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TORTIOUS TOXICS

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In this Article we offer one small idea with potentially large implications. We propose the recognition and development of a special tort for toxic exposures, where the exposures have not yet led to a physical illness such as cancer. We argue, in brief, that this new tort would, in one simple step, accomplish three things: it would address many of the problems with the courts' current handling of toxic torts; it would consolidate the many overlapping causes of action now pressed in toxic tort cases into one single claim; and it would give expression to the real injury motivating these cases—a dignitary and autonomy-based harm, not a physical one.

In Part I, we briefly canvass the familiar problems with the courts' current approaches to handling toxic tort cases. These problems range from the difficulty of showing causation to the courts' hostility to acknowledging emotional harm as an injury cognizable in tort. The problems also stem from the overlapping and duplicative nature of many toxic tort claims. The profusion of different legal claims arising from the same basic kinds of factual settings—claims based on harm to quality of life, emotional distress, enhanced risk, medical monitoring, post-traumatic stress disorder, damage to property values and others—calls to mind weeds growing chaotically in a vacant lot. But, we will suggest, all of these claims are bound by a common theme; they all grow out of the dread that follows substantial exposures to toxic substances.

In Part II, we discuss the extensive psychological and sociological literature on the special nature of the dread associated with exposure to toxic substances. As we will explain, risk itself can corrode communities' and individuals' sense of security and autonomy, regardless of whether anyone dies or falls physically ill. The sociologist Kai Erikson uses the term "chronic disaster" to refer to the cumulative, insidious, gradual harm that is characteristic of prolonged exposure to hazardous substances.¹ Cognitive psychologists, too, as we shall see, have noticed that people

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¹ KAI ERIKSON, *A NEW SPECIES OF TROUBLE: EXPLORATIONS IN DISASTER, TRAUMA, AND COMMUNITY* 21 (1994).

reserve an uncommon dread for the kinds of circumstances that typically surround exposures to toxic substances.

This Article thus has a second purpose in addition to proposing a new toxic tort: this purpose is to bring into the literature on torts relevant research from cognitive psychology and sociology. This psychological and sociological literature has been extremely important in contemporary academic discussions of environmental law.² Remarkably, however, despite the obvious connections between the literature on dread and the human impulses that lead to toxic tort suits, so far other scholars have not brought the psychological and sociological literature to bear on the problem of toxic torts.

Part II takes a first cut at exploring the implications, for tort doctrine, of this psychological and sociological literature on risk. Throughout this section, we try to show what this literature reveals about what's wrong with current doctrine. Perhaps most obviously, this literature shows that the injuries from exposures to toxic substances—even in advance of any physical disease—are real and widespread. So widespread are they, in fact, that they might be said to comprise a kind of "syndrome," predictable and consistent in its manifestations. At the least, the reality and widespread nature of these injuries suggests that the off-hand dismissal of such injury by some courts is based on ignorance rather than evidence. In addition, this literature suggests that the legal system's growing preoccupation with the numerical expression of risk misses the concerns underlying the legal claims based on toxic exposures. Finally, the emerging idea that fear of latent diseases is not recoverable in tort, but fear of acute near-misses is, is exactly backwards: it is precisely when we do not know we are safe that we have the most to fear.

The Article ends, in Part III, on a positive note, with suggestions about the way tort doctrine should develop in order to take account of the non-legal literature on risk. The first suggestion is to decouple the notion of "risk" and risk-based harms from numerical probabilities of physical injuries, and to cease making recovery in tort dependent on a showing of a specific numerical probability of harm. The second suggestion is to recognize the real basis of the true toxic tort (that is, the tort that exists before physical injury has manifested itself). This tort is an autonomy- and dignitary-based tort, not a tort based on physical injury. In this way, the tort's closest cousins are not negligence and strict liability, but instead battery, assault, and trespass.

² See, e.g., STEPHEN BREYER, *BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION* (1993).

I. CURRENT LAW

Persons exposed to toxic substances have brought a diverse array of legal claims, including claims based on emotional distress, post-traumatic stress disorder, decreased quality of life, property damage, increased risk, fear, and medical monitoring. Yet, regardless of the specific rubric under which they actually bring their claims, plaintiffs bringing toxic exposure cases have consistently stumbled over several large obstacles to judicial relief, intrinsically tied to the nature of their injury. For example, if plaintiffs wait until they develop physical disease before they sue, they are faced with problems of muddled and convoluted chains of causation and long latency periods (which further complicate causation).³ Yet if plaintiffs sue before they develop disease, they are faced with the courts' hostility to tort recovery for non-physical harms. Moreover, if plaintiffs sue before they have developed physical disease, they may be barred by the single controversy rule from suing later, should they develop a disease;⁴ but if they wait to sue, they may find that the statute of limitations has passed. Toxic tort plaintiffs thus find themselves caught in a variety of Catch-22's.

Our focus will be on the tort doctrines that have frustrated (or, more rarely, allowed) recovery for "exposure-only" plaintiffs—that is, plaintiffs who have not yet manifested a physical disease due to their exposure to toxic substances. Toxic exposure victims have brought suit under a wide variety of legal theories, with, as we shall see, decidedly mixed success. We briefly canvass the most common claims, and their judicial fates, here.

Negligent infliction of mental distress. Early tort law categorically denied emotional distress recovery.⁵ However, courts eventually began to allow recovery for emotional harms, but only where those harms were parasitic to some more tangible, physical harm.⁶ This requirement

³ See, e.g., Mark Seltzer, *Personal Injury Hazardous Waste Litigation: A Proposal for Tort Reform*, 10 B.C. ENVTL. AFF. L. REV. 797, 811-12 (1982).

⁴ See, e.g., Marc J. Veilleux, Note, *Recovery for Cancerphobia and Increased Risk of Cancer Under the Jones Act: Hagerty v. L & L Marine Services, Inc.*, 12 TUL. MAR. L.J. 219, 220 (1987).

⁵ Nancy Levit, *Ethereal Torts*, 61 GEO. WASH. L. REV. 136, 141 (1992) ("The fear of imaginary injuries and fictitious suits, the belief in self-responsibility for mental well-being, the difficulty of monetarily valuing emotional harms, the lack of tools and standards for measurement of emotional ills, and the nascent state of behavioral sciences all combined to precluded recovery for emotional suffering.").

⁶ *Id.* at 142.

eventually "yielded to the requirement that the plaintiff establish a physical manifestation of the emotional injury, and many courts still require that the emotional distress suffered be 'serious.'"⁷

As the years passed, many courts began to allow recovery for the "bystander" to a physically harmful event, so long as the bystander had been within the "zone of danger" of the event.⁸ In other words, so long as the plaintiff *could* have been physically hurt by the event that ended up emotionally hurting her, she could recover for her emotional injury in at least some jurisdictions. Even in the relatively few jurisdictions that have abandoned the "zone of danger" rule, plaintiffs must still meet certain requirements concerning proximity in time and space, and the closeness of the relationship between the person physically hurt and the person emotionally injured. Though the understanding and application of these requirements varies among courts, the underlying intent is the same—to assuage the courts' deep-seated fear of a deluge of frivolous and unsubstantiated claims.⁹

Claims for negligent infliction of emotional distress arising out of toxic exposure, like all emotional distress claims, must meet the same physical harm or impact requirements in most jurisdictions.¹⁰ However, as the physical injuries suffered are often latent and difficult to directly attribute to a particular cause, this requirement creates a problem for toxic exposure plaintiffs. With few exceptions,¹¹ the judicial system has

⁷ *Id.* at 170 (citations omitted). Courts have explained that serious emotional distress exists where "a reasonable man, normally constituted, would be unable to adequately cope with mental stress engendered by the circumstances of the case." *Molien v. Kaiser Found. Hosps.*, 27 Cal. 3d 916, 928 (1980).

⁸ The Supreme Court has embraced the "zone of danger" rule under the Federal Employers' Liability Act. *Conrail v. Gottshall*, 512 U.S. 532 (1994).

