Defense Counsel Journal

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A Publication of the International Association of Defense Counsel

Indoor Environment: Regulatory Developments and Emerging Standards of Care

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Defense Counsel Journal • Vol. 62 • No. 1 • January 1995

Indoor Environment: Regulatory Developments and Emerging Standards of Care

Second-hand tobacco smoke, radon, asbestos and sick buildings are alerting defense counsel and their clients to new standards

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AVERAGE Americans spend 90 percent of their lives indoors, so the air quality of the indoor environment has enormous health, economic and legal implications.[1] Often indoor air quality is significantly worse than the air outside. A five-year study by the Environmental Protection Agency found that concentrations of chemicals indoors are often 10 times greater than outdoors and that maximum indoor exposures are at least a hundred times greater than maximum outdoor exposures.[2]

Lawyers view questions of risk in the light of standards of care, reasonably foreseeable circumstances, and duties. The public is becoming increasingly informed about indoor air quality issues. As complaints about that quality increase and more research is funded to explore these problems, the standards of care and the scope of duties continue to expand.

Indoor air quality is relevant to lawyers on many levels—as residential occupants, as tenants of commercial property, as employers, and as counsel to employees, employers, building owners and managers, architects, builders, and design and construction engineers. As the implications of indoor air pollutants become more fully understood, defense counsel particularly must be prepared to advise clients as to how to respond to verified risks with reasonable and cost-effective policies.

This article discusses the case law, legislation and regulations regarding these categories of indoor air pollution:

- Environmental tobacco smoke (ETS),[3]
- Asbestos,
- Radon and
- Sick building syndrome (SBS).

ENVIRONMENTAL TOBACCO SMOKE

In December 1992, the U.S. EPA categorized second-hand smoke as a Group A carcinogen, a classification that places it among the EPA's most dangerous substances, including benzene and asbestos.[4] The EPA uses this designation when sufficient evidence from epidemiologic studies supports a causal association between exposure to the agents and cancer.[5] Scientific studies cited in the EPA report show an increased risk of lung cancer as a result of exposure to second smoke.

In addition to an increased risk of lung cancer, researchers have cited disturbing implications for children from this exposure. Studies have indicated that the nature of their developing lungs render children particularly suscep-

1. Steve Kelly, *Indoor Air Pollution: An Impetus for Environmental Regulation Indoors?* 6 B.Y.U. J. PUB. L. 295 1992).

2. Note, *Legislation for Clean Air: An Indoor Front*, 82 YALE L.J. 1040, 1042-46 (1973); Conservation Foundation, *The Epidemic of Indoor Air Pollution*, 60 BUS. & SOC. REV. 53 (1987).

3. Environmental tobacco smoke is composed of mainstream (exhaled) and sidestream (emissions from a smoldering cigarette) smoke. John D. Spengler, *Sources and Concentrations of Indoor Air Pollution*, in INDOOR AIR POLLUTION: A HEALTH PERSPECTIVE 33, 43 (Johnathan M. Samet & John D. Spengler, eds., 1991) [hereinafter HEALTH PERSPECTIVE].

4. U.S. EPA, *Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders* 2-2 (1992) [hereinafter EPA Report].

5. 51 Fed. Reg. 34,000 (Sept. 24, 1986).

tible to ETS's harmful effects.[6] Both the Occupational and Health Safety Administration and the EPA have found that exposing children to ETS results in hundreds of thousands of lower respiratory infections annually, some leading to hospitalization; exacerbation of asthma symptoms in children already suffering from this disease and statistical correlation between exposure and new cases of asthma; general physical irritations; build-up of fluid in the middle ear; and reduced lung function.[7] The heightened risks to children have prompted non-smoking family members to bring legal actions to restrict other family members from smoking in the home.[8]

Although there are a myriad of state and local smoking laws and ordinances, H.R. 3434 in the 103d Congress, entitled the Smoke-Free Environment Act of 1993 and sponsored by Rep. Henry A. Waxman, D.-Calif., would have prohibited smoking in most public and private work places in the United States. Smoking areas could be designated but only if they were separately ventilated from the rest of the building. While this legislation was not enacted, similar proposals are certain to surface in future Congresses.

Under pressure from non-smoking groups, including the Tobacco Working Group, which is composed of the attorneys general from 16 states, many fast-food restaurant chains now ban smoking in their restaurants.

Although the courts have been reluctant to jump into the causation fray, continued health assessments and public pressure will result in increased litigation that will create concerns for businesses and building owners. Courts will find the public policy arguments more persuasive if the evidence implicating ETS accumulates.

For example, in October 1991, 30 current and former flight attendants filed the first class action suit against tobacco companies involving ETS exposure. The complaint contained counts in strict liability, breach of warranty, fraud and misrepresentation, and conspiracy to commit fraud.[9] The Florida trial court refused to certify the class, finding "too many variables" in the plaintiffs' exposure to ETS, such as diverse working conditions, varying work hours, and exposure to ETS outside the workplace. The Florida Court of Appeal reversed the trial court's ruling and held that the complaint satisfied Florida's class action requirements.[10]

In October 1994, the court of appeal denied the defendants' petition for rehearing and lifted a discovery stay. It found that three issues could be certified: (1) how much exposure to ETS causes injury; (2) whether the tobacco industry knew that second-hand smoke causes injury and misrepresented data on the risk; and (3) whether the industry has a duty to warn nonsmokers about ETS.[11]

OSHA regulates industrial pollutants, but it has been slow to establish standards for exposure to pollutants such as ETS in office settings.[12] However, the Department of Labor has proposed a ban on smoking in open areas at every work place.[13] These regulations would require all employers to ban smoking or provide separate ventilation for smoking areas.

