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## Nuclear Power: Risk, Liability, and Indemnity

Harold P. Green

*George Washington University National Law Center*

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## NUCLEAR POWER: RISK, LIABILITY, AND INDEMNITY

*Harold P. Green\**

IN 1946, the Congress of the United States enacted the original Atomic Energy Act<sup>1</sup> as the framework for development, control, and use of atomic energy. This Act provided for the transfer to the new Atomic Energy Commission (AEC), a civilian agency, of the entire atomic energy program which to that point had been conducted by the Manhattan Engineer District, a creature of the United States Army. The Act contemplated that the heart of the nuclear technology—the production of special nuclear material<sup>2</sup> and the use of special nuclear material in both military and civil applications—would be a government monopoly. All special nuclear material in existence and to come into existence was to be owned by the government, and private persons were prohibited from owning or possessing special nuclear material and facilities for producing or utilizing special nuclear material.

Although the AEC, acting under the 1946 Act, was primarily concerned with the development of nuclear technology for military purposes, it also undertook research and development in connection with peaceful uses of the technology, including nuclear power. Almost all of such research and development took place at the AEC's government-owned installations at geographically isolated sites.

The Atomic Energy Act of 1954<sup>3</sup> revised and superseded the 1946 Act. The basic premises of the 1946 Act and the statutory prohibitions against private production, possession, and use of special nuclear material were abandoned. It was now possible for private persons to construct, own, and operate nuclear reactors for production of industrial heat and electric power and for other peaceful

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\* Professor of Law, George Washington University National Law Center. A.B. 1942, J.D. 1948, University of Chicago.—Ed.

1. Act of Aug. 1, 1946, ch. 724, 60 Stat. 755.

2. "Special nuclear material" is the term of art used in the Atomic Energy Act of 1954 to describe material capable of releasing substantial quantities of energy in the course of nuclear fission or nuclear transformation. 42 U.S.C. §§ 2014(c), 2014(aa), 2071 (1970). In more practical terms, special nuclear material encompasses the fuel used in nuclear reactors and the material that through the process of fission results in the detonation of atomic weapons. Such material was described in the 1946 Act as "fissionable material." Use of the term "special nuclear material" in the 1954 Act was intended to broaden the scope of protected materials to include fusionable as well as fissionable materials.

3. Act of Aug. 30, 1954, ch. 1073, 68 Stat. 919, *as amended*, 42 U.S.C. §§ 2011-2281 (1970).

purposes; such activities, however, were subject to a stringent federal licensing scheme, administered by the AEC and designed primarily to protect the health and safety of the public against the radiation hazards of the new technology.<sup>4</sup>

This 180 degree turn in the basic national policy with respect to atomic energy was prompted by a number of factors. By 1954, it had become clear that the "secrets" of atomic energy were readily available to other nations. Britain and the Soviet Union had developed nuclear weapons, and both had the capability for developing peaceful uses of atomic energy. Within the United States, AEC research and development had expanded nuclear reactor technology to the point at which civilian nuclear power seemed to be an imminent reality. Privately owned utilities and industrial concerns were clamoring for the opportunity to invest their own funds in the development and exploitation of nuclear technology. Economic policy questions were raised as to whether atomic energy, which was almost certainly a basic industry of the immediate future, should remain an "island of socialism" in our free enterprise, competitive national economy. Finally, faced with a race with other nations for development of the peaceful uses of atomic energy, it was believed that the goal of atomic power at competitive prices would be reached more quickly if "cost-cutting and other incentives of free and competitive enterprise"<sup>5</sup> were substituted for development solely under government auspices.

With enactment of the 1954 Act there was a rush of private industrial and business interest and activity into atomic energy technology. This was, however, only an ephemeral phenomenon. Faced with the hard economic facts, many firms that had expressed an interest and taken the plunge soon concluded that merely breaking even, let alone making a profit, lay in the relatively remote and uncertain future. The absence of short-term profit potential, coupled with the necessity for reliance on the AEC for special nuclear material for use as fuel and essential materials and services, quickly chilled the enthusiasm of private enterprise. To create a more favorable financial environment, the AEC offered various forms of economic incentives and inducements to spur private investment.<sup>6</sup>

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4. 42 U.S.C. §§ 2073-78, 2131-40 (1970).

5. H.R. REP. NO. 2181, 83d Cong., 2d Sess. 3 (1954). These factors are discussed in President Eisenhower's message to Congress (H.R. Doc. No. 328, 83d Cong., 2d Sess. (1954)) recommending enactment of the legislation and in the report of the Joint Committee on Atomic Energy on the legislation. H.R. REP. NO. 2181, *supra*.

6. See Green, *The Strange Case of Nuclear Power*, 17 FED. B.J. 100 (1957); Morrisson,

Notwithstanding these subsidy-type programs, a major roadblock remained, primarily in the nuclear power segment of the industry. This obstacle was the problem of potential public liability: the remote possibility of an accident that could result in damages giving rise to public liability claims of astronomic proportions. The roadblock was removed in 1957 through enactment of the Price-Anderson Act,<sup>7</sup> a much discussed but little understood (in its policy bases and implications) and unique approach to technological advance in the public interest.

#### I. EVOLUTION OF THE PRICE-ANDERSON ACT OF 1957

The problem of potential liability can be described simply. The major hazard in the operation of nuclear power plants is in the accumulation of radioactive wastes known as "fission products" in the reactor as it is operated. The fuel elements in which the accumulation occurs are periodically removed for reprocessing and replaced. So long as the fission products are contained in the reactor, there is no possibility of catastrophic accident. If, however, an accident were to occur resulting in release of the fission products into the environment, the damage caused could be enormous because of their long-lived toxicity; fission products are more toxic per unit weight than any other industrially known material by a factor of a million to a billion.<sup>8</sup> The extent of the damages caused would turn upon three factors: the quantity of fission products released, the prevailing meteorological conditions that control the dispersal of the released products, and the demographical and geographical characteristics of the area into which the products are dispersed.

Clearly, the industry recognizes the hazards of nuclear technology. Great care is taken in designing, constructing, and operating nuclear power plants, and the AEC licensing and regulatory program that involves multiple levels of independent safety review is extremely stringent. Nevertheless, in 1956 and 1957 the nuclear power industry was not prepared to proceed on the assumption that

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*Federal Support of Domestic Atomic Power Development—The Policy Issues*, 12 VAND. L. REV. 195 (1958).

7. Act of Sept. 2, 1957, Pub. L. No. 85-256, 71 Stat. 576 (codified at 42 U.S.C. § 2210 (1970)). The legislation was cosponsored by Congressman Melvin Price (D., Ill.) and Senator Clinton Anderson (D., N.M.), both of whom were senior members (Senator Anderson was then Chairman) of the Joint Committee on Atomic Energy.

8. *Hearings Before the Joint Comm. on Atomic Energy on Government Indemnity for Private Licensees and AEC Contractors Against Reactor Hazards*, 84th Cong., 2d Sess. 47 (1956) (testimony of C. Rogers McCullough) [hereinafter *1956 Indemnity Hearings*].

such an accident—involving a new technology with many unknowns not yet proved in the crucible of experience and subject to the vagaries of human fallibility—would not occur.<sup>9</sup>

Although the risk of a serious accident was generally regarded as extremely remote—infinitesimally small, some said—there was great concern about the enormous, indeed astronomical, damage that might result in the event such an accident in fact occurred. Despite this concern, there was a considerable reluctance on the part of industry spokesmen, AEC officials, and members of the Joint Committee on Atomic Energy to quantify the potential damages in dollar terms. Industry spokesmen preferred to relate the magnitude of such damages to the assets or net worth of their companies. The reluctance to estimate specifically the potential damages is illustrated in the following colloquy between Joint Committee Chairman Anderson and Charles J. Haugh, who appeared on behalf of the Association of Casualty and Surety Companies. Mr. Haugh had referred to a statement by AEC Commissioner Libby referring to “the very remote event that we had a horrible catastrophe and a hundred percent of the fission products were released . . . .”<sup>10</sup>

Chairman Anderson: But that damage was only about \$200 million.

Mr. Haugh: [T]here are various opinions and various estimates that have been made . . . as to the possible, not probable, sir, but possible, costs, under the most favorable conditions. I hesitate on all of this, because apparently the only thing that appeals to the press is big figures, and it gets out and sounds as if we thought these things were going to blow up by the dozen.

Chairman Anderson: . . . You say estimates have been proposed.

Mr. Haugh: That is right.

Chairman Anderson: I do know some other estimates have been proposed, and one of them was shown to me, but shown to me in such a fashion that I must not reveal it, or talk about it.

Mr. Haugh: That must have been the same one I saw, sir.

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9. As one utility executive stated:

We have hoped that we could be assured that the risk was too remote to be considered. But we have not found a single expert who is willing to say that, within a period of years of actual experience, the hazard, although extremely remote, can be ignored.

*Id.* at 240 (testimony of Willis Gale, Chairman, Commonwealth Edison Co.).

10. *Id.* at 158.