⁹ See Veilleux, *supra* note 4, at 222 ("Perhaps the largest obstacle to recovery for emotional distress or mental anguish is the potential for trivial, feigned, or imagined claims. In response to these policy reservations, a plaintiff is often required to prove some physical injury or physical impact that caused or accompanied the emotional distress or mental anguish.") (citations omitted). However, the requirements described in text are often rendered somewhat meaningless in application as the judicial systems lacks any sort of consistent standard for what may constitute the necessary injury. As the California Supreme Court noted: "[i]f physical injury, however slight, provides the ticket for admission to the courthouse, it is difficult for advocates of the 'floodgates' premonition to deny that the doors are already wide open." *Molien*, 27 Cal. 3d at 928.

¹⁰ See Veilleux, *supra* note 4, at 222 n.22 ("Jurisdictions which require proof of some physical harm as a precondition to recovery are in the majority . . .").

¹¹ See, e.g., *Lilley v. Bd. of Supervisors of La. State Univ.*, 735 So. 2d 696, 703 (La. Ct. App. 1999) (upholding plaintiffs claim for asbestos exposure regardless of the existence of a physical injury).

demonstrated a clear trend of outright rejection of most emotional distress claims arising from toxic exposure without accompanying physical harm.¹² Thus, exposure victims are often faced with two unappetizing options: bring their true injury of emotional distress alone and face the likelihood of judicial rejection of their claim; or exaggerate physical symptoms in an attempt to manipulate the unaccommodating judicial system and get their claim into court.¹³

Fear. Some jurisdictions have allowed recovery for the fear of developing latent disease from exposure to harmful substances, a fear often known as "cancerphobia."¹⁴ This claim is derived from the "more commonly recognized claim for emotional distress or mental anguish."¹⁵ Indeed, it is hard to see a difference between the two kinds of claims. Courts have not thus far required that the plaintiffs bringing fear claims demonstrate a probability that they will actually develop the illness they fear.¹⁶ Even so, the courts are unwilling to allow the new tort to develop completely independent of the probability of physical disease. Plaintiffs bringing a fear claim must demonstrate, as a threshold, physical manifestations of their fear, akin to the physical impact necessary for traditional emotional distress claims, again in an attempt to weed out

¹² See, e.g., *Metro-North Commuter R.R. Co. v. Buckley*, 521 U.S. 424, 430 (1997) (listing a variety of cases dismissing emotional distress claims for lack of physical injury).

¹³ See Glen Donath, *Curing Cancerphobia: Reasonableness Redefined*, 62 U. CHI. L. REV. 1113, (1995) (discussing the same problem in regard to cancerphobia specifically).

Requiring proof of physical injury is particularly problematic in the context of cancerphobia claims, where the underlying physical injury is the cancer that has yet to develop. This harm can almost never be shown As a result, retaining the physical harm requirement in cancerphobia actions serves only to confuse and distort cancerphobia claims. Although proponents of the physical harm requirement laud its fraud-preclusion function, the requirement actually encourages victims to: exaggerate sick headaches, nausea, insomnia and other symptoms in order to make out a technical basis of bodily injury upon which to predicate a recovery for the more grievous disturbance

Id. at 1120.

¹⁴ The term cancerphobia comes from the case of *Ferrara v. Galluchio*, 152 N.E. 2d 249, 251 (N.Y. 1958) (defining cancerphobia as "the phobic apprehension that she would ultimately develop cancer"). For a further discussion of cancerphobia specifically, see Donath, *supra* note 13.

¹⁵ Veilleux, *supra* note 4, at 221.

¹⁶ *Id.* at 223 n.34 (citing *Heider v. Employers Mut. Liab. Ins. Co.*, 231 So. 2d 438 (La. Ct. App. 1970), as an example of a case where the plaintiff was able to recover for fear on a very limited probability—there was only a two to five percent chance he would develop epilepsy from his concussion).

frivolous cases. Needless to say, this requirement results in a "perverse incentive structure," wherein it is beneficial to plaintiffs to fabricate physical harm.¹⁷ Unfortunately, as a result, the ability to recover for fear may be based largely on "the plaintiff's physiological idiosyncrasies;"¹⁸ those with meritorious claims often go uncompensated, while those prone to theatrics may be rewarded.

Post-Traumatic Stress Disorder. Closely related to (perhaps fundamentally indistinguishable from) claims based on emotional distress and fear are claims based on allegations that plaintiffs who have faced prolonged exposure to toxic substances suffer from post-traumatic stress disorder ("PTSD"). These claims have not fared well in the courts. While PTSD is now a recognized and accepted psychiatric disorder within the realm of psychiatry,¹⁹ courts have categorically refused to recognize claims for PTSD arising out of toxic exposure. The attitude of the court in *Sterling v. Velsicol*²⁰ is not atypical. In affirming the dismissal of the plaintiffs' claims based on PTSD, the court explained:

Plaintiffs' drinking or otherwise using contaminated water, even over an extended period of time, does not constitute the type of recognizable stressor identified either by professional medical organizations or courts. Examples of stressors upon which courts have based awards for PTSD include rape, assault, military combat, fires, floods, earthquakes, car and airplane crashes, torture, and even internment in concentration camps, each of which are natural or man-made disasters with immediate or extended violent consequences. Whereas consumption of contaminated water may be an unnerving occurrence, it does not rise to the level of the type of psychologically traumatic event that is a universal stressor.²¹

Increased risk. Increased risk, conceptually similar to the newly recognized loss of chance tort, arises where a defendant's negligence increases the probability that the plaintiff will suffer a particular physical

¹⁷ Donath, *supra* note 13, at 1124.

¹⁸ *Id.*

¹⁹ See AMERICAN PSYCHIATRIC ASSOCIATION, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (4th ed. 1994) for definitions, diagnostic features, and criteria.

²⁰ 855 F.2d 1188 (6th Cir. 1987).

²¹ *Id.* at 1210 (citations omitted).

harm or disease. The harm or risk created is, in theory, statistically measurable with "some degree of medical certainty. Plaintiffs allege future damages, including 'future medical expenses, loss of earnings, and diminished life expectancy.'"²² Importantly, in recognizing increased risk as a cause of action, courts are, for the first time, recognizing the protected interest of being free from future harm, "devoid of both certainty and existing physical harm."²³ For toxic exposure plaintiffs, this is a significant step forward.

Plaintiffs pursuing this new course, however, still run into the same difficulties inherent in the more traditional causes of action; they must meet the unrealistically high numerical probability standard and they must time their claim so as not to run into preclusion and statutes of limitations. In order to limit recovery for increased risk, the courts fall back onto their traditional causation standards and require a pure probability, or more likely than not standard of proof. This rule has hugely arbitrary and inequitable results in the realm of increased risk as, medically speaking, "the probability of developing a future disease is unlikely to exceed fifty percent."²⁴ While it is perhaps comforting to the judiciary to have a bright-line numerical cut-off, analytically²⁵ and equitably, the application of this rule in toxic exposure cases is difficult to defend. The result is that a substantial portion, if not a large majority, of toxic exposure victims go uncompensated, rendering the development of the increased risk claim essentially meaningless.²⁶

Further, where toxic exposure plaintiffs are able to bring increased risk claims, they once again run into the Catch-22 of preclusion. As many courts assume that the increased risk and the latent disease that potentially develops therefrom arise from the same harm, plaintiffs face a no-win situation. They may bring an increased risk claim, but may then be barred from bringing additional claims if and when they manifest an illness. In

²² Donath, *supra* note 13, at 1116 (quoting *Potter v. Firestone Tire & Rubber Co.*, 25 Cal. Rptr. 2d 550, 588 (1993) (George, J., concurring in part and dissenting in part)).

²³ Levit, *supra* note 5, at 157.

²⁴ Brent Carson, Comment, *Increased Risk of Disease from Hazardous Waste: A Proposal for Judicial Relief*, 60 WASH. L. REV. 635, 639 (1985).

²⁵ See Levit, *supra* note 5, at 177 ("Analytically, it is difficult to justify insulating a defendant who has caused a forty-nine percent risk while imposing liability on a defendant who has caused a fifty-one percent risk of harm.").