State and local legislation restricting smoking in most other areas of public gathering has put OSHA under increasing pressure to address smoking in the work place. Opponents of

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6. *See* National Research Council, *Environmental Tobacco Smoke: Measuring Exposures and Assessing Health Effects* 2 (1986) [hereinafter *Measuring Exposures*]; Julie E. Lipperet, *Prenatal Injuries from Passive Tobacco Smoke: Establishing a Cause of Action for Negligence*, 78 KY. L.J. 865, 873 (1989-90); United States Dep't of Health & Human Services, *The Health Consequences of Involuntary Smoking—A Report of the Surgeon General* 58-59 (1986) [hereinafter 1986 *Surgeon General's Report*]; J. H. Ware et al., *Passive Smoking, Gas Cooking, and Respiratory Health of Children Living in Six Cities*, 122 AM. REV. RESPIR. DIS. 366, 369 (1984).

7. 59 Fed. Reg. 15968, 15976-77 (1994); 55 Fed. Reg. 25874 (1990).

8. Satalino v. Satalino, No. 11440-86 (N.Y. Sup.Ct. Oct. 19, 1990); Roofeh v. Roofeh, 525 N.Y.S.2d 765 (Sup.Ct. Nassau Cty. 1988).

9. *See Florida Court Reinstates Class Action Against Manufacturers by Flight Attendants*, 22 Prod. Safety & Liab. Rep. (BNA) 296 (March 25, 1994). *See generally* Note (Cindy L. Pressman), *"No Smoking Please." A Proposal for Recognition of Non-Smokers' Right Through Tort Law*, 10 N.Y.L. SCH. J. HUM. RTS. 595 (1993).

10. Broin v. Phillip Morris Inc., 641 So. 2d 888 (Fla.App. 1994).

11. *See Florida Appeals Court Declines to Rehear Certification Ruling for Flight Attendants*, 22 Prod. Safety & Liab. Rep. (BNA) 1066 (Oct. 21, 1994). *See also* 641 So.2d at 890.

12. *See* Action on Smoking and Health ("ASH") v. Dep't of Labor, 28 F.3d 162, 165 (D.C. Cir. 1994) (ASH's allegation that OSHA has unreasonably delayed issuing health and safety standards for ETS moot because agency had finally issued notice of proposed rule).

13. 59 Fed. Reg. 15968 (April 5, 1994).

ETS argue that because smoking bears no relationship to any manufacturing, service or other industry, there is no reason to allow smoking in the work place. This cannot be said of many dangerous chemicals, which, while precautions are taken and regulations promulgated, cannot be eliminated from the manufacturing environment.

With the exception of inmates claiming Eighth Amendment violations arising from ETS exposure, plaintiffs alleging a constitutional right to breathe clean air have not fared well. In *Gasper v. Louisiana Stadium & Exposition District*[14] plaintiffs filed a class action seeking to enjoin smoking in the Louisiana Superdome during events there. Filed under 42 U.S.C. § 1983, the complaint alleged that the plaintiffs' First Amendment rights to receive others' thoughts and ideas at a public function were abridged because that right could not be enjoyed without exposure to hazardous smoke. They also contended that the state, which owns and operates the Superdome, deprived them of their right to breathe clean air freely, which was an alleged deprivation without due process of the exercise of the right to pursue life, liberty and property.

The federal district court dismissed and the Fifth Circuit affirmed, disparaging the claim that any infringement of rights were of a constitutional dimension. The court stated that recognition of such a constitutional right would be the equivalent of resurrecting Prohibition, which the court claimed involved a substance "fully as physically harmful as tobacco smoke, if not more so."

Government employees also have been unsuccessful in alleging that ETS exposure in the work place constitutes a constitutional tort entitling victims to damages and injunctive relief.[15]

In *Helling v. McKinley*,[16] however, the U.S. Supreme Court recognized that the Eighth Amendment's prohibition against cruel and unusual punishment is violated if an inmate is exposed to ETS at levels sufficient to create an unreasonable risk of harm to his future health. Because the Court lacked information regarding the prison conditions and what manner of separation of smokers and non-smokers would meet the constitutional standard, it affirmed the Ninth Circuit's remand to the district court to allow the plaintiff to present his case.

On remand, the Court stated, the plaintiff was obliged to prove the objective component of an Eighth Amendment violation, that he was presently exposed to unreasonably high levels of ETS, and the subjective component, that prison officials were now exposing him to dangerous levels of ETS with deliberate indifference to his welfare. The Court noted that the plaintiff might have difficulty satisfying both elements because he had since been transferred to a different Nevada prison where he was no longer housed with a five-pack-a-day smoker. Then too, the entire Nevada prison system had adopted a formal smoking policy that restricted smoking to designated areas in non-dormitory settings and that directed wardens to designate non-smoking areas in prison dormitories contingent on space availability.

Most workers who claim injury from ETS exposure in the work place have pursued claims under common law theories and under unemployment, disability and worker's compensation statutes. Courts appear to be more inclined to grant injunctive relief to non-smokers subjected to ETS as opposed to damage claims.

