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Unseen Dangers in the Work Place: Protecting Workers from the Threat of Naturally-Occurring Toxic and Lethal Substances

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Approximately 139,880,000 Americans leave their homes to go to work[1] an average of eight hours each day, five days a week, fifty weeks per year.[2] While reports often suggest that the most common place for individuals to be injured is in their homes, hazards in the work place pose serious threats to working Americans. The Occupational Safety and Health Administration ("OSHA") estimates that on average, seventeen workers die each day on their jobs.[3] In 1996 alone, a total of 6.2 million injuries and illnesses in the work place were reported to the United States Department of Labor.[4] Even Mother Nature may be wreaking havoc in the work place in the form of unseen, naturally-occurring toxic and lethal substances, such as radon and *Legionella pneumophila.*

This comment focuses on the liability of employers for naturally-occurring toxic and lethal substances, such as radon and *Legionella.* Part I briefly sets out the history and purposes of legislation and regulations designed to protect workers from on-the-job hazards, focusing specifically on the development of

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1. *See* United States Dept. of Labor, Bureau of Labor Statistics, April 2000, (visited May 17, 2000) <http://stats.bls.gov/news.release/empsit.nr0.htm>.

2. *See* Richard Belzer, *The Peril and Promise of Risk Assessment*, 14 REG. 40, 45 (1991) (noting this is the standard used by OSHA in determining exposure to hazardous materials). *See also* U.S. Dept. of Labor, Bureau of Labor Statistics, *supra* note 1 (based on the most recent Dept. of Labor statistics, the average worker only works 34.6 hours per week).

3. *See* U.S. Dept. of Labor, Occupational Safety and Health Administration, *National Census of Fatal Occupational Injuries, 1996*, (visited May 17, 2000) <http://www.osha.gov:80/oshstats/cfoi.nws.html>

4. *See* U.S. Dept. of Labor, Bureau of Labor Statistics, *Workplace Injuries and Illnesses in 1997*, (visited on May 17, 2000) <http://www.osha.gov/oshstats /bls/osnr0007.pdf>. Research suggests that the number of cases of occupational diseases may be underreported because of: (1) the slow onset of symptoms for some diseases; (2) the difficulties of ascertaining the cause of the disease; and (3) the lack of recognition by workers that legal remedies exist for occupational diseases.

workers' compensation and occupational safety and health standards. Part II defines "naturally-occurring toxic or lethal substances" and proceeds to examine the specific problems of radon and *Legionella*. Part III analyzes the current remedies for work place injuries or diseases and argues that these remedies are not sufficient to compensate employees for life-threatening and life-ending diseases and injuries. The comment concludes with a discussion of alternative remedies for workers who sustain occupational diseases from naturally-occurring toxic or lethal substances, as well as suggestions for national and state reforms that would promote worker safety.

I. History of Legislation and Regulations Protecting Workers

Making employers liable for the injuries suffered by their employees in the work place was one of the major themes of the progressive movement in the early part of the twentieth century.[5] As the nation continued the process of industrialization, the number of workers injured each year accelerated rapidly.[6] Litigation associated with employee injuries increased;[7] however, employees were seldom able to recover damages due to numerous common law defenses that protected employers from liability.[8] The national and state governments undertook the task of drafting new legislation that would protect workers' safety and promote the development of new industries.

A. State Efforts

States adopted workers' compensation statutes to guarantee injured employees a means to recover not only medical costs, but

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5. *See* W. PAGE KEETON ET AL., PROSSER AND KEETON ON TORTS § 80 at 569 (5th ed. 1984). (noting that the Progressive Movement was seeking to codify the existing common law principle that employers have a duty to their employees to provide safe working conditions). *See also* Ross v. Walker, 21 A. 157, 158 (Pa. 1891) (supporting the proposition that in Pennsylvania, an employer has a common law duty to provide safe working conditions ("It is the duty of an employer to provide his laborers with a suitable place to work, with suitable tools and machinery to use, with suitable materials, and with reasonably competent fellow laborers with whom to work.")).

6. *See* LAWRENCE WHITE, HUMAN DEBRIS 63 (1983) (citing the period from 1903 to 1907 as having the highest industrial-accident rate in the nation's history).

7. *See* NICHOLAS ASKOUNES ASHFORD, CRISIS IN THE WORK PLACE: OCCUPATIONAL DISEASE AND INJURY: A REPORT TO THE FORD FOUNDATION 48 (1976).

8. *See* WHITE, *supra* note 6, at 64 (citing three common defenses for employers: the fellow-servant doctrine; assumption of the risk; and contributory negligence).

also income benefits.[9] However, state legislatures recognized the need to protect employers from further litigation and included language in the statutes making workers' compensation the "exclusive remedy" for injured employees.[10]

Pennsylvania enacted its Workmen's Compensation Act[11] in 1915 to define the liability for accidental injuries to an employee in the course of employment.[12] Over time, Pennsylvania courts have stated that the purposes of the Workers' Compensation statute is: to provide benefits to employees who suffer work-related injuries resulting in a loss of earnings;[13] to substitute as a method of accident insurance;[14] and to establish an independent means of providing compensation to an injured employee without resorting to litigation.[15] As the statute is interpreted in Pennsylvania today, the Workers' Compensation Act provides the exclusive means for recovery for an employee.[16] Employers are immune from lawsuits not only for their negligence, but also for intentional torts that may result in injury to their employees.[17]

While workers' compensation statutes addressed work place injuries,[18] employees were also being exposed to harmful chemicals

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9. *See* CARL GERSUNY, WORK HAZARDS AND INDUSTRIAL CONFLICT 54 (1981) (noting that by 1948, every state had adopted a workers' compensation statute).

10. *See* Joseph H. King, Jr., *The Exclusiveness of an Employee's Workers' Compensation Remedy Against His Employer*, 55 TENN. L. REV. 405, 407-408 (1988).