- Chairman Anderson: Yes. Do you not think it would be nice if we got that thing in the record someplace?
- Mr. Haugh: I am under the same wraps that you are . . . .
- Chairman Anderson: This has nothing to do with "Q" clearance. This one I saw was by an organization that just said, "We do not want to sponsor this, but we think the damage can run to \$5 billion. . . ." It was a composite of a hundred guesses. And it would be interesting if we could put that in the record, but nobody wants to put in the record the basis.<sup>11</sup>

Specific figures finally emerged with the release in 1957 of a study prepared for the AEC by its Brookhaven National Laboratory.<sup>12</sup> The *Brookhaven Report* concluded that in the event of a serious accident (in a nuclear power plant of the general type then contemplated at a typical location) resulting in release of all accumulated fission products as many as 3,400 people might be killed; as many as 43,000 people might be injured; and as much as 7 billion dollars in property damage might result, largely from long-term land contamination.<sup>13</sup> It must be understood, however, that these figures were based on extreme assumptions involving combinations of circumstances that are regarded as incredible by knowledgeable experts. But it is clear from testimony on the Price-Anderson Act that even industry spokesmen visualized the possibility of liability substantially in excess of 500 million dollars.<sup>14</sup>

Ordinarily, business enterprises whose activities may result in public liability seek protection in the form of liability insurance. Unfortunately, however, the problem was beyond the capability of the insurance industry for two principal reasons. First, the insurance companies had no experience with the risks of nuclear reactors. Second, the amount of the potential liability was many orders of magnitude beyond the capacity of the insurance industry.<sup>15</sup> Nevertheless, insurance companies were not prepared to accept the pros-

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11. *Id.* at 158-59.

12. AEC, *THE THEORETICAL POSSIBILITIES AND CONSEQUENCES OF MAJOR ACCIDENTS IN LARGE NUCLEAR POWER PLANTS* (1957) (published under the designation WASH-740) [hereinafter *Brookhaven Report*]. A letter from Harold S. Vance, Acting AEC Chairman, that summarized the conclusions of the study was included in the Joint Committee's report on the Price-Anderson bill. H.R. REP. No. 435, 85th Cong., 1st Sess. 31-34 (1957) [hereinafter Vance letter]. See note 65 *infra* and accompanying text for a discussion of this report and a 1965 updating exercise.

13. Vance letter, *supra* note 12, at 32-33.

14. See *1956 Indemnity Hearings*, *supra* note 8, at 122-24 (testimony of Charles H. Weaver, Vice President, Westinghouse Electric Co.).

15. See *id.*

pect of a system of government insurance devised so as to freeze them out of a potentially lucrative type of business. Accordingly, it was made known during legislative consideration of the Price-Anderson Act that the private insurance industry would be able to offer liability coverage in an amount ranging from 50 million dollars to 65 million dollars.<sup>16</sup> Insurance spokesmen stated that this would be four times greater than any public liability policy previously available to any single American industrial plant.<sup>17</sup> Indeed, it was pointed out that requests for coverage in excess of 10 million dollars were very rare.<sup>18</sup> Even this unprecedented amount of coverage was, however, regarded as inadequate by the atomic energy industry.

During the legislative consideration of the Price-Anderson Act, it also became clear that the nuclear industry regarded the insurance problem as a "roadblock" to private development of nuclear power technology. Utilities and equipment suppliers that had taken the lead in nuclear power projects were publicly expressing their inability or reluctance to risk their solvency, all the assets of their stockholders, and the very existence of their companies on the remote possibility of a major nuclear catastrophe that was insurable to only a limited extent.<sup>19</sup> The AEC itself had previously characterized the insurance issue as "serious" and expressed doubt "that this problem can remain unresolved for a period of two or three years without impeding the construction and operation of privately operated nuclear power reactors."<sup>20</sup>

Even the staging of the public hearings involved some difficult problems for the Joint Committee on Atomic Energy and the AEC.<sup>21</sup> A major difficulty was that the insurance problem cut across the basic political issue regarding the respective roles of private investment and government investment in nuclear power technology.<sup>22</sup> Republi-

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16. *Id.* at 5, 146.

17. *Id.* at 5.

18. *Id.* at 146.

19. Willis Gale, Chairman, Commonwealth Edison Co.: "At this time we do not see any sound basis on which we can risk our solvency on the possibility, remote as it may be, of a major nuclear catastrophe." *Id.* at 240. Charles H. Weaver, Vice President, Westinghouse Electric Co.: "Obviously, we cannot risk the financial stability of our company for a relatively small project . . . [W]e cannot exclude the possibility that a great enough fool aided by a great enough conspiracy of circumstances, could bring about an accident exceeding available insurance." *Id.* at 110, 114-15.

20. Atomic Industrial Forum, Inc., Forum Memo, March 1956, at 11.

21. Two months prior to commencement of the public hearings in May 1956, the Joint Committee had called a "seminar" of some forty persons representing AEC, equipment suppliers, utilities and insurance companies to discuss the problem. The seminar "increased the desire" of the Committee to find some solution. H.R. REP. NO. 435, 85th Cong., 1st Sess. 1, 3 (1957).

22. For the political history of the Gore-Holifield and Price-Anderson bills, see

can members of the Joint Committee, consistent with the Administration's position, urged that the job be left primarily in the hands of private enterprise. Democratic members were pressing to accelerate the nuclear power program through enactment of the Gore-Holifield bill,<sup>23</sup> which called for investment of public funds in several demonstration plants to be owned and operated by the AEC. The asserted necessity for a commitment of federal resources to underwrite potential liability of private industry made it possible for the Democrats to argue that if industry required a subsidy or government assumption of risk, perhaps the government should enjoy all of the benefits of ownership.

A second and more serious difficulty lay in convincing Congress that the government "backstop" was necessary. Stated simply, the dilemma was that the legislation sought could be justified only upon a showing that nuclear power involved extraordinary risk. Yet, to demonstrate this extraordinary risk would tend to frighten the public and the Congress—and perhaps lead to delays in the development and use of nuclear technology.

The final dilemma in presentation of the issue at the Joint Committee hearings involved the relative importance of the two objectives of the legislation: (1) to eliminate the liability roadblock to private development of nuclear power, and (2) to provide assurance that the public would be compensated for losses resulting from a serious accident. The initial indemnity bill submitted by the AEC<sup>24</sup> stressed the former objective. As an AEC official testified: "[W]e have not approached this from the standpoint of disaster insurance to protect the public . . . we are trying to remove a roadblock that has been said to interfere with people getting into this program. . . ."<sup>25</sup> The general view of the AEC was that its safety review procedures were adequate to protect the public and that the proposed legislation was for protection of industry.<sup>26</sup> Thus, the AEC bill did not provide for indemnity protection in any minimum amount but rather left each nuclear power plant owner free to buy from the AEC as much indemnity protection as he wanted. Moreover, under the original AEC bill, the AEC financial obligation did not arise

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H. GREEN & A. ROSENTHAL, *GOVERNMENT OF THE ATOM: THE INTEGRATION OF POWERS* 151-52, 153-56, 256-58 (1963).

23. S. 4146, 84th Cong., 2d Sess. (1956).

24. See *1956 Indemnity Hearings*, *supra* note 8, at 44-46, for the text of the bill.

25. *Id.* at 36 (testimony of Harold L. Price, Director, AEC, Division of Civilian Applications).

26. *Id.* at 56.



if the loss occurred by reason of bad faith, willful misconduct, or gross negligence on the part of the person indemnified.<sup>27</sup> However, as a result of highly critical questions and comments by members of the Joint Committee,<sup>28</sup> it soon became clear that protection of the public against uncollectible damage claims was of concern to Congress. Nevertheless, removal of the roadblock to private development and use of nuclear power remained the primary objective, since, obviously, if nuclear power plants were not built, the public would not require assurance of compensation against injury resulting from nuclear power plant accidents.

In June 1956, the Joint Committee reported out the Price-Anderson bill,<sup>29</sup> but the bill was not considered on the floor of either house since its fate had been tied to consideration of the Gore-Holifield bill, which was reported out by the Joint Committee at about the same time.<sup>30</sup> The Gore-Holifield bill reflected a lack of confidence by the Democratic members of the Joint Committee in the ability of private enterprise to develop nuclear power technology on an appropriate time scale. The bill sought to accelerate the development of nuclear power by authorizing and directing the AEC to proceed with the immediate development, construction, and operation at isolated AEC facilities of several commercial-size nuclear power plants to demonstrate their economic feasibility. Whereas the Eisenhower Administration strongly supported the Price-Anderson bill, it strongly opposed the Gore-Holifield bill.<sup>31</sup> The latter bill was passed by the Senate but rejected in the House, thereby dooming prospects for enactment of the Price-Anderson bill in 1956.

Pressure for enactment of the Price-Anderson bill continued into 1957, and the Joint Committee scheduled new hearings on the bill.<sup>32</sup> The ultimate pressure was applied when the General Electric Company, one of the two primary suppliers of nuclear power plants, informed the Joint Committee categorically that it would withdraw from the nuclear power business if legislation such as the Price-Anderson bill were not adopted.<sup>33</sup> Once again the Price-Anderson

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27. *Id.* at 44.

28. *Id.* at 55-60.