In *Shimp v. New Jersey Bell Telephone Co.*[17] the plaintiff sought an injunction against smoking in her immediate work area, alleging that her employer violated its duty under New Jersey common law to provide a safe working environment. The New Jersey Superior Court, Chancery Division, accepted the plaintiff's contention that she experienced a severe allergic reaction to ETS. It took judicial notice of cigarette smoke's toxicity, reviewed the scientific evidence presented, and concluded that ETS was toxic to non-smokers and was not a necessary by-product of the employer's business activities. The court went on to hold that the evidence compelled it to enjoin the employer from allowing workers to smoke any-

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14. 418 F.Supp. 716 (E.D. La. 1976), *aff'd*, 577 F.2d 897 (5th Cir. 1978), *cert. denied*, 439 U.S. 897 (1979).

15. *See* Kensell v. Oklahoma, 715 F.2d 1350, 1351 (10th Cir. 1983); Federal Employees for Nonsmokers' Rights v. United States, 446 F.Supp. 181 (D. D.C. 1978), *aff'd*, 598 F.2d 310 (D.C. Cir.), *cert. denied*, 444 U.S. 926 (1979).

16. 113 S.Ct. 2475 (1993), *aff'g and remanding* 959 F.2d 853 (9th Cir. 1992). For earlier decision *sub nom.* McKinney v. Anderson, see 924 F.2d 1500 (9th Cir. 1991), *cert. granted, judgment vacated*, 112 S.Ct. 291 (1991).

17. 368 A.2d 408 (N.J.Super. 1976).

where but in the office cafeteria, which was a designated smoking area.

Non-smokers also have had some success in litigating unemployment and workers' compensation claims based on ETS exposure. In *Lapham v. Unemployment Board of Review*[18] a Pennsylvania court upheld an employee's right to unemployment compensation because ETS exposure caused her to develop bronchitis, which compelled her to resign.

If a state's workers' compensation statute provides compensation for ETS-related injury, an employer may rely on the statute's exclusive remedy provisions in defending against claims brought by non-smokers alleging injury from ETS exposure in the work place. If the statute does not provide that coverage, however, an employee may bring a common law negligence action against the employer, as in *Shimp,* or allege a breach of the employer's duty to provide a safe working environment.[19] Even when a workers' compensation statute exclusive remedy rule normally would apply, an allegation of intentional injury accompanying the exposure to ETS may evade that exclusivity provision.[20]

The increase in legislation protecting non-smokers' right to an environment free of ETS and the courts' willingness to imply a private cause of action under those statutes suggests that commercial building owners should be acutely aware of ETS exposure to tenants and their employees. While plaintiffs in ETS suits have prevailed only against employer-tenants, it is becoming an area in which there is increasing litigation that conceivably could see a building owner or others being sued if the heating, ventilating and air conditioning system (HVAC) is alleged to be inadequate to avoid exposure, or the employer could bring the building owner into the suit as a third-party defendant.

RADON

Radon is a naturally occurring, colorless, odorless and tasteless radioactive gas that can rise to dangerous levels if it accumulates inside a building.[21] The risks of radon relate to inhalation of radioactive particles that emit alpha radiation and cause mutation in the lung cells. This gas can move from the soil into a building and become trapped, causing the radon level to increase to dangerous levels.

Radon is produced as part of the natural decay process of uranium, an element found throughout the earth's crust. Outdoor radon levels are harmless, but indoor radon levels usually are five to ten times higher than outdoor levels and can be several thousand times higher.[22]

The first discovery of artificial radon in buildings occurred in the 1960s in Grand Junction, Colorado, in homes built on piles of uranium mine tailings.[23] The presence of naturally occurring radon in homes was first discovered in 1984. In December of that year, a nuclear power plant engineer in Boyertown, Pennsylvania, set off radiation detection devices on his way into the power plant where he worked. The radiation exposure was traced to his home, where the naturally occurring radon levels created a hazard equal to smoking 135 packs of cigarettes a day.[24]

Although radon is imperceptible to the senses, it is one of the most harmful and insidious indoor pollutants. For many years it has been a known risk in lung cancer. Scientists believe that radon causes between 5,000 to 20,000 lung cancer deaths annually in the United States. The Assistant Surgeon General of the U.S. Public Health Service and the Administrator of the EPA have stated that only cigarette smoking causes more cases of lung cancer.[25] These findings were supported by

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18. 519 A.2d 1101 (Pa.Commw.Ct. 1987).

19. *See* McCarthy v. Dep't of Social & Health Servs., 730 P.2d 681, 685 (Wash.App. 1986).

20. *See* Pechan v. DynaPro Inc., 622 N.E.2d 108, 113-16 (Ill.App. 1993) (court found implied cause of action in Illinois Clean Indoor Air Act's anti-discrimination provision, which was intentional tort evading workers' comp exclusive remedy rule).

21. Office of Air and Radiation & U.S. Dep't of Health & Human Services, U.S. EPA, *A Citizens Guide to Radon: What It Is and What To Do About It* 1 (Report No. OPA-86-0004, Aug. 1986).

22. Office of Air and Radiation, U.S. EPA, *Radon Facts* § 1 (Aug. 1987).

23. *See* Office of Radiation Programs, U.S. EPA, *Summary of State Radon Programs* 7-8 (Report No. IPA 520/1-87-19-1, Aug. 1987).

