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Ved P. Nanda

Jeffrey C. Lowe

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Nuclear Weapons and the Ecology: Is International Law Helpless to Address the Problem?*

VED P. NANDA**
JEFFERY C. LOWE***

The purpose of this article is to call attention to the ongoing damage and threat to the ecology of the earth posed by the continued production and deployment of nuclear weapons, to study trends in international and domestic law addressing this serious problem, and to recommend a direction for further development of the law.

I. THE PROBLEM

August, 1990, marked the forty-fifth anniversary of the detonation by the United States of the atomic bombs on Hiroshima and Nagasaki, Japan. That single use opened the eyes of the world to a potential catastrophe more devastating than anything previously imagined, let alone employed to kill human beings. Despite partly successful efforts through conventions to limit the testing[1] and spread[2] of nuclear weapons, they have nevertheless proliferated in size and numbers.[3] Also, an ever-increas-

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** Thompson G. Marsh Professor of Law; Director, International Legal Studies Program, University of Denver College of Law.

*** J.D. Candidate, Spring 1991, University of Denver College of Law.

1. *See* the Limited Test Ban Treaty, Aug. 5, 1963, 14 U.S.T. 1313, T.I.A.S. No. 5433 [hereinafter LTBT]; Threshold Test Ban Treaty, July 3, 1974, United States-Soviet Union, preamble, art. 1, § 1, *reprinted in* 13 I.L.M. 906 (1974) (unratified), 12 U.N. DISARMAMENT Y. B. 155-81 (1987); COMM'N ON INT'L SECURITY & ARMS CONTROL BACKGROUND AND ISSUES 187-223 (1985); B. LALL & P. BRANDES, BANNING NUCLEAR TESTS (1987); N. JOECK & H. YORK, COUNTDOWN ON THE COMPREHENSIVE BAN (1986). *But see* Towell, *Will Fear of Accidental Blasts Torpedo Activists' Plans?*, 48 CONG Q.W. REP. 1733 (June 2, 1990) (discussing recent revelations about currently deployed U.S. warheads that were found to be unsafe).

2. *See* the Nuclear Non-Proliferation Treaty, July 1, 1968, 21 U.S.T. 483, T.I.A.S. No. 6839 [hereinafter NPT]; Antarctic Treaty, Dec. 1, 1959, 12 U.S.T. 794, T.I.A.S. No. 4780, 402 U.N.T.S. 71; Treaty of Tiatelolco (Latin America Nuclear Free Zone Treaty), Feb. 14, 1967, 634 U.N.T.S. 281; M. SHAKER, THE NUCLEAR NON-PROLIFERATION TREATY: ORIGIN AND IMPLEMENTATION 1959-1979 II (1980); U.N. ASS'N OF THE U.S., NUCLEAR PROLIFERATION: TOWARD GLOBAL RESTRAINT (1984); *Preventing the Proliferation of Nuclear Weapons, reprinted in* U.S. Dept. of State, Current Policy No. 631 (1984) (address by the Secretary of State George P. Shultz to the United Nations Association of the United States, Nov. 1, 1984, emphasizing the U.S. policy of trying to prevent acquisition of nuclear weapons by nations that do not already have them).

3. Over 50,000 nuclear weapons now exist throughout the world, amounting to an esti-

ing number of countries not party to the Nuclear Non-Proliferation Treaty of 1968 are thought to possess actual weapons or the capability to produce them.[4] With thousands of nuclear bombs and missiles in existence, the possibility of an accidental detonation in a populated area[5] or a hostile use by one of the superpowers or another country can not be ruled out.

Even if, arguendo, one were to accept the proposition that the manufacture and possession of nuclear weapons are not in violation of international law,[6] one cannot overstate the threat of these weapons; should nuclear weapons ever again be used by one country against another, humanity and the world as we know it will be irrevocably altered, if not completely destroyed.[7]

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mated total yield of some 15,000 megatons— about 5000 times greater than that of all the explosives used in the Second World War. *See Climatic and Other Global Effects of Nuclear War* (Results of a United Nations General Assembly commissioned study), DISARMAMENT, Autumn 1988, at 141; Warner, *Environmental Consequences of Nuclear War*, SCI. & PUB. POL'Y, Feb. 1989, at 53; C. CHANT & I. HOGG, NUCLEAR WAR IN THE 1980'S? (1983).