29. S. REP. No. 2298, 84th Cong., 2d Sess. (1956).

30. S. REP. No. 2390, 84th Cong., 2d Sess. (1956).

31. See H. GREEN & A. ROSENTHAL, *supra* note 22, at 78, 151-52.

32. *Hearings Before the Joint Committee on Atomic Energy on Governmental Indemnity and Reactor Safety*, 85th Cong., 1st Sess. (1957) [hereinafter *1957 Indemnity Hearings*].

33. *1957 Indemnity Hearings*, *supra* note 32, at 148, 156-61 (testimony of Francis K. McCune, Vice President, General Electric Co.).

bill was reported out by the Joint Committee.<sup>34</sup> This time it was passed by the House by voice vote after debate and by the Senate without debate.

## II. THE BASIC PROVISIONS OF THE 1957 PRICE-ANDERSON ACT

The provisions of the Price-Anderson Act<sup>35</sup> are complex, but their basic elements can be easily broken down. First of all, they require, as a condition of each construction permit and operating license issued by the AEC, that the licensee have and maintain financial protection to cover public liability claims.<sup>36</sup> Although the AEC has discretion to determine the amount of such financial protection, the statute requires that licensees of facilities designed for the production of substantial amounts of electricity with a rated capacity of 100,000 electrical kilowatts or more carry "the maximum amount [of financial protection] available from private sources."<sup>37</sup> Since the insurance industry was offering 60 million dollars of coverage in 1957, this meant that each licensee of a nuclear power plant was required to carry this amount of financial protection. The financial protection, however, was not required to be in the form of such insurance, but could consist of private contractual indemnities, self-insurance, other proof of financial responsibility, or a combination of these.<sup>38</sup> Second, whenever financial protection was required, it was mandated that the licensee enter into a 500 million dollar indemnity agreement with the AEC.<sup>39</sup> Although the indemnity agreement is between the AEC and the licensee of a nuclear power plant (the utility running the plant), it operates to indemnify and hold harmless not only the utility, but also any other person who might be liable<sup>40</sup> as a result of a "nuclear incident," defined to include

any occurrence . . . within the United States causing, within or outside the United States, bodily injury, sickness, disease, or death,

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34. H.R. REP. NO. 435, 85th Cong., 1st Sess. (1957).

35. Act of Sept. 2, 1957, Pub. L. No. 85-256, 71 Stat. 576 (codified at 42 U.S.C. § 2210 (1970)). The Price-Anderson Act was in the form of amendments to the Atomic Energy Act of 1954. References to provisions of Price-Anderson will, for convenience, be cited to the 1954 Act as amended by Price-Anderson.

36. 42 U.S.C. § 2210(a) (1970).

37. 42 U.S.C. § 2210(b) (1970).

38. 42 U.S.C. § 2210(b) (1970).

39. 42 U.S.C. § 2210(c) (1970).

40. The indemnity covers "the licensee and other persons indemnified." 42 U.S.C. § 2210(c) (1970). "Person indemnified" is defined to mean "the person with whom an indemnity agreement is executed and any other person who may be liable for public liability." 42 U.S.C. § 2014(t) (1970).

or loss of or damage to property, or loss of use of property, arising out of or resulting from the radioactive, toxic, explosive, or other hazardous properties of source, special nuclear, or by-product material . . . .<sup>41</sup>

Since in drafting its insurance policies the insurance industry followed the pattern of the indemnity provisions of the Act, the effect of the Price-Anderson Act is to extend both the insurance and indemnity coverage to any person who may be liable on account of a nuclear accident.<sup>42</sup> Thus, as the Joint Committee's report on the bill makes clear, the indemnification "extends to such persons as the subcontractors of the licensee, including those responsible for the design and construction of the reactor and the supplying of parts."<sup>43</sup> Coverage is not limited, however, to persons in contractual privity with the licensee, but also applies to strangers. As the Joint Committee pointed out, if negligence in maintaining an airplane motor should cause an airplane to crash into a reactor causing a nuclear incident damaging the public, the airplane company's liability would be covered.<sup>44</sup> Thus, the insurance and indemnity coverage would apply in the case of every nuclear incident and would protect each and every person who might have liability regardless of that person's relationship with the licensee.

The purpose of this broad coverage was obviously to ensure a mechanism for compensating injured members of the public in the event of any nuclear incident regardless of the identity of the causal agent. On the other hand, it should be noted that the original Price-Anderson Act did not provide absolute financial protection to the public, since neither indemnification nor insurance coverage applied unless persons were found liable under the applicable state law. Thus, if a court, in applying applicable state law, did not find fault or negligence to be a cause of a nuclear incident or did not apply principles of *res ipsa loquitur* or absolute liability, then the public would go uncompensated for damages sustained.<sup>45</sup>

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41. 42 U.S.C. § 2014(q) (1970).

42. See STAFF OF SUBCOMM. ON LEGISLATION, JOINT COMM. ON ATOMIC ENERGY, 89th CONG., 1ST SESS., SELECTED MATERIALS ON ATOMIC ENERGY INDEMNITY LEGISLATION 199-243 (Joint Comm. Print 1965) [hereinafter SELECTED MATERIALS].

43. H.R. REP. No. 435, 85th Cong., 1st Sess. 17 (1957).

44. *Id.* The possibility of such a catastrophe is not merely hypothetical. See N.Y. Times, Nov. 12, 1972, § 1, at 1, col. 1: "The heavily armed gunmen who had taken over the plane almost 20 hours earlier . . . had threatened to crash the twin-jet craft into the Oak Ridge atomic plant in Tennessee if their demands were not met." The AEC shut down the plant in response to the threats. *Id.*

45. A number of legal scholars have given considerable attention to the question whether there would be absolute liability in the event of a nuclear power plant

Another important provision of the Act placed a ceiling on aggregate liability at an amount equal to the 500 million dollar indemnity plus the amount of private financial protection required.<sup>46</sup> Accordingly, since the private protection required at the time Price-Anderson was enacted was 60 million dollars,<sup>47</sup> the Act cut off all liability in excess of 560 million dollars, including costs of investigating, settling, and defending claims. Upon a showing that public liability would probably exceed this amount, a United States District Court with bankruptcy venue over the location of the nuclear incident was required, on application of the AEC or any indemnified person, to issue orders designed to apportion the available 560 million dollar fund among claimants.<sup>48</sup> The thrust of this provision is obvious. The Price-Anderson Act does not fully protect the public against loss resulting from a nuclear incident, even when liability has been established, if aggregate liability exceeds 560 million dollars. Moreover, the Act insulates the nuclear industry from any possible liability that is not covered by the insurance and indemnity arrangements.<sup>49</sup>

In considering the legislative history of the Price-Anderson Act, as enacted in 1957, two remarkable facts should be noted. First, the transfer of the financial risk of liability from the industry to the government represented a complete repudiation of one of the basic premises of the Atomic Energy Act of 1954. Although that Act permitted private possession and use of special nuclear material, ownership of special nuclear material was exclusively in the government until 1964. This material, however, was made available by lease to licensed utilities for use as fuel in nuclear power plants. One of the statutory conditions of such leases was that the licensee indemnify

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catastrophe. See E. STASON, S. ESTEP & W. PIERCE, *ATOMS AND THE LAW* 635-780 (1959); Seavey, *Torts and Atoms*, 46 CALIF. L. REV. 3 (1958); *Hearings Before the Subcomm. on Legislation of the Joint Comm. on Atomic Energy on Proposed Extension of AEC Indemnity Legislation*, 89th Cong., 1st Sess. 211-23 (1965) (testimony of Professor David F. Cavers) [hereinafter *1965 Indemnity Hearings*]. See also W. PROSSER, *TORTS* § 78, at 516 (4th ed. 1971).

46. 42 U.S.C. § 2210(e) (1970). There is a 100 million dollar limit on nuclear incidents outside of the United States.

47. See text accompanying note 16 *supra*.

48. This provision was originally part of 42 U.S.C. § 2210(e), but was deleted and replaced by other provisions to the same effect by a 1966 amendment. Act of Oct. 13, 1966, Pub. L. No. 89-645, § 3, 80 Stat. 891. See text accompanying note 104 *infra*. The original text of section 2210(e) may be found in *SELECTED MATERIALS*, *supra* note 42, at 93.

49. This produces a situation comparable to that which would exist if every automobile owner were required to carry a prescribed amount of public liability insurance and could not be held liable for any amount in excess thereof.

and hold the United States harmless against liability claims that might arise out of the use of the leased special nuclear material.<sup>50</sup> The Price-Anderson Act in effect repealed this provision and, thus, made the United States liable to the extent that liability claims exceed the limited private insurance protection.<sup>51</sup>

Second, the story of the liability roadblock reflects consummate "gamesmanship" that does not cast industry, the AEC, or the Joint Committee in a favorable light. The fact that potential liability would be a substantial deterrent, even if not a "roadblock," to the fledgling nuclear power industry was well recognized by all parties when the 1954 legislation was being considered. Nevertheless, in the entire published<sup>52</sup> legislative history of the 1954 Act there is only one reference to the problem.<sup>53</sup> The writer was an attorney in the Office of the General Counsel of the Atomic Energy Commission in 1953 and 1954 and was intimately involved in the drafting of the legislation. There was an understanding, tacit at least, that the liability problem would not be injected into the consideration of the legislation, lest enactment be jeopardized by public apprehension. There was time enough to raise the problem, it was felt, after the bill had become law.

