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INCREASED RISK OF DISEASE FROM HAZARDOUS WASTE: A PROPOSAL FOR JUDICIAL RELIEF

Toxic substances have leached into ground water and dispersed through the air from hazardous waste dumps across the country, posing significant health risks to those living and working in surrounding communities. Congress has responded by enacting Superfund legislation to support a massive clean-up program, and by adopting the Resource Conservation and Recovery Act of 1976 (RCRA) to prevent continued abuses by hazardous waste handlers. These efforts, however, do not address the legal barriers that prevent adequate compensation for hazardous waste victims.


The hazardous waste problem is enormous. As many as 750,000 businesses generate an estimated 47.5 million metric tons of industrial waste per year. J. QUARLES, FEDERAL REGULATION OF HAZARDOUS WASTES: A GUIDE TO RCRA 15 (1982), partially reprinted in HAZARDOUS WASTE, supra, at 8. Insecure lagoons, ponds, and landfills hold as much as 90% of this waste. In addition, waste handlers have dumped an unknown quantity of waste down sewers or along road beds. ENVIRONMENTAL PROTECTION, supra, at 554.


4. The first study documenting these barriers was the Six City Study. ENVIRONMENTAL LAW INSTITUTE FOR THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS, 96TH CONG., 2D SESS., SIX CASE STUDIES OF COMPENSATION FOR TOXIC SUBSTANCES POLLUTION: ALABAMA, CALIFORNIA, MICHIGAN, MISSOURI, NEW JERSEY, AND TEXAS (Comm. Print 1980). A second and broader study was undertaken at the direction of Congress under § 301(e) of CERCLA. THE SUPERFUND SECTION 301(E) STUDY GROUP FOR THE SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS, 97TH CONG., 2D SESS., INJURIES AND DAMAGES FROM HAZARDOUS WASTES—ANALYSIS AND IMPROVEMENT OF LEGAL
Persons exposed to hazardous wastes have an increased risk of developing cancer and other latent diseases. Conclusive scientific evidence establishes this enhanced probability, yet the judicial system bars recovery for increased risk because the victims cannot prove the occurrence of these diseases with reasonable medical certainty.

Postponing legal action until a disease fully develops is not a viable alternative. Statutes of limitation, res judicata, and proof of causation are obstacles to recovery.

REMEDIES, (Comm. Print 1982) [hereinafter cited as § 301(e) STUDY]. The § 301(e) STUDY identified recurring problems involving statutes of limitation, apportionment of liability among defendants, and proof of causation, that prevent hazardous waste victims from receiving adequate compensation. Id. at 43-71.


The debate over compensation for toxic tort victims was the focus of a recent American Bar Association conference. Recovery for Exposure to Hazardous Substances: The Superfund § 301(e) Study and Beyond, 14 ENVTL. L. REP. (ENVTL. L. INST.) 10,098-111 (1984) [hereinafter cited as COMPENSATION CONFERENCE]. The conference included papers on the obstacles to recovery for toxic waste injuries as well as presentations by those who believe that barriers to legitimate recovery are the exception, not the rule. See, e.g., Cheek, Why Current Victim Compensation Proposals are Unfair and Ineffective, id. at 10,125; Corash, Evaluating the Effects of Alternative Compensation Systems, id. at 10,122.


A variety of carcinogenic chemicals are present at toxic waste dumps across the country. See Seltzer, supra note 4, at 798; see also Cordasco, Morgat, Beerel, Popovici & Murphy, Environmental Aspects of Respiratory Cancer: Medical Legal Update, 29 MED. TRIAL TECH. Q. 229, 234-35 (1982) (tables showing chemicals associated with the development of various cancers); SIERRA CLUB, POISONS IN THE WATER: THE REAGAN ADMINISTRATION AND TOXIC DUMP CLEANUP 20-24 (1982) (tables showing health effects of common ground water contaminants), partially reprinted in HAZARDOUS WASTE, supra note 1, at 79-83.

There are a variety of methods to assess the risk of disease arising from exposure to toxic substances. See infra notes 18-21 and accompanying text.

7. See infra notes 13-15 and accompanying text.

8. In several states, plaintiffs’ rights to sue for a latent injury will lapse before they know that a remedy is available. Hathaway, Hazardous Substance Victims Need a Federal Cause of Action, COMPENSATION CONFERENCE, supra note 4, at 10,295; see also McGovern, The Status of Statutes of Limitations and Statutes of Repose in Product Liability and Toxic Substance Litigation, in TOXIC SUBSTANCES LITIGATION 275 (Practising Law Institute, S. Birnbaum & P. Rheingold, co-chairpersons, 1982).

9. A court may characterize exposure to hazardous waste as a single cause of action. In that case, if
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preclude most plaintiffs from future damage recoveries. Fairness demands an immediate remedy,\textsuperscript{11} either by recognizing current physiological damage caused by hazardous waste exposure as an actionable injury,\textsuperscript{12} or by accepting increased risk of disease as a separate cause of action.

This Comment addresses the need to provide adequate and present remedies for individuals exposed to toxic wastes. Part I describes the prevailing "reasonable medical certainty" rule and shows how it unjustly prevents recovery by plaintiffs exposed to hazardous waste. Part II examines one method of avoiding the injustice of the "reasonable medical certainty" rule. The adoption of an "extent of the injury" rule\textsuperscript{13} would allow courts to recognize genetic or cellular damage as injury, and provide some hazardous waste victims with a remedy for their increased risk of disease. In Part III a better solution is proposed—accepting increased risk as an actionable injury. This approach, which will ensure recovery for all hazardous waste victims, has several practical benefits and is supported by existing legal doctrine. Finally, Part IV recommends two forms of judicial relief, a damage award for probable out-of-pocket expenses, and court-ordered purchase of insurance coverage for hazardous waste victims. An insurance remedy is proposed because it is uniquely tailored to the increased risk injury.