4. Besides France and China, which have developed and tested nuclear weapons, the known countries include India (whose only nuclear explosion took place underground), Israel, Pakistan, Iraq, Iran, South Africa, Taiwan, Brazil, Argentina and the Republic of Korea. *See* Koplow & Schrag, *Phasing Out Nuclear Weapons Tests*, 25 STAN. J. INT'L L. 207, 209 (1989). The *IAEA Bulletin* periodically updates the list of NPT parties. *See* SCHEINMAN, THE NONPROLIFERATION ROLE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY (1985).

5. *See* THE RISK OF ACCIDENTAL NUCLEAR WAR (A. Demchuck ed. 1987); Natvig, *Nuclear Disarmament and Accidental Nuclear War*, 20 BULL. PEACE PROPOSALS 219 (1989). For an account of past accidents, see Gregory & Edwards, *The Hidden Cost of Deterrence: Nuclear Weapons Accidents 1950-1988*, 20 BULL. PEACE PROPOSALS 3 (1989); Note, *Liability for Damage Caused by the Accidental Operation of a Strategic Defense Initiative System*, 21 CORNELL INT'L L.J. 317 (1988).

6. Of course, the question of nuclear weapons' *legality* is itself an unsettled issue. All too often — especially at the governmental level — they are simply assumed to be legal. Since they were first developed, there has been little serious debate among the ruling elites anywhere about this crucial issue. Moreover, general discussions of subjects such as the environmental effects of war often regard their use as outside the topic's scope. *See, e.g.*, Schafer, *The Relationship Between the International Laws of Armed Conflict and Environmental Protection: The Need to Reevaluate What Types of Conduct are Permissible During Hostilities*, 19 CAL. W. INT'L J. 285 (1989).

However, in assessing the legal constraints society can and should impose on the continued existence of nuclear weapons, one should not gloss over this important matter. Sound arguments can and should be made that they are unacceptable, both morally or ethically, *see, e.g.*, O'Conner, *Just Peace and Just War*, in AMERICAN CATHOLIC COMMITTEE, JUSTICE AND WAR IN THE NUCLEAR AGE 99 (1983) [hereinafter AMERICAN CATHOLIC COMMITTEE], and legally. *See, e.g.*, LAWYERS AND THE NUCLEAR DEBATE (M. Cohen & M. Govin eds. 1988); Green, *Nuclear Weapons and the Law of Armed Conflict*, 17 DEN. J. INT'L & POL'Y 1 (1988); Meyrowitz, *The Opinions of Legal Scholars on the Legal Status of Nuclear Weapons*, 24 STAN. J. INT'L. L. 111 (1987); Boyle, *The Relevance of International Law to the "Paradox" of Nuclear Deterrence*, 80 NW.U. L. REV. 1407 (1986); Weston, *Nuclear Weapons Versus International Law: A Contextual Reassessment*, 28 MCGILL L.J. 542 (1983); Goldblat, *Nuclear War Cannot Be Conducted With Obedience to the Rules of International Law*, 13 BULL. OF PEACE PROPOSALS 317 (1982).

7. *See* U.S. DEP'T OF DEFENSE, THE POTENTIAL EFFECTS OF NUCLEAR WAR ON THE CLI-

Unfortunately, the threat of nuclear weapons extends beyond accidental or deliberate detonation. Our scientific ability to understand the effects of these weapons is increasingly catching up with our ability to build them. We now recognize that our environment — and thus our way of life — is placed in jeopardy by their very existence. We must confront ongoing hazards inherent in the production, deployment, transportation and testing of nuclear warheads and their components; in addition, the problem of processing, disposing of and storing radioactive and nonradioactive wastes dramatically increases year by year.