Indeed, it did not take long for the issue to surface. Almost immediately upon enactment of the statute, spokesmen for the industry began to discuss "the insurance problem."<sup>54</sup> On February 1, 1955, less than seven months after the President had signed the bill, the General Counsel of the AEC told the Joint Committee: "Damages from a major accident, if one should occur, might well be beyond the capacity of most companies and communities to handle

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50. Act of Aug. 30, 1954, ch. 1073, § 53(e)(8), 68 Stat. 939.

51. 42 U.S.C. § 2073(e)(8), until amended in 1957 by the Price-Anderson Act, made it a condition of each license issued for possession and use of special nuclear material that "the licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee." As this provision presently stands following the 1957 amendment, the above language is preceded by the phrase "except to the extent that the indemnification and limitation of liability provisions of section 2210 [the Price-Anderson Act] apply . . ."

52. The Joint Committee held many hearings in executive session while the 1954 legislation was under consideration. These hearings, although recorded in voluminous transcripts, have never been made public. Cf. H. GREEN & A. ROSENTHAL, *supra* note 22, at 125-32.

53. The problem was briefly mentioned by a representative of General Electric Co., *Hearings Before the Joint Comm. on Atomic Energy on S. 3233 and H.R. 8862 To Amend the Atomic Energy Act of 1946*, 83d Cong., 2d Sess., pt. 1, at 334 (1954).

54. A meeting of industry executives to discuss the problem took place in September 1954, within weeks after the 1954 Act was signed by the President. Atomic Industrial Forum, Inc., Forum Memo, Jan. 1955, at 8.

and cannot now be fully covered by insurance."<sup>55</sup> And spokesmen for industry told the Committee:

It now seems unlikely that private industry will ever be able to underwrite the whole risk of atomic accidents, but it should be able to carry a substantial amount of the load. Meanwhile, private persons may be unwilling to risk all their possessions and utility commissions may be unwilling to allow utilities to risk their assets essential for the regular public service in an endeavor to tame a new force which conceivably might destroy them in the process.<sup>56</sup>

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The potential damage might be much greater in dollar magnitude than the net worth of the station operator or the manufacturers of the generating equipment and auxiliaries, and hence self-insurance is not possible. Insurance companies have thus far not been willing or able to write insurance for this extraordinary risk.<sup>57</sup>

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The aggregate amount of such claims could easily exceed the resources of any private insurance underwriter, or even groups of underwriters. These possibilities suggest that, for some time to come, Government must provide the enforcement and inspection agencies and insurance underwriters with a legal umbrella relieving them, in part, of the incalculable risks until experience results in reduction of the risks to reasonable commercial dimensions.<sup>58</sup>

As noted above, by 1956 the problem was openly characterized as a "roadblock," and the AEC was speaking of it as a "serious" impediment to the development of nuclear power.<sup>59</sup>

### III. EXPERIENCE UNDER THE PRICE-ANDERSON ACT: 1957-1972

As originally enacted in 1957, Price-Anderson was regarded as temporary legislation. Although the requirement for financial protection as a condition of securing a nuclear power license was in the nature of permanent legislation, the indemnity provisions of the Act were applicable only to licenses issued between August 30, 1954, and August 1, 1967.<sup>60</sup> When a license was issued within this period

55. *Hearings Before the Joint Comm. on Atomic Energy on Development, Growth, and State of the Atomic Energy Industry*, 84th Cong., 1st Sess., pt. 1, at 59 (1955) (testimony of William Mitchell).

56. *Id.* pt. 2, at 258 (testimony of Paul W. McQuillen, Chairman, Legal Comm., Atomic Power Developments Associates).

57. *Id.* pt. 1, at 388 (testimony of Dr. C. G. Suits, Chairman, Subcomm. on Atomic Energy, Comm. on Research, NAM).

58. *Id.* pt. 3, at 493 (testimony of Earle W. Mills, President, Foster Wheeler Corp.).

59. See note 20 *supra* and accompanying text.

60. Act of Sept. 2, 1957, Pub. L. No. 85-256, § 4, 71 Stat. 525, as amended, 42 U.S.C. § 2210(c) (1970).

and an indemnity agreement was entered into between the AEC and the licensee, the indemnity remains in effect for the forty-year period of the license.<sup>61</sup> Moreover, since the cut-off of aggregate liability at 560 million dollars was applicable to the aggregate liability of all "persons indemnified,"<sup>62</sup> the limitation on liability would remain in effect beyond August 1, 1967, for the full term of such licenses. The AEC was, however, precluded from entering into indemnity agreements whenever a license was issued after August 1, 1967, and, therefore, the cut-off of liability would not be applicable to nuclear incidents in such subsequently licensed facilities. The termination of authority to enter into indemnity agreements was based on the hope that by that time "there will be enough experience gained so that the problems of reactor safety will be solved and the insurance people will have had experience on which to base a sound program of their own."<sup>63</sup>

Experience during the first eight years of the Price-Anderson Act was eminently satisfactory. The deterrent to private investment in nuclear power had been removed, as evidenced by the existence of over one million electrical kilowatts of nuclear power generating capacity by 1965. Moreover, there had been no nuclear power plant accidents causing injury to the public.<sup>64</sup>

In 1965, the AEC and the Joint Committee undertook consideration of a possible extension of the Act, and hearings were held by the Committee in June of that year. In contemplation of these hearings, it was announced that the AEC had commissioned the Brookhaven National Laboratory to conduct a new study to update its 1957 *Report* on the theoretical possibilities and consequences of a major nuclear power plant accident. The results of this study have never been made public, presumably to avoid unduly alarming the public.<sup>65</sup> The Chairman of the AEC did, however, inform the Joint Committee by letter dated June 18, 1965:

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61. Although the statute is not explicit on this point, the Joint Committee's report stated: "The provisions of this bill provide governmental indemnifications to those licensees who obtain their licenses within the next 10 years. The indemnification agreement is to run for the life of the license." H.R. REP. NO. 435, 85th Cong., 1st Sess. 9 (1957).

62. 42 U.S.C. § 2210(e) (1970).

63. H.R. REP. NO. 435, 85th Cong., 1st Sess. 9 (1957).

64. H.R. REP. NO. 883, 89th Cong., 1st Sess. 5 (1965).

65. That such a study was launched is indisputable. On December 3, 1964, AEC Commissioner Palfrey, speaking at the annual meeting of the Atomic Industrial Forum, stated:

My assignment today was to review with you the updating of the Brookhaven report on the theoretical consequences of major nuclear accidents. . . . Well, the Brookhaven study is not ready yet. . . .

I think I should beg off on the Brookhaven study because my guesses on what it

Reactors today are much larger than those in prospect in 1957, their fuel cycles are longer and their fission product inventories are larger. Therefore, assuming the same kind of hypothetical accidents as those in the 1957 study, the theoretically calculated damages would not be less and under some circumstances would be substantially more than the consequences reported in the earlier study.<sup>66</sup>

On August 20, the Joint Committee reported a bill<sup>67</sup> to extend the authority of the AEC to enter into indemnity agreements for an additional ten-year period to August 1, 1977. It was the Committee's view that the "experience in this field is not yet sufficiently great nor the technology sufficiently developed, that it is possible to deny the theoretical possibility" of a catastrophic accident.<sup>68</sup> Moreover, based on the testimony of every witness representing the nuclear industry, the Committee concluded that the then potential threat of uninsurable liability was probably as great a deterrent to "necessary industrial participation" in nuclear power as it had been in 1957.<sup>69</sup>

The bill as reported by the Joint Committee, and ultimately enacted,<sup>70</sup> also reflected the willingness of the insurance industry to increase the amount of liability insurance available. At the urging of the Joint Committee, the insurance industry agreed that it would, effective January 1, 1966, provide liability coverage in the amount of 74 million dollars, approximately a twenty-five per cent increase.<sup>71</sup> The Joint Committee concluded that aggregate coverage under the

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will say or should say could be irresponsible chatter on a ticklish subject that needs accurate reporting. All I will say is what you probably know, that seven years after the first study, one is considering theoretically conceivable accidents in a reactor which is considerably larger than in 1957, located somewhat closer to population centers, with the confidence of increased operating experience and constantly improving designs and engineered safeguards.

AEC Press Release No. S-30-64, Dec. 3, 1964.

66. *1965 Indemnity Hearings*, *supra* note 45, at 347-48. The letter reported that the "probability of catastrophe is exceedingly low, even lower than our estimate of the remote probability of such an event in 1957 . . . . We cannot say, however, that the likelihood is non-existent." *Id.* at 348.

67. H.R. REP. NO. 883, 89th Cong., 1st Sess. (1965). The authors of the report took pains to make it clear that the primary purpose of the Price-Anderson Act was "providing assurance that funds will be made available to satisfy public liability claims arising from a catastrophic nuclear incident." *Id.* at 5.

68. *Id.* at 6. Mirroring the hope reflected in its 1957 report on the original indemnity legislation that by 1967 experience would have obviated the necessity for such a statute (*see* text accompanying note 63 *supra*), the 1965 report suggested that by 1977 "a significant amount of data will have been accumulated, which should enable the industry and Congress to assess much more accurately the likelihood of a major nuclear incident and the insurance requirements of the nuclear industry." *Id.* at 10.