²⁶ Some jurisdictions, recognizing the injustice, have instead allowed plaintiffs to recover for enhanced risk on a lesser standard, but only when accompanied by gross physical injuries of the sort not typically present in toxic exposure cases. See Carson, *supra* note 24, at 639-40.

that event, they are thus significantly under-compensated for the extent of their injuries, but are able to receive some compensation before the expiration of the statute of limitations. Or, they may choose to wait until the actual manifestation of illness to bring suit, thus suffering the same problems of the passage of time discussed above, namely statute of limitations, loss of critical evidence, difficulty in identifying liable parties, etc.²⁷ Some courts have even expressed concern about the occurrence of the former situation as a justification for disallowing recovery for increased risk at all.²⁸ Either way, while the concept of increased risk is progress for toxic exposure victims, the actual application and management of the concept thereof by the judicial system has done little to advance true redress.

Medical monitoring. Medical monitoring, or medical surveillance, "is a claim for the post-exposure, pre-symptom compensation of future periodic medical examinations, designed to facilitate early detection and diagnosis of exposure-related diseases."²⁹ Medical monitoring claims have enjoyed an arguably more successful introduction to the judicial arena than the other novel torts,³⁰ seemingly because they are based on an easily cognizable and substantially less speculative injury.³¹ Thus, "courts are ignoring the absence of injury and allowing plaintiffs to recover the reasonable cost of medical testing on the legal basis of the plaintiff's right to recover for reasonably anticipated future medical expenses."³² Some courts have concluded that this recovery just makes plain and equitable sense.³³

²⁷ See *id.* at 644 (discussing the detrimental effects of delayed suit on plaintiffs' cases).

²⁸ See *Eagle-Picher Indus., Inc. v. Cox*, 481 So. 2d 517, 524 (Fla. Dist. Ct. App. 1985) (disallowing recovery for increased risk in part because those who later manifest the disease to which they have an increased risk will be under-compensated). The court also noted that those who fail to manifest the disease will have received a financial windfall, *id.*, but this interpretation is flawed in that it fails to recognize the increased risk as an independent compensable injury.

²⁹ Ann Taylor, *Public Health Funds: The Next Step in the Evolution of Tort Law*, 21 B.C. ENVTL. AFF. L. REV. 753, 776 (1994).

³⁰ For an extensive list of jurisdictions recognizing, rejecting, and lacking case law on medical monitoring causes of actions, see Carey C. Jordan, Comment, *Medical Monitoring in Toxic Tort Cases: Another Windfall for Texas Plaintiffs?*, 33 HOUS. L. REV. 473, 489 n.100 (1996).

³¹ See *id.* at 483-84.

³² *Id.* at 486.

³³ See, e.g., *Friends for All Children, Inc. v. Lockheed Aircraft Corp.*, 746 F.2d 816, 825 (D.C. Cir. 1984) (explaining that medical monitoring as a cause of action "accords with

Unfortunately, courts have also found ways to limit the efficacy of the medical monitoring cause of action. For example, courts have required a discrete and direct exposure to the toxin,³⁴ an increased risk of serious injury,³⁵ a present physical injury,³⁶ and specific methods for the dispersion of the funds.³⁷ These limitations unnecessarily limit the award of damages where, intuitively, it seems they should "be included in a damage award to the extent that in the past, they were medically advisable and, in the future, will probably remain so."³⁸ However, implicit in that statement is the idea that medical monitoring costs should be *included* in a damage award, not constitute the entirety thereof. That is the fundamental shortcoming of the medical monitoring cause of action, and probably a large reason for its judicial success—it in no way compensates toxic tort victims for their injury. Rather, it subtly dissuades the victims from believing that they have suffered a harm at all, shifting the focus back to the development of a "real" injury—a "physical, visible, or discern[i]ble" one³⁹—much like traditional tort law and its inability or disinclination to recognize the true harm of toxic exposure.⁴⁰

Property damage. Interestingly, toxic exposure claims centered on, or at least akin to, property damage have met with greater success. The claims have most often taken on two forms: true property damage and decreased quality of life. The property claims often have a nuisance-like ring; touting the right to use one's property free from interference and

commonly shared intuitions of normative justice which underlie the common law of tort").

³⁴ See, e.g., *Theer v. Philip Carey Co.*, 628 A.2d 724 (N.J. 1993) (limiting the broad scope of *Ayers v. Township of Jackson*, 525 A.2d 287 (N.J. 1987), so as not to apply to the exposure suffered by the wife of an asbestos worker when she did the family laundry).

³⁵ See, e.g., *Hansen v. Mountain Fuel Supply Co.*, 858 P.2d 970 (Utah 1993) (requiring multiple elements, including increased risk, before allowing recovery for medical monitoring costs).

³⁶ See, e.g., *Ball v. Joy Techs., Inc.*, 958 F.2d 36 (4th Cir. 1991), *cert. denied*, 502 U.S. 1033 (1992) (wherein physical injury was required for recovery and mere exposure did not create sufficient injury).

³⁷ See *Jordan*, *supra* note 30, at 493-94.

³⁸ *Hagerty v. L & L Marine Servs., Inc.*, 788 F.2d 315, 319 (5th Cir. 1986), *reh'g denied en banc and modified*, 797 F.2d 256 (5th Cir. 1986) (awarding medical monitoring costs to a tankerman accidentally drenched with carcinogenic dripolene).

³⁹ *Levit*, *supra* note 5, at 174.

⁴⁰ The cumulative result of the judicial system's disinclination to confront and redress these harms head-on is an informal immunity for those creating the risks of exposure at the expense of those who are harmed. See, e.g., *Seltzer*, *supra* note 3, at 850.

the commonly invoked maxim "sic utere tuo"⁴¹ Courts seem to have much less trouble extrapolating from their obligation to enjoin a feedlot "polluting" nearby residents with noxious odor and flies,⁴² to their similar obligation to prevent toxic pollutants, than they do recognizing emotional harms from the same pollution. In the same vein, where courts have likened quality of life damages to tangible property rights damages, recovery of damages has succeeded, even where the congruent emotional distress damages were rejected.⁴³

Summing Up. Several observations emerge from this quick tour of toxic tort doctrine. First, many courts remain reluctant to allow recovery for non-physical injury; they seem hesitant to conclude that emotional injury, even if accompanied by physical symptoms of distress, is real, or at least important enough to justify judicial intervention. Second, courts often tie judicial relief to the plaintiff's ability to prove not only that her probability of physical illness can be quantified, but also that it rises to a particular numerical level (often greater than fifty percent). Finally, some courts—including, most prominently, the U.S. Supreme Court—have explicitly distinguished between acute near-misses and latent risks, and have held that recovery may be allowed in the former but not the latter case. As we shall see, each of these features of current doctrine misses the important lessons to be learned from the large and growing psychological and sociological literature on risk.

II. THE PSYCHOLOGY AND SOCIOLOGY OF RISK

Consulting research on risk and risk perception in the fields of psychology and sociology yields a treasure trove of insights relevant to toxic tort law. Specifically, people care a lot about risk even before they die or fall ill from it; they care about much more than the numerical probability of harm; and they reserve a special dread for latent risks. All

⁴¹ A person may not use their property in such a way as to interfere with others' use and enjoyment of their own property. See BLACK'S LAW DICTIONARY 1380 (6th ed. 1990).

⁴² *Spur Indus., Inc. v. Del E. Webb Dev. Co.*, 494 P.2d 700 (Ariz. 1972).