Dangers related to the transportation and deployment of nuclear arms are illustrated by accidents involving Soviet submarines, gravely threatening the residents and environments of the Baltic and Arctic regions, and the recent revelation of "lost" nuclear missiles from a U.S. destroyer in the Pacific.[8]

Similarly, the transportation of nuclear weapons material places workers and residents living near weapons facilities at grave health risks. Recently, there was a massive federal criminal inquiry into allegations that the U.S. Department of Energy and Rockwell International Company, former operator of the Rocky Flats Weapons facility near Denver, had dumped hazardous wastes illegally and had lied to cover up violations.[9] As of this writing, Rocky Flats remains shut down because of inadequate waste disposal arrangements.[10]

A short time ago, the Natural Resources Defense Council (NRDC) filed a law suit against the U.S. Department of Energy (DOE) demanding that the Department remove the shroud of secrecy surrounding the U.S. nuclear weapons program and prepare one comprehensive environmental impact statement covering all DOE facilities. NRDC based its claims on allegations that DOE had failed to fulfill its responsibilities under the National Environmental Policy Act.[11] The environmental group demanded that DOE "give the public the big picture" concerning nuclear weapons production, waste cleanups, and compliance with federal hazardous waste laws.[12] NRDC had obtained information that over eighty percent of DOE

MATE: A REPORT TO THE U.S. CONGRESS (1985); NUCLEAR WINTER, DETERRENCE AND THE PREVENTION OF NUCLEAR WAR (P. Sederberg ed. 1986); 2 M. HARWELL & T. HUTCHINSON, ENVIRONMENTAL CONSEQUENCES OF NUCLEAR WAR: ECOLOGICAL AND AGRICULTURAL EFFECTS (1985); THE ENVIRONMENTAL EFFECTS OF NUCLEAR WAR (J. London & G. White eds. 1984); STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE, WARFARE IN A FRAGILE WORLD: MILITARY IMPACT ON THE HUMAN ENVIRONMENT (1980) [hereinafter MILITARY IMPACT].

8. *See* N.Y. Times, Apr. 9, 1989, at A20, col. 1; N.Y. Times, Apr. 10, 1989, at A6, col. 6.

9. *See, e.g.*, L.A. Times, June 28, 1989, § 1, at 4, col. 1.

10. *See* N.Y. Times, Mar. 31, 1990, at 26, col. 1.

11. 42 U.S.C. §§ 4321-4370a (1982).

12. *See Environmentalists File Suit Against DOE Seeking Comprehensive Impact Statement*, BUREAU OF NAT'L AFFAIRS, DAILY RPT., DER No. 123, June 28, 1989; Barber, *Lawmakers, Environmental Groups Seek Review of Weapons Plants*, INSIDE ENERGY/ WITH FEDERAL LANDS, Dec. 19, 1988, at 5. *But see* Weinberger v. Catholic Action of Hawaii/Peace Education Project, 454 U.S. 139 (1981) (the Supreme Court held that the Navy is not re-

facilities were not in compliance with federal hazardous waste laws. Several law suits are pending in four states — Washington, Colorado, Nevada and Ohio — brought by workers and neighbors of nuclear weapons plants.[13] The plaintiffs contend that because of released radioactivity they have suffered physical injury, emotional distress and lowered property values.[14]

It is clear that the events at the Rocky Flats plant were not an isolated occurrence. Billions of gallons of radioactive wastes from production of bomb-grade material have been dumped directly or indirectly into the soil and groundwater of the United States.[15] Moreover, hundreds of nuclear waste disposal tanks have been leaking for years.[16] The bill for cleaning up this waste could total over $100 billion.[17] The recent report that radioactivity in the Columbia River from the Hanford nuclear weapons plant might have caused serious health risks to those who drank water and ate fish from the river has renewed concern among Native Americans, some of whom were permanent residents near Hanford and others who, for several years, migrated to the river for a part of each year to fish.[18]

