If the defendant is someone who controls the substance apart from manufacture, the plaintiff must also show negligence.¹⁷⁶ Once these requirements have been met, the burden shifts to the defendant to disprove increased likelihood of disease.¹⁷⁷ Punitive damages are recoverable if the defendant has concealed the harmful effects of a toxic substance or has acted with "reckless indifference" to human health.¹⁷⁸

B. *Weaknesses of the Guam Statute*

Although extremely plaintiff-friendly, the present structure of the Guam statute is unlikely to have a significant impact on toxic tort litigation. Indeed, the Guam statute contains a number of weak-

expenses for treatment or monitoring and any other direct or indirect effects of exposure.

Id.

171. Id. § 41101(7) (indicating that "case law in other jurisdictions has created an unacceptable burden on persons exposed to toxic substances to prove causation and the likelihood of harm").

172. Id. § 41104(6).

173. Id. § 41103(1) (stating that "[t]oxic substances shall mean polychlorinated biphenyls, dioxins, furans or halogenated chloroflourocarbons").

174. Id. § 41104(1). Federally permitted levels of exposure are the maximum levels of exposure of humans as determined by federal regulatory agencies. In the case of conflicting levels, the lowest maximum permissible level applies. Id. § 41103(3).

175. Id. § 41104(1)(a).

176. Id. § 41104(1)(b).

177. Id. § 41104(5)(a).

178. Id. § 41104(3).

nesses that should be addressed before similar legislation is adopted in other jurisdictions. In the only reported case on point since the adoption of the statute, workers exposed to PCBs after the rupture of an electrical transformer on the United States Naval Base failed to recover.¹⁷⁹ The Ninth Circuit held that the plaintiffs had not submitted adequate expert testimony on the exposure level of each individual.¹⁸⁰ The court, in other words, required the plaintiffs to establish exposure not only qualitatively, but quantitatively as well. Furthermore, the court held that the plaintiffs had not established an increased risk claim since they had not shown that future disease was more likely than not to occur.¹⁸¹ Clearly the statute's attempt to address the problems faced by toxic tort litigants proved unsuccessful in this instance.

The statute fails to accomplish its purpose largely because it fails to define the causes of action in sufficient detail. The statute states that damages for increased risk are recoverable,¹⁸² but gives no further guidance. Similarly, the statute does not address the important issue of what evidence can be offered to prove essential elements like exposure. Moreover, the statute offers no real guidance on calculating damages. Perhaps most importantly, however, the statute does not qualitatively supplement environmental regulation. By confining the statute to four regulated substances, and by keying exposure to "federally permitted levels," the statute merely amounts to more regulation. It does not exploit its potential to factor something new into the equation. State legislatures addressing increased risk causes of action in the future should consider these issues carefully. The following discussion outlines some suggestions and proposals for drafting a toxic substance exposure act.

C. Suggestions for Future Statutory Drafting

The ideal statute would alleviate the unfair burdens currently placed on toxic tort litigants,¹⁸³ but would also ensure that liability is imposed in a fair, controlled, and productive manner. Such a statute would compensate injured plaintiffs, but would not unduly interfere with progress, commercial function, and product innovation. This balance can be achieved by recognizing increased risk as a compensa-

179. *Abuan v. General Elec. Co.*, 3 F.3d 329 (9th Cir. 1993).

180. *Id.* at 332, 335.

181. *Id.* at 334.

182. See note 170 and accompanying text.

183. See Part III.A.

ble injury in and of itself, but requiring the plaintiff to adhere to traditional tort principles to recover for that injury. In other words, the plaintiff should still be required to prove that the defendant owed her a duty of care, that the defendant breached that duty, and that the breach caused her increased risk of disease. The plaintiff should also bear the traditional burden of establishing her case by a preponderance of the evidence.