I. THE REASONABLE MEDICAL CERTAINTY RULE

Courts have adopted a variety of standards to prohibit speculation and conjecture about future damages.\textsuperscript{14} One widely followed standard is the

the plaintiff seeks present compensation for harm to private property, damage to a source of livelihood, or acute personal injuries, res judicata will bar any future claim for damages incurred as a result of a latent disease. See infra note 49; see also Outen, Injury from Hazardous Chemicals: Compensating Innocent Bystanders, 1 ENVTL. P. 6 (1983). Alternatively, if the plaintiff sues after a latent illness develops, the statute of limitations on the other damage claims may have run.

10. One of the greatest barriers to recovery for hazardous waste victims who develop a disease is proving by a preponderance of the evidence that the defendant caused the injury. See § 301(e) STUDY, supra note 4, at 132; see also infra note 48. Legislative proposals have been made to ease this burden. Light, A Comparison of the 301(e) Report and Some Pending Legislative Proposals, in COMPENSATION CONFERENCE, supra note 4, at 10,133. See generally Health Related Claims: Can the Tort and Compensation Systems Cope?, 2 J. PROD. LIAB. 115 (1983) (compilation of articles delivered at conference sponsored by National Legal Center for Public Interest).

11. Even if legislation eased the limitations on future recovery, there are several practical reasons favoring a present claim for damages. See infra notes 43–53 and accompanying text.

12. Courts have generally not recognized cellular and genetic damage caused by exposure to toxic substances as recoverable injury. See Comment, Damages in Genetic Mutation and Chromosomal Breakage: Tort Actions, 26 ST. LOUIS U.L.J. 105, 110–18 (1981); see also infra notes 29–37 and accompanying text.

13. The extent of injury rule permits recovery for future damages that may develop as a result of a present injury, but that cannot be proven as more likely than not to occur. See infra notes 24–26 and accompanying text.

reasonable medical certainty rule. Under this rule, courts compensate plaintiffs with a ripe cause of action for prospective damages only if a qualified medical expert can establish that the damages are reasonably certain to accrue.\textsuperscript{15}

The reasonable medical certainty principle presents a major obstacle to hazardous waste victims seeking relief prior to the manifestation of a clinically recognizable disease.\textsuperscript{16} Although various techniques are available to assess the likely effects of chemical inhalation and ingestion,\textsuperscript{17} qualitative results from these assessments will seldom allow an expert to predict with reasonable certainty that a cancer will develop.\textsuperscript{18}

Quantification of the risk\textsuperscript{19} will likewise be insufficient to prove damages


\textsuperscript{16} Seltzer, supra note 4, at 833. For example, in Ayers v. Township of Jackson, 189 N.J. Super. 561, 461 A.2d 184, 186 (1983), plaintiffs were exposed to toxic substances released from the town dump into community drinking water. Plaintiffs were unable to recover for their increased risk of cancer because the future damages were considered too speculative. Id. at 187.

\textsuperscript{17} Experts use evidence from four types of studies to identify substances that may pose a risk of cancer. First, there are epidemiological assessments. See Work Group on Risk Assessment, Interagency Regulatory Liaison Group (IRLG), Scientific Bases for Identification of Potential Carcinogens and Estimation of Risks, 44 Fed. Reg. 39,858, 39,861–62 (1979) [hereinafter cited as IRLG REPORT]; Gample & Battigelli, Epidemiology, in 1 Patty’s Industrial Hygiene and Toxicology 113 (3d ed. 1978); see also Dore, A Commentary on the Use of Epidemiological Evidence in Demonstrating Cause-in-Fact, 7 HARv. ENVTL. L. REV. 429, 433–34 (1983) (technical and practical problems limit the usefulness of epidemiological data). Second, experts may rely on animal bioassays. See IRLG REPORT, supra, at 39,862–69; Casaret, Toxicologic Evaluation, in Toxicology: The Basic Science of Poisons 20 (1975). Also, short term microorganism or cell culture tests are used. See IRLG REPORT, supra, at 39,869–70; see also Hoffman & Wynder, Organic Particulate Pollutants—Chemical Analysis and Bioassays for Carcinogenicity, in 3 AIR POLLUTION 423–55 (A. Stern ed. 3d ed. 1977). Finally, experts may use chemical structural analysis to identify potentially carcinogenic substances. See IRLG REPORT, supra, at 39,870.

\textsuperscript{18} Evidence from studies described supra note 17 provides a qualitative assessment of the potential toxic properties of a substance without quantifying the risk imposed on exposed individuals. IRLG REPORT, supra note 17, at 39,860. This information will not provide an expert with sufficient evidence to state with reasonable certainty that an exposed group of persons will develop cancer.

\textsuperscript{19} A quantitative risk assessment applies the results of the hazard evaluation described supra note 17 to the specific population exposed. See Houk, Determining the Impact on Human Health Attributable to Hazardous Waste Sites, in Risk Assessment at Hazardous Waste Sites 21, 29 (1982). First, a dose response relationship is established. See IRLG REPORT, supra note 17, at 39,873. Second, the magnitude and duration of the community’s exposure is evaluated. Id. at 39,873–75. Finally, the dose response model is applied to calculate the exposed individuals’ risk of developing a latent disease. While quantitative risk assessment involves various uncertainties, id. at 39,871, it is used by a number of regulatory agencies including the Environmental Protection Agency (EPA), Food and Drug Administration, and Occupational Safety and Health Administration. National Research Council, Risk Assessment in the Federal Government: Managing the Process 40–41, 93–131 (1983).
under the reasonable medical certainty standard because the probability of developing a future disease is unlikely to exceed fifty percent. Courts applying the reasonable medical certainty standard equate a forty-nine percent chance of disease formation with speculation, yet treat a fifty-one percent probability as reasonably certain. This arbitrary result fails to recognize the scientific certainty of quantitative risk assessment. It unjustly denies immediate relief to everyone in the exposed population for their increased risk, even though a certain number of persons will develop a disease.