A potential catastrophe is also posed by the danger of concentrated radioactive waste interacting with water and chemicals to form hydrogen and organic vapors which could explode.[19] In the Ural Mountains region of the Soviet Union, a total exclusion zone of about 1000 square kilometers has existed since 1957, almost thirty years before the widely publicized vast contamination and evacuation due to the Chernobyl nuclear

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quired to prepare an EIS because national security precludes the Navy from disclosing whether it has made such a proposal; thus a court does not have the information necessary to require an EIS); Comment, *Weinberger v. Catholic Action of Hawaii/Peace Education Project: Assessing the Environmental Impact of Nuclear Weapons Storage*, 3 VA. J. NAT. RESOURCES L. 335 (1984) [hereinafter *Weinberger*].

13. *See* Schneider, *Nuclear Weapons Plants Face Suits Around the U.S.*, N.Y. Times, Aug. 8, 1990, at A14, col. 1.

14. *See id.*

15. *See* Steele, *Hanford: America's Nuclear Graveyard*, BULL. OF ATOMIC SCIENTISTS, Oct. 1989, at 15; Davis, *Congress Faces Major Decision on Nuclear-Weapons Reactors*, 46 CONG Q. W. REP. 21 (Jan. 2, 1988); Alvarez & Makhijani, *Hidden Legacy of the Arms Race: Radioactive Waste*, TECH. REV., Aug./Sept. 1988, at 42; Montange, *Federal Nuclear Waste Disposal Policy*, 27 NAT. RESOURCES J. 309 (1987); *Cleaning up Nuclear Weapons Facilities May Top $92 Billion*, 12 INT'L ENV'T REV. (BNA) 9 (Jan. 11, 1989) [hereinafter *$92 Billion*]; Finamore, *Regulating Hazardous and Mixed Waste at DOE Nuclear Weapons Facilities: Reversing Decades of Environmental Neglect*, 9 HARV ENVTL. L. REV. 83 (1985); U.S. Gen. Accounting Office, Department of Energy Acting to Control Hazardous Wastes at its Savannah River Nuclear Facilities (Nov. 21, 1984) (GAO/RCED-85-23); *Weinberger, supra*, note 12.

16. *See* Alvarez & Malchijani, *supra* note 15, at 44-46.

17. *See* Alvarez & Makhijani, *supra* note 15, at 51; *See also $92 Billion, supra* note 15, at 9 (putting the estimate at $92 million).

18. *See* Schneider, *Nuclear Complex Threatens Indians*, N.Y. Times, Sep. 3, 1990, at C1, col. 1.

19. *Id.* at 47-48.

reactor explosion.[20] Radionuclide contamination sufficient to visibly affect the genetic and biological processes of plants and animals has left the entire area uninhabitable by humans. This catastrophe was the result of the Kyshtyn accident in which nuclear waste from many years of nuclear processing for military purposes was dispersed over an extensive area.[21]

An additional threat exists in the possibility of earthquakes. The nuclear power plant and disposal facility located on the Savannah River in South Carolina lies only ninety miles from the location of the largest and most destructive earthquake ever recorded in the eastern U.S. It occurred in 1886 and measured eight (8.0) on the Richter scale. The earthquake caused damage as far away as Chicago.[22]

The concerns of non-nuclear nations to possible severe health risks from nuclear testing were dramatically brought to light by Australia and New Zealand when they sued the French in the *Nuclear Test Cases*.[23] Those two countries sought a declaratory judgment that the "carrying out of further atmospheric nuclear weapon tests in the South Pacific Ocean is not consistent with applicable rules of international law,"[24] and asked for a court order to halt such tests. The French argued that "in the absence of ascertained damage attributable to its nuclear experiments, they did not violate any rule of international law . . . ."[25] Because France ceased nuclear testing before the case reached the "merits" phase, the International Court of Justice considered the matter moot and declined to pass on the merits of the case. However, the Court did order interim measures, requesting France to "avoid nuclear tests causing the deposit of radioactive fallout" on the territories of Australia and New Zealand.[26]