⁴³ See *Ayers v. Township of Jackson*, 525 A.2d 287 (N.J. 1987) (clearly distinguishing between subjectively measured damages for "pain and suffering" and those property-like damages that objectively affect quality of life such as the inability to use the water supply where the town's landfill contaminated the local water supply).

of these insights into people's reactions to risk make current tort doctrine regarding toxic exposures look confused and ignorant, even backward.⁴⁴

A. *Risk as an Injury*

Studies of individuals and communities that have lived through exposure to long-lived risk have revealed profound and adverse effects from such exposures. Sociologist Kai Erikson explains:

The experience of trauma, at its worst, can mean not only a loss of confidence in the self but a loss of confidence in the scaffolding of family and community, in the structures of human government, in the larger logics by which humankind lives, and in the ways of nature itself.⁴⁵

Within families and among neighbors, long-lived threats have often produced disagreements and divides that did not exist before the threatening exposures occurred. Recurring problems include family disputes over whether to move away from the area where the exposures occurred or are occurring, and disputes among neighbors over whether to join legal or political efforts to combat the risks.⁴⁶

In addition, many researchers have found that one of the most dramatic effects of long-lived environmental threats is a loss of trust. Indeed, virtually all case studies of "contaminated communities," as Michael Edelstein calls them, have found a generalized loss of trust in society's institutions.⁴⁷ This mistrust extends, most obviously, to the

⁴⁴ This Part draws heavily on Lisa Heinzerling, *Environmental Law and the Present Future*, 87 GEO. L.J. 2025 (1999), reprinted in 31 LAND USE & ENVT'L. L. REV. 305 (2000) (reprinted as one of the best environmental law articles of 1999).

⁴⁵ ERIKSON, *supra* note 1, at 242.

⁴⁶ See, e.g., Margaret S. Gibbs, *Psychopathological Consequences of Exposure to Toxins in the Water Supply*, in 6 ADVANCES IN ENVIRONMENTAL PSYCHOLOGY: EXPOSURE TO HAZARDOUS SUBSTANCES: PSYCHOLOGICAL PARAMETERS 47, 52 (Allen H. Lebovits et al. eds. 1986) [hereinafter ADVANCES IN ENVIRONMENTAL PSYCHOLOGY]; Adeline G. Levine & Russell A. Stone, *Threats to People and What They Value: Residents' Perceptions of the Hazards of Love Canal*, in 6 ADVANCES IN ENVIRONMENTAL PSYCHOLOGY, *supra*, at 109, 125; ERIKSON, *supra* note 1, at 122-28.

⁴⁷ See, e.g., MICHAEL R. EDELSTEIN, CONTAMINATED COMMUNITIES: THE SOCIAL AND PSYCHOLOGICAL IMPACTS OF RESIDUAL TOXIC EXPOSURE 70-82 (1998); Bruce P. Dohrenwend, *Psychological Implications of Nuclear Accidents: The Case of Three Mile Island*, 59 BULL. N.Y. ACAD. MED. 1060 (1983); PHIL BROWN & EDWIN J. MIKKELSEN, NO SAFE PLACE: TOXIC WASTE, LEUKEMIA, AND COMMUNITY ACTION 118-20 (1990);

entities directly responsible for the threat, but it also reaches the local, state, and federal government entities deemed responsible for reacting to the threat. Indeed, in some cases, citizens have lost more faith in the government than in the polluter.⁴⁸ This loss of trust can have severe effects on citizens' relationship with their government and thus, in a participatory government like ours, on the functioning of government itself.⁴⁹ And, once lost, trust is hard to restore.⁵⁰

The loss of trust experienced as a result of environmental contamination is connected to the long-term nature of environmental threats. The longevity of these threats increases the uncertainty associated with them, as years may pass before the exposed community learns the full consequences of their exposure.⁵¹ This uncertainty puts the government and other institutions involved in disclosing and explaining the threat in the position of wanting to say something about the threat, without having very much that they can say.⁵² The dilemma is well illustrated in the following statement by the United States Environmental Protection Agency regarding dioxin exposures in Missouri: "Dioxin in Missouri may present one of the greatest environmental problems in the

Kenneth M. Bachrach & Alex J. Zautra, *Assessing the Impact of Hazardous Waste Facilities: Psychology, Politics, and Environmental Impact Statements*, in ADVANCES IN ENVIRONMENTAL PSYCHOLOGY, *supra* note 46, at 71, 84 (discussing a hazardous waste facility in Arizona); Gibbs, *supra* note 46, at 52 (examining toxic water contamination in Legler section of Jackson Township, New Jersey); ERIKSON, *supra* note 1, at 129-33 (discussing a leaking underground gas tank in East Swallow, Colorado); Levine & Stone, *supra* note 46, at 127 (discussing Love Canal); MARTHA R. FOWLKES & PATRICIA Y. MILLER, LOVE CANAL: THE SOCIAL CONSTRUCTION OF DISASTER (1982).

⁴⁸ See, e.g., EDELSTEIN, *supra* note 47, at 80-81 (describing citizens' reactions to events at Love Canal).

⁴⁹ See, e.g., Paul Slovic, *Perceived Risk, Trust, and Democracy*, 13 RISK ANALYSIS 675 (1993).

⁵⁰ *Id.* at 677; see also Paul Slovic et al., *Perceived Risk, Trust, and the Politics of Nuclear Waste*, 254 SCIENCE 1603, 1606 (1991); Dohrenwend, *supra* note 47, 1071-72 (finding high levels of distrust among the residents living near the Three Mile Island nuclear reactor, stemming from the accident there; distrust did not dissipate after the accident, as mental distress did).

⁵¹ Cf. Robin Pope, *The Pre-Outcome Period and the Utility of Gambling*, in FOUNDATIONS OF UTILITY AND RISK THEORY WITH APPLICATIONS 137, 157 (Brent P. Stigum & Fred Wenstop eds., 1983) (arguing that having a concept of uncertainty is impossible without having a concept of time).

⁵² EDELSTEIN, *supra* note 47, at 77.

history of the United States. Conversely, it may not."⁵³ In the absence of information about the actual physical effects of pollution—which, with long-term threats, may not be available for many years, if ever—people are forced to come to their own conclusions about the risks they face. The “nonempirical belief systems,” as Henry Vyner has called them, that are formed in the absence of empirical information may consist either of denying any threat, or fearing the worst.⁵⁴ Government often embraces the former conviction,⁵⁵ citizens the latter. This divergence creates fertile space for mistrust within communities.

Of course, communities can be destroyed by short-lived threats, too. Kai Erikson himself has produced one of the most famous accounts of the devastating effects an acute disaster—a flood—can have on a community’s sense of itself.⁵⁶ But latent threats are special in this sense: they can convert what would otherwise be a discrete, diffuse kind of harm—one death here, another there—into a catastrophe that tears the web of a whole community. When an exposed community will not know for many years whether anyone will fall ill or die as a result of their exposure, when, indeed, they may never know whether the illnesses and deaths they

⁵³ *Id.* at 76 (quoting *St. Louis Post-Dispatch* (Nov. 14, 1983)). Anastasia Shkilnyk quotes an equally memorable governmental statement, this one from a letter to members of an Ojibwa band in Canada, whose river had been contaminated with mercury:

Your level of mercury was found to be __ parts per billion Most of the band members have mercury levels that are higher than the people living in southern Ontario who do not eat very much fish, but this is to be expected, and the mercury level does vary from person to person without necessarily having any effect on their health. We consider your mercury level to be in the range of measurements which would not affect your health.

We realize that the matter of mercury in the fish is a difficult one to understand and the experts are still learning more about mercury and its effects, but it is also important to remember that to keep healthy, it is necessary to eat balanced meals which contain some meat or fish as well as starch foods such as bread, and fats such as margarine or butter.

ANASTASIA M. SHKILNYK, *A POISON STRONGER THAN LOVE* 210-11 (1985).

⁵⁴ See generally HENRY M. VYNER, *INVISIBLE TRAUMA: THE PSYCHOLOGICAL EFFECTS OF INVISIBLE ENVIRONMENTAL CONTAMINANTS* (1988).

⁵⁵ See, e.g., Lee Clarke, *Politics and Bias in Risk Assessment*, 25 SOC. SCI. J. 155, 161 (1988) (government officials often defend risky systems even more adamantly after a disaster has occurred); VYNER, *supra* note 54, at 182-88 (asserting that invisibility of environmental threats allows government to deny their seriousness).

⁵⁶ KAI T. ERIKSON, *EVERYTHING IN ITS PATH: DESTRUCTION OF COMMUNITY IN THE BUFFALO CREEK FLOOD* (1976).

experience came from the exposure or from something else,⁵⁷ the whole community becomes involved in the threat of death—even if, ultimately, only a handful of illnesses and deaths will reasonably be attributed to the exposure they fear. A long temporal lag between exposure and physical effects can thus transform a diffuse and individual harm into a collective harm, a disaster.⁵⁸ Prolonged enough, risk itself becomes the disaster.