11. The Workers' Compensation Act, Act of June 2, 1915, Pub. L. 736, No. 338.

12. *See* PENNSYLVANIA BAR INSTITUTE, FUNDAMENTALS OF WORKERS' COMPENSATION 3 (1995). Substantial revisions of Pennsylvania's Workers' Compensation Act occurred in 1972 and 1993. The complete text of the Worker's Compensation Act is found at PA. STAT. ANN. tit. 77, §§ 1 - 1031 (1998). In the event that an employer does not provide workers' compensation coverage, an employee can elect to sue under tort or under the Workers' Compensation Act. When occupational diseases were not covered under a statute in Pennsylvania, workers were permitted to proceed against their employer for negligence. *See* Boal v. Electric Storage Battery Co., 98 F.2d 815 (3d Cir. 1938) (permitting an employee who had contracted cancer from exposure to sulfuric acid to sue his employer because occupational diseases were not expressly covered under the Workmen's Compensation Act).

13. *See* U.S. Steel Corp. v. Workmen's Compensation Appeal Bd., 437 A.2d 92 (Pa. Commw. 1981).

14. *See* Vescio v. Pa. Elec. Co., 9 A.2d 546 (Pa. 1940).

15. *See* Turner v. Southeastern Pa. Transp. Authority, 389 A.2d 591 (Pa. Super. 1978).

16. *See* PA. STAT. ANN. tit. 77, § 481 (1998). *See also* Hartwell v. Allied Chemical Corp., 320 F. Supp. 75 (D.C. 1970). *See also* PENNSYLVANIA BAR INSTITUTE, *supra* note 12.

17. *See id.*

18. *See* GERSUNY, *supra* note 9, at 24. Injuries typically were caused by: the

and biohazards while on the job.[19] Occupational diseases that resulted from exposure to these substances were not covered under early workers' compensation statutes.[20]

Occupational diseases posed greater problems for policy makers. First, the symptoms of occupational diseases do not manifest themselves rapidly.[21] An employee exposed to a carcinogen in the work place may not detect a cancerous growth until several years have passed. In the worst case scenario for the worker, he may no longer be employed where he contracted the disease. Second, occupational diseases are often compounded by factors not associated with the work place.[22] For example, a worker who has been exposed to asbestos[23] while on the job may contract lung cancer. However, if the worker has also smoked cigarettes for the last ten years, the exposure to asbestos may be exacerbated by the fact that the worker was a smoker.

States gradually adopted occupational disease statutes to address claims by impaired workers. Pennsylvania enacted its occupational disease statute in 1939.[24] Today, occupational diseases are covered not only under the 1939 act, but also under the Workers' Compensation Act.[25]

State efforts were not the only attempts to promote the maintenance of safe working environments; the national government also worked to protect employees' safety and health.

B. National Efforts

At the turn of the century, Congress enacted protective legislation again in response to the progressive movement.[26] These early efforts were limited in scope and sought to provide injured

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misuse or malfunction of machinery or tools; accidents in the transportation of raw materials or finished goods; and falls. In one study of a textile mill in Massachusetts, eighty-one percent of all injuries were attributed to these three causes.

19. *See* ASHFORD, *supra* note 7, at 73. (noting there are four general sources of occupational health hazards: physical conditions; chemical agents; biological substances; and stress).

20. *See* WHITE, *supra* note 6, at 44.

21. *See* ASHFORD, *supra* note 7, at 72.

22. *See id.*

23. *See* WHITE, *supra* note 6, at 46. (noting that asbestos has been proven to cause cancer of the lungs and mesothelioma, as well as asbestosis, a non-cancerous lung disease).

24. Pennsylvania Occupational Disease Act, Pub. L. 566, No. 284 (1939).

25. *See* PA. STAT. ANN. tit. 77, § 27.1(n) (1998).

26. *See, e.g.,* the Federal Employers' Liability Act of 1908, Pub. L. No. 60-100, 35 Stat. 65 (codified as amended at 45 U.S.C. §§ 51 – 60 (1998)).

workers remedies and not to prevent future accidents or diseases.[27] The national government did not return to the issue of occupational health and safety until the 1960s.[28] Two major pieces of legislation, the Federal Coal Mine Health and Safety Act of 1969[29] and the Occupational Safety and Health Act of 1970[30] renewed the national government's involvement in the arena of protecting workers.

The Occupational Safety and Health Act of 1970[31] was designed to insure that American workers had safe and healthful working conditions. Because of the inadequacy of economic incentives to encourage employers to protect the safety and health of their workers, Congress created a regulatory agency to monitor the working conditions of Americans.[32] The Occupational Safety and Health Administration was designed to be proactive and prevent employee injury and illness, rather than respond to complaints against employers.[33]

While regulations and governmental structures to respond to injuries and occupational diseases have been in place for at least three decades, protection of workers from injury and illness still is not guaranteed. New threats from naturally-occurring toxic and lethal substances are emerging that raise issues of the adequacy of existing remedies for workers.

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27. *See* ASHFORD, *supra* note 6, at 51 (noting that efforts by Congress were directed to the protection of federal workers or workers in hazardous occupations, such as mining and railroading).

28. *See id.*

29. *See* Federal Coal Mine Health and Safety Act of 1969, Pub. L. 91-173, 83 STAT. 742 (codified as amended at 30 U.S.C. §§ 801 – 960 (1998)). Due to its limited scope, this paper will not address the provisions of the Federal Coal Mine Health and Safety Act.

30. *See* Occupational Safety and Health Act of 1970, Pub. L. 91-596, 84 STAT. 1590 (codified at 29 U.S.C.S. §§ 651 – 678 (1998)).

31. *See id.*

32. *See* Ralph Nader, *Occupational Safety and Health: Policy Options and Political Reality*, 31 HOUS. L. REV. 1, 19 (1994).

33. *See id.* The legislative history of the Occupational Safety and Health Act clearly shows that Congress did not intend to prevent states from enacting further protections for workers. *See also* Independent Sch. Dist. No. 197 v. W.R. Grace & Co., 752 F. Supp. 286, 306 (D. Minn. 1990). "Nothing in this act shall prevent any state agency or court from asserting jurisdiction under state law over any occupational safety or health issue with respect to which no standard is in effect under 29 U.S.C. § 655."