Non-nuclear nations are not the only victims of nuclear testing. This fact is well demonstrated by the claims of various U.S. citizens and dependents against their own government for exposure through testing in the states of New York, Nevada and Utah and in the Bikini Atoll.[27] As early as 1969, Ernest J. Sternglass, a professor of radiation physics at the University of Pittsburgh Medical School, reported that there was a direct correlation between the number of excess fetal deaths as a part of live births and the amount of fallout deposits over New York state.[28]

Thus, even a cursory glance at these pressing issues reveals two simple yet important observations. First, the problem of nuclear pollution is

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20. On Chernobyl, *see infra*, notes 55-74 and accompanying text.

21. *See* Z. MEDVEDEV, NUCLEAR DISASTER IN THE URALS (1979). *See also* Trablka, Eyman & Auerbach, *Analysis of the 1957-1958 Soviet Nuclear Accident*, 209 SCI. 345 (1980).

22. Alvarez & Malchijani, *supra* note 15, at 47-48.

23. Australia v. France [1973] I.C.J. 99, 135.

24. *Id.* at 100.

25. *Id.* at 105.

26. *Id.* at 106, 142.

27. *See, e.g.*, P. FRADKIN, FALLOUT — AN AMERICAN NUCLEAR TRAGEDY (1989).

28. Sternglass, *Infant Mortality and Nuclear Tests*, BULL. ATOMIC SCIENTISTS, Apr. 1969, at 18.

global in nature. Consequently, there is a definite need to address the ecological risks from a similar perspective. Secondly, these risks are inherent in nuclear technology, whether employed for peaceful or nonpeaceful purposes.[29] In this respect, the nuclear accidents that have exposed the world to the danger of nuclear radiation, as at Three-Mile Island and Chernobyl, can be viewed as a barometer of the hazards present at production facilities in nuclear arsenals or in nuclear-powered submarines, satellites, etc.

Precise standards for controlling polluting activities at the international level are currently lacking, particularly in the context of environmental liability; indeed, in many instances, the same holds true even within countries. Practically speaking, despite increasing recognition of the many problems and their global dimensions, the various international agreements and declarations do not elucidate an international consensus on the issue of liability for transboundary harm.

Yet international law does contain evidence of rules that, if applied, would impose liability on an offending state for transboundary ecological damage. The traditional legal principle *sic utere tuo ut alienum non laedas*, that a "state may not legitimately permit its territory to be used in ways directly injurious to another state," characterizes this claim.[30] This maxim has been adopted in several resolutions and declarations, including the 1972 Stockholm Declaration on the Human Environment,[31] as well as important decisions of international tribunals. These include the

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29. *See, e.g.*, Miatello, *International Responsibility for the use of Nuclear Energy*, in UNITED NATIONS CODIFICATION OF STATE RESPONSIBILITY 287 (M. Spinedi & B. Simma eds. 1987); Curlee, *Regulation of Radiation and Radioactive Materials*, 31 A.F. L. REV. 69 (1989); Handl, *Transboundary Nuclear Accidents: The Post-Chernobyl Multilateral Legislative Agenda*, 15 ECOLOGY L. Q. 203 (1988); Levy, *International Law and the Chernobyl Accident: Reflections on an Important But Imperfect System*, 36 KAN. L. REV. 81 (1987); Finamore, *supra* note 15; Note, *Compensating Damage Arising from Global Nuclear Accidents: The Chernobyl Situation*, 10 LOY. L.A. INT'L & COMP. L.J. 197 (1988) [hereinafter *Compensating Damage]*; Note, *After Chernobyl: Liability for Nuclear Accidents Under International Law*, 25 COLUM. J. TRANSNAT'L L. 647 (1987) [hereinafter *After Chernobyl*].

30. *See* Caldwell, *Concepts in Development of International Environmental Practice*, in INTERNATIONAL ENVIRONMENTAL LAW 12, 22 (L. Teclaff & A. Utton eds. 1974); Levy, *supra* note 29, at 99-100.