24. *See* Jeanne Prussman, *The Radon Riddle: Landlord Liability for a Natural Hazard,* 18 B.C. ENVTL. AFF. L. REV. 715, 716 n.8 (1991); Comment (Anne Rickard Jackowitz), *Radon's Radioactive Ramifications: How Federal and State Governments Should Address the Problem,* 16 B.C. ENVTL. AFF. L. REV. 329, 329-30 (1988).

25. *See* Mark Jaffe & Matthew Purdy, *Radon Warning Issued: U.S. Says Homes Should Be Tested,* PHILA. INQUIRER, Sept. 13, 1988, at 1A, quoting joint announcement); Office of Public Affairs, U.S. EPA Envtl. News, *EPA Finds Radon Problem in 10-State Survey* (Aug. 4, 1987).

studies of miners and their exposure to radon gas. It also has been shown that smoking and radon exposure, in combination, is a deadly combination, with a multiplicative rather than additive effect.[26]

These findings were confirmed by a Swedish residential study published in the *New England Journal of Medicine* last year.[27] This study showed that radon exposure significantly raised lung cancer risks. The test subjects included 1,360 men and women with lung cancer, compared with 2,847 healthy persons. The conclusions of the study indicated that exposure to levels of radon from 3.8 pCi/L (pico curies per liter of air) to 10.8 pCi/L increased the risk of lung cancer by 30 per cent. People exposed to levels above 10.8 increased the risk to 80 percent. All subjects had lived in the homes since 1947.

Title IV of the Superfund Amendments and Reauthorization Act of 1986 (SARA) authorizes the EPA to conduct research and disseminate information about radon and other indoor air pollutants.[28] The Indoor Radon Abatement Act (Radon Act)[29] amends the Toxic Substances Control Act[30] and sets forth the long-term goal of establishing an indoor ambient air standard for radon that is the equivalent of outside air.[31]

The committee report on the Radon Act states that its goal of attaining safe radon levels in existing and new buildings "does not . . . create a legal cause of action for any building occupant, building purchaser, or member of the public against any building owners, real estate professionals, lenders, or builders."[32] Nonetheless, recognition of radon as a national problem enhances potential plaintiffs' chances of imputing constructive knowledge of radon hazards to building contractors.

Congress intended the Radon Act to educate the public about radon hazards and to provide technical and financial assistance to states developing their own radon programs.[33] The act authorizes the EPA to develop model construction techniques for diminishing radon levels in new construction. States and local governments will benefit from the EPA's actions by using the findings as a basis for their building codes.

Although radon testing and abatement is basically a voluntary program, it promises to have implications in the context of real estate transfers and legal liability. Federal and state legislation addresses the radon problem primarily in the residential rather than commercial context, because the higher radon gas rises in a structure the more it dissipates.[34]

In Illinois, the Residential Property Disclosure Act,[35] effective October 1, 1994, requires sellers to note their knowledge or lack thereof of the radon level (and other latent defects) in their houses. This requirement will likely put the buyer on notice that the radon level should be included in the home inspection and as part of the inspection contingency clause.

Some states have legislation to provide financial assistance to homeowners to abate indoor radon gas and to license and standardize the proficiency of contractors who measure and mitigate radon.[36] One way to do this is to adopt the EPA's listing program as part of the state licensing requirements. The listing program guarantees at least minimum proficiency in radon work. EPA has recently released model construction standards, which were developed in co-operation with industry practitioners, on which to base building codes and improve construction resistance to this insidious gas.

It is hoped these radon resistant construction standards will be adopted, at the very least, in areas with high radon potential. It must be remembered, however, that even in a low-risk geographic area, there will be homes with elevated radon levels.

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26. Smokers are 10 times more likely to die from lung cancer resulting from combined exposure to radon and tobacco smoke than non-smokers. *Cancer Risk from Radon Exposure Greater for Cigarette Smokers*, 18 Env't Rep. (BNA) 1997 (Jan. 8, 1988), reprinted in *Radon: The Invisible Menace* (BNA Plus information package).

27. G. Pershagen et al., *Residential Radon Exposure and Lung Cancer in Sweden*, 330 N. ENG. J. MED. 159 (Jan. 20, 1994).

28. 42 U.S.C. § 7401.

29. 15 U.S.C. §§ 2661-2671.

30. 15 U.S.C. §§ 2601-2692.

31. 15 U.S.C. § 2661.

32. H.R. REP. No. 1047, 102d Cong., 2d Sess. 11, reprinted in 1988 U.S. CODE CONG. & ADMIN. NEWS 3617.

33. 15 U.S.C. § 2665.

34. Steven A. Loewy, George W. Kelly & Martha D. Nathanson, *Indoor Pollution in Commercial Buildings: Legal Requirements and Emerging Trends*, 11 TEMP. ENVTL. L. & TECH. J. 239, 244 n.43 (1992) [hereinafter *Indoor Pollution*].

35. 765 ILCS 77/1-99.

36. *See, e.g.*, FLA. STAT. ANN. § 404.056(5)(b) (requiring anyone who receives money for radon testing to obtain license); N.J. STAT. ANN. § 13:1K-14 (providing state funding for radon testing).

Because they are in a good position to prevent radon contamination, construction contractors have been targeted as the most likely potential defendants in actions regarding indoor radon contamination. The increasing awareness of the hazards of radon exposure, the existence of construction safeguards that can eliminate the hazard, and the recent legislation concerning radon may work against contractors' claims that construction on uranium-bearing rocks is reasonable and hence not a breach of any duty.