69. *Id.* at 9.

70. Act of Sept. 29, 1965, Pub. L. No. 89-210, 79 Stat. 855 (codified at 42 U.S.C. §§ 2210(c)-(e), (k)-(l) (1970)).

71. H.R. REP. NO. 883, 89th Cong., 1st Sess. 11 (1965).



insurance and indemnity arrangements should remain at 560 million dollars. Accordingly, the Act was amended to limit the amount of the government indemnity to 500 million dollars less the amount by which privately available financial protection exceeds 60 million dollars.<sup>72</sup> The effect of this was to reduce the government's indemnity exposure from 500 million dollars to 486 million dollars and to retain the liability cut-off at 560 million dollars.

During the course of its consideration of the 1965 legislation, the Joint Committee became concerned about the possible need to improve the Price-Anderson Act to enhance the financial protection of the public against the possibility of a serious nuclear power plant accident. By the terms of the Act, the indemnity was available only when the claimant established that legal liability existed, and the Act left undisturbed the basic principle of American law that liability is to be determined under applicable state law. Unless, under the circumstances of a particular nuclear incident, applicable state law provided for imposition of liability without fault under some variant of the principle of *Rylands v. Fletcher*,<sup>73</sup> a claimant could recover under the indemnity only if negligence could be established. Since only a minority of American states have accepted the principle of strict liability, it appeared likely that in many cases financial protection of the public would be available only if fault could be established. Moreover, the requirement that fault be proved might present an insurmountable obstacle to recovery, since much of the relevant evidence would likely be destroyed or rendered unavailable for many years in the event of a serious nuclear accident.<sup>74</sup>

Even if fault could be established or applicable state law provided for liability without fault, other problems existed that might impair financial protection of the public. These problems arise from the effect of radiation on human beings. When an individual is exposed to a large amount of radiation, somatic injury may be immediate and apparent. At lower levels of exposure, however, the radiation may produce a latent injury that does not become manifest until sometime in the future, perhaps years later.<sup>75</sup> Thus, recovery may be precluded by operation of the applicable state statute of limitations. And, quite apart from the problem of limitations, since radiation injuries are nonspecific, a plaintiff faces immense difficulties

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72. 42 U.S.C. § 2210(c) (1970) provides, following this amendment, that the basic 500 million dollar indemnity "shall be reduced by the amount that the financial protection required shall exceed \$60,000,000."

73. L.R. 3 H.L. 330 (1868).

74. H.R. REP. No. 2043, 89th Cong., 2d Sess. 7 (1966).

75. *Id.* at 20-21.

in his effort to establish a causal connection between his exposure to radiation resulting from the nuclear incident and an illness that becomes apparent at a later date.<sup>76</sup> Finally, exposure to radiation produces undesirable genetic mutations that become manifest only in later generations,<sup>77</sup> and may also result in a general life-shortening effect.<sup>78</sup> Neither genetic injury nor life-shortening is presently adequately cognizable in American courts as giving rise to liability.<sup>79</sup>

Thus, although the original Price-Anderson Act provided more financial protection for the public than would have otherwise existed (assuming, of course, that private investment would have gone forward even without the 1957 legislation), it clearly did not provide a mechanism that would assure that all persons injured in a nuclear incident would receive monetary compensation. This situation led to recommendations that Congress enact legislation to establish a federal law of strict liability with respect to nuclear incidents so as to assure, regardless of applicable state law, that the benefits of the Price-Anderson Act would be available to all persons equally without the need to establish fault.<sup>80</sup>

Thus, when it reported out the 1965 bill extending the indemnity provisions of the Act until 1977, the Joint Committee identified three areas warranting further review: first, the adequacy of state tort law and whether the Price-Anderson Act should be amended to establish a federal basis of liability for nuclear incidents and to provide a means for consolidation of suits resulting therefrom; second, the adequacy of state statutes of limitations, considering the fact that radiation injuries are frequently latent for many years; and third, the difficulty of establishing causal relationships in radiation injury cases.<sup>81</sup> The Committee was troubled by the possibility that persons injured as a result of a nuclear incident would be "subjected to a series of substantive and procedural hurdles which would prevent the speedy satisfaction of a legitimate claim"<sup>82</sup> and expressed determination that "the promise to the public, contained in the Price-Anderson Act, will not prove to be an illusory one."<sup>83</sup> Accord-

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76. E. STASON, S. ESTEP & W. PIERCE, *supra* note 45, at 79.

77. *Id.* at 28-30. The genetic effects of radiation have generally been ignored by the AEC and the Joint Committee in their pronouncements on nuclear power plant hazards.

78. *Id.* at 35.

79. *Id.* at 221-27.

80. *See, e.g., 1965 Indemnity Hearings, supra* note 45, at 211-23 (testimony of Professor David F. Cavers).

81. H.R. REP. NO. 883, 89th Cong., 1st Sess. 13 (1965).

82. *Id.*

83. *Id.*

ingly, it was stated that hearings on this subject would be held at an early date.<sup>84</sup>

The promised hearings were held in July 1966, and a bill was reported<sup>85</sup> on September 14, 1966, and enacted in due course, to establish, in effect, absolute liability for nuclear power catastrophes.<sup>86</sup> It accomplishes this, however, in a rather indirect manner. The possibility of federal legislation directly and explicitly establishing a rule of absolute liability in the event of a serious nuclear power plant accident was considered and rejected by the Joint Committee for four reasons. First, a federal rule of absolute liability could inhibit the development and use of nuclear power by singling out the nuclear industry as one for which extraordinary rules of liability are necessary, thereby "stimulating public apprehension of the potential dangers of atomic activities" and subjecting the industry to a series of harassing and unfounded claims.<sup>87</sup> Second, such a measure would not be consistent with the principle of the Price-Anderson Act that there be interference with state law only to the minimum extent necessary.<sup>88</sup> Third, it would be difficult to obtain a consensus on any such bill since "the principles of strict liability are not entirely well defined, and many aspects of this problem are subject to dispute among courts and legal scholars."<sup>89</sup> Moreover, creation of a federal tort would require consideration of such matters as proof of damages, causation, and the possible continued validity of portions of state law.<sup>90</sup> Finally and "most important of all, perhaps," said the Committee, was the fact that the nuclear industry strongly preferred the Joint Committee's alternative approach.<sup>91</sup> Therefore, the legislation included a "unique system of waivers," thereby avoiding the "differences of opinion" surrounding an absolute liability statute and providing a "strong indication of continuing and strengthening the partnership between Government and private industry . . . ."<sup>92</sup>

The net effect of the ingenious provision for waiver of certain defenses is absolute liability. The AEC is authorized to require inclusion of provisions in both existing and future indemnity agree-

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84. *Id.*

85. H.R. REP. No. 2043, 89th Cong., 2d Sess. (1966).

86. 42 U.S.C. § 2210(n) (1970).

87. H.R. REP. No. 2043, 89th Cong., 2d Sess. 8 (1966).

88. *Id.* at 9.

89. *Id.* at 9-10.

90. *Id.*

91. *Id.*

92. *Id.*

ments with licensees and in insurance policies furnished as proof of financial responsibility whereby persons indemnified and their insurers waive certain rights. First, they waive "any issue or defense as to the conduct"<sup>93</sup> of the claimant. This is intended to eliminate any question or defense as to contributory negligence or assumption of risk.<sup>94</sup> Second, persons indemnified and their insurers waive "any issue or defense" as to the "fault of the persons indemnified . . . ."<sup>95</sup> This, of course, establishes absolute liability. Third, the enactment provides for a waiver of "any issue or defense based on any statute of limitations if suit is instituted within three years from the date on which the claimant first knew, or reasonably could have known, of his injury and the cause thereof, but in no event more than ten years after the date of the nuclear incident."<sup>96</sup> The statute further provides that such waivers are to be judicially enforceable by the claimant.<sup>97</sup>

The waivers do not, however, apply in all cases of nuclear incidents, but only to a nuclear incident that is an "extraordinary nuclear occurrence."<sup>98</sup> This term is defined to mean an event causing the dispersal of nuclear material that the AEC determines has resulted or will probably result in substantial damages to persons or property offsite.<sup>99</sup> Although the AEC is required to establish written criteria denoting the basis upon which such a determination will be made,<sup>100</sup> that statute provides that such a determination "shall be final and conclusive, and no other official or any court shall have power or jurisdiction" to review it.<sup>101</sup> It is the AEC's determination, after the event, that there has been an extraordinary nuclear occurrence that triggers the applicability of the waiver of defenses. Thus, in the case of a "nonextraordinary" nuclear incident, defendants would have all defenses available to them, and liability would be determined under traditional tort law.

The 1966 amendments also included other additions to the Act. Provision was made for "emergency assistance payments" to injured persons, without requirement of a release or compromise

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93. 42 U.S.C. § 2210(n)(1) (1970).

94. H.R. REP. NO. 2043, 89th Cong., 2d Sess. 26 (1966).

95. 42 U.S.C. § 2210(n)(1) (1970).

96. 42 U.S.C. § 2210(n)(1) (1970).