The social and psychological reactions we have described have been consistently reported by people who have lived through exposure to long-lived environmental threats.⁵⁹ These include the famous events at Three Mile Island, Love Canal, and Times Beach, and less well-known toxic episodes in places like Woburn, Massachusetts; Hardeman County, Tennessee; and Legler, New Jersey. One might say, in fact, that the set of reactions we have described is so strikingly similar from place to place, and so intimately tied to the special nature of toxic exposures, that they comprise a kind of syndrome.⁶⁰ Perhaps the most vivid expression of the clustering of the rather disparate reactions we have described, and their association with toxic exposures, is the “demoralization scale” developed by Bruce Dohrenwend—who led the task force on behavioral and mental health effects as part of the President’s Commission on the Accident at Three Mile Island—and his colleagues.⁶¹ The demoralization scale, a measure of “nonspecific stress,”⁶² includes feelings of sadness, depression,

⁵⁷ Many environmental contaminants pose the problem of what Henry Vynar calls “etiologically invisibility,” that is, the cause of a particular health effect cannot be isolated. Ionizing radiation, for example, leaves no “marker” that distinguishes leukemias caused by it from leukemias caused by something else. VYNER, *supra* note 54, at 15-16.

⁵⁸ Cf. ALLEN H. BARTON, *COMMUNITIES IN DISASTER: A SOCIOLOGICAL ANALYSIS OF COLLECTIVE STRESS SITUATIONS* 38 (1969) (defining disasters as “collective stress situations . . . [in which] many members of a social system fail to receive expected conditions of life from the system . . . includ[ing] the safety of the physical environment, protection from attack, provision of food, shelter, and income, and guidance and information necessary to carry on normal activities”) (emphasis omitted).

⁵⁹ For an excellent summary of these effects, see Michael B. Gerrard, *Fear and Loathing in the Siting of Hazardous and Radioactive Waste Facilities: A Comprehensive Approach to a Misperceived Crisis*, 68 TUL. L. REV. 1047, 1137-46 (1994).

⁶⁰ Cf. VYNER, *supra* note 54, at 121-40 (describing features of what author calls “radiation response syndrome,” a collection of symptoms found among veterans exposed to radiation during testing of atomic bombs).

⁶¹ See Bruce P. Dohrenwend et al., *Stress in the Community: A Report to the President’s Commission on the Accident at Three Mile Island*, 365 ANNALS N.Y. ACAD. SCI. 159 (1981). Dohrenwend attributes their use of the term “demoralization” to Jerome Frank. See Dohrenwend, *supra* note 47, at 1065 (citing J.D. FRANK, *PERSUASION AND HEALING* (1973)).

⁶² See Dohrenwend, *supra* note 47, at 1067.

loneliness, and anxiety; nervousness; restlessness; sour stomach; poor appetite; cold sweats; headaches; generalized physical ailments; and helplessness, hopelessness, uselessness, and failure.⁶³ Populations exposed to various toxic episodes have been found to score "high" on the demoralization scale as compared to other populations, including the clients of mental health centers.⁶⁴ Demoralization is a compact way of describing a large part of the cluster of social and psychological responses common to toxic exposures.

In short, risk matters to people, and it matters long before the date on which a person subject to a hazard may fall ill or die as a result of it. Indeed, the entire current literature on the monetary value of a human life takes this as given: this literature seeks to identify, not the value a person places on life itself, but the value she places on small increases (or reductions) in risk of death.⁶⁵ The empirical evidence purporting to find, for example, that workers accept higher wages in return for accepting small increases in risk makes no sense unless risk itself is a kind of commodity, separate and apart from life itself, as no one is suggesting that workers would accept a finite sum of money in exchange for certain death.⁶⁶ While there is much reason to question the specific valuations found in the wage premium studies that have been done to date,⁶⁷ there is little reason to question the basic premise that people conceive increased risk (or decreased risk) as a real cost (or benefit) to themselves. This premise is supported by other kinds of empirical evidence as well. It often happens, for example, that the property values of homes surrounding sources of environmental hazards, such as toxic waste sites, decrease as a result of these hazards, and researchers have found that decreases in value

⁶³ See Jeffrey S. Markowitz & Elane M. Gutterman, *Predictors of Psychological Distress in the Community Following Two Toxic Chemical Incidents*, in ADVANCES IN ENVIRONMENTAL PSYCHOLOGY, *supra* note 46, at 89, 95 tbl.6.2.

⁶⁴ See, e.g., *id.* at 103; Bachrach & Zautra, *supra* note 47, at 79, 83-85. As Bruce Dohrenwend puts it, "High scores on this symptom scale are in some ways analogous to body temperature: when it goes up, one knows something is wrong." Dohrenwend, *supra* note 47, at 1067-69.

⁶⁵ See, e.g., W. KIP VISCUSI, RATIONAL RISK POLICY 45 (Clarendon Press 1998).

⁶⁶ See, e.g., JOHN M. MENDELOFF, THE DILEMMA OF TOXIC SUBSTANCE REGULATION: HOW OVERREGULATION CAUSES UNDERREGULATION AT OSHA 27 (1988).

⁶⁷ The critiques of the late economist Don Shakow are particularly illuminating and incisive. See, e.g., Don Shakow, *Market Mechanisms for Compensating Hazardous Work: A Critical Analysis*, in EQUITY ISSUES IN RADIOACTIVE WASTE MANAGEMENT 277 (Roger E. Kasperson ed., 1983); Julie Graham & Don Shakow, *Hazard Pay for Workers: Risk and Reward*, 23 ENV'T. 14 (Oct. 1981); Julie Graham et al., *Risk Compensation—in Theory and in Practice*, 25 ENV'T. 14 (Jan./Feb. 1983).

correspond to perceptions of increased risk.⁶⁸ Thus, risk is sufficiently concrete, in and of itself, to have a value in the marketplace. Indeed, this insight is the basic foundation of the institution of insurance.⁶⁹

Other common behaviors also suggest that risk itself is a consequential event in people's lives. In many cases, people choose where to live,⁷⁰ where to work,⁷¹ and even where to play⁷² based on the risks they face. Sometimes risk even affects the decision whether to have children.⁷³ Risk also influences what people eat,⁷⁴ what they drink,⁷⁵ and

⁶⁸ See, e.g., Howard Kunreuther & Douglas Easterling, *Gaining Acceptance for Noxious Facilities with Economic Incentives*, in *THE SOCIAL RESPONSE TO ENVIRONMENTAL RISK: POLICY FORMULATION IN AN AGE OF UNCERTAINTY* 151, 155 (Daniel W. Bromley & Kathleen Segerson eds., 1992) [hereinafter *THE SOCIAL RESPONSE FOR ENVIRONMENTAL RISK*]. See also ERIKSON, *supra* note 1, at 116 n.* (reporting that one family's home had been declared to have "no value" due to a leaking underground storage tank).

⁶⁹ See, e.g., WARREN FREEDMAN, 1 *FREEDMAN'S RICHARDS ON INSURANCE* 12 (6th ed. 1990) (describing nature of insurance in way that makes it closely resemble nature of environmental risk: insurance involves risk of "real loss" that insured and insurer cannot either "avert or hasten;" a large number of persons are subject to the same risk; the loss itself is likely to fall on a relatively small part of the larger group; the probabilities of harm must be capable of estimation; the loss must be "sufficiently considerable . . . to be worth providing against;" and the cost of providing against the loss must not be "prohibitive").

⁷⁰ See, e.g., Valerie Preston et al., *Adjustment to Natural and Technological Hazards: A Study of an Urban Community*, 15 *ENV'T. & BEHAVIOR* 143, 160-61 (1983) (finding that twelve percent of residents of a community exposed to various technological risks had attempted to relocate in response to the risks, and that one-third of the residents had considered relocating).