In light of the degree of certainty by which increased risk of disease from exposure to toxic wastes can be established, application of the reasonable medical certainty rule is no longer justified. Alternative doctrines must be found that adequately compensate hazardous waste victims while preventing speculation and limitless liability.

II. THE EXTENT OF THE INJURY RULE

One means of avoiding the harsh results of the medical certainty rule is through application of a standard based on the "extent of the injury." The extent of the injury doctrine, adopted by a growing number of jurisdictions, allows a plaintiff to recover damages for future illnesses that may

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20. Even for those toxic substances that have the strongest association between exposure and disease formation, the absolute risk of disease development is far less than 50%. For example, there is a strong association between exposure to asbestos and development of mesothelioma. Black & Lilienfeld, Epidemiologic Proof in Toxic Tort Litigation, 52 FORDHAM L. REV. 732, 758 (1984) (relative risk for developing mesothelioma from asbestos exposure is 50-80 compared with 10 for most diseases; relative risk is the ratio of the incidence rate of disease in the exposed group divided by that rate in the non-exposed "control" group). However, the risk of developing the mesothelioma is less than 50%. See Wilson v. Johns-Manville Sales Corp., 684 F.2d 111, 120 & n.45 (D.C. Cir. 1982) (15% of asbestosis sufferers later contract mesothelioma).


22. Statistical significance testing enables an investigator to determine if an increased risk, no matter how small, is truly due to chemical exposure. See Black & Lilienfeld, supra note 22, at 757 n.104 (citing I. Hacking, LOGIC OF STATISTICAL INFERENCE (1965)).

23. Suppose, for example, that 1,000 persons in a community were exposed to a chemical released from the local dump. Using evidence developed from epidemiological studies on other populations exposed to the chemical, a quantitative risk assessment might conclude that the exposed persons have an increased 1 in 50 chance of developing a particular cancer. Thus, 20 additional persons would be expected to develop cancer, although the victims could not yet be identified. Because the individual risk is only 2%, no person could be compensated under the reasonable medical certainty rule.

24. See M. Minzer, supra note 15, at § 13.02; Wolfstone & Wolfstone, Damages for Increased Likelihood of Illness and Disability, in 1977 PERSONAL INJURY ANNUAL 313.

result from present injury, but that are not reasonably likely to develop. Present injury must still be proven by a preponderance of the evidence, but plaintiffs need only establish with reasonable certainty their enhanced risk of disease formation.  

To date, courts have applied the extent of the injury rule only where gross physical injuries have occurred. Exposure to hazardous waste, however, does not result in such apparent physical trauma. For this rule to be applicable in the hazardous waste context, courts must recognize genetic or cellular damages as present injury.


28. Acute human health impacts from exposure to toxic substances are possible where a major accident releases large concentrations of chemicals. The most extreme example is the recent disaster in Bhopal, India. Iyer, India’s Night of Death, TIME, Dec. 17, 1984, at 22. Continual contact with certain chemicals may also cause acute skin diseases. Birmingham, Occupational Dermatoses, in 1 PATTY’S INDUSTRIAL HYGIENE AND TOXICOLOGY 203 (3d ed. 1978). Of concern here, however, are the potential long-term effects of exposure to hazardous wastes on the respiratory, nervous, alimentary, and urological systems, as well as the possible development of cancer, infant deformity, and permanent genetic impairment. See ENVIRONMENTAL PROTECTION, supra note 1, at 553; Casarett, supra note 17, at 11.

29. Courts in the past have not considered the cellular and chromosomal damage that occurs at the earliest stages of disease formation to be actionable injury because it was not detectable and its relationship to future illness was not fully appreciated. See Comment, supra note 12, at 110–14. Instead, many courts have preserved a plaintiff’s cause of action arising out of exposure to toxic substances through the discovery rule. See, e.g., Urie v. Thompson, 337 U.S. 163, 169 (1949) (to measure the plaintiff’s disease from a specific moment of contact with the toxin would charge the plaintiff “with knowledge of . . . a disease whose symptoms had not yet obtruded on his consciousness”). However, given our improved scientific understanding of latent diseases, see Weissburger, Chemical Carcinogenesis, in TOXICOLOGY: THE BASIC SCIENCE OF POISONS 333 (1975); see also infra note 30, these
Chromosomal changes indicative of increased cancer risk are detectable through various techniques. One test involves microscopic inspection of human cells for chromosomal aberrations. Another test identifies improper exchanges of genetic material between complementary chromosomal strands. A third test quantifies the DNA adducts that are created subclinical effects must be regarded as compensable.

Some courts have approved the use of subclinical effects to show injury. In Lead Indus. Ass'n, Inc. v. Environmental Protection Agency, 647 F.2d 1130 (D.C. Cir.), cert. denied, 449 U.S. 1042 (1980), the plaintiff challenged EPA's use of elevated blood lead concentrations (EP levels) as a basis for setting the national ambient air quality standard for lead because these effects were only subclinical. The court responded:

"[D]escribing a particular effect as a "subclinical" effect in no way implies that it is improper to consider it adverse to health. While EP elevation may not be readily identifiable as a sign of disease, the Administrator properly concluded that it indicated a lead-related interference with basic biological functions. . . . [T]he modern trend in preventive medicine is to detect health problems in their "subclinical" stages, and thereupon to take corrective action."

Id. at 1158 (footnotes omitted). Although this decision is not in a tort litigation context, the court's reasoning supports the conclusion that subcellular damage caused by toxic substances should be considered recoverable injury. Alleged chromosomal damage was sufficient injury to go to trial in Bradfors v. Susquehanna Corp., 586 F. Supp. 14, 17-18 (D. Colo. 1984) (radiation injury from uranium tailings), and In re Three Mile Island Litigation, No. 79-0763 (M.D. Pa. Dec. 27, 1982), summarized in 26 ATLA L. REP. (ASS'n Trial Law. Am.) 212 (1983).