II. Naturally-Occurring Toxic and Lethal Substances

A. Definition

The Environmental Protection Agency ("EPA") used the term "naturally occurring" in drafting inventory-reporting requirements, but the agency failed to define the concept.[34] It actually may be a simpler task to define a "naturally-occurring substance" by stating what it is not. First, synthetic substances are not natural. Synthetic materials are produced artificially by humans. The Organic Food Production Act ("OFPA")[35] defines a "synthetic substance" as "a substance that is formulated or manufactured by a chemical process or by a process that chemically changes a substance extracted from a naturally occurring plant, animal, or mineral sources, except that such term shall not apply to substances created by naturally occurring biological processes.[36] The OFPA provides no definition of the word "natural;"[37] its intrinsic meaning, therefore, is that "naturally occurring substances" are not synthetic.

Intertwined with the problem of defining "naturally occurring substances" is the principal concern with substances that are hazardous, toxic, or lethal. The Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA")[38] defines the term "hazardous substance" as "any element, compound, mixture, solution, or substance designated by the EPA as presenting substantial danger to the public health or welfare or the environment when released to the environment."[39]

Merging these two definitions from federal statutes, a "naturally-occurring toxic or lethal substance" can be defined as an element or a substance created by naturally occurring biological or geological process that presents a substantial danger to the public health or welfare. Two substances that fall within this definition are radon and *Legionella pneumophila.* Each substance warrants examination of its health risks to American workers.

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34. *See* Toxic Substances Control Act, Inventory Reporting Regulations, 40 C.F.R. § 710.4(b) (1998).
35. *See* Organic Food Production Act, 7 U.S.C.S. §§ 6501 - 6522 (1998).
36. *See* 7 U.S.C.S. § 6517 (1998).
37. *See id. See also*, National Organic Program, 62 Fed. Reg. 65850 (1997).
38. *See* Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C.S. §§ 9601 – 9675 (1998).
39. *See* 42 U.S.C.S. § 9601(14)(b) (1998).

B. *Radon*

Radon is a naturally-occurring gas that is the byproduct of uranium decay.[40] Radon seeps through the soil and enters buildings through small fissures in bricks and concrete.[41] When radon enters an enclosed structure, such as a commercial office building with a sealed heating, ventilation, and air conditioning ("HVAC") system, it becomes trapped and levels rapidly increase.[42]

Radon has been classified as a Class A carcinogen.[43] Radon is the second leading cause of lung cancer in the United States according to the EPA.[44] The EPA estimates that 20,000 people die each year from lung cancer that developed due to exposure to high levels of radon.[45]

While radon contamination may be national in scope, it is of particular concern in Pennsylvania, which is known to have one of the highest concentrations of radon in the United States.[46] While radon in homes has been a principal concern of policy makers,[47] OSHA estimates that over 21 million Americans work in buildings that are polluted by radon and other airborne carcinogens.[48]

C. *Legionnaire's Disease*[49]

Celebrating the 200th anniversary of the United States' independence from Great Britain, the American Legion gathered

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40. *See* Stephen F. Conaway, *Grappling With Silent Invaders Of The Home: Legal Remedies For Radon Gas Contamination*, 5 TEMP. ENVTL. L. & TECH. J. 36 (1986).

41. *See id.* at 37.

42. *See id. See also*, John Tiffany, *Indoor Air Quality Issues; Recognizing and Treating Sick Buildings: Prevention is Key*, 14 ENVIRONMENTAL COMPLIANCE & LITIGATION 5 (1998).

43. *See* Susan M. Green, *Radon Transforms Dream Home Into A Long Nightmare*, THE TAMPA TRIBUNE, July 25, 1998. Class A carcinogens are known to cause cancer in humans. The scientific data linking Class A carcinogens to cancer are widely accepted and not viewed as skeptical.

44. *See id.*

45. *See* Mark Diamond, *Revised Standards; Rules Define Duties Of Those Responsible for Air Quality*, NEW YORK L.J., June 12, 1996, p. 5.

46. *See* Conaway, *supra* note 40, at 36.

47. *See* discussion *infra* Part II.D.

48. *See id.* (citing 29 C.F.R. §§ 1910, 1915, 1926, 1928 (1998)). *See also* Lillian Weis, *Dispatch Office Air 'Sick,' But What Ails?; Pinpointing Cause Difficult, Experts Say*, THE PALM BEACH POST, August 3, 1998 (noting that the EPA estimates that people spend as much as ninety percent of their time indoors, increasing their chance of exposure to harmful indoor air contaminants.

49. Legionnaire's disease is the popularly adopted term for *Legionella pneumonia*. The terms "Legionnaire's disease," "*Legionella*," and "*Legionellis*" are used interchangeably in the medical and legal literature.

for their annual convention in the birthplace of the Declaration of Independence, Philadelphia.[50] Legionnaires, as the members of the organization were commonly called, established their base of operations in the Bellevue-Stratford Hotel in the heart of the city.[51] Convention goers mingled and joined in the festivities in hospitality suites throughout the hotel. The party ended abruptly as numerous legionnaires began complaining of fever and muscle aches.[52] Several had to be hospitalized with the rapid onset of pneumonia.[53] As the event unfolded, one hundred eighty-two persons were infected with an unknown agent and twenty-nine died.[54]

After the outbreak at the Bellevue-Stratford Hotel, the Centers for Disease Control ("CDC") discovered that a bacterium, *Legionella pneumophila*,[55] infected the legionnaires and caused a previously unknown type of pneumonia. The bacteria apparently had thrived in the scum lining the cooling tower of the hotel's air-conditioning system.[56]

Since its discovery, scientists have determined that *Legionella* requires particular environmental conditions to thrive, specifically vitamins and minerals, particularly iron, in order to thrive.[57] By 1978, researchers had uncovered naturally-occurring *Legionella* in soil, ponds, slow-moving creeks, polluted and silty water, and mud.[58] Since that time, *Legionella* also has been discovered in cooling towers, water-driven condensers, steam turbines, fountains, and grocery store vegetable counter misters.[59] *Legionella* can also lurk in hot tubs, shower heads and humidifiers.[60]

Given that *Legionella* attacks the lungs, it is most dangerous to cigarette smokers, people recovering from surgery,[61] and individuals

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50. *See* LAURIE GARRETT, THE COMING PLAGUE: NEWLY EMERGING DISEASES IN A WORLD OUT OF BALANCE, 171-191 (1994).