⁷¹ See, e.g., W. KIP VISCUSI, *RISK BY CHOICE: REGULATING HEALTH AND SAFETY IN THE WORKPLACE* 67 (1983) (finding that "workers' risk perceptions had a powerful influence on their intentions [and propensities] to quit"); cf. Allen H. Lebovits et al., *The Case of Asbestos-Exposed Workers: A Psychological Evaluation*, in *ADVANCES IN ENVIRONMENTAL PSYCHOLOGY*, *supra* note 46, at 3, 15 (finding that asbestos workers stayed in trades involving significant asbestos exposure despite knowledge of hazards associated with asbestos).

⁷² See, e.g., ERIKSON, *supra* note 1, at 156.

⁷³ See, e.g., BROWN & MIKKELSEN, *supra* note 47, at 95; VYNER, *supra* note 54, at 48; Donald G. Unger et al., *Living Near a Hazardous Waste Facility: Coping with Individual and Family Distress*, 62 *AM. J. ORTHOPSYCHIATRY* 55, 57 (1992).

⁷⁴ See, e.g., ROBERT V. PERCIVAL ET AL., *ENVIRONMENTAL REGULATION* 527 (2d ed. 1996) (reporting "rapid decline in apple consumption" following television report on the risks of Alar, a growth regulator used on apples); SHKILNYK, *supra* note 53, at 202-03 (describing effects of mercury contamination of river on community's consumption of fish).

⁷⁵ For a detailed account of the effect on daily life of being advised not to drink or use one's tap water, see EDELSTEIN, *supra* note 47, at 34-37.

how and where they bathe.⁷⁶ An increase in risk, in brief, constrains options along a broad spectrum of human choice, from home, to work, to family, to daily habits of living.

In light of this evidence of the serious and profound consequences of prolonged exposures to toxic risks, courts' rather casual rejection of, or severe limitations on, legal claims arising out of such exposures seems ignorant, or even callous.

B. *Counting More Than Numbers*

The kinds of risks posed by exposures to toxic substances seem to strike a singular kind of fear in the hearts of ordinary citizens.⁷⁷ This fear often does not correspond very well with numerical probabilities of physical illness and death.⁷⁸ To give one famous example, ordinary people tend to view nuclear power as a much riskier activity than medical X-rays, even though people who are experts in assessing risk believe that the numerical probability of illness and death from X-rays is higher than it is from nuclear power.⁷⁹ The risk perceptions of experts, too, are affected by other factors besides numerical probabilities of harm, but less so, it seems, than those of lay citizens.⁸⁰

The discrepancy between lay and expert perceptions of risk, and more specifically, between lay perceptions of risk and numerical probabilities of physical harm, has led to concerted efforts to understand the reasons for the divergence. Many researchers have concluded that at least part of the divergence between lay and expert, or nonstatistical and

⁷⁶ See, e.g., *Potter v. Firestone Tire & Rubber Co.*, 6 Cal. 4th 965, 978 n.2 (1993); EDELSTEIN, *supra* note 47, at 29, 36.

⁷⁷ Some critics of environmental regulation point to citizens' fears as a cause of the regulatory problems they perceive. See, e.g., Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 GEO. L.J. (forthcoming 2002).

⁷⁸ Paul Slovic, *Perception of Risk*, 236 SCIENCE 280, 282 (1987).

⁷⁹ *Id.* at 281; Paul Slovic et al., *Facts and Fears: Understanding Perceived Risk*, in SOCIAL RISK ASSESSMENT: HOW SAFE IS SAFE ENOUGH? 181, 192-93 (Richard C. Schwing & Walter A. Alberts, Jr. eds., 1980).

⁸⁰ Jay J.J. Christensen-Szalanski et al., *Effects of Expertise and Experience on Risk Judgments*, 68 J. APPLIED PSYCHOL. 278 (1983), discussed in Lola L. Lopes, *Risk Perception and the Perceived Public*, in THE SOCIAL RESPONSE TO ENVIRONMENTAL RISK, *supra* note 68, at 57, 61; Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk Assessment Battlefield*, 1997 U. CHI. LEGAL F. 59, 68-69, 83-87. Of course, the statistical probabilities themselves, on which many experts mostly rely for formulating their judgments about risk, are usually pervaded by nontechnocratic biases and assumptions. See, e.g., Clarke, *supra* note 55, at 155; Lopes, *supra*, at 71.

statistical, views of risk arises from laypeople's tendency to take a wider set of considerations into account in judging risk. The list of these considerations is quite large: the controllability, familiarity, immediacy, diffuseness, voluntariness, equity, reversibility, and naturalness of the hazard—or the opposite of these characteristics—all appear to be important in shaping ordinary people's perceptions of risk.⁸¹ Ordinary people also appear to care a great deal about whether a hazard threatens only this generation, or also future generations, and appear to perceive the latter as riskier than the former.⁸² In making judgments about risk, lay citizens also tend to consider the benefits they perceive to stem from the risky substance or activity.⁸³

Here, too, courts' responses to the diverse claims raised by toxic tort plaintiffs seem out of step with the latest interdisciplinary work. In particular, courts' preoccupation with the numerical probabilities of harm in cases alleging harm based on increased risk begs the underlying question of what risk means.

C. *Latency and Risk*

Citizens' anxieties about a particular substance or activity do not appear to depend on the immediacy of the physical harm that might be caused by it. Indeed, sometimes there appears to be an inverse relationship between anxiety and immediacy. To perceive more risk from hazards that pose threats to future generations than from ones that threaten this generation alone, for example, is to reserve a special dread for the remote threat of harm.

Less obviously, considerations such as equity, controllability, knowability, and reversibility also have a large temporal dimension. A long passage of time between the imposition of a risk and the manifestation of physical harm makes inequity more likely, as those who benefited from the risk are less likely to be around to suffer its adverse consequences. In addition, it is harder to control and to know a threat

⁸¹ See Christensen-Szalanski et al., *supra* note 80, at 283; WILLIAM W. LOWRANCE, OF ACCEPTABLE RISK: SCIENCE AND THE DETERMINATION OF SAFETY 87 fig.3-1 (1976); Robin Gregory & Robert Mendelsohn, *Perceived Risk, Dread, and Benefits*, in 13 RISK ANALYSIS 259 (1993) (using regression techniques to identify major explanatory variables for risk perceptions reported by laypeople in other studies).

⁸² Gregory & Mendelsohn, *supra* note 81, at 261.

⁸³ *Id.* at 262; Slovic, *supra* note 80, at 81 & nn.65-67.

whose consequences cannot be perceived until many years after one acts.⁸⁴ One's ability to engage in trial and error—and thus to learn about and to control a hazard—is severely undermined by a large temporal gap between the trial and the error.⁸⁵ It is also more difficult to reverse a threat that has been many years in the making,⁸⁶ and that arises—as many risks from toxic substances do—from durable agents that, once unleashed, persist in the environment and in living tissue for many years.⁸⁷

There is also a temporal element in citizens' tendency to consider the benefits of an activity in judging its riskiness.⁸⁸ Put simply, latent hazards pack no thrill. The chance, for example, that exposure to a chemical will lead to a diagnosis of cancer a quarter-century hence just does not match up to the high-adventure, high-adrenaline possibility of dying immediately in a spectacular skiing, boating, or motorcycle accident.⁸⁹ Part of the reason why people enjoy activities like skiing and motorcycling is that they are risky, and *immediately* so.⁹⁰ If all goes well,

⁸⁴ VYNER, *supra* note 54, at 14-18 (arguing that environmental contaminants that are "invisible" for a long period due to latency of diseases caused by them are less amenable to adaptation and control by people exposed to such contaminants).

⁸⁵ Clayton P. Gillette & James E. Krier, *Risks, Courts, and Agencies*, 138 U. PA. L. REV. 1027, 1077, 1107 (1990). See also Laura M. Davidson et al., *Toxic Exposure and Chronic Stress at Three Mile Island*, in ADVANCES IN ENVIRONMENTAL PSYCHOLOGY, *supra* note 46, at 35, 44 (claiming that uncertainty about future consequences of past exposures to harmful agents may increase perceptions of loss of control).