30. Scientists have developed means of detecting changes in human chromosome structure that may indicate increased likelihood of cancer development. Comment, Occupationally Induced Cancer Susceptibility: Regulating the Risk, 96 HARV. L. REV. 697, 697 (1983). Although the process by which normal cells transform into a tumor is not completely understood, an initiator-promoter model has been used to explain the mechanism of carcinogenesis. Under this simplified scheme, a carcinogen reacts with specific tissue receptors, resulting in a permanent aberration of several cells. These so-called dormant or latent tumor cells are stimulated into growth by other chemicals known as promoters or cocarcinogens. After a sufficient number of multiplications, a tumor is visible. See Weisburger, supra note 29, at 353-55.


31. Chromosome aberrations involve breaks in whole chromosomes that may, after cell replication, be rejoined incorrectly, remain broken, or be lost. Maugh, supra note 30, at 643. For a description of various types of chromosomal aberrations, see A. CASARETT, supra note 30, at 99-115.

32. These exchanges are known as Sister Chromatid Exchanges (SCE's). Although SCE's have been induced in cultured cells by known chemical carcinogens, the relationship of SCE's to illness is more tenuous than chromosomal aberrations. Maugh, supra note 30, at 644.

Chromosomal aberrations and SCE's have been used for assessing cancer risks in populations exposed to toxic substances. See, e.g., Heath, Nadel, Zack, Chen, Bender, & Preston, Cytogenetic Findings in Persons Living Near the Love Canal, 251 J.A.M.A. 1437, 1438 (1984) [hereinafter cited as Heath]. Genetic testing is also performed to screen workers for susceptibility to cancer and for evidence of exposure. Comment, supra note 30, at 697.
when a carcinogen binds to the DNA molecule. The presence of specific DNA adducts provides incontrovertible evidence of the subject’s exposure to carcinogenic chemicals and increased risk of cancer.

Scientists also suspect damage to the immune system in the formation of cancer and other latent diseases. Environmental contaminants can cause immunodysfunction. Scientists have diagnosed immunological injury in persons exposed to toxic substances and have assessed their risks of future disease.

Cytogenetic tests on persons living near hazardous waste sites may prove with reasonable certainty that the chemicals released from the site have damaged their chromosomes or immune systems. Such bodily effects clearly demand recognition as actionable injury. Courts should treat broken chromosomes no differently than broken bones. The difference between cellular injury and injury to a leg or arm lies only in the ease of detectability and the degree of trauma, not in the fact of injury.

Acceptance of cellular damage as a present cause of action will enable plaintiffs to receive compensation for the full extent of the injury. Under the extent of the injury rule, hazardous waste victims who have discovered genetic or immunological injury should recover for the possibility of developing future diseases.

Recognizing the earliest stages of disease formation as actionable injury need not bar claims by persons who do not undergo cytogenetic testing and yet develop an exposure-related disease. Jurisdictions that apply the discovery rule should find that cellular damage is not a reasonably discoverable injury, thereby preserving claims until an exposure-related disease.


34. Id. at 1183–84.

35. Research to clarify the suspected role of depressed immune function in chemical carcinogenesis is being performed at the Oak Ridge National Laboratory. S. WINSLOW, THE EFFECTS OF ENVIRONMENTAL CHEMICALS ON THE IMMUNE SYSTEM: A SELECTED BIBLIOGRAPHY WITH ABSTRACTS 26 (1981); see also Rea & Mitchell, Chemical Sensitivity and the Environment, 157 IMMUN. ALLERGY PRAC. 21, 21 (1982).


38. Under the discovery rule, “the cause of action does not accrue until the injury is discovered or in the exercise of reasonable diligence should have been discovered.” Borel v. Fibreboard Paper Products Corp., 493 F.2d 1076, 1102 (5th Cir. 1973), cert. denied, 419 U.S. 869 (1974).
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actually develops. Standard clinical examinations seldom include tests for immunodysfunction, even if the doctor knows of the patient’s exposure to toxic substances. Cytogenetic evaluation requires carefully controlled studies using analytical techniques not available in most laboratories.

Thus, under the extent of the injury rule, persons exposed to hazardous wastes would have a choice. They could delay suit until manifestation of a latent disease. Their cause of action would be preserved because the cellular injuries were neither discovered nor reasonably discoverable. Alternatively, they could undergo cytogenetic testing. If the results were negative, they could postpone legal action. If injuries were discovered, they would have a fixed period in which to initiate a lawsuit for future damages.

Although the extent of the injury doctrine applied in conjunction with cellular injury avoids the harsh results of the reasonable medical certainty rule, the approach only benefits those who demonstrate present physiological damage. For others who are at risk of developing future diseases, yet whose cytogenetic tests prove negative, this solution is ineffectual. Adequate relief for all hazardous waste victims compels recognition of increased risk by itself as an actionable injury.

III. AN ALTERNATIVE—INCREASED RISK AS RECOVERABLE INJURY

The best means of providing immediate relief for persons exposed to toxic wastes is through an “increased risk of disease” cause of action. An offending substance invades the body. See, e.g., Askey v. Occidental Chem. Corp., 477 N.Y.S.2d 242, 247 (App. Div. 1984). In these jurisdictions, recognizing cellular damage as injury will not change the exposure rule’s harsh results. By adopting the extent of the injury rule, however, these jurisdictions could provide adequate relief for those persons forced to sue immediately upon exposure.

A similar situation would exist in states following the “disease manifestation” rule, where the statute of limitations begins to run when the plaintiff first has a medically provable injury. See Note, Preserving Causes of Action in Latent Disease Cases: The Locke v. Johns-Manville Corp. Date-of-the-Injury Accrual Rule, 68 Va. L. Rev. 615, 615 (1982).

39. Only a limited number of specialists apply the sophisticated principles of immunodysfunction testing to the treatment of non-allergic diseases such as cancer. Levin, supra note 30.