For example, in *ABC Builders Inc. v. Phillips*[37] the Wyoming Supreme Court held that an experienced contractor with knowledge about the building site could be held liable for damage caused during a landslide. While contractors would not suffer regulatory sanction for failure to follow recommended construction guidelines for radon abatement, plaintiffs argue that those guidelines provide evidence of a contractor's duty and claimed negligence.

Assuming the establishment of a contractor's duty to protect against radon contamination, the plaintiff then faces the difficult task of proving that the breach proximately caused damages. Radon-induced cancer has an approximate 20-year latency period.[38] Nonetheless, a plaintiff might seek to recover based on emotional distress or future harm in the form of increased cancer risk, fear of cancer, future medical surveillance, and intentional infliction of emotional distress.[39]

Unless a court finds that the plaintiff manifests symptoms of disease, however, recovery for at-risk injuries is difficult.[40]

In jurisdictions that have recognized enhanced risk of injury claims, plaintiffs can recover only if there is a significant risk of future disease. The majority of jurisdictions that apply this damage theory requires that plaintiffs prove through statistical data that there is a "reasonable medical certainty" or that it is "more likely than not" that the plaintiff will endure future illness.[41]

Although some courts apply the enhanced risk of injury theory to ameliotrate the effects of statutes of limitations on the extended latency periods of radon and other exposure diseases, proving that future disease is "more likely than not" is an appropriately difficult standard to satisfy. In *Abuan v. General Electric Co.*[42] the federal district court dismissed claims by more than 1,000 former workers and family members alleging that a 1987 explosion at a U.S. Navy power plant exposed the employees to dangerous levels of PCBs and a significant risk of future harm. The court held that the plaintiffs had failed to present adequate expert evidence that they had been exposed to PCBs at levels capable of increasing the risk of future disease and stated that a plaintiff must support a claim of increased risk of future injury with evidence that the injury is probable and reasonably certain, not a mere possibility.

Similarly, in *Wehmeier v. UNR Industries Inc.*[43] the Illinois Appellate Court held that a trial court erred by allowing the plaintiff to present evidence of his increased risk of contracting cancer owing to asbestos exposure, because the evidence was merely speculative. As in *Abaun,* the plaintiff in *Wehmeier* failed to establish a reasonable medical certainty that he would contract cancer.[44]

The difficulty of proving that future injury is a reasonable medical certainty or more likely than not has led a few courts to impose a more lenient "reasonable probability" standard. In *Valori v. Johns-Manville Sales Corp.* a New Jersey federal district court held that the plaintiff claiming to suffer from asbestosis had satisfied the "reasonable probability" test and could present his case to the jury, even though the statistical evidence showed only that the plaintiff was a member of a class of which 43 percent would contract cancer. The

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37. 636 P.2d 925, 937 (Wyo. 1981).

38. Mary Rose Kornreich, *Minimizing Liability for Indoor Air Pollution*, 4 TUL. ENVTL. L.J. 61 (1990).

39. Note (Carolyn Marie Shuko), *Radon Gas: Contractor Liability for an Indoor Health Hazard*, 12 AM. J. L. & MED. 241, 251 (1986).

40. *See* Mink v. University of Chicago, 460 F.Supp. 713 (N.D. Ill. 1978) (in DES case, increased risk unaccompanied by tangible physical injury is not enough to support a claim for strict products liability).

41. Arvin Maskin & Peter A. Antonucci, *Overview and Update of Emerging Damage Theories in Toxic Tort Litigation*, C837 ALI-ABA 629, 650 (1993).

42. 1992 WL 535958 (D. Guam 1992), *aff'd*, 3 F.3d 329 (9th Cir. 1993), *cert. denied*, 114 S.Ct. 1064 (1994).

43. 572 N.E.2d 320 (Ill.App. 1991).

44. *See also* Sterling v. Velsicol Chem Corp., 855 F.2d 1188, 1204 (6th Cir. 1988) ("Where the basis for awarding damages is the potential susceptibility to future disease, the predicted future disease must be medically reasonable certain to follow."); Mauro v. Raymark Indus. Inc., 561 A.2d 257, 264 (N.J. 1989) ("plaintiff must prove that the prospective disease is at least reasonably probable to occur").

court rejected the defendants' arguments that the reasonable probability requirement should be interpreted as "more likely than not" (that is, greater than 50 percent):

> The threshold showing that the defendants would impose on plaintiffs is too burdensome given the modest purpose of the "reasonable probability" test. Indeed, the test is intended to maintain to a significant degree the jury's central role in assessing future damages, while culling out only those cases in which plaintiff is able to produce so little definitive proof to support his claims of future harm that any damage award would necessarily be based on vague speculation. In this court's view, that concern may be met by a proffer of statistics which contain the kind of precision exhibited by those presented here. Indeed, given the fact that Mr. Valori's risk is so well quantified, the jury's decision to award damages for his enhanced risk could hardly be called overly speculative.[45]

Alternatively, other courts instead have found the traditional injury requirement to be met by questionable de minimis claims of damage.

In *Brafford v. Susquehanna Corp.*[46] the plaintiff alleged that his home was permeated with radon emissions from uranium mill tailings underlying the house. The federal district court held that to recover under an enhanced cancer risk theory, the plaintiffs must have endured a definite physical injury.[47] Because the plaintiff's medical experts testified that radon exposure caused immediate cellular damage, a present physical injury, the court denied the defendant's summary judgment motion and held that recovery was possible.