1. Establishing the Existence of an Injury

The plaintiff should initially be required to show two things: the qualitative toxicity of the substance at issue and exposure to that substance. These elements suffice to establish the existence of an injury. The statute should carefully specify the type of evidence to be utilized and the standards to be used for evaluating that evidence.¹⁸⁴ Showing that a substance has been classified as toxic by a federal agency should be considered relevant.¹⁸⁵ Because agencies do not have the resources to identify every potentially toxic substance, however, the plaintiff should have other evidentiary options as well. For instance, the statute should allow the plaintiff to establish qualitative toxicity by evidence of harmful effects on animals.¹⁸⁶ Alternatively, the plaintiff should be able to show that the substance has a chemical structure which sufficiently resembles that of a chemical known to have toxic properties.¹⁸⁷ The defendant should naturally be able to introduce evidence of non-toxicity and the plaintiff should bear the

184. The use of scientific evidence in the courtroom is inevitably plagued by controversy. See, for example, Peter Huber, *Galileo's Revenge: Junk Science in the Courtroom* (Basic Books, 1991).

185. In the face of uncertainty, agencies often make conservative decisions. Howard Latin, *Good Science, Bad Regulation, and Toxic Risk Assessment*, 5 *Yale J. Reg.* 89, 94 (1988). For example, benign animal tumors are included with malignant ones in risk estimates. *Id.* at 100. See also Cranor, *Regulating Toxic Substances* at 221 (cited in note 13) (providing a table of the most significant scientific uncertainties in carcinogen risk assessments). This policy has been criticized for being inefficient and inconsistently applied. See Applegate, 91 *Colum. L. Rev.* at 265 (cited in note 72) ("[T]he regulatory effect of uncertainty is . . . inefficiency"); Latin, 5 *Yale J. Reg.* at 89-95 (arguing that the EPA's policy of accepting the most conservative scientifically valid estimate is inconsistently applied and suggesting that the EPA move toward considering social policy when assessing risks).

186. See Cranor, *Regulating Toxic Substances* at 13-25 (cited in note 13) (describing the advantages, shortcomings, and process of animal testing).

187. See Lyndon, 87 *Mich. L. Rev.* at 1804-05 (cited in note 73) (explaining how toxicity might be determined if manufacturers fail to include health effects data when registering chemicals under TSCA, but noting that this method can be questioned, since a small difference in chemical structure might make a huge difference in chemical properties).

burden of persuading a jury that it is more likely than not that the substance is toxic.¹⁸⁸

The plaintiff should also bear the burden of persuading a jury that more likely than not she was exposed to the substance. The statute should acknowledge the relevance of a variety of evidence in proving exposure. Blood tests may be able to measure the amount, if any, of the chemical absorbed by the plaintiff's system.¹⁸⁹ In some cases, exposure to a toxic substance might cause minor physical symptoms which can be used as evidence.¹⁹⁰ In any event, the plaintiff's own testimony should be considered highly relevant in proving exposure.¹⁹¹ For example, the plaintiff may be able to testify as to how extensively she used household water later proved to be contaminated. Similarly, a plaintiff in an occupational setting may be able to testify that she remembers using a substance on a regular basis or that she was never furnished safety gear. The defendant would have the opportunity to cross-examine the plaintiff, and the jury would decide whether the evidence of exposure was credible.

2. Establishing Breach of a Duty of Care

The statute should also require the plaintiff to establish negligence. Violations of federal or state environmental regulations should be considered highly probative of negligence.¹⁹² The negligence inquiry should focus partly on the feasibility of alternatives or non-use of toxic substances. The plaintiff should be required to show, in other

188. In tort litigation, the plaintiff usually must persuade the jury that the existence of a contested fact is more probable than its non-existence. John William Strong, ed., *McCormick on Evidence* § 339 (West, 4th ed. 1992). See Cranor, *Regulating Toxic Substances* at 71-81 (cited in note 13) (arguing that legal burdens of proof and persuasion represent normative choices about acceptable risks of error, that science takes a more rigid approach, and that since science and law serve different institutional functions, legal burdens should be analytically separated from scientific ones).

189. See, for example, *Laxton*, 639 S.W.2d at 433 (involving blood tests performed on plaintiffs showed no abnormalities).

190. For example, exposure to chlorine or chlorinated substances might result in a skin condition known as chloracne. J.E. Schmidt, *Attorney's Dictionary of Medicine* C-163 (Matthew Bender, 1995).