40. The Centers for Disease Control’s follow-up assessment at Love Canal was a carefully controlled cytogenetic study. Wolff, Love Canal Revisited, 251 J.A.M.A. 1464 (1984). Cell specimens were sent to Brookhaven National Laboratory and Oak Ridge National Laboratory for cell culture, harvesting, fixation, staining, and aberration identification. Heath, supra note 32, at 1438.

41. The lack of present chromosomal or immunological damage does not rule out the possibility that tested persons will develop cancer or other latent diseases as a result of exposure to hazardous substances. Heath, supra note 32, at 1440; see also Reserve Mining Co. v. Environmental Protection Agency, 514 F.2d 492, 515 (8th Cir. 1975), modified sub nom. Reserve Mining Co. v. Lord, 529 F. 2d 181 (8th Cir. 1976) (discussing inconclusive nature of negative results from tissue study). Plaintiffs may still prove the increased risk of cancer using the risk assessment techniques described supra notes 17–19.

42. See supra note 41.
increased risk claim offers several practical benefits and is supported by existing legal doctrine.

A. Practical Benefits

Because of the pragmatic problems of future recovery, persons exposed to hazardous wastes cannot wait until a disease has developed to seek judicial relief. In many jurisdictions, statutes of limitation will have run long before manifestation of a disease. Even in jurisdictions where the discovery rule theoretically preserves hazardous waste victims' causes of action, future compensation is doubtful. Critical evidence of exposure and tortious conduct often disappears when plaintiffs are forced to wait years to litigate. The chances of identifying liable parties also decreases over time as those responsible for mishandling wastes abandon sites, sell to other parties, or file for bankruptcy.

Where evidence is preserved and defendants are located, plaintiffs still face the enormous burden of proving that the defendants caused the manifested disease. In addition, res judicata may completely bar a future

43. See supra notes 8, 38.
44. Rosenberg, supra note 4, at 920 (delay in resolving the issue of liability may result in loss or degradation of evidence). Many actions for occupational cancer have failed when the plaintiff was unable to prove the magnitude of exposure. Comment, Tort Actions for Cancer: Deterrence, Compensation, and Environmental Carcinogenesis, 90 YALE L.J. 840, 851-52 & n.54 (1981).
45. A number of waste dumps are considered “orphan” sites. It is unknown who operated or used them. ENVIRONMENTAL PROTECTION, supra note 1, at 567. While those responsible for some sites will never be located, earlier litigation will improve the chances for finding culpable parties.
46. Potential corporate defendants may be sold or reorganized, Landau, Hurdling the Barriers to Toxic Tort Recovery, TRIAL, Apr. 1983, at 40, 41, or the dump site may be sold to an innocent purchaser. See Bleicher & Stonelake, Caveat Emptor: The Impact of Superfund and Related Laws on Real Estate Transactions, 14 ENVTL. L. REP. (ENVTL. L. INST.) 10,017, 10,017 (1984).

For these same reasons, an earlier suit would help a liable defendant obtain contribution while other responsible parties can be located and are not judgment-proof.
48. There are two types of causation problems for the toxic tort plaintiff. First, an indeterminant defendant problem exists when it is unclear which one of several defendants caused the plaintiff’s harm. This problem has been addressed by courts through a variety of techniques. See, e.g., Hall v. E.I. DuPont DeNemours & Co., 345 F. Supp. 353, 376-78 (E.D.N.Y. 1972) (enterprise liability); Sindell v. Abbott Laboratories, 26 Cal.3d 588, 163 Cal. Rptr. 132, 145, 607 P.2d 924, 937 (market share theory). cert. denied, 449 U.S. 912 (1980); Abel v. Eli Lilly Co., 418 Mich. 311, 343 N.W.2d 164, 170-73 (1984) (alternative liability).

Second, the problem of an indeterminant plaintiff is present when the origin of the plaintiff’s illness cannot be linked to the defendant’s conduct. This is particularly difficult where there are both natural and chemical causes of the manifested disease. Rosenberg, supra note 4, at 856-57; see also In re “Agent Orange” Product Liability Litigation, M.D.L. No. 381, slip op. at 269-97 (E.D.N.Y. Sept. 25, 1984) (preliminary memorandum and order on settlement). The courts have not provided relief to indeterminant plaintiffs. Delgado, supra note 4, at 908. But see Allen v. United States, 588 F. Supp. 247, 415 (D. Utah 1984) (burden of proving causation shifted to defendant after threshold showing by plaintiffs).
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lawsuit if the plaintiff had brought an earlier action to recover other damages from exposure. Even those who never develop a latent disease suffer an immediate loss and deserve compensation for the increased medical costs of monitoring for early signs of disease formation. Because a defendant cannot be liable for damages without causing injury, courts must recognize increased risk as the underlying injury.

Increased risk recovery also serves the tort goal of deterrence. Potential lawsuits far in the future will not deter mishandling of hazardous wastes. Immediate liability most effectively influences present conduct and prevents further health and environmental damage.

B. Supporting Legal Doctrine

In addition to the practical benefits, recognition of the increased risk claim comports with existing tort principles. A number of analogous legal doctrines support judicial relief for the increased risk victim.


50. Rosenberg, supra note 4, at 885. The victim's discounted life prospects and increased insurance premiums are also a present loss. Id. at 886; see also Ginsberg & Weiss, Common Law Liability for Toxic Torts: A Phantom Remedy, 9 HOFSTRA L. REV. 859, 924 (1981).

51. Most courts that permit jury awards to include the expected medical costs of future diagnostic testing require proof of a present injury. See, e.g., Cooper v. Painless Parker, Dentist, 105 Cal. App. 110, 286 P. 1048, 1050 (1930) (present x-ray burns may lead to cancer); see also Mink v. University of Chicago, 460 F. Supp. 713, 719–20 (N.D. Ill. 1978) (denying medical monitoring costs for DES (diethylstilbestrol) daughters because no disease present).