51. *See id.* at 172.

52. *See id.*

53. *Id.*

54. *See* MICHAEL J. PELCZAR, ET AL., MICROBIOLOGY: CONCEPTS AND APPLICATIONS, 657 (1993).

55. *See id.* at 658. In addition to causing Legionnaire's Disease, *Legionella pneumophila* can cause Pontiac fever, named for an outbreak in Pontiac, Michigan. Pontiac fever is a nonfatal disease, characterized by the same symptoms as Legionnaire's Disease.

56. *See* GARRETT, *supra* note 50, at 190.

57. *See id.* at 189.

58. *See* PELCZAR, ET AL., *supra* note 54, at 658.

59. *See* GARRETT, *supra* note 50, at 189.

60. *See id.* at 190. *See also*, Charles W. Henderson, *Legionellosis Aspect of Legionnaires' Disease Reviewed*, HEALTH LETTER ON THE CDC, July 27, 1998.

61. *See* Henry N. Williams, et al., *Molecular techniques reveal high prevalence of Legionella in dental units*, 127 JOURNAL OF THE AMERICAN DENTAL

who have weakened immune systems.[62] The EPA reports that untreated *Legionella* has a fifteen percent mortality rate in the United States.[63]

The CDC tracks the number of *Legionella* cases each year. In 1997, the CDC reported 776 cases of legionellosis throughout the United States.[64] Through October 1998, the number of cases of Legionnaire's Disease reported by the CDC has increased to 939.[65] In Pennsylvania, reported cases of *Legionella* have increased thirty percent from 1997 through October 1998.[66]

While *Legionella* is not transmitted from person to person as some other infectious diseases are,[67] the threat from the *Legionella* has increased as it is temperature and antibiotic resistant.[68] The threat of death from Legionella is more serious now than ever before. Estimates of 2,000 to 6,000 deaths in the United States from *Legionella* since the advent of air-conditioning systems and indoor plumbing will pale in comparison to the number of actual deaths attributed to *Legionella* in the future unless the government takes action.[69]

D. Responding to the Threat Posed by Radon and Legionella

While radon and *Legionella* appear to pose significant health risks to American workers, little effort has been undertaken to protect workers from their effects. State and national efforts have largely been directed to addressing crises surrounding each of the substances.

The radon crisis drew national attention in the 1970s as several studies reported that radon inside homes was responsible for 5,000

ASSOCIATION 1188 (1996). The presence of *Legionella* has become a significant concern to health care professionals. Studies have traced the bacteria not only to hospitals, but also to dental offices.

62. *See* GARRETT, *supra* note 50, at 190.

63. *See* Announcement of the Draft Drinking Water Contaminant Candidate List, 62 Fed. Reg. 52194 (1997).

64. *See* Morbidity and Mortality Weekly Report (visited Jan. 21, 1999) <http://158.111.4.28/scripts/pbisa60.dll/MMWR>.

65. *See id.*

66. *See* Morbidity and Mortality Weekly Report, *supra* note 64. One hundred twelve cases of *Legionella* were reported in Pennsylvania in 1997. In 1998, CDC data showed 155 cases of *Legionnella* in the Commonwealth.

67. *See* Announcement of Draft Drinking Water Contaminant Candidate List, 62 Fed. Reg. 52194, 52200 (1997), citing Yu, et al., 1983. Tuberculosis is an example of an airborne infectious disease that can be transmitted by person-to-person contact. Direct person-to-person spread of Legionnaire's Disease has not been documented.

68. *See* GARRETT, *supra* note 50, at 190.

69. *See id.* at 191.

to 30,000 deaths from lung cancer annually.[70] In an attempt to address the problems associated with radon, Congress enacted the Indoor Radon Abatement Act ("IRAA") in 1976.[71] While IRAA provided for assistance to the states for programs to assess and mitigate radon levels, the legislation did little to promote an overall program to assist employees exposed to radon.[72]

Pennsylvania acted promptly in dealing with the problems associated with residential radon. In October 1985, the Pennsylvania Housing Finance Authority adopted a program to provide low-interest loans for middle-income families to abate levels of radon in their homes.[73] Homeowners in the Commonwealth also resorted to litigation to recover damages from contractors in the radon cases.[74]

The history of governmental attention to the threat posed by *Legionella* can be characterized also as crisis intervention. For example, following the outbreak at the 1976 American Legion Convention in Philadelphia, new standards for the maintenance HVAC systems was implemented. More recently, the outbreak of Legionnaires' disease on a cruise ship in 1994 prompted a series of public meetings to discuss strategies for dealing with *Legionella.*[75]

The national and state government's lack of response to threats to workers' health from naturally-occurring toxic and lethal substances may stem from inadequate legislative and regulatory authority or it may stem from ignorance about the scope of the danger.

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70. *See* Conaway, *supra* note 40, at 36-37.

71. *See* Indoor Radon Abatement Act of 1976, Pub. L. 94-469 (codified at 15 U.S.C.S. §§ 2661 – 2671 (1998)).

72. *See id. See also* 20 U.S.C.S. § 1003 note (1998) (noting that in addition to IRAA, Congress incorporated provisions for institutions of higher education to assess the extent of radon gas exposure to students and employees in their facilities).

73. *See* Conaway, *supra* note 40, at 38.

74. *See id.* Homeowners proceeded under three distinct legal theories in the radon cases: negligence; implied warranty of habitability; and product liability.

75. *See* Board of Scientific Counselors, National Institute for Occupational Safety and Health: Meeting, 59 Fed. Reg. 48330 (1994) (calling for a public meeting sponsored by the National Center for Environmental Health (NCEH) and the National Center for Infection Diseases of the CDC on the recent Legionnaires' disease outbreak from a hot tub on a cruise ship).