191. The *Abuan* court discounted the value of the plaintiff's testimony regarding exposure levels. 3 F.3d at 333 n.4.

192. The Guam statute provides that violation of a federal environmental regulation is negligence per se. Guam Code Ann. § 41104(b)(i). This raises the same issues as whether agency determinations of carcinogenicity should suffice to establish qualitative toxicity. See note 185 and accompanying text. Establishing violation of a statute as negligence per se adds an additional layer of deterrence to the regulations. On the other hand, keying tort recovery too closely to existing regulation discounts the tort system's ability to weigh competing policy values in a given situation. The best course might be to deem violation of a statute to be highly probative of negligence.

words, that it was possible for the defendant to dispose of waste properly, to use a non-toxic substance, to set more appropriate occupational safety standards, or otherwise to take steps to prevent human exposure to toxic substances. Furthermore, the statute should define negligence to include failure to take reasonable steps to investigate the potential toxicity of a particular substance.

3. Defining the Underlying Causes of Action and Determining Damages

The statute should detail the standards to be employed for each underlying cause of action. To recover for medical monitoring, the plaintiff should also be required to show that medical care is likely to be beneficial.¹⁹³ To recover for fear of future disease, the plaintiff should be required to show that her fear is reasonable vis-à-vis the magnitude of the increased risk.¹⁹⁴ The statute should explicitly prohibit the arbitrary fifty-one percent standard. No additional requirements should be necessary to establish the increased risk claim itself.¹⁹⁵

The ideal statute would establish coherent guidelines for assessing damages. As in the Guam statute, punitive damages should be recoverable in particularly egregious cases.¹⁹⁶ Medical monitoring damages should be determined by the cost of the necessary or desirable testing. Emotional distress damages should be keyed to the amount of risk faced by the plaintiff.¹⁹⁷ A legislature might also wish to specify that the notoriousness of a particular substance, or degree of public apprehension surrounding it, may also constitute a factor in calculating emotional distress damages.

Increased risk recoveries should be subject to more mathematical computation. The statute should require epidemiological evidence to quantify the increased risk faced by the plaintiff. Ideally, total class recovery would equal the present value of the amount the defendant would have to pay if held liable for all the cases of disease caused by its conduct.¹⁹⁸ The statute should urge courts to strive for

193. See notes 126-28 and accompanying text.

194. See notes 145-48 and accompanying text.

195. The increased risk is the underlying injury that has already been proven. See Part III.B.3.

196. Guam Code Ann. § 41104(3) (1993).

197. See Part III.B.2.

198. See Rosenberg, 97 Harv. L. Rev. at 881-87 (cited in note 153) (arguing for imposing liability in proportion to the excess disease risk in a population and distributing it among members of the class of exposed persons). See also Daniel Farber, *Toxic Causation*, 71 Minn. L. Rev.

actuarial accuracy, so that each plaintiff's recovery equals the amount it would take to insure that plaintiff against the increased risk she faces.

Under the proposed statute, the plaintiff still faces a number of significant burdens in proving her case. She has simply been relieved of the impossible burden of proving causation as she must do when the disease itself, and not the increased risk of contracting the disease, is posited as the underlying injury. This change of focus should allay concerns that recognizing increased risk causes of action would result in counterproductive liability and inhibit commercial function.

V. IMPLEMENTING AND EVALUATING THE NEW SYSTEM

A. *The Similarity Between Increased Risk Causes of Action and Other Instances in Which Courts Have Modified Traditional Causation Principles*

Although in some respects a radical break with existing tort doctrine, modifying causation principles in toxic tort cases is not entirely unprecedented. In "wrongful life" cases,¹⁹⁹ for instance, some courts impose liability even though a plaintiff cannot prove that the defendant's negligent conduct resulted in a legally recognizable injury. For instance, in *Procanik by Procanik v. Cillo*,²⁰⁰ a doctor negligently failed to diagnose german measles in a pregnant woman. She subsequently gave birth to a child with congenital rubella syndrome.²⁰¹ Because the doctor could not have done anything to prevent the harm suffered by the fetus had he diagnosed the woman correctly, his negligence technically did not cause the injury.²⁰² At most, his negligence caused the woman not to terminate the pregnancy, but the law traditionally does not recognize the birth of any child as an injury

1219 (1987) (arguing that proportional recovery should be modified to subdivide plaintiffs into groups according to characteristics that might make contracting the disease more or less likely).