In Ayers v. Township of Jackson, 189 N.J. Super. 561, 461 A.2d 184, 190 (1983), the court permitted medical monitoring costs for early detection of cancer in persons exposed to hazardous wastes. The court reasoned that tortfeasors should bear the cost of medical testing required by their tortious conduct. Id. While policy reasons amply justify this conclusion, the court failed to reconcile its holding with the lack of present injury. The logical implication from the opinion is that the New Jersey court did recognize increased risk of cancer as the underlying injury, but permitted recovery only for those future damages proven to be reasonably certain to accrue.


53. Executives responsible for a corporation's tortious conduct are likely to be more concerned about the firm's short-term profit than about remote and contingent disease claims that may only confront their managerial successors. Rosenberg, supra note 4, at 920; see also Cheek, supra note 4, at 10,124 (opposing administrative victim compensation proposals because they destroy incentives of tort system).
Loss of chance cases represent one supporting doctrine.\textsuperscript{54} For example, a recent loss of chance decision held a physician liable for negligently decreasing a patient's chance of survival, even though that chance was already less than fifty percent.\textsuperscript{55} Such recognition of increased risk as injury applies directly in a hazardous waste context. Under the loss of chance principle, persons who prove that exposure to toxic substances caused an increased risk of death or disease merit judicial relief.\textsuperscript{56}

Market share liability provides a further basis for granting increased risk claims.\textsuperscript{57} Courts applying this theory justify imposing liability on manufacturers who may not have caused the plaintiffs' injury on the ground that all defendant manufacturers have contributed to the risk of injury to the public.\textsuperscript{58} Courts have also noted that without market share liability, an innocent plaintiff would be deprived just compensation.\textsuperscript{59}

The market share reasoning supports the increased risk claims of hazardous waste victims. The tortious conduct of the hazardous waste handler increases the plaintiffs' probability of injury, just as defendant manufacturers in market share cases have increased the risk of disease in the consuming public. Whereas the market share theory is concerned with uncertainty as to which defendant injured the plaintiffs, the hazardous

\textsuperscript{54} In loss of chance cases, plaintiffs cannot trace causation of their injuries to the defendant, but are permitted to recover if they can show that the defendant's actions made a bad situation worse. Delgado, \textit{supra} note 4, at 889.


\textsuperscript{56} At least one court has recognized the possibility of such a claim. \textit{In re} Kitsap County Asbestos Cases of Schroeter, Goldmark and Bender, No 81-2-00940-1, slip op. at 2-3 (Wash. Super. Ct. Kitsap County June 6, 1983) (denying a defendant's motion in limine to preclude discussion of future cancer in asbestosis cases).


\textsuperscript{58} See, e.g., Martin \textit{v.} Abbott Laboratories, 102 Wn. 2d 581, 604, 689 P.2d 368, 382 (1984). Defendants are only held responsible for the harm that they statistically could have caused. \textit{Id.} at 606, 689 P.2d at 383.

\textsuperscript{59} See, e.g., \textit{id.} at 604, 689 P.2d at 382.
waste problem involves uncertainty of future disease. In both, statistical evidence can be used to avoid the harsh results of traditional tort doctrine and impose liability on those who have acted wrongfully.

Legal precedent involving anticipatory nuisance law and environmental endangerment statutes furnishes additional support for recognizing increased risk claims. Courts have ordered plant closures or installation of pollution control devices when the risk of injury to the public is less than fifty percent. The factors supporting equitable relief in these cases equally support compensation for increased risk. Uncertainty of future harm to the plaintiff and potential economic burden to the defendant are similar in equitable and compensation contexts. It is incongruous to order a hazardous waste facility to spend millions of dollars reducing exposure to the surrounding community while denying compensation to those at risk of developing disease long after the clean-up has ended.

By relying on these precedents, courts can recognize a new cause of action for increased risk without reaching far beyond existing legal doctrine. This approach will prevent continued unjust treatment of hazardous

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60. See, e.g., Village of Wilsonville v. SCA Services, Inc., 86 Ill. 2d 1, 426 N.E.2d 824, 842 (1981)(Ryan, J., concurring) (granting injunctive relief even though the possibility of the harmful result is uncertain or contingent); see also W. ROGERS, ENVIRONMENTAL LAW § 2.4 (Supp. 1984).


62. Reserve Mining v. Environmental Protection Agency, 514 F.2d at 536-37 (pollution control actions required although no finding of imminent or probable harm), modified sub nom. Reserve Mining Co. v. Lord, 529 F.2d 181 (8th Cir. 1976); Ethyl Corp. v. Environmental Protection Agency, 541 F.2d at 17-20 (authorizing EPA to regulate gasoline additives that may present a less than probable risk of harm).

63. For example, In Village of Wilsonville v. SCA Services, Inc., 86 Ill. 2d 1, 426 N.E.2d 824, 836-37 (1981), the Illinois Supreme Court upheld a lower court injunction requiring the closure of a hazardous waste disposal site that might release toxins into the environment. If persons living in Wilsonville had been exposed to toxic waste and had sought damages for their increased risk of developing cancer, the court would most likely have denied them relief. See Seltzer, supra note 4, at 840-41; see also Comment, The Burden of Proof in Environmental and Public Health Litigation, 49 UMKC L. Rev. 207, 208-09 (1981).