97. 42 U.S.C. § 2210(n)(1) (1970).

98. 42 U.S.C. § 2210(n)(1) (1970).

99. 42 U.S.C. § 2014(j) (1970).

100. 42 U.S.C. § 2014(j) (1970). The Commission's criteria are set forth at 10 C.F.R. §§ 140.81-85 (1972).

101. 42 U.S.C. § 2014(j) (1970).

of claims, pending final resolution.<sup>102</sup> In addition, in the case of suits arising out of an extraordinary nuclear occurrence, original jurisdiction is vested in the United States District Court in the district in which the occurrence takes place, and any action brought in any other federal or state court may be transferred to such district court on "motion of the defendant or the Commission."<sup>103</sup> Finally, when the court determines that public liability may exceed the limit of aggregate permissible liability with respect to any nuclear incident, procedures are spelled out for the apportionment and payment of claims with due regard to possible latent injury claims that may not be discovered until a later time.<sup>104</sup>

Although the 1966 amendments clearly enhance the financial protection of the public against reactor catastrophe, they are not panaceas. The difficult problem of proving a causal link between a nuclear incident and delayed radiation injury remains, as does the problem of financial compensation for genetic injury and life-shortening.<sup>105</sup>

Finally, to round out the history of the Price-Anderson Act since 1957, it should be noted that the insurance industry increased the amount of liability insurance available to 82 million dollars in 1968 and to 95 million dollars in 1972.<sup>106</sup> Meanwhile, the nuclear power industry's excellent record of safety has continued. Although there have been malfunctions and accidents in nuclear power plants, there have been no accidents that have resulted in damage to persons or property offsite.

#### IV. THE POLICY IMPLICATIONS

As noted above, there has been, since the earliest days of consideration of the nuclear energy liability question, a dual justification for the Price-Anderson Act: first, establishment of a mechanism for compensating members of the public who may sustain losses in the event of a serious nuclear accident; and, second, avoiding the possibility that a serious accident might result in bankrupting liability to utilities and industrial concerns because of the potentiality of enormous, uninsurable liability.

With respect to the first of these justifications, it is difficult to

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102. 42 U.S.C. § 2210(m) (1970).

103. 42 U.S.C. § 2210(n)(2) (1970).

104. 42 U.S.C. § 2210(o) (1970).

105. See Estep, *Radiation Injuries and Statistics: The Need for a New Approach to Injury Litigation*, 59 MICH. L. REV. 259 (1960).

106. 10 C.F.R. § 140.11(a)(4) (1972), as amended, 37 Fed. Reg. 3423 (1972).

argue against a public policy that provides assurance that members of the public who are injured because of a major disaster should receive financial assistance from the federal government. Indeed, it is well known that the federal government has usually responded with financial assistance after catastrophic floods, earthquakes, and hurricanes. Even when the catastrophe results from human activity rather than natural causes, as in the case of the Texas City disaster of 1947, it is likely that Congress will respond with financial assistance for victims who otherwise would be without sources of private relief.<sup>107</sup> Such governmental measures have, however, generally provided for less than total compensation for damage sustained, and the relief has usually been available only after considerable delay.<sup>108</sup> A government commitment to a scheme of "social insurance" that will provide prompt, certain, and adequate financial compensation for losses sustained as a result of catastrophic events does, therefore, make considerable sense.

It should be noted, however, that Congress has clearly shown a preference to deal with such problems on an ad hoc, after-the-fact basis, rather than to enact a formal, automatic statutory scheme for compensation of disaster victims. In recent years, numerous proposals for general programs to compensate victims of natural and man-caused catastrophes have been before the Congress and have not been enacted or even seriously considered. If it is public policy to ensure compensation of the public for losses sustained as a result of catastrophic occurrences, it is obviously illogical to apply this policy only in the case of nuclear technology and to ignore both natural catastrophes capable of producing injury of equally astronomical dimensions and man-caused disasters such as those that may result from, for example, various extra-hazardous military and space activities. The fact that atomic energy has been singled out for this unique form of government beneficence must, therefore, be attributable to something more than a general policy of compensating the public for losses sustained in catastrophes for which adequate insurance protection is not available.

This suggests that it is the second justification—namely, protection of the nuclear industry against bankrupting public liability—that is the primary consideration underlying the Price-Anderson

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107. For a brief description of the Texas City disaster and its aftermath, see A. ROSENTHAL, H. KORN & S. LUBMAN, *CATASTROPHIC ACCIDENTS IN GOVERNMENT PROGRAMS* 3-4 (1963) (a study by the Columbia University Drafting Research Fund). See also Kunreuther, *The Case for Comprehensive Disaster Insurance*, 11 J. LAW & ECON. 133 (1968).

108. See A. ROSENTHAL, H. KORN & S. LUBMAN, *supra* note 107, at 2-4.

Act. This leaves unanswered, however, the question why only the nuclear industry has been given such protection. In part, this is attributable to the fact that insurance coverage is available in most other extra-hazardous technological areas since the insurance companies have both the experience and financial capacity to provide coverage deemed adequate by industry, or to the fact that the industry itself has the financial resources to provide self-insurance. This is not universally true, however, since numerous industrial concerns are subject to enormous uninsurable liability, such as government contractors engaged in such extra-hazardous activities as space vehicle launchings, transportation of rocket fuels, weather control, and production of missiles and nuclear bombs and warheads. A 1963 study by the Columbia University Legislative Drafting Research Fund concluded that

[t]he role of the contractors in most of these programs is so intimately associated with and subordinate to that of the government that the losses ought to be regarded as part of the cost of the government program. It would be particularly damaging to the government itself to allow the destruction of any substantial segment of the industrial capacity upon which our defense and other basic national programs depend.<sup>109</sup>

Although present law authorizes indemnification of some such contractors engaged in ultrahazardous activities, the study regards such statutes as inadequate and therefore contractors "are now exposed to the danger of devastating liabilities with no sure means of guarding against them . . ."<sup>110</sup> Broader indemnification legislation applicable to such activities has been submitted to Congress on numerous occasions but has not been enacted.

Curiously, however, as the Columbia study points out, industrial companies have been willing to engage in ultrahazardous government contract work without government indemnity protection, perhaps because they cannot maintain their competitive positions, or in some cases even survive, without government business.<sup>111</sup> Indeed, many of the very industrial concerns that insisted upon enactment of Price-Anderson as a precondition to remaining in the atomic energy business have exhibited little reluctance to accept ultrahazardous government work without comparable protection. As a matter of fact, there is little doubt that nuclear equipment manufacturers, who expressed reluctance to supply the equipment for pri-

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109. *Id.* at 12.

110. *Id.* at 11-12.

111. *Id.* at 74.

vate nuclear power projects without the Price-Anderson Act protection, would have been eager to supply the same equipment to the AEC under a contract with that agency. This reflects the fact that AEC projects would have been located at more remote sites with less potential for injury to the public. It may also reflect greater confidence in safe operation by the AEC than by private utility companies.

Why, then, was privately sponsored nuclear power technology singled out for unique statutory treatment in this respect? The reasons are not difficult to identify. First and foremost, there was a national policy commitment to bring about the rapid development, introduction, and use of nuclear power technology and to rely upon private enterprise to accomplish this objective. This commitment gave the nuclear power industry considerable bargaining leverage, much more leverage than exists with respect to government contracting. The industry was in a position to insist upon government financial protection against massive uninsurable liability. Second, the demand for such financial protection was addressed to the Joint Committee on Atomic Energy, a uniquely aggressive and expansion-minded congressional committee eager to spur the development of nuclear technology. The Joint Committee was, moreover, capable of pushing the Price-Anderson legislation through Congress without friction, since the Congress has almost always rubber-stamped legislation proposed by the Joint Committee.<sup>112</sup> It is quite likely that the atomic energy indemnity legislation would never have seen the light of day if it had been submitted to any other congressional committee, such as Armed Services, Judiciary, or Banking and Currency.

The Price-Anderson Act must, therefore, be viewed as a measure adopted for the primary purpose of freeing the nuclear industry from the spectre of massive potential liability, thereby eliminating an impediment to the industry's development and introduction of nuclear power. Viewed in another way, it was legislation intended to encourage the development and use of nuclear power by private industry. It was in a very real sense the extension of a government subsidy to the nuclear industry.<sup>113</sup> The characterization of the Price-Anderson protection as a subsidy has been vigorously contested by the AEC and the Joint Committee. It has been argued that no subsidy is involved because no payments under the Act have ever been

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112. See H. GREEN & A. ROSENTHAL, *supra* note 22, at 146-49.

113. This point was cogently made by Congressman Holifield in a statement appended to the Joint Committee report on the Price-Anderson bill. H.R. REP. NO. 435, 85th Cong., 1st Sess. 35-47 (1957).



made by the government and because industry pays fees for the Price-Anderson indemnity protection.<sup>114</sup> It is apparent, however, that there is a subsidy in reality, although it may be regarded as an inverse subsidy in the sense that the Act relieves industry of some of the costs of providing for contingent liability rather than providing direct revenues as is the case with the typical subsidy program.