An additional available theory of recovery for homebuyers is under the implied warranty of habitability, in which a home seller impliedly warrants that the home is fit for habitation. In *Nobel v. Kanze*[48] a homeowner sued a construction firm under an implied warranty theory for installing an air conditioning unit that allowed radon to leak into the home. The plaintiff spent approximately $100,000 to find the source of the problem and reduce the radon level, which was more than 14 times the EPA's maximum safety standard.

Fraud and misrepresentation actions also might be available if the seller knew of high radon concentrations, a latent dangerous defect, and failed to disclose it. In *Schnedd v. Gustafson*[49] the Colorado Court of Appeals held that a seller's failure to disclose that a home rested on uranium-bearing land provided the homebuyer with a colorable claim for fraud and deceit.

Legislation such as the Illinois act requiring disclosure of knowledge of radon levels will increase contractors' potential liability and enhance the likelihood that home purchasers are making informed choices.

Asbestos

Asbestos is known to be a potential hazard to all exposed to it. Sources of potential exposure to asbestos fibers, from asbestos containing friable materials, include materials sprayed or troweled onto ceilings, rafters, beams and other structural building parts for fireproofing, insulation, sound deadening or decoration or used as pipe and boiler insulation. Friable asbestos is dry asbestos that can be crumbled, pulverized or reduced to powder by hand pressure.

The risk of breathing asbestos is well known and has been regulated by federal law for many years. Airborne asbestos exposure increases the risk of lung cancer; asbestosis, a disease that gradually decreases the lungs' ability to transfer oxygen and carbon dioxide efficiently until the victim suffocates; and mesothelioma, a cancer of the chest and abdominal membrane.[50] Lung cancer is the risk most frequently associated with asbestos. Its risks are greatly exacerbated when the exposed

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45. 1985 WL 6074, slip op. (D. N.J. Dec. 11, 1985) (No. 82-2686).

46. 586 F.Supp. 14 (D. Colo. 1984). *See also* DePass v. United States, 721 F.2d 203 (7th Cir. 1983) (where physical injury has occurred, plaintiff may recover for possible decrease in life span even if evidence does not show probability of early death) (Posner, J., dissenting).

47. *See also* Anderson v. W. R. Grace & Co., 628 F.Supp. 1919 (D. Mass. 1986) (claim for increased risk of cancer cognizable only if related to current illness); *but see* Hagerty v. L & L Marine Servs. Inc., 788 F.2d 315 (5th Cir. 1986) (plaintiff may recover for serious mental distress arising from fear of developing cancer with or without present physical injury if fear is reasonable and causally related to defendant's negligence).

48. No. 83-05253 (Montgomery Co., Pa. C.C.P., Civ. Div. 1983), an unreported case discussed in Note (Rita M. Nichols), *Construction Contractors Confront the Indoor Radon Hazard: Homeowners' Private Causes of Action and a Federal Response with the Indoor Radon Abatement Bill*, 37 WASH. U. J. URB. & CONTEMP. L. 135, 161-67 and nn.129 and 130 (1990).

49. 38 P.2d 850 (Colo.App. 1981).

50. Office of Pesticides and Toxic Substances, U.S. EPA, *Guidance for Controlling Asbestos-Containing Materials in Buildings* 1-2 (1985).

person also smokes. These diseases, like many diseases associated with indoor contamination, have long latency periods, on an average of 20 to 40 years after exposure.[51]

There are five federal agencies that regulate asbestos.

- OSHA sets asbestos exposure limits for worker exposure on the job.[52]
- The Food and Drug Administration is responsible for preventing asbestos contamination in food, drugs and cosmetics.
- The Consumer Product Safety Commission regulates asbestos in consumer products such as dry-wall patching compounds, ceramic logs and clothing.[53]
- The Mine Safety and Health Administration regulates the mining and milling of asbestos.[54]
- The EPA regulates the use and disposal of toxic substances in air, water and land, and it directly and indirectly regulates asbestos under the Resource Conservation and Recovery Act (RCRA),[55] the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA),[56] the Toxic Substance Control Act (TSCA),[57] the Clean Air Act (CAA),[58] and the Asbestos Hazard Emergency Response Act (AHERA).[59]

The effects of cumulative exposure to asbestos have been established by hundreds of epidemiological studies. Through the National Emissions Standards for Hazardous Air Pollutants program (NESHAP) created under the CAA, the EPA regulates emissions from asbestos mills and various manufacturing and fabricating operations.[60] Because the NESHAP program was also intended to reduce asbestos emissions during building demolition and renovation projects, the EPA-promulgated standards impose the primary safety obligations regarding asbestos on commercial building owners.[61]

Asbestos litigation takes one of three forms: (1) claims of statutory violations, (2) claims of long-range injury and (3) claims of personal damage seeking diminution of property value, lost profits, and removal and clean-up costs. Plaintiffs claiming long-range injury could include employees of commercial landlords, contractors, and commercial building tenants and visitors.