⁸⁶ See Michael Gaffney & Bernard Altshuler, *Public Health Implications of Carcinogenic Exposure Under the Multistage Model*, 124 AM. J. EPIDEMIOLOGY 1021, 1029 (1986) (arguing that because early-stage carcinogens take longer to do their harmful work, many years of exposure will be accumulated by the time epidemiological studies reveal their harmful consequences, and at that point, it is too late to repair the damage that has been done).

⁸⁷ LOWRANCE, *supra* note 81, at 93-94.

⁸⁸ There is a spatial element, too, in many of the nonstatistical features of risk that laypeople deem important; specifically, many of these features are related to territoriality. See Michael B. Gerrard, *Territoriality, Risk Perception, and Counterproductive Legal Structures: The Case of Waste Facility Siting*, 27 ENVTL. L. 1017 (1997).

⁸⁹ Such accidents are in the lowest quartile of hazards scored according to Slovic's scale of dread and unknown risks. Slovic, *supra* note 78, at 2832 fig.1.

⁹⁰ As Ralph Keyes has written:

Only an actual masochist enjoys danger as such. Yet we all enjoy its by-products: alertness, intensity, and a sense of elation once danger has passed. With its faster pulse, shortness of breath, and copious perspiration, the body responds to moderate stress much as it does to physical exercise As with exercise, short doses of tolerable stress are essential for keeping body and spirit tuned But it must be emphasized that this means occasional stress at tolerable levels. There

one's payoff is immediate: one returns home safe and sound the same day, having experienced at once the thrill of danger and the thrill of mastering it.⁹¹ Almost simultaneously with experiencing the risk itself, one experiences (again, if all goes well) the certainty of having survived it intact.⁹² With latent risks, one must wait years for such assurance.⁹³

This lack of early assurance distinguishes even the unwelcome immediate threat (such as a hurricane or flood) from the latent one, and helps to explain why a special anxiety might be reserved for hazards whose physical consequences are remote. As Kai Erikson has written:

One reason toxic emergencies provoke such concern is that they are not bounded, that they have no

is little good to be said for even occasional panic, constant phobias, or nagging anxiety.

RALPH KEYES, CHANCING IT: WHY WE TAKE RISKS 35 (1985).

⁹¹ Lola L. Lopes, *Between Hope and Fear: The Psychology of Risk*, in 20 ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY 255, 288 (Leonard Berkowitz ed., 1987) (citing KEYES, *supra* note 90, at 115 (observing of people who pursue risky professions or hobbies: "[I]t's not adventure they're after. It's mastery."); KEYES, *supra* 90, at 41, 62 (explaining that among "Level I" risk takers (people who engage in "highly stimulating, exciting activities that are often dangerous and seldom last very long," such as "thrill sports"), a common stated reason for this risk-taking is the ability to take charge over one's life). See also Paula Horvath & Marvin Zuckerman, *Sensation Seeking, Risk Appraisal, and Risky Behavior*, 14 PERS. INDIVID. DIFF. 41, 41 (1993).

Why do high sensation seekers take risks while low sensation seekers avoid activities which are risky? One reason may be that the high sensation seekers value the rewards of the activities more than the low sensation seekers. The sensations of free-fall for a parachutist, the "rush" of heroin or the "high" of cocaine, the wind in the face and the blur of the scenery for the accelerating motorcyclist, the fast beating heart of the gambler waiting for the outcome of the bet, the excitement of sex, all seem to provide forms of arousal that are more valued by high sensation seekers than by lows. The intense reward effects of such activities may outweigh the risks for the high sensation seekers.

Id.

⁹² KEYES, *supra* note 90, at 65 (discussing thrill-seekers reporting that one of the main rewards of risk-taking is "the calm that follows" the danger). Cf. VISCUSI, *supra* note 65, at 15-16 (1998) (claiming that people are willing to pay a "certainty premium" to be assured of zero risk, over and above the amount they would be willing to pay for similar reductions in risk that achieve nonzero levels of risk); see also Lopes, *supra* note 91, at 278 (discussing the "seemingly special status of certainty in risky choice").

⁹³ See, e.g., VYNER, *supra* note 54, at 55-57. For a critique of expected utility theory on the ground that it ignores the length of time between a decision to take (or not to take) a risk and the resolution of uncertainty with respect to that risk, see Pope, *supra* note 51; see also Lopes, *supra* note 91, at 289-91.

frame. We generally use the word “disaster” in everyday conversation to refer to a distinct event that interrupts the accustomed flow of everyday life. “Disasters” seem to adhere to Aristotle’s rules of drama. They have “a beginning and a middle and an end.” . . . They have *plot*, in short, which is “the first principle and as it were the soul of tragedy.”

An alarm sounds the beginning. It is a signal to retreat, to take to storm cellars, to move to higher ground, to crouch in the shelter of whatever cover presents itself. A period of destruction then follows that may take no more than a brief, shattering moment or may last many days. Sooner or later, though, the disaster comes to an exhausted close. The floodwaters recede, the smoke clears, the winds abate, the bombers leave, and an all clear is sounded either literally or figuratively. . . .

Toxic disasters, however, violate all the rules of plot. Some of them have clearly defined beginnings, such as the explosion that signaled the emergency at Chernobyl or the sudden moment of realization that opened the drama of Bhopal; others begin long years before anyone senses that something is wrong, as was the case at Love Canal. But they never end. Invisible contaminants remain a part of the surroundings, absorbed into the grain of the landscape, the tissues of the body, and worst of all, the genetic material of the survivors. An all clear is never sounded. The book of accounts is never closed.⁹⁴

“Chronic disasters” is the name Erikson gives to the cumulative, insidious, and gradual harm that is characteristic of so many environmental problems.⁹⁵ That the term at first seems oxymoronic—as if an emergency could last a lifetime—just shows how large the gap is between explicit intuitions about time and risk (surely, one thinks, perceptions of risk must decrease with the time it takes for a physical harm to occur), and the

⁹⁴ ERIKSON, *supra* note 1, at 147-48 (quoting ARISTOTLE, THE POETICS 29-31 (W. Hamilton Fyre trans., 1932)). See also EDELSTEIN, *supra* note 47, at 9 (1988) (“A sense of finality is elusive for the toxic victim, in part because toxic disasters lack a ‘low point’ from which things would be expected to improve.”) (citations omitted).

⁹⁵ ERIKSON, *supra* note 1, at 21-22.

widespread, probably mostly unconscious amplification of perceived riskiness with time.⁹⁶

Latent hazards provoke another kind of psychological response as well. Latency is, simply, dormancy, and dormancy in this context refers to a condition in which a harmful agent, or the beginning of disease itself, is present but invisible. Latency thus creates a sense of *contamination*, of slow and invisible poison. Many people reserve a special dread for this kind of hazard. Again, Kai Erikson's work is illuminating. Toxic substances, he writes:

invert the process by which disasters normally inflict harm. They do not charge in from outside and batter like a gust of wind or a wall of water. They slink in without warning, do no immediate damage so far as one can tell, and begin their deadly work from within—the very embodiment, it would seem, of stealth and treachery Toxic poisons provoke a special dread because they contaminate, because they are undetectable and uncanny and so can deceive the body's alarm systems, and because they can become absorbed into the very tissues of the body and crouch there for years, even generations, before doing their deadly work.⁹⁷

In interviews with people who lived near the nuclear reactor at Three Mile Island when it experienced the nation's worst nuclear power accident to date, Erikson discovered a widespread sense of the kind of contamination he describes: people feared that radiation from the power plant had infiltrated their bodies, their genes, their houses, yards, and gardens.⁹⁸ Simple events—like “grandchildren romping in [one's] backyard”⁹⁹—had become laced with dread.¹⁰⁰

⁹⁶ For other accounts sounding the same theme, see, for example, EDELSTEIN, *supra* note 47; BROWN & MIKKELSEN, *supra* note 47.

⁹⁷ Kai Erikson, *Toxic Reckoning: Business Faces a New Kind of Fear*, 68 HARV. BUS. REV. 118, 122 (1990).

⁹⁸ *Id.* at 123-24.

⁹⁹ *Id.* at 124.