199. See, for example, *Smith v. Cote*, 513 A.2d 341 (N.H. 1986) (regarding a doctor negligently failing to test a mother for rubella and a child being born with congenital rubella syndrome); and *Curlender v. Bio-Science Laboratories*, 165 Cal. Rptr. 477 (1980) (pertaining to a laboratory negligently performing genetic tests to see if a couple's offspring were likely to be afflicted with Tay-Sachs and a child who was subsequently born with the disease).

200. 97 N.J. 339, 478 A.2d 755 (1984).

201. *Id.* at 758.

202. *Id.* at 760.

in and of itself.²⁰³ Nevertheless, the New Jersey Supreme Court required the doctor to pay the child's extraordinary medical expenses.²⁰⁴ The court based its holding on both fairness and the need to deter future wrongful acts.²⁰⁵

The DES litigation also presented difficult causation issues. For example, in *Sindell v. Abbott Laboratories*,²⁰⁶ the injured plaintiff was faced with the virtually impossible task of identifying which one of a number of DES manufacturers provided DES to her. Rather than allow the drug manufacturers to escape liability for the harm they had imposed upon society, the court held them liable for the harm caused in proportion to the economic benefit they had received from the industry as a whole.²⁰⁷ Unlike the typical toxic exposure case, DES cases like *Sindell* posed an indeterminate defendant problem.²⁰⁸ The indeterminate defendant problem is nonetheless conceptually similar to the indeterminate plaintiff problem.²⁰⁹ Both involve statistical evidence that the defendant's behavior posed a public health threat, but in both cases, the plaintiff cannot prove a causal connection because of the nature of the injury.²¹⁰ In toxic exposure cases, courts should similarly hold defendants who gain an economic benefit from a particular activity liable for the health costs of that activity.

"Loss of a chance" cases are also analytically similar to increased risk causes of action.²¹¹ For example, in *Herskovits v. Group Health Co-op. of Puget Sound*,²¹² a doctor negligently failed to diagnose a patient's lung cancer.²¹³ The patient would have had only a thirty-nine percent chance of surviving the cancer even if timely diagnosis had been made.²¹⁴ With the delay, however, his chances were decreased to twenty-five percent.²¹⁵ Traditional tort doctrine dictated that since the patient had less than a fifty percent chance of

203. *Id.* at 761.

204. *Id.* at 764.

205. *Id.* at 763.

206. 163 Cal. Rptr. 2d 132, 607 P.2d 924 (1980).

207. *Id.* at 929. The *Sindell* court cited *Summers v. Tice*, 199 P.2d 1 (Cal. 1948), for the proposition that "as between an innocent plaintiff and negligent defendants, the latter should bear the costs of the injury." *Id.* at 936.

208. See Delgado, 70 Calif. L. Rev. at 883 (cited in note 113) (distinguishing the DES "indeterminate defendant" problem from the toxic tort indeterminate plaintiff problem).

209. *Id.*

210. *Id.*

211. See generally Howard Ross Feldman, *Chances as Protected Interests: Recovery for the Loss of a Chance and Increased Risk*, 17 U. Balt. L. Rev. 139 (1987).

212. 99 Wash. 2d 609, 664 P.2d 474 (Wash. 1983).

213. *Id.* at 475-76.

214. *Id.* at 475.

215. *Id.*

survival from the start, he suffered no compensable injury due to the doctor's negligence.²¹⁶ That is, because the patient had a less than fifty percent chance of survival to begin with, the doctor's negligent diagnosis was not a substantial factor in bringing about his death.²¹⁷

The *Herskovits* court, however, permitted the patient to recover on the theory that the fourteen percent lost chance of survival constituted a substantial factor in bringing about his injury.²¹⁸ The concurring judge was willing to go even farther by explicitly recognizing the lost fourteen percent chance as the underlying injury.²¹⁹ Increased risk cases raise similar concerns.

Should courts continue to adhere to traditional causation principles that deny recovery to legitimately injured plaintiffs? Should they simply set a lower threshold for proving causation, as the *Herskovits* court did when it held that a fourteen percent reduction in chance of survival constituted a substantial factor in bringing about death? Or should courts explicitly acknowledge the statistical nature of the underlying injury and compensate for the statistical injury directly?