Classes of exposed plaintiffs can be large. An asbestos worker may have a claim against product manufacturers for workplace exposure to asbestos dust; his family may present an environmental exposure claim for residential exposure to asbestos residue on the worker's clothing; building tenants exposed to airborne asbestos may have a claim against the contractor that removed asbestos.[62] CERCLA authorizes suits by injured parties to recover hazardous waste clean-up costs against current and former owners and operators, generators and transporters who release hazardous waste, including asbestos.[63]

Courts contending with asbestos litigation and other toxic torts have tended to treat the cases as both an application of traditional tort law and as a special type of litigation requiring special rules, principles and doctrines with respect to the difficult problems of causation, duty to warn, applicability of joint and several liability for exposure to numerous substances, and whether workers' knowledge of the hazards of exposure should limit their ability to obtain damages.[64]

These same issues of causation and of proof and limitation of damages will arise in other toxic tort litigation concerning indoor air quality and exposure in the workplace, although the class of potential plaintiffs will be limited to tenants and employees spending time in the affect buildings.

Building Sickness

A 1984 World Health Organization committee report suggested that up to 30 percent of

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51. Office of Public Affairs, U.S. EPA, *Asbestos Fact Book* 4-5 (1986).
52. 29 U.S.C. §§ 651-678. OSHA began to regulate asbestos in the work place in 1971. *See* Corrosion Proof Fittings v. EPA, 947 F.2d 1201, 1206 (5th Cir. 1991).
53. *See* 16 C.F.R. §§ 1304-05, 1500.14 (1994).
54. *See* 30 C.F.R. § 71.701 (1994).
55. 42 U.S.C. §§ 6901-6992.
56. 42 U.S.C. §§ 9601-9675.
57. 15 U.S.C. §§ 2601-2671.
58. 42 U.S.C. §§ 7401-7642.
59. 15 U.S.C. §§ 2641-2655. Under AHERA and EPA regulations administering that act, public and private elementary schools are required to inspect school buildings for friable asbestos. If friable asbestos is found, parents and school employees must be informed, and local education agencies must develop management and response plans. *See* 40 C.F.R. §§ 763.10 to .179 (1994).
60. 42 U.S.C. § 7604.
61. 42 U.S.C. § 7412.
62. *See* Robert F. Blomquist, *American Toxic Tort Law: An Historical Background*, 10 Pace Envtl. L. Rev. 85, 139-40 nn.280-81 (1992) [hereinafter Blomquist].
63. 42 U.S.C. § 9607.
64. *See* Blomquist, *supra* note 59, at 139-40.

new and remodeled buildings worldwide may be the subject of excessive complaints related to indoor air quality.[65] Building sickness can develop when a building is not operated or maintained as intended by its original design or prescribed operating procedures. Poor building design and unusual and unanticipated occupant activities also may create an air quality problem.

Building sickness is generally classified as (1) building-related illness, (2) sick building syndrome or (3) multiple chemical sensitivity.[66] Building-related illness symptoms include coughing, chest tightness, fever, chills, infection and muscle aches. The symptoms can be clinically defined and have identifiable causes. Symptoms of building-related illness can be serious, require prolonged recovery, and may not subside even after the afflicted person leaves the building. Other factors such as acute sensitivities like allergies, job related stress, or dissatisfaction must also be considered when defending such a claim.

Sick building syndrome (SBS) is indicated where a large percentage of a building's occupants have adverse reactions as a result of exposure to any number of indoor air pollutants, without singling out any specific pollutant. SBS indications include headache; eye, nose, or throat irritation; dry cough; dry or itchy skin; dizziness and nausea; difficulty in concentrating; fatigue; and sensitivity to odors. SBS victims of SBS differ form those suffering from building-related illness in that SBS symptoms appear when the occupants enter the building and dissipate when they leave.[67]

While it is difficult to identify a single cause of SBS, the EPA has set forth contributing factors, such as inadequate ventilation, poor lighting, chemical contaminants from indoor sources, chemical contaminants from outdoor sources and biological contaminants; poorly designed, maintained or operated HVACs; and misuse of the building.[68]

Officials of DuPage County, Illinois, and persons who worked in a new courthouse constructed in 1991 claimed the structure was a prime example of a sickness-inducing building. One year after it was opened, the building was shut down when 400 of 700 employees exhibited SBS symptoms, which county authorities attributed to a poorly designed HVAC system and use of construction materials that emitted toxins. The county sued the architect and builders seeking recovery of $5.5 million spent to overhaul the HVAC system and to pay employees' medical bills. County employees filed suit against the same defendants seeking compensatory and punitive damages.[69]

The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) has revised its ventilation standards to provide a minimum of 20 cubic feet per minute of outdoor air per person to reduce the possibility of SBS.[70] Smoking areas require a much higher air exchange rate. Indoor chemical contaminants can emanate from adhesives, carpeting, upholstery, manufactured wood products, copying machines, and pesticides and cleaning agents, among other things. These indoor factors emit volatile organic compounds (VOCs), including formaldehyde. Environmental tobacco smoke contributes high levels of VOCs, other toxic compounds and respirable particulate matter.

Research indicates some VOCs cause chronic and acute health effects and some are known carcinogens. Combustion products such as carbon monoxide, nitrogen dioxide, as well as respirable particles, can come from unvented kerosene and gas space heaters, woodstoves, fireplaces and gas stoves.[71]

Chemical contaminants also can cause SBS when they enter a building from outside. Sources include motor vehicle exhaust, plumbing vents and exhausts from other buildings that enter through poorly located air intake vents, windows, garage entrances and other openings. Biological contaminants that may induce SBS or building-related illness include mold, pollen and viruses. Biological agents may breed in stagnant water that has accumulated in ducts, humidifiers and drain pans, or where water has collected on ceiling tiles, car-

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65. Office of Air and Radiation, U.S. EPA and U.S. Consumer Product Safety Comm's, *The Inside Story: A Guide to Indoor Air Quality* 27 (1988) [hereinafter *Inside Story*].