III. The Inability of Existing Regulatory and Protective Legislation to Address the Health Hazards Posed by Naturally-Occurring Toxic and Lethal Substances

A. State Protective Efforts

The Pennsylvania Workers' Compensation Act establishes its scope by enumerating definitions of employees,[76] employers,[77] benefits,[78] and most importantly, injury[79] and occupational disease.[80]

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76. *See* PA. STAT. ANN. tit. 77, § 22 (1998) (defining employe as "[a]ll natural persons who perform services for another for a valuable consideration, exclusive of persons whose employment is casual in character and not in the regular course of the business of the employer, and exclusive of persons to whom articles or materials are given out to be made up, cleaned, washed, altered, ornamented, finished or repaired, or adapted for sale in the worker's own home, or on other premises, not under the control or management of the employer. Every executive officer of a corporation elected or appointed in accordance with the charter and by-laws of the corporation, except elected officers of the Commonwealth or any of its political subdivisions, shall be an employe of the corporation except as hereinafter provided in sections 302(c), 305 and 321.")

77. PA. STAT. ANN. tit. 77, § 21 (1998) (defining employer as "[a person] synonymous with master, and to include natural persons, partnerships, joint-stock companies, corporations for profit, corporations not for profit, municipal corporations, the Commonwealth, and all governmental agencies created by it.")

78. *See* 1996-97 PENNSYLVANIA BUREAU OF WORKERS' COMPENSATION ANN REP. 3. The Pennsylvania Workers' Compensation Act provides five types of benefits to injured employees: replacement of lost wages; payment of medical expenses; payment for specific losses (such as the use of limbs); disfigurement benefits; and death benefits.

79. *See* PA. STAT. ANN. tit. 77, § 411 (1998) (defining injury as "an injury to an employee, regardless of his previous physical condition, arising in the course of his employment and related thereto, and such disease and infection as naturally results from the injury or is aggravated, reactivated, or accelerated by the injury; and wherever death is mentioned as a cause for compensation under this Act, it shall mean only death resulting from such injury and its resultant effects and occurring within 300 weeks after the injury.")

80. *See* PA. STAT. ANN. tit. 77, § 27.1 (1998). Occupational disease for purposes of the Pennsylvania Workers' Compensation Act includes a lengthy list of illnesses such as: poisoning by chemical compounds; Caisson disease (compressed air illness); radium poisoning or disability; epitheliomatous cancer or ulceration (from tar, pitch, bitumen, mineral oil, or paraffin); infection or inflammation of the skin (due to oils, cutting compounds, lubricants, dust, liquids, fumes, gasses, or vapor); anthrax; silicosis; asbestosis; and tuberculosis, serum hepatitis, or infectious hepatitis. Furthermore, the statute protects workers from "[a]ll other diseases (1) to which the claimant is exposed by reason of his employment, and (2) which are causally related to the industry or occupation, and (3) the incidence of which is substantially greater in that industry or occupation than in the general population." PA. STAT. ANN. tit. 77, § 27.1(n) (1998). In addition to the Workers' Compensation Act, the Pennsylvania Occupational Disease Act, Act of June 21, 1939 (P.L. 566, No. 284), provides protection to workers who contract occupational diseases.

The Pennsylvania Supreme Court is one of the few state supreme courts which has actually defined the term "compensable injury." In a workers' compensation case, the Pennsylvania Supreme Court defined compensable injury as any adverse or hurtful change in the system which would cause lessened facility of the natural use of any bodily activity, or capacity.[81]

Additionally, the Pennsylvania Supreme Court has stated the requirements for a worker to prevail on an occupational disease claim under Section 108(n) of the Worker's Compensation Act.[82] "To prevail on an occupational disease claim. . .the claimant must prove that (1) he was exposed to the disease by reason of his employment; (2) the disease is causally related to that employment; and (3) the incidence of the disease is substantially greater in that industry or occupation than in the general population."[83]

While compensation for work place injuries may seem to be a desirable public policy, there is growing recognition that current workers' compensation statutes suffer from significant problems.[84] These problems are evident in dealing with naturally-occurring toxic or lethal substances.

Pennsylvania's scheme for compensating injured employees poses two specific concerns: inadequate compensation for the death of the employee and the inability to address diseases resulting from long-term exposure to toxic and lethal substances.

1. Inadequate Compensation for Death of the Employee— Restrictions on benefits for survivors are often short changed under workers' compensation statutes. Benefits are often restricted to ten years and are capped from $7,000 to $60,000.[85] Furthermore, if an employee dies from an occupational illness, the survivor may only be awarded nominal burial expenses under some workers' compensation schemes.[86]

To receive compensation upon the death of the injured worker, the Pennsylvania Workers' Compensation Act requires that an

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81. *See* Pawlosky v. Workmen's Compensation Appeal Bd., 525 A.2d 1204 (Pa. 1986).

82. *See* PA. STAT. ANN. tit. 77, § 27.1(n) (1998). An injured worker may not receive compensation under both the Pennsylvania Workers' Compensation Act and the Pennsylvania Occupational Disease Act. PA. STAT. ANN.tit. 77, § 1000 (1998).

83. Andres v. Workers' Compensation Appeal Bd., 1998 Pa. Commw. LEXIS 674 at *5-6, citing Pawlosky, *supra* note 81.

84. *See, e.g.*, National Academy of Social Insurance, *Academy Launches Review of Workers' Compensation* (visited Jan. 17, 1999), <http://www.nasi.org /wcpress.htm>.

85. *See* Indoor Air Quality, 59 Fed. Reg. 15968, 16009 (1994).

86. *See id.*

eligible survivor[87] file a fatal claim petition and have the petition granted.[88] Benefits then are calculated according to the statutory scheme based on the decedent's average weekly wage.[89] This amount of compensation is likely to be substantially less than a settlement or a court award in a negligence action brought by the injured employee's survivors.[90]

Furthermore, the 1993 amendments to the Pennsylvania Workers' Compensation Act, raised the maximum burial expense to three thousand dollars.[91] This benefit falls far short of the national average cost for funerals—$5543.25.[92]

2. Inability to Address Diseases Resulting From Long-Term Exposure to Hazardous Substances—Occupational diseases often result from long-term exposure to toxic substances and may manifest themselves years after an employee has left the work place.[93] Though workers' compensation is a no-fault based system, employers are reluctant to pay claims arising from occupational diseases that are not diagnosed quickly. Evidence suggests that many occupational illnesses are never reported or compensated.[94]

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87. *See* PA. STAT. ANN. tit. 77, § 561 (1998).