64. Some courts are concerned that increased risk recovery will lead to a flood of litigation. See, e.g., Ayers v. Township of Jackson, 189 N.J. Super. 561, 461 A.2d 184, 187 (1983). This fear is unwarranted. The risks imposed on persons each day will rarely lead to actionable injuries. See Comment, Increased Risk, supra note 4, at 564-67. Courts can also require statistical proof to prevent purely speculative claims. See, e.g., Martin v. Johns-Manville Corp., 322 Pa. Super. 348, 469 A.2d 655, 657 n.2. (1983). Increased risk recovery will actually improve judicial efficiency because the same evidence needed to establish an increased risk claim will be presented to establish emotional distress claims. See, e.g., Arnett v. Dow Chemical Co., No. 729586, slip op. at 24-26 (Cal. Super. Ct. San Francisco County Mar. 21, 1983).
waste victims and achieve the tort system’s goal of compensation and deterrence. Allowing present relief for increased risk should not preclude claims by those who wait for a disease to develop before filing suit. An increased risk cause of action will not be discovered until a risk assessment establishes the person’s enhanced probability of future disease. The specialized nature and expense of such a study renders the increased risk injury not reasonably discoverable. As under the extent of the injury rule, plaintiffs would have a choice. They could make the extraordinary effort to determine if they have a present cause of action for increased risk, or wait until after a disease develops to seek judicial relief.

IV. RECOVERY FOR INCREASED RISK—THE INSURANCE POLICY REMEDY

Recognition of increased risk claims presents peculiar remedy problems. This section describes the limitations of a monetary award for an increased risk cause of action and recommends an insurance policy remedy for this unique injury.

Judicial relief for the hazardous waste victim must address two problems. First, persons who are at risk of developing future diseases face immediate out-of-pocket expenses that deserve compensation. Second, those who develop a disease after exposure to toxic substances have little hope of financial recovery.

consequences of a latent disease.

Juries have compensated plaintiffs for possible future diseases by weighing the magnitude and probability of the potential harm.\textsuperscript{71} If the probability is low, however, plaintiffs are likely to be under-compensated,\textsuperscript{72} particularly when there is no separate claim for mental distress or other present injuries.\textsuperscript{73} On the other hand, jury sympathy for the toxic tort victim could lead to over-compensation.\textsuperscript{74} Jury discretion could be limited by applying a proportional recovery approach, recommended by some commentators.\textsuperscript{75}

Under the proportional recovery approach, the court fixes the percentage of future damages to be awarded by the probability of disease formation.\textsuperscript{76} This limitation is favored because it is "actuarially fair." Tortfeasors pay the full cost of damages that they have caused.\textsuperscript{77} To the individual hazardous waste victim, however, it is either grossly unfair or overly generous.

\begin{itemize}
  \item \textsuperscript{71} See M. Minzer, supra note 15, at § 13.02 and cases cited therein.
  \item \textsuperscript{72} For example, in the case In re Three Mile Island Litigation, No. 79-0763 (M.D. Pa. Dec. 27, 1982), the plaintiffs were entitled to a trial for damages arising from an increased risk of cancer due to radiation exposure. At trial, however, the defendants estimated that the exposure had increased the risk by only 0.0001%. Kanner, supra note 4, at 384.
  \item \textsuperscript{73} In cases tried under the extent of the injury rule, the courts have emphasized the severe emotional trauma associated with the risk in upholding large damage awards. In Davis v. Graviss, 672 S.W.2d 928, 931 (Ky. 1984), a $224,500 award for mental and physical suffering was not considered excessive because: appellant is left to twist in the wind every day of her life as to whether she ought to have the operation or whether she ought to run the risk that if she gets a common cold it may get into her spinal fluid and lead to meningitis or worse. Id. at 931; see also Martin v. City of New Orleans, 678 F.2d 1321, 1327 (5th Cir. 1982), cert. denied, 459 U.S. 1203 (1983). Hence, without a claim for emotional distress, compensation for increased risk of future disease would likely be minimal.
  \item \textsuperscript{74} In toxic tort cases, attorneys are often viewed as "representing" a Fortune 500 monolith pitted against a "hard-working, church-going family man, a loving husband and father. . . . [A] clever plaintiff's attorney will increase the jury's empathy for his client in direct proportion to a defendant's ascent up the Fortune 500 ladder." Goggin & Brophy, Toxic Torts: Workable Defenses Available To The Corporate Defendant, 28 Vill. L. Rev. 1208, 1214 (1983). When plaintiffs are suing because of their increased risk of cancer, a jury is likely to be even more sympathetic. See Shelton, Defending Cancer Litigation: The Causation Defense, 24 FOR DER 8, 11 (1982).
  \item \textsuperscript{75} See, e.g., Black & Lilienfeld, supra note 20, at 782.
  \item \textsuperscript{76} Proportional recovery has generally been suggested where a plaintiff develops a disease but must use epidemiological evidence to prove causation. Id. However, it is equally applicable in the context of future damage compensation. See King, Causation, Valuation, and Chance in Personal Injury Torts Involving Preexisting Conditions and Future Consequences, 90 YALE L.J. 1353, 1396 (1981); Delgado, supra note 4, at 900-01.
  \item Proportional damage awards have occurred in indeterminant defendant litigation and have been proposed in loss of chance cases. See, e.g., Martin v. Abbott Laboratories, 102 Wn. 2d 581, 606, 689 P.2d 368, 383 (1984); Herskovits v. Group Health Coop. of Puget Sound, 99 Wn. 2d 609, 635, 664 P.2d 474, 487 (1983).
  \item \textsuperscript{77} Black & Lilienfeld, supra note 20, at 783 (citing Robinson, Multiple Causation in Tort Law: Reflections on the DES Cases, 68 VA. L. REV. 713, 747 (1982)). But see Kaye, The Limits of the Preponderance of the Evidence Standard: Justifiably Naked Statistical Evidence and Multiple Causation, 1982 AM. B. FOUND. RESEARCH J. 487, 491.
\end{itemize}
Those who develop a disease receive a fraction of their medical costs, lost wages, and nonpecuniary damages arising from the defendant’s tortious conduct,\textsuperscript{78} while others receive a windfall.\textsuperscript{79}

The better approach to judicial relief is an award of insurance coverage to plaintiffs exposed to hazardous waste.\textsuperscript{80} Insurance provides future monetary relief to plaintiffs who develop a latent illness, and gives an immediate psychological benefit to exposed plaintiffs who would be covered financially against catastrophic future illnesses.