A business enterprise will invest money in a project only if it estimates that the investment will yield a profit, that revenues will exceed costs. In estimating costs, consideration must be given to the costs of potential liability in the event of an occurrence giving rise to public liability. The magnitude of these potential costs will be determined by considering the aggregate liability that might result, discounted by the probability of the occurrence. The availability of liability insurance enables the enterprise to shift the risk of liability to insurance companies and to translate the uncertain costs of potential liability into ascertainable sums paid periodically as insurance premiums. The premiums charged for insurance coverage represent the judgment of the insurance companies, our society's professionals in risk assessment, as to the magnitude of potential liability and the probability of the occurrence. If the costs of insurance are too high relative to the anticipated revenues, thereby presenting a discouraging picture of potential profit, investment will be deterred. If adequate insurance coverage is not available, investment will likewise be deterred when the enterprise's estimate of uninsurable costs of liability is too high relative to anticipated revenues. Thus, the liability mechanism operates as a self-regulatory device to discourage extra-hazardous business activity.<sup>115</sup>

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114. The Joint Committee's report on the 1965 extension bill, which was presented to the House of Representatives by Congressman Holifield, states:

It is true that the Government's indemnity is valuable and is provided at a charge which is presumably much lower than the charge which would be assessed for "commercial" insurance if such insurance were available. However, the fundamental reason why the indemnity is necessary is that there is not yet enough experience on which to base a firm judgment on the likelihood of the indemnity ever being utilized. Expert opinion holds this indemnity almost certainly will never be utilized. If this opinion eventually is proven correct, then there surely is no Government subsidy involved here, and in fact power reactor operators have been paying for protection above that which is necessary.

H.R. REP. No. 883, 89th Cong., 1st Sess. 8 (1965).

115. The relationship between the liability mechanism and insurance protection, on the one hand, and the rate of technological advance, on the other, has apparently not been the subject of serious study by economists. See G. FIELDS, *THE INFLUENCE OF INSURANCE ON TECHNOLOGICAL DEVELOPMENT* (1969) (George Washington University Program of Policy Studies in Science and Technology, Staff Discussion Paper 405). The lack of interest in this subject probably reflects the apparent uniqueness of nuclear power technology (within the private enterprise sector), which has produced an overnight quantum jump in potential liability in an area in which relatively little risk experience is available.

In the case of nuclear power, industry professed confidence that the probability of a serious accident that might give rise to massive liability was extremely low. Nevertheless, the potential uninsurable liability if such an accident occurred was so high that the industry was unwilling to accept the costs even after discounting such potential liability by the extremely low probability of the occurrence. The effect of the Price-Anderson Act was, therefore, to overcome the deterrent effect of the liability mechanism and to permit and encourage the industry to invest in this ultrahazardous technology. Costs of potential liability are not, however, totally eliminated from the industry's calculation. A utility operating a nuclear power plant is required to carry the maximum amount of insurance available, at the present time 95 million dollars, and to pay premiums for this coverage. Although the insurance companies still do not have sufficient experience with nuclear technology from which premiums can be accurately related to actual risks, it may be assumed that the premiums are based on their assessment of the risk.<sup>116</sup> In addition, the utility is required to pay a fee to the AEC for its indemnity protection.<sup>117</sup> This fee bears no relationship to assessment of risk.

Thus, a utility contemplating construction and operation of a nuclear power plant may make its profit projections by taking into account as costs of potential public liability the ascertainable insurance premiums and indemnity fee. Moreover, because of Price-Anderson's cut-off of liability at 560 million dollars, it is free of concern about possible liability in excess of the amount covered by insurance and indemnity—even though the possibility exists of liability substantially in excess of 560 million dollars. It should also be noted that Price-Anderson also drastically reduces the deterrent effect of liability as it affects decisions regarding the siting of plants (particularly as they relate to locating plants closer to population centers), cost-cutting measures, and investment in plants with progressively larger power capacity (as capacity increases, more fission products are stored, and the amount of damage that may result from an accident also increases).

The net effect of Price-Anderson is to encourage the industry to make decisions on technological and economic bases without reckon-

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116. In a recent nuclear power licensing proceeding before the AEC, the parties entered into a stipulation which shows that Maine Yankee Atomic Power Company will pay an annual premium of 250,000 dollars for its 95 million dollar public liability insurance and an annual fee of 73,500 dollars for its 465 million dollar AEC indemnity contract. It pays nothing, of course, for the added protection afforded by the cut-off of aggregate liability at 560 million dollars. *Maine Yankee Atomic Power Co., AEC Dkt. No. 50-309, Jt. Ex. 1.*

117. 42 U.S.C. § 2210(f) (1970).

ing with the full social costs that may result in the event of an accident. In other words, in an era in which environmental concern is leading to increased emphasis on internalization of social costs, the effect of Price-Anderson is to externalize these costs.<sup>118</sup> It is not suggested that Price-Anderson provides industry with a license for reckless business decisions in disregard of the public safety. There remain other important economic and noneconomic factors that provide powerful incentives for industry to make nuclear power plants as safe as possible. Moreover, to the extent that reduction of the deterrent effect of liability may represent a compromise of safety, this is counter-balanced by the unusually stringent regulatory program established under the Atomic Energy Act. Yet, AEC regulation is neither a panacea nor a completely effective prophylactic. Human error, miscalculation, and inaccurate predictions as to how systems will function can be just as prevalent among regulators as among those who are regulated.<sup>119</sup> In addition, the very existence of nuclear power plants (AEC regulation is premised on the assumption that nuclear power plants should exist) creates the risk of a catastrophic occurrence through totally unforeseeable circumstances such as the crash of an airplane into the power plant, a combination of human and technological failures, or an act of God.

Perhaps the most substantial public policy issue raised by Price-Anderson relates to the degree of risk that society will be compelled to accept in the name of technological progress. As discussed above, at the time the Price-Anderson Act was adopted, maximum private liability insurance coverage on the order of magnitude of 15 million dollars appeared to be adequate for most American industries.<sup>120</sup> With enactment of Price-Anderson, the maximum coverage avail-

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118. Cf. Katz, *The Function of Tort Liability in Technology Assessment*, 38 U. CIN. L. REV. 587 (1969). Professor Katz regards the trend toward enterprise liability and liability for distinctive risk as desirable in promoting "therapeutic deterrence" which will stimulate enterprise to consider positive and constructive alternatives to hazardous technologies. *Id.* at 607. He regards the Price-Anderson Act as a commendable exemplar that internalizes social costs to the extent that the Act requires licensees to carry insurance protection. Although he seems to recognize that "at least a fraction of the vast social costs of a nuclear incident" is internalized by Price-Anderson, he does not discern that this fraction is so small that the element of therapeutic deterrence is almost wholly eliminated, a fact that is obvious since the net effect of Price-Anderson is to encourage (if not subsidize) nuclear power rather than to deter it. *See id.* at 653-54.

119. "With all the inherent safeguards that can be put into a reactor, there is still no foolproof system. Any system can be defeated by a great enough fool." INTERNATIONAL CONFERENCE ON PEACEFUL USES OF ATOMIC ENERGY, SAFETY ASPECTS OF NUCLEAR REACTORS 136 (C. McCullough ed. 1957). Dr. McCullough was for many years Chairman of the AEC's Advisory Committee on Reactor Safeguards and was a leading authority on nuclear safety. The substance of the sentences quoted above is attributed by Dr. McCullough to Dr. Edward Teller. *Id.* at 166 n.1.

120. *See* text accompanying notes 15-18 *supra*.

able was increased four-fold, and the nuclear industry was still unwilling to proceed with nuclear power without an indemnity commitment and liability cut-off at a figure at least thirty to forty times the amount of the maximum liability insurance previously available. It is fair to infer from this that, with the advent of nuclear power, our society is bearing the risk that a single occurrence in a nuclear power plant could result in destruction thirty to forty times, and perhaps even more, than the maximum previously deemed significant before the advent of nuclear power. If, moreover, one takes into account the possible level of damages estimated in the *Brookhaven Report*,<sup>121</sup> the relevant factor increases another ten-fold. This raises the question whether there is *any* level of potential catastrophe that may result from use of a technology which our society will regard as unacceptably high despite the fact that the technology will yield substantial benefits.

One virtue of the traditional liability and insurance mechanisms is that they promote a relatively slow, step-by-step advance in hazardous technologies and discourage rapid technological advance involving a quantum jump in risk: The prudent businessman will not introduce a technological advance involving substantial potential public liability unless adequate insurance can be obtained at acceptable premium rates; and such insurance becomes available only on a step-by-step basis as the insurance companies' experience and confidence at each level enable them to offer insurance for the next step.<sup>122</sup> Dr. James R. Schlesinger, Chairman of the AEC, has likened the evolution of nuclear power technology since 1954 to compressing the entire history of commercial aviation from Kitty Hawk to the Boeing 747 into less than twenty years.<sup>123</sup> Such an evolution of the aircraft industry could not have come about in so short a time without substantial risk to the public safety, primarily because such rapid growth can come about only through leapfrogging experience.

While such a leapfrogging process in the nuclear power industry has occurred under conditions of stringent AEC regulation, it should be noted that the quality and adequacy of regulation itself are largely a function of experience. It is suggested, therefore, that there may be considerable merit in the normal situation in which the availability of insurance controls, in the first instance, the rate of advance of hazardous technologies. Thus, the initial decision to

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121. See text accompanying note 13 *supra*.