As the concurrence in *Herskovits* demonstrated, the latter course is the most desirable. In fact, conceptualizing the underlying injury as a statistical increase in risk simply allows courts to apply traditional tort principles to a new type of injury. No radical reformulation of causation thresholds is necessary.

B. Weighing the Costs and Benefits of the New System

Undeniably, implementing a system of increased risk recovery would carry potential costs. Most of these costs, however, could be contained by sensible legislative drafting and judicial application. Moreover, on balance, the costs of the new system are outweighed by its deterrence and information-forcing benefits.

Ideally plaintiffs would be compensated in proportion to the amount of increased risk actually incurred. This compensation scheme thus technically avoids the problem of overcompensation. Nevertheless, a plaintiff who admittedly may not ever suffer any adverse medical effects from toxic exposure could receive compensation under the statute. This concern, however, should not defeat the entire concept of increased risk recovery. Potential overcompensation

216. *Id.* at 476.

217. *Id.*

218. *Id.* at 479.

219. *Id.* at 487.

should be weighed against the value of these causes of action in deterring socially harmful behaviors.

In certain contexts, Congress has determined that overcompensating plaintiffs is justified if it achieves socially desirable results. For example, Congress has allowed plaintiffs to receive treble damages under the civil provisions of the Racketeer Influenced Corrupt Organizations Act ("RICO").²²⁰ This heightened damage provision creates a private incentive to bring suit against a person who has violated racketeering laws. The effect is to add an additional layer of deterrence: the defendant incurs liability under both governmental regulations and private tort laws.

The civil provisions of RICO and similar statutes²²¹ essentially designate the plaintiff as a private attorney general²²² whose private legal action ultimately benefits the public. By analogy, if regulation has failed to deter environmentally irresponsible behavior, a person who has incurred a statistical increase in the likelihood that she will contract a disease should be allowed to sue. This plaintiff would function as a private attorney general in that her cause of action would ultimately achieve the socially desirable result of forcing a company to pay the costs of environmentally harmful activity.²²³ A primary goal of tort law,²²⁴ deterrence, argues strongly in favor of increased risk causes of action. Thus, even if one were to view the increased risk recovery as potentially overcompensating plaintiffs, it does not follow that such recovery should not be allowed.

Private tort litigation also has a number of institutional advantages that render it a helpful supplement to regulatory action. First, agencies specialize in detection and investigation, while private parties have more expertise in litigation tactics.²²⁵ Private litigators may also be more efficient because of their ability to organize a claim outside of a rigidly bureaucratic structure.²²⁶ Furthermore, private

220. 18 USC § 1964(c) (1994 ed.).

221. For examples of federal statutes creating a "private attorney general," see Consumer Product Safety Act § 24, 15 U.S.C. § 2073 (1994 ed.); Civil Rights Act of 1964, 42 U.S.C. § 2000(a)(3)(b), 2000(e)(5)(k) (1988 ed. & Supp. V); Clayton Act, 15 U.S.C. § 15 (1994 ed.); Securities Act of 1933, 15 U.S.C. § 77(k)(e) (1994 ed.).

222. The term "private attorney general" was coined by Judge Jerome Frank of the Second Circuit in *Associated Industries of New York State, Inc. v. Ickes*, 134 F.2d 694, 704 (2nd Cir. 1943), to refer to a private plaintiff whose claim worked to "vindicate the public interest." *Id.*

223. Thus it is best to recognize increased risk causes of action by legislative mandate. See Part IV.

224. Fowler V. Harper, Fleming James, Jr., and Oscar S. Gray, *The Law of Torts* § 11.5 (Little, Brown, 2nd ed. 1986).

225. John C. Coffee, *Rescuing the Private Attorney General: Why the Model of the Lawyer as Bounty Hunter is Not Working*, 42 *Mary. L. Rev.* 215, 224 (1983).