88. *See* Moore v. Dodge, 213 A.2d 130 (Pa. Super. 1965) (holding that the action for survivor's benefits is independent from a disability claim under the Pennsylvania Workers' Compensation Act and the Pennsylvania Occupational Disease Act).

89. *See* PA. STAT. ANN. tit. 77, § 582 (1998) (defining wages as "the average weekly wages of the employee, ascertained as follows:

(a) If at the time of the injury the wages are fixed by week, the amount so fixed shall be the average weekly wage;

(b) If at the time of the injury the wages are fixed by the month, the average weekly wage shall be the monthly wage so fixed multiplied by twelve and divided by fifty-two;

(c) If at the time of the injury the wages are fixed by the year, the average weekly wage shall be the yearly wage so fixed divided by fifty-two;

(d) If at the time of the injury the wages are fixed by any manner not enumerated in clause (a), (b) or (c), the average weekly wage shall be calculated by dividing by thirteen the total wages earned in the employ of the employer in each of the highest three of the last four consecutive periods of thirteen calendar weeks in the fifty-two weeks immediately preceding the injury and by averaging the total amounts earned during these three periods. *Id.*

90. *See* Joan T.A. Gabel, et al., *The New Relationship Between Injured Worker and Employer: An Opportunity For Restructuring The System*, 35 AM. BUS. L.J. 403 (1998). The basis for this conclusion is that workers' compensation benefits historically have been kept low to encourage workers to return to their jobs. Mass media report with regularity large settlements in cases involving negligence.

91. *See* PA. STAT. ANN. tit. 77, § 561.7 (1998).

92. *See* National Funeral Directors Association, *Funeral Price Information*, (visited on Jan. 21, 1999) <http://www.nfda.org/resources/funeralprice.html>.

93. *See* Indoor Air Quality, 59 Fed. Reg. 15968, 16009 (1994).

94. *See id.*

Even if an individual attempts to assert a worker's compensation claim based upon an occupational disease, the claimant bears the burden of providing that "the incidence of the disease is substantially greater in that industry or occupation than in the general population."[95] Furthermore, claims for total disability under the occupational disease standard are subject to a three-year statute of limitations.[96] The statute of limitations begins to run from "the time the Claimant knows or should have known that he suffers from total disability caused by an occupational disease."[97]

This scheme is particularly problematic when dealing with claims for cancer under workers' compensation. Though it is the number one cause of death in the United States, scientists are still uncertain of the cause or causes of cancer. Over the course of the past three decades, increased attention has been paid to toxic chemical exposures in the work place and the subsequent diagnosis of cancer. However, the decisions providing compensation for cancer victims from exposure to toxic substances in the work place has been limited because of a lack of definiteness and certainty about the cause and effect relationship.[98]

Courts have permitted compensation to cancer victims under state occupational disease laws[99] and under workers' compensation statutes.[100] However, as with the survivors' benefits, the compensation pales in comparison to the amount of a settlement or court award.[101]

B. National Protective Efforts

In order to achieve its objective, the Secretary of Labor, through OSHA is authorized "to set mandatory occupational safety

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95. *See* Andres v. Worker's Compensation Appeal Bd., 1998 Pa. Commw. LEXIS 674 at *6, citing K-Mart Corp. v. Workmen's Compensation Appeal Bd., 595 A.2d 758 (Pa. Commw. 1991).

96. *See* PA. STAT. ANN. tit. 77, § 602 (1998).

97. *See* Andres v. Worker's Compensation Appeal Bd., 1998 Pa. Commw. LEXIS at *5, citing Price v. Workmen's Compensation Appeal Bd., 626 A.2d 114 (Pa. 1993).

98. *See* Troyen A. Brennan & R.L. Carter, *Legal and Scientific Probability of Causation of Cancer and Other Environmental Diseases in Individuals*, 10 J. HEALTH POL. POL'Y L. 33 (1985). *See also* Troyen A. Brennan, *Causal Chains and Statistical Links: The Role of Scientific Uncertainty in Hazardous-Substance Litigation*, 73 CORNELL L. REV. 469 (1988).

99. *See* Union Carbide Corp. v. Industrial Com., 581 P.2d 734 (Colo. 1978); Prescott v. United States, 523 F.Supp. 981 (D. Nev. 1981).

100. *See* Krumback v. Dow Chemical Co., 676 P.2d 1215 (Colo. App. 1983); Silkwood v. Kerr-McGee Corp., 667 F.2d 908 (10th Cir. 1981).

101. *See* Gabel, et al., *supra* note 90.

and health standards applicable to businesses affecting interstate commerce."[102] In developing standards, the Secretary must set the standard "that most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity."[103] OSHA seeks to obtain information through the public comment process about the costs and benefits of various standards.[104] The creation of standards is a highly charged political debate and has limited OSHA's effectiveness.[105]

One area that highlights this problem is the establishment of the appropriate level of exposure to hazardous substances. In promulgating regulations dealing with exposure to toxic substances, agencies are engaged in an exercise in prediction. Scientists have used various models in assessing the risk associated with exposure to toxic or lethal substances, each of which has been exposed to criticism.[106] Furthermore, regulatory agencies, like OSHA, may establish different levels of proof than tort law.[107] Two competing models have emerged for determining the effect of hazardous substances in the work place: the lowest observed effects model and the no-threshold model.

Using the lowest observed effects model, toxicologists calculate the largest safe human dose of a substance by dividing the largest

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102. U.S. Dept. of Labor, Occupational Safety and Health Administration, Fact Sheet No. OSHA 92-14, January 1, 1992.

103. *See* Indoor Air Quality, 59 Fed. Reg. 15968 (1994).

104. The entire standard setting process is described in U.S. Department of Labor, Occupational Safety and Health Administration, Fact Sheet No. OSHA 92-14, January 1, 1992.

105. See *infra* Part III.

106. *See* AFL-CIO v. OSHA, 965 F.2d 962, 975-980 (11th Cir. 1992) (providing a general critique of the risk assessment process).