¹⁰⁰ The sense that one's body, and indeed all of nature, has become contaminated is a common response to toxic exposures. See, e.g., SHKILNYK, *supra* note 53, at 205 (reporting one woman's response to mercury poisoning in the lake in her community: “People have been trusting the fish for many years, and suddenly you don't know whether to trust them any more”).

The special anxieties associated with toxic substances can have large effects on the lives of individuals and communities. Individuals who have been exposed to substances whose physical effects likely will not become manifest for years, perhaps decades, have reported a wide range of adverse psychological responses to their potentially harmful exposures, including anxiety and anguish about their future health,¹⁰¹ depression,¹⁰² and physical conditions linked to their emotional distress, such as fatigue and insomnia,¹⁰³ headaches, diarrhea, and muscle pain.¹⁰⁴ These anxieties can also provoke hormonal and immunological changes that cause or exacerbate many physical illnesses.¹⁰⁵ Although many of these responses have taken place in the context of heightened cancer risk, a similar set of responses has been reported by people who have been exposed to a risk of other illnesses whose physical effects are not immediately manifest.¹⁰⁶

¹⁰¹ See, e.g., ERIKSON, *supra* note 1, at 99-138; BROWN & MIKKELSEN, *supra* note 47, at 94-96. See also, e.g., Hagerty v. L & L Marine Services, Inc., 788 F.2d 315 (5th Cir. 1986); Sterling v. Velsicol Chem. Corp., 855 F.2d 1188 (6th Cir. 1988); Day v. NLO, Inc., 814 F. Supp. 646 (S.D. Ohio 1993); Barth v. Firestone Tire & Rubber Co., 673 F. Supp. 1466 (N.D. Cal. 1987); Stites v. Sundstrand Heat Transfer, Inc., 660 F. Supp. 1516 (W.D. Mich. 1987); Anderson v. W.R. Grace & Co., 628 F. Supp. 1219 (D. Mass. 1986); Potter v. Firestone Tire & Rubber Co., 6 Cal. 4th 965 (Cal. 1993); Laxton v. Orkin Exterminating Co., 639 S.W.2d 431 (Tenn. 1982); Waldrop v. Vistron Corp., 391 So. 2d 1274 (La. App. 1 Cir. 1980).

¹⁰² See, e.g., Gibbs, *supra* note 46, at 64; BROWN & MIKKELSEN, *supra* note 47, at 81-87. See also, e.g., Anderson, 628 F. Supp. 1219; Stites, 660 F. Supp. 1516; Wisner v. Illinois Cent. Gulf R.R., 537 So. 2d 740 (La. App. 1 Cir. 1988).

¹⁰³ See, e.g., Anderson, 628 F. Supp. 1219; Werlein v. United States, 746 F. Supp. 887 (D. Minn. 1990).

¹⁰⁴ See, e.g., Werlein, 746 F. Supp. 887.

¹⁰⁵ Andrew Baum, *Disasters, Natural & Otherwise*, PSYCHOL. TODAY, Apr. 1988, at 56, 60; see also Andrew Baum et al., *Emotional, Behavioral, and Physiological Effects of Chronic Stress at Three Mile Island*, in READINGS IN SOCIAL PSYCHOLOGY: GENERAL, CLASSIC, AND CONTEMPORARY SELECTIONS 357 (Wayne A. Lesko ed., 1991) (documenting the role of the Three Mile Island accident in increasing levels of stress—as indicated by emotional, behavioral, and physiological measures—in the population surrounding the nuclear power plant); Levit, *supra* note 5, at 180-88 (noting the effect of hopelessness on levels of depression and suicide, incidence and spread of cancer, and the immune system).

¹⁰⁶ A large category of cases has involved people who suffer severe mental distress, and the psychological, social, and physical consequences that come along with it, as a result of exposure to the virus that causes AIDS. For general discussion, see Mandana Shahvari, *AfrAIDS: Fear of AIDS as a Cause of Action*, 67 TEMPLE L. REV. 769 (1994). Cf. Mary Donovan, *Is the Injury Requirement Obsolete in a Claim for Fear of Future Consequences?*, 41 UCLA L. REV. 1337, 1367-68 (1994) (discussing series of cases brought by patients with defective artificial heart valves, who fear that at some unknown future moment, they will suffer "sudden death" as a result of the defect in the valves).

Certainly, anxieties and anxiety-based disorders are not limited to the context of latent harms. Anxiety-based tort claims, in fact, first developed in cases in which people suffered mental distress as a consequence of acute near-misses, such as barely escaping being run over by a train.¹⁰⁷ There is a difference between these two classes of cases, however, and it has to do with the reasons why latent harms might provoke special anxieties in the first place: whereas a person involved in a near-miss with a train or a car knows immediately that she is safe, the person exposed to substances whose physical consequences become manifest only after a period of years cannot find the peace of mind that comes with the assurance of safety. Where there is no early test available to detect the presence (or absence) of disease in a person exposed to a disease-bearing agent, only time will tell whether the person will become sick.¹⁰⁸

In sum, the emerging legal distinction between acute and chronic risks, and the awarding of recovery in tort for fear engendered by the former but not the latter,¹⁰⁹ has it exactly backwards, as it is precisely the person who does not yet know she is safe who has the most reason to be fearful. A veteran exposed to radiation during atomic testing described the awful uncertainty engendered by latent risk in this way: "the worst would be better than this."¹¹⁰

III. CONCLUSION: A TORT FOR TOXICS

We believe that if courts took seriously the psychological and sociological literature we have just described, they would be in a position to reconceptualize post-exposure, pre-illness, toxic tort claims in the following three ways.

First, courts could see that the human stakes in these toxic tort cases are not tied in some linear fashion to the numerical probabilities of harm associated with toxic exposures. Courts should decouple their

¹⁰⁷ See, e.g., *Mack v. South-Bound R.R. Co.*, 52 S.C. 323 (1898); see also *Metro-North Commuter R.R. Co. v. Buckley*, 521 U.S. 424, 430-33 (1997) (citing relevant cases).

¹⁰⁸ Cf. *Kerins v. Hartley*, 21 Cal. Rptr. 2d 621, 632 (Ct. App. 1993); *Faya v. Almaraz*, 620 A.2d 327, 337 (Md. 1993) (holding that plaintiffs' recovery for mental distress arising from exposure to the AIDS virus was limited to the period during which they had not yet received test results indicating they were HIV-negative).

¹⁰⁹ See, e.g., *Buckley*, 521 U.S. at 430 (disallowing tort recovery for mental distress caused by "simple physical contact with a substance that might cause a disease at a substantially later time").

¹¹⁰ VYNER, *supra* note 54, at 57.

analysis of claims based on emotional distress and increased risk from the specific numerical probabilities of harm posed by a particular exposure. Certainly, courts should not require that serious physical illness is more probable than not as a result of these exposures in order to find that such exposures deserve judicial redress.

Second, courts should recognize that the diverse array of legal claims that has arisen from toxic exposures really are all aimed at the same kind of harm—the psychological, social, and medical consequences of experiencing a dreadful risk. Negligent infliction of emotional distress is the same as increased fear, and claims based on PTSD, and even claims for enhanced risk and medical monitoring; properly conceptualized, these are not separate legal theories. To the extent that these claims differ at all, it is because they seek different kinds of damages, not because they reflect different legal theories. This second suggestion would have the virtue of “tidying up” the area of toxic tort law and bringing order to the confusing profusion of claims that has characterized it.

Third, courts should recognize the post-exposure, pre-illness toxic tort claim for what it really is: it is a claim based on an invasion of autonomy and a denial of human dignity. It is not a subset of personal injury law. Its closest relations are battery, assault, and trespass, and not negligence and strict liability. An important limit on relief flows from this relation, and should give comfort to those who worry that our proposed new tort would soon flood the courts with trivial claims: that limit is that some kind of enhanced intent—either reckless or knowing endangerment—should be required for recovery under this new tort.

With these three adjustments, the law of toxic torts would begin to absorb the lessons of the psychology and sociology of risk, and would begin to take seriously the human impulses motivating claims of toxic torts.