66. Marian C. Marbury & James E. Woods, in HEALTH PERSPECTIVE, *supra* note 3, at 307-08.

67. *EPA Report, supra* note 4, at 3-10.

68. *Inside Story, supra* note 62, at 4.

69 Andrew Martin & Art Barnum, *Judge Ends Lawyer Hangup in Suit Against County Courthouse Designer*, CHI. TRIB., July 22, 1994, at 2.

70. *See Indoor Pollution, supra* note 31, at 246.

71. John B. Spengler, in HEALTH PERSPECTIVE, *supra* note 3, at 48.

peting or insulation.[72] Insect or bird droppings also can be a source of biological indoor contaminants.

Symptoms related to biological pollution include coughing, chest tightness, fever, chills, muscle aches and allergic responses of the mucous membranes. One outdoor bacterium, *Legionella*, has caused both legionnaire's disease and Pontiac fever.[73]

Science has allowed for the discovery of these contaminants and their effect on human occupants. As in other types of indoor air pollution, an increased awareness of causes raises the issue of the duty the landowners, employers and managers owe to visitors or occupants of the property. Good building maintenance, which can avert building sickness, should include consideration of several factors.

Pollution source removal or modification is an effective way to resolve an indoor air quality problem. Building owners should routinely maintain HVAC systems; replace water-stained ceiling tile and carpeting; institute smoking restrictions; vent contaminant source emissions to the outdoors; store and use paints, adhesives solvents and pesticides in well-ventilated area; and allow building materials in new or remodeled area to "off-gas" pollutants before occupancy. Building managers should retain personnel trained in the area of indoor air quality.

Increasing ventilation rates can be a cost-effective means of reducing indoor pollutant levels. At a minimum, HVAC systems should be designed to meet ventilation standards in local building codes. These codes most likely will have adapted the ASHRAE standards. Under ASHRAE Standard 62-1989, office space ventilation should supply 20 cubic feet per minute of fresh air per occupant, with some variations depending on the types of occupants and furnishings. Indoor air quality can be improved by operating the HVAC system to at least its design standard, and to ASHRAE 62-1989, if possible, to assure that industry standards for fresh air ventilation are met.

Combustion appliances also contribute to concerns regarding indoor air pollution.[74] Under certain conditions, these appliances can produce combustion pollutants that can damage health or even cause death. Combustion pollutants are gases or particles that come from burning materials. Common fuels burned in appliances are natural gas, fuel oil, kerosene, wood or coal. The types and amounts of pollutants produced depends on the type of appliance, the installation, the maintenance, and ventilation. Common pollutants from these fuels include carbon monoxide, nitrogen dioxide, aldehydes, particulates, and sulphur oxides. Proper selection, installation, inspection and maintenance of HVAC systems are crucial for reducing exposure to combustion pollutants.

Pesticides are also known to cause building sickness. Pesticides are regulated, in part, by the Toxic Substances Control Act,[75] as well as by state and local legislation. The EPA is encouraging use of what is being called integrated pest management (IPM), a system that may be an alternative to scheduled spraying of pesticides.[76] IPM programs use current, comprehensive information on the life cycles of pests and their interactions with the environment. This approach minimizes use of dangerous substances, thereby lessening the environmental threat.

In the context of standard of care, spraying heavy doses of toxic pesticides as the first attack on pests may not be the best approach. It may not even be the alternative with the lowest cost.[77]

The third category of persons suffering from building-related illness are those with multiple sensitivity to chemicals in the environment at levels that would not affect the average individual. Scientists dispute both the existence and the etiology of this unpredictable syndrome, so it would be difficult to premise liability on its sudden appearance.[78]

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72. *Id.* at 58.
73. *See* Andrew J. Harrison Jr., *An Analysis of the Health Effects, Economic Consequences and Legal Implications of Human Exposure to Indoor Air Pollutants*, 37 S.D. L. REV. 289, 318 (1992).
74. *Inside Story, supra* note 62, at 14, 17.
75. 15 U.S.C. § 2601.
76. *See* Donald T. Hornstein, *Lessons from Federal Pesticide Regulation on the Paradigms and Politics of Environmental Law Reform*, 10 YALE J. ON REGUL. 369, 401 (1993) (citing EPA Relative Risk Reduction Strategies Comm'n, Science Advisory Board, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* 22 (1990).
77. *See* A. Dan Tarlock, *Legal Aspects of Integrated Pest Management*, in PEST CONTROL: CULTURAL AND ENVIRONMENTAL ASPECTS 217, 232 (David Pimentel & John H. Perkins eds. 1980).
78. *EPA Report, supra* note 4, at 3-11.

Conclusion

Common indoor environmental health threats can be reduced or eliminated only by anticipating the risks and using state of the art techniques of indoor air quality management to minimize the hazards. Recent awareness of the causes of illness and long latency periods relating to building sickness and radon exposure, coupled with the development of case law in asbestos litigation and other toxic torts, as well as legislation setting forth minimal standards of care, should alert defense counsel and their clients to an awareness of how courts and juries will perceive their duties in the future.