122. Again, it is noted that there is little authority for this analysis other than what the author believes to be sound economic logic. See note 115 *supra*.

123. Address of James R. Schlesinger, Oct. 20, 1971, AEC Press Release, S-21-71.

proceed with the technology is made by private interests as a result of their assessment of prospective revenues and costs (including costs of liability and/or insurance against liability). Unless this assessment process flashes a green light for the technology to be developed and used, there will be no such technological activities to be regulated by the government. In this normal mode government regulation is a supplement to, and not a substitute for, the forces of the marketplace in regulating—usually by controlling and restricting—the technology; and government regulation does not “attach” until after the technology passes the test of the market. In short, therefore, the availability of insurance coverage and the willingness of insurance companies to provide it at feasible rates are probably the best objective index to that level of risk which our society regards as acceptable.

On the other hand, it must be recognized that in many areas the government cannot rely, and has not relied, on the market to provide technological advance. For example, in areas where technological advance is vital for purposes of national defense (such as military technology) or national prestige (such as space technology), the government cannot rely on market forces to produce an adequate rate of technological advance and introduction, but must directly support and procure the development and introduction of these technologies. In recent years, and especially since World War II, government support of technological development has broadened to include many technologies of an essentially commercial character (for example, nuclear power, medicine, saline water conversion, and the supersonic transport). The government's benevolent policy toward nuclear power, as reflected in the Price-Anderson Act, is therefore based on the legislative judgment that this technology is of such vital importance to the public interest that its development and use must be forced at a more rapid rate than the market will permit. Price-Anderson's elimination or reduction of the deterrent effect of liability contributes directly to this objective. Stating this another way, Price-Anderson encourages and permits industry to employ an extremely hazardous technology, fraught with the potential for catastrophe. Because the technology is deemed vital to the public interest, the public is forced to accept the hazard in the same manner as it is forced to pay taxes to further this public interest. Significantly, however, the public is compelled to bear this risk, however remote, which industry itself is not prepared to bear, and is offered only the solace that, if a catastrophic accident in fact occurs, a fund exists to compensate—at least to a substantial extent—the pecuniary losses sustained.

There was, and perhaps still is, an alternative means to meet the public interest requirement for nuclear power that would more clearly distinguish between the public interest and the element of Price-Anderson support for industry's development and use of nuclear power technology for private profit. The original Atomic Energy Act of 1946 contemplated that nuclear power would be developed by the AEC, under a government monopoly, until the time when the technology had been brought to the point of "practical value," at which time the door would be opened to private enterprise. The concept of "practical value" connotes acceptability in the marketplace taking into account *all* anticipated revenues and costs. Perhaps it would have made sense to have continued this policy until the AEC itself had developed the technology to the point at which the risk of public liability became one that private enterprise—utilities, equipment manufacturers, investors, and insurance carriers—would find acceptable. Had this policy been continued, the AEC would presumably have constructed and operated demonstration nuclear power plants only at its relatively isolated sites such as Oak Ridge, Hanford, and Los Alamos. A major accident at such an isolated site might have caused great damage to personnel and property of the AEC and its contractors, but the general public would have been exposed to little risk. When safety had been demonstrated through adequate experience, private enterprise would, it is hoped, have been willing to adopt the proven technology for use in sites closer to population centers.

Such an alternative approach was in fact advocated in the 1950's by Congressman Holifield, a senior member of the Joint Committee on Atomic Energy, who strenuously opposed enactment of the 1954 Act on the theory that private enterprise was not prepared to invest in nuclear power without substantial government subsidies.<sup>124</sup> He similarly opposed enactment of the Price-Anderson Act as a subsidy that would place upon the federal government "an enormous potential liability that could reach several hundred billion dollars."<sup>125</sup> He argued:

In my view this legislation is unnecessary and unwise. If the risks are negligible, as the proponents of the bill contend, there is no reason why the Government should assume potential liabilities of the magnitude indicated above. If the risks are real and substantial, then reactor development programs should continue to be developed under direct Government supervision and control at

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124. See H.R. REP. No. 2181, 83d Cong., 2d Sess. 105-38 (1954).

125. H.R. REP. No. 435, 85th Cong., 1st Sess. 35-40 (1957).

isolated locations, with the continued promise of safety exhibited in the record of Government performance.

Until we can prove by a history of experience in the operation of the new and unproven power reactors (which are now planned) that they are safe mechanisms, we should insist they be located safe distances from populated centers. Congress cannot evade its responsibility for protecting human lives by authorizing huge dollar payments.<sup>126</sup>

The logic of this argument is even more compelling in 1972 with the recognition that there are now twenty-eight operable nuclear power plants in operation in the United States, with an additional 112 under construction or on order and scheduled for completion by 1980,<sup>127</sup> each one of which has the potential for a catastrophic accident.

It is too late today to turn back the clock and eliminate the existing nuclear power plants or to declare a blanket moratorium on the construction of new plants. Perhaps, however, a moratorium could be imposed on the construction and operation of additional plants involving concepts not fully tested, except by the AEC at isolated locations. Such a course of action would provide additional nuclear power with minimum risk.

The authority of the AEC to indemnify licensees of new nuclear power plants will expire in 1977, and it is likely that consideration of another extension will commence in 1974. There is no reason to believe that industry will not press for another ten-year extension of the indemnity authority in its present form. Any such extension will be vigorously contested by the environmental groups that have in recent years mounted an ever-increasing attack on nuclear power. These groups have seized upon the existence of the Price-Anderson Act as a major element in their attack, and, as a matter of elementary logic, Price-Anderson may be regarded as nuclear power's Achilles heel. It is difficult to argue that the affected public should not be deeply concerned about the existence in its backyard of a facility that has such immense potential for destruction that it requires the extraordinary protective umbrella of Price-Anderson. Outright repeal of Price-Anderson would connote that the risks of nuclear power have become manageable, that they are of ordinary proportions, and that they can properly be compared with other types of risks that the public has become accustomed to accepting.

Short of repeal of Price-Anderson, lesser changes could be made

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126. *Id.* at 39-40.

127. AEC Press Release No. P-333, Oct. 17, 1972.

with salutary effects. There is little justification for the present provisions that totally immunize industry from any exposure to liability not covered by insurance or indemnity. At the present time, industry is protected by 95 million dollars in private insurance, 465 million dollars in AEC indemnity, and the absolute cut-off of liability at 560 million dollars. This structure might be altered in one of two ways. Preferably, an industry-liability corridor of perhaps 25 million dollars might be established between the private insurance coverage and the applicability of the indemnity. Thus, for example, if there were public liability in the total amount of 150 million dollars, the first 95 million dollars would be covered by insurance, industry would be responsible for the next 25 million dollars, and the indemnity would cover the remaining 30 million dollars. Alternatively, the 25 million dollar corridor might exist after exhaustion of the 560 million dollar insurance and indemnity but before liability is cut off. Thus, if an accident resulted in 600 million dollars liability, industry would be at risk for 25 million dollars, and the remaining 15 million dollars would be cut off by operation of the Price-Anderson Act. Under either proposal, the amount of the corridor could be increased from time to time to reflect increasing experience and confidence.

These are modest proposals, but would represent a substantial improvement. They would reinstate to some degree the deterrent effect of potential liability. They would, moreover, compel industry to share to some extent the risk presently borne by the public. At the same time, the exposure of industry would be finite and ascertainable, and is a risk that industry should be readily willing to bear after twenty years of pronouncements that the possibility of an accident causing such liability is vanishingly small.

In the past, congressional consideration of the Price-Anderson Act and its amendments has proceeded on the tacit assumption that Price-Anderson is a technical measure necessary for adequate protection of the public interest with respect to a technology that exists and will inevitably grow substantially. The fact that the technology exists and grows only *because of* Price-Anderson has been artfully concealed from public view so that consideration of the indemnity legislation would not trigger public debate as to whether *nuclear power* was needed and whether its risks were acceptable. Moreover, when the 1965 and 1966 amendments to the Price-Anderson Act were enacted, great pains were taken to characterize the risks of nuclear power as minimal. It seems strange and quite disingenuous that in 1966 the Joint Committee should reject explicit statutory



strict liability for nuclear power plants because this "would single out the nuclear industry as one for which extraordinary rules of liability must be devised."<sup>128</sup> After all, the Price-Anderson Act and the 1966 amendments themselves singled out the nuclear industry and created special rules of liability.

Nuclear power, and its associated governmental policies, have always been regarded as unique and as requiring extraordinary public measures. The Price-Anderson Act is perhaps the most extraordinary of these measures. It is remarkable that the atomic energy establishment has been so successful in procuring public acceptance of nuclear power in view of the extraordinary risks of the technology that are so thoroughly and incontrovertibly documented by the mere existence of that Act. It is necessary, however, as nuclear power capacity grows, as nuclear power becomes more commonplace, as concern with environmental values increases, that steps be taken to normalize all aspects of nuclear power. The opportunity exists for some first steps in this direction when Congress considers what should be done when Price-Anderson expires in 1977.

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128. See text accompanying note 87 *supra*.