226. *Id.* at 226.

litigation may ultimately result in fairer outcomes in that the parties will theoretically be evenly matched, whereas agencies can exploit the power and ideological force of government status.²²⁷

Recognizing increased risk causes of action would provide the additional benefit of generating more information about potentially toxic substances. The connection between exposure and disease would be subject to increased judicial and commercial scrutiny. In other words, the mere process of litigating these claims would probably yield new information. For example, recognizing medical monitoring claims brought by a group of plaintiffs who could prove exposure to a particular substance would result in a collection of helpful data for an epidemiologist to use in studying the effects of the substance.²²⁸

Furthermore, recognizing an increased risk cause of action would give companies using and producing toxic substances an incentive to generate information about the substance,²²⁹ the risk of disease,²³⁰ and ways to prevent exposure in the first place. If liability hinges on an accurate assessment of risks associated with a particular substance, a company would surely want to learn all it could, good or bad, about that substance before using or producing it. In the end, increased information would benefit everybody—the company, the government, and the public. The company would make better informed risk management decisions. The government's difficult risk assessment burden would be alleviated. Most importantly, the public would receive more accurate information about the risks it faces from toxic substances. William Ruckelshaus, former director of the EPA, has observed that when people receive more information about various risks, they are more likely to accept them.²³¹ When asked to rate various risk factors in society, the public currently tends to rank them in

227. *Id.* at 227.

228. See generally Norman J. Landau and Douglas K.W. Landau, *Claims for Nonphysical and Nonpresent Injuries: Emotional Distress and Medical Monitoring Damages*, in G. Marc Whitehead, ed., *Preparation and Trial of a Toxic Tort Case, 1990* at 327 (Practicing Law Institute and Administrative Practice Series no. 388).

229. Commentators have previously identified a need to shift the burden of generating information about toxic substances onto those who use and produce them. See, for example Kathleen O'Nan, *The Challenge of Latent Physical Effects of Toxic Substances: The Next Step in the Evolution of Toxic Torts*, 7 *J. Min. L. & Policy* 227 (1991-92) (arguing that if a plaintiff can establish prima facie evidence of toxic exposure, defendants should bear the costs of the scientific testing required for litigation).

230. Office of Technology Assessment, *Identifying and Regulating Carcinogens* 63 (cited in note 67).

231. William D. Ruckelshaus, *Risk in a Free Society*, 14 *Envir. L. Rep.* 10190, 10192 (stating that "better information inclines people to act more sensibly").

a significantly different order than environmental experts.²³² Increased information about toxic substances should narrow the gap between the public's risk perceptions and scientific knowledge.

VI. CONCLUSION

A large number of potentially toxic substances are currently in industrial use.²³³ The federal government must pursue regulatory strategies that require companies to use due care regarding these substances. Due to the inherent limitations on environmental regulation, however, state legislatures and courts must also implement a system of tort recovery designed to supplement regulatory efforts. These regulatory and compensatory devices must make it worthwhile for a company to make responsible environmental decisions. Perhaps more importantly, however, legislatures and courts must implement a system that forces companies to research and evaluate the potential health effects of new chemicals working their way into the industrial world. Similarly, they must ensure that new technologies are implemented in a safe manner. Before the dire health effects of DDT were recognized, the substance was sprayed indiscriminately on crop fields, with disastrous consequences.²³⁴ Surely no one wishes to repeat this scenario with a new chemical or a biotechnological agent.²³⁵

To achieve these goals, state legislatures should recognize increased risk causes of action—medical monitoring, fear of future disease, and outright recovery for increased risk. Legislatures should define the standards of recovery and evidentiary burdens carefully, so as to achieve a balance between addressing the toxic tort problem and

232. Risk perception factors include whether the risk is incurred voluntarily or involuntarily, whether the risk affects everyone or only a small, identifiable group, the way the existence of the risk is communicated to the public, and, above all, the degree of uncertainty associated with the risk. *Id.*

233. According to a report issued by the National Research Council of the National Academy of Sciences, in 1984 no toxicity data were available for approximately 80% of these substances. National Research Council, *Toxicity Testing: Strategies to Determine Needs and Priorities* (1984). Although a number of these chemicals probably pose no threat, a significant number may.

234. See generally Rachel Carson, *Silent Spring* (Houghton Mifflin, 1962) (attempting to bring the harmful effects of chemical pesticides on the environment and human health to the attention of the public).

235. See Ferretti, 10 Pace Envir. L. Rev. at 748 (cited in note 10).

promoting commercial progress. Careful drafting will help courts implement increased risk recovery in a fair, uniform, and sensible manner.

Tamsen Douglass Love