Plaintiffs would request an insurance policy remedy as equitable relief in addition to compensation for out-of-pocket expenses and other present injuries.\textsuperscript{81} A judge would order defendants to purchase an insurance package for exposed plaintiffs. These policies would be structured to pay medical treatment costs if and when a designated disease developed,\textsuperscript{82} and provide supplemental income should plaintiffs become unable to work as a result of the disease. The policy would also compensate the victims’ successors if the plaintiffs died from a designated illness.

This remedy avoids the problems of under-compensation and over-compensation arising from a money judgment.\textsuperscript{83} Instead, it offers plaintiffs

\textsuperscript{78} Increased risk judgments under the proportional recovery approach will not adequately offset the costs of cancer if it develops. Comment, \textit{Increased Risk}, supra note 4, at 581–82.

\textsuperscript{79} Rosenberg, \textit{supra} note 4, at 883.


\textsuperscript{81} An insurance fund judgment would be most appropriate in a class action by risk claimants filed immediately upon discovery of mass exposure. Rosenberg, \textit{supra} note 4, at 920. This remedy could also be sought by an individual plaintiff. The size of the insured class may affect the premiums charged, but not the feasibility of the remedy.

\textsuperscript{82} A list of diseases covered by insurance would be developed from existing scientific studies associating certain illnesses with the chemicals to which the plaintiffs have been exposed. \textit{See, e.g., In re "Agent Orange" Products Liability Litigation}, M.D.L. No. 381, slip op. at 381 (E.D.N.Y. Sept. 25, 1984) (compensation may be limited to designated diseases); \textit{see also supra} note 5.

A designated disease may be caused by factors other than the defendant’s waste. To address this issue, some have suggested prorating insurance benefits according to the probability of causation by the defendant. \textit{See Rosenberg, supra} note 4, at 921. However, this raises the problems associated with proportional recovery. \textit{See supra} note 76 and accompanying text. The burden of proof could be shifted to the defendant or insurance company to prove the lack of causation, as in Allen \textit{v. United States}, 588 F. Supp. 247, 415 (D. Utah 1984), but this would significantly reduce the certainty of the insurance judgment. No reduction in benefits will be needed if the exposed population is relatively small and the compensable illnesses are precisely determined, because the defendant will face a minimal economic burden.

\textsuperscript{83} \textit{See supra} notes 73–74 and accompanying text.
protection from the risk they face. Even if plaintiffs have adequate insurance, this remedy provides additional relief, just as a damage award may compensate an accident victim who is already covered by insurance.

An insurance judgment is a fair remedy. Plaintiffs are provided compensation if and when it is needed, but share in the chance that a disease may not develop. Defendants under the insurance approach face approximately the same liability as under a proportional recovery system, since insurance premiums will be based on the same determination of risk.\textsuperscript{84} Defendants might also benefit financially by being allowed to spread the costs of insurance over the latency period of the designated illnesses.\textsuperscript{85}

Although the insurance industry has not favored recent toxic tort reform proposals,\textsuperscript{86} the insurance approach proposed in this Comment is likely to be met with greater acceptance.\textsuperscript{87} The principal interest of insurance companies with regard to any hazardous waste victim compensation system is the predictability of costs.\textsuperscript{88} Under the proposed insurance remedy, policies would be written for a known group of individuals who face a known risk of future disease.\textsuperscript{89} This will allow premiums to be set with reasonable certainty.\textsuperscript{90} Uncertainties as to which insurer is responsible for

\textsuperscript{84} Rosenberg, supra note 4, at 920.

\textsuperscript{85} See id. (suggesting use of annuities). Safeguards would be needed to ensure that defendants continue to pay premiums. Pre-paid insurance policies, while imposing greater costs, may be preferable because they provide greater certainty to plaintiffs.


\textsuperscript{87} Legislation may be required to permit issuance of such policies. Letter from Richard L. Roddis, Chief Executive Officer of Unigard Insurance Group, to the author (February 25, 1985) (copy on file with the Washington Law Review).

\textsuperscript{88} Hearings, supra note 86, at 139 (statement of Leslie Cheek).

\textsuperscript{89} This is similar to policies now issued for Environmental Impairment Liability (EIL) insurance. Before EIL insurance is issued, a risk assessment is performed to define the area of potential liability, including identification of those individuals who may be injured by discharges. Wrenn, The Use of Risk Assessment in Insurance, Real Estate and Merger Decisions, in ALI-ABA MATERIALS, supra note I, at 481–83.


\textsuperscript{90} Setting appropriate premiums requires reasonable certainty as to the number of persons who will make claims and the average claim cost. Hearings, supra note 86, at 139 (statement of Leslie Cheek).
paying benefits or what activities are covered would also be avoided.91

An insurance remedy is far from the standard approach to tort compensation. However, as plaintiffs realize the limited potential for damage awards, they will seek court-ordered insurance judgments.92 The courts should grant this type of relief because of the unique nature of the increased risk injury, the inadequacy of damage awards, and the inherent fairness of this remedy.93

V. CONCLUSION

Judicial relief for increased risk of disease from exposure to hazardous waste is not possible under current tort doctrine. Yet, postponing legal action until the manifestation of a disease is impractical and unfair. To avoid the harsh results of the current doctrine, two approaches are proposed.

First, courts can recognize cellular or genetic damage caused by toxic substances as a present injury. A remedy for that injury, including possible future complications, can be granted under the extent of the injury rule. This alternative will only help victims demonstrating present physiological effects.

The better solution, one that provides relief to all persons at risk of developing future disease from exposure to hazardous waste, is to recognize increased risk alone as actionable injury. An increased risk claim provides important practical benefits and is supported by analogous tort principles.

The remedy granted for an increased risk cause of action should include both a monetary award for medical monitoring costs and emotional distress damages, and an award of insurance coverage. An insurance policy remedy avoids problems of valuation, under-compensation, and over-compensation inherent in a lump-sum judgment, and spreads the risk of future damages more equitably between the parties.

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