107. *See* U.S. Dept. of Labor, Semiannual Agenda of Regulations, 63 Fed. Reg. 22218 (1998); U.S. Dept. of Labor, Semiannual Agenda of Regulations, 62 Fed. Reg. 57714 (1997). OSHA has been developing standards dealing with permissible exposure limits for air contaminants since its creation. The criteria used by OSHA were successfully challenged in 1992 and OSHA had to renew its efforts to determine air contaminant levels. At present, OSHA evaluates each substance and determines: "the severity of the health effect, the number of expose workers, toxicity of the substance, uses and prevailed exposure levels of the substance, the potential risk reduction, availability and quality of information useful in quantitative risk assessment to ensure that significant risks are addressed and that workers will experience substantial benefits in the form of enhance health and safety."

safe animal dose by 100.[108] The lowest observed effects model is based on a single exposure, a dose.[109]

The lowest observed effects model can be challenged as it relates to the development of long-term occupational diseases. First, the model is based on linear extrapolation; it presumes that the effects of a substance in an animal model will be the same in humans.[110] Second, the lowest observed effects model is concern with a single dose, making the level of exposure the critical component. With occupational diseases, the level of exposure to a toxic substance is important, but so is the duration of the exposure. A worker who is exposed to radon in the work place for only a short period of time is likely to have different medical condition than a worker who has labored in the hazardous environment for a decade.

An alternative, the no-threshold model, has received greater attention by federal courts. The Reference Manual on Scientific Evidence, developed by the Federal Judicial Center, asserts in its section on toxicology that any one molecule of a carcinogenic mutational agent can produce alterations in genetic material leading to cancer.[111]

The no-threshold model also presents difficulties in its application to occupational diseases. Courts have the responsibility to assure that scientific opinions are grounded in fact which poses problems in proving the element of causation.[112] Tort law requires proof that it is more likely than not that another party has caused a particular harm.[113] The no-threshold model does not adequately address the "more likely than not" standard found in the law, since its premise is that a single carcinogenic molecule causes cancer.

Which standard, the lowest observed effects standard or the no-threshold model, best complies with the directive to the

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108. *See* STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION 43 (1993).

109. *See id.*

110. *See id.*

111. *See* National Bank of Commerce v. Associated Milk Producers, Inc., 1998 U.S. Dist. LEXIS 15647, at *51 (E.D. Ark., June 12, 1998), (citing the Reference Manual on Scientific Evidence, Federal Judicial Center (1994)). The decision in National Bank of Commerce continues to assert that the no-threshold model was adopted by the Occupational Safety and Health Administration in its regulation of work place carcinogens. *See also* Public Citizen Health Research Group v. Tyson, 796 F.2d 1479 (D.C. Cir. 1986) and 29 C.F.R. § 1990.143(h) (1985).

112. *See* Sutera v. Perrier Group of America, 986 F. Supp. 655, 661 (D. Mass. 1997).

113. *See id.* at 664 (citing Wright v. Willamette Industries, 91 F.3d 1105, 1197 (8th Cir. 1996)).

Secretary of Labor that "no employee will suffer material impairment of health or functional capacity?"[114] Substantial disagreement still exists and illustrates one of OSHA's shortcomings.

In addition to its inability to articulate effective standards for work place safety, OSHA has been plagued by structural problems and by the need to respond to interest group pressure.[115]

To respond to the concerns of Congress, OSHA was given the function to monitor employer compliance with regulations. The enforcement function under the Act of 1970 was delegated to the Occupational Safety and Health Review Commission (OSHRC).[116] The division of responsibility crippled OSHA and created significant backlog of cases against employers.[117] Furthermore, OSHA and OSHRC have been marginalized by Congress, as is evidenced by the low levels of funding allocated to OSHA and OSHRC.

Congress also hindered the effectiveness of OSHA by subjecting it to a regulatory process that could easily be sidetracked by interest groups seeking to promote their policy agendas. "OSHA has issued only twenty-four substance-specific health regulations since its creation. It has not been able to review the many thousands of currently unregulated chemicals in the work place nor to keep up with reviewing the several thousand new chemicals introduced since its creation."[118]

An example of the slow-moving OSHA process of establishing regulations can be seen in its treatment of indoor air quality ("IAQ") and environmental tobacco smoke ("ETS"). OSHA's proposal, appearing in the Federal Register on April 5, 1994, generated the largest public response in agency history, with over 100,000 comments.[119] Hearings on the IAQ/ETS proposal lasted over six months, with more than 400 witnesses.[120] To date, OSHA has not rendered a final determination on the proposal offered over four years ago.[121]

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114. *See* Indoor Air Quality, 59 Fed. Reg. 15968 (1994).
115. *See* Nader, *supra* note 32, at 24-25.
116. *See* 29 U.S.C.S. §§ 651 - 678 (1998).
117. *See* Nader, *supra* note 32, at 85.
118. *See* AFL-CIO v. OSHA, at 971 (11th Cir. 1992). A challenge to OSHA's slow-moving rulemaking process was mounted in *Oil, Chemical and Atomic Workers Union v. OSHA*, 145 F.3d 120 (3d Cir. 1998). The Third Circuit noted that while it had jurisdiction to review the Secretary of Labor's actions for unreasonable delay, the facts in the case did not warrant intervention.
119. *See* Occupational Safety and Health Administration (visited Oct. 30, 1998) <http://spider.osha.gov/oshFAQs/air1.html>.
120. *See id.*
121. *See id.*

IV. Remedies and Reforms to Address Naturally-Occurring Toxic or Lethal Substances

Given the inadequacies of present state and national regulations to protect workers from the effects of naturally-occurring toxic or lethal substances, injured employees need to examine alternative remedies. Furthermore, efforts should be made at the national and state levels to reform existing regulations and legislation to protect workers from hazardous conditions in the work place that are the product of naturally-occurring substances.

A. Alternative Remedies

Workers whose health has been affected adversely by toxic or lethal substances should be permitted to sue their employer for damages due to exposure. OSHA has recognized tort liability as a possible non-regulatory option to protect employees from occupational hazards.[122] However, as addressed in Part I, workers' compensation statutes serve as a bar to claims against employers for injuries and illnesses arising during the course of employment.

What is occurring in jurisdictions throughout the United States is the creation of exceptions to the exclusivity doctrine under workers' compensation statutes that permit workers to bring tort claims.[123] The three principle exceptions to the exclusivity doctrine cover intentional torts, dual capacity and bad faith.[124] Pennsylvania courts have not adopted any of these exceptions.[125]

An avenue for worker recovery that may be more feasible would be to bring claims under "sick building syndrome." The bar by workers' compensation laws may be challenged by asserting that the employer has not injured, in the classic sense, an employee but jeopardized the employee's health by having an unsafe working environment.[126]

Litigation involving "sick building syndrome" is attracting increased attention as a method for ensuring work place safety.[127] "Sick building syndrome" cases typically involve claims of poor

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122. *See* Indoor Air Quality, 59 Fed. Reg. 15968, 16008 (1994).
123. *See generally,* Gabel, et al., *supra* note 90.
124. *See id.*
125. *See* PENNSYLVANIA BAR INSTITUTE, *supra* note 12. The Pennsylvania Workers' Compensation Act specifically includes intentional torts. It is unlikely that the Pennsylvania Supreme Court would create an exception to the exclusivity provision in this area.
126. *See* PROSSER AND KEETON, *supra* note 5.
127. *See generally* Arnold W. Reitze, Jr. and Sheryl-Lynn Carof, *The Legal Control of Indoor Air Pollution*, 25 B.C. ENVTL. AFF. L. REV. 247 (1998).

indoor air quality. Recent cases that emphasize the proliferation of this form of litigation include: $12.5 million claims against the Social Security Administration for an outbreak of Legionnaire's Disease in California; and claims by Hamilton County, Ohio, employees against the office building owners for exposure to bacteria, fungi, and other irritants.[128]

Claims involving sick building syndrome require the same elements of proof as the classic tort model; typically, the most difficult element to establish is causation. However, an employee's claim under the sick building syndrome theory may be buttressed by complaints of co-workers and others who use the facility.

B. Reform Efforts

Efforts to enact reforms to protect workers have met roadblocks over the past decade. Attempts to revamp the workers' compensation system in some states has been directed at efforts to reduce the costs of the system, rather than enhancing the protection of workers.[129] Furthermore, employers have little incentive to provide information on potentially hazardous materials because they may bear the financial responsibility for exposure to these substances.[130]

Two potential areas for reform are: to impose a duty to provide medical monitoring for employees when a claim related to naturally-occurring toxic substance is validated and to toughen disclosure laws on employers with the threat of voiding the exclusivity provision of the workers' compensation statutes for deliberate misrepresentation of working conditions.

Medical monitoring involves the payment by an employer for the costs of tracking an employee's health after exposure to a toxic substance. To prevail on a medical monitoring claim, the plaintiff must establish that:

> (1) [he] was significantly exposed to a proven hazardous substance through the negligent actions of the defendants; (2) as a proximate result of the exposure, the plaintiff suffers a significantly increased risk of contracting a serious latent disease; (3) by reason of the exposure a reasonable physician

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128. *See* Indoor Air Quality, 59 Fed. Reg. 15968, 16009 (1994). *See also*, Komatsu v. Board of Trustees, 693 P.2d 405 (Haw. 1984).

129. The cost of workers' compensation rose dramatically during the latter part of the 1980s. According to Gabel, et al., *supra* note 90, at 407, "[b]etween 1988 and 1991, costs [of workers' compensation] rose twenty-nine percent to an annual employer payout of approximately sixty billion dollars."

130. *See id.*

> would prescribe a monitoring regime different from the one that would have been prescribed in the absence of the exposure; and(4) monitoring and testing procedures exist that make the early detection and treatment of the disease possible and beneficial.[131]

This new avenue for protecting workers have been treated with skepticism by some courts, but perhaps it deserves more attention.[132]

OSHA has argued in recent years that employees have little information regarding exposure to occupational health hazards.[133] While most states have adopted right-to-know acts that mandate the disclosure of information regarding the presence of hazardous materials, employers rarely suggest that a naturally-occurring substance, such as radon or *Legionella*, may be present in their work place. Inspections of facilities for the presence of this class of substance and disclosure of any defects should be mandatory.[134] If employers fail to comply and workers are injured, the exclusivity doctrine under workers' compensation should not serve as a bar to an employee's action for negligence.

V. Conclusion

Rather than wait until the next toxic natural substance takes its toll on American workers, the legal system needs to develop a mechanism to address the hazards from naturally-occurring toxic or lethal substances in the work place proactively. As bacteriologist Mortimer Stall, of the University of California, Davis, has stated: "It would be arrogant for humanity to assume it had identified all of its flora, marine, and soil microbial enemies . . . The existence of plant-animal ambilateral harmfulness is generally unrecognized . . . and [it] may have a significant bearing on the 'emergence' of 'new' infectious diseases."[135]

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131. Metro-North Commuter Railroad Company, 1997 U.S. LEXIS 3867 at * 46 (Ginsburg, J., dissenting) (adopting the Third Circuit Court of Appeals test for a compensable medical monitoring claim from In re Paoli R.R. Yard PCB Litig., 35 F.3d 717 (3d Cir. 1994).

132. *See* Metro-North Commuter Railroad Company v. Buckley, 1997 U.S. LEXIS 3867 at *33 (addressing the costs to employers for permitting unchecked substance-exposure-related medical monitoring). The majority was unwilling to create a "new, full-blown, tort law cause of action." *See id.* at *36.

133. *See* Indoor Air Quality, 59 Fed. Reg. 15968 (1994).

134. *See* Tiffany, *supra* note 42. Employers may benefit from closer inspections of their facilities as they may be able to prevent the occurrence of some naturally-occurring bacterial threats.

135. *See* GARRETT *supra* note 50, at 191.

As bacteria become more life-threatening due to growing antibiotic resistance,[136] government should become more proactive in promoting solutions to monitor and compensate workers who fall victim to the unseen dangers of the work place.

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136. *See* Centers for Disease Control and Prevention, *Antibiotic Resistance: A new threat to your and your family's health*, (visited on May 17, 2000) <http://www.cdc.gov/ncidod/dbmd/antibioticresistance>.