31. Stockholm Declaration on the Human Environment, Principle 21, in Report of the United Nations Conference on the Human Environment, June 5, 1972, U.N. Doc. A/CONF. 48/14 at 2-65 and Corr. 1 (1972) [hereinafter Stockholm Declaration], *reprinted in* 11 I.L.M. 1416, 1420 (1972). *See also* General Assembly Resolution 2996 (XXVII) of Dec. 15, 1972 which confirms the legal significance of Principle 21, 14 U.N. GAOR A/8730 at 278, U.N. Doc. A/CONF 4816 (1972). As early as 1961, by Resolution 1629 (XVI), the U.N. General Assembly declared:

> The fundamental principles of international law impose a responsibility on all states concerning actions which might have harmful biological consequences for the existing and future generations of peoples of other states, by increasing the levels of radioactive fallout.

16 U.N. GAOR (1043 Plenary Meeting) at 505-7, U.N. Doc. A/PV.1043 (1961). The resolution was passed by a vote of 74 in favor, 0 against and 17 abstentions.

Trail Smelter Arbitration[32] between the United States and Canada which explicitly recognized the principle of state responsibility for transboundary environmental damage:

> [N]o State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence.[33]

Many writers have accepted this formulation as a rule of customary international law.[34]

Additionally, although it did not involve environmental harm, the International Court of Justice's (ICJ) decision in the *Corfu Channel (U.K. v. Albania.)* case[35] is cited by scholars in support of holding states liable for damages caused by transboundary pollution.[36] The ICJ in *Corfu Channel* held Albania liable for damage to British warships and loss of life caused by mines located in Albanian waters. In the words of the Court, liability was founded "on certain general and well recognized principles, namely . . . every State's obligation not to allow, knowingly, its territory to be used for acts contrary to the rights of other States."[37]

From an ecological perspective, the use of nuclear material magnifies the threat of uncompensated harm as well as the lack of a definite solution. As Professor Jenks stated relatively early,

> the potential hazards of nuclear accidents and contamination are so much more dramatic than the hazards of aviation and the older forms of pollution that they have given a new impetus to international action concerning ultra-hazardous liability.[38]

The need remains especially urgent to further develop and apply legal principles to the threat of transboundary radioactive pollution. Na-

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32. Trail Smelter Arbitration (U.S. v. Canada), 3 R. INT'L ARB. AWARDS 1911 (1938); 3 R. INT'L ARB. AWARDS 1938 (1941).

33. 3 R. INT'L ARB. AWARDS 1938, 1965 (1941).

34. *See,e.g.*, Sands, *Introduction — Transboundary Nuclear Pollution: International Legal Issues*, in CHERNOBYL LAW AND COMMUNICATION 1, 11 (P. Sands ed. 1988) [hereinafter LAW AND COMMUNICATION]; Kirgis, *Technological Challenge of the Shared Environment: U.S. Practice*, 66 AM. J. INT'L L. 291 (1974).

35. Corfu Channel Case (United Kingdom v. Albania) [1949] I.C.J. 4. Indeed, these same decisions arguably support the position that strict liability should be the applicable standard of care. *See infra*, notes 44-47 and accompanying text.

36. *See, e.g.*, A. SPRINGER, THE INTERNATIONAL LAW OF POLLUTION 133 (1983); J. BARROS & D. JOHNSTON, THE INTERNATIONAL LAW OF POLLUTION 69 (1974) [hereinafter Barros]; Goldie, *International Principles of Responsibility for Pollution*, 9 COLUM. J. TRANSNAT'L L. 283, 306 (1970).

37. Corfu Channel Case, [1949] I.C.J. at 22.

38. Jenks, *Liability for Ultra-Hazardous Activities in International Law*, 117 RECUEIL DES COURS 106 (1966), *quoted in* Silva, *Pending Problems on International Law of the Environment*, in ACADAMIE DE DROIT INTERNATIONAL: THE FUTURE OF THE INTERNATIONAL LAW OF THE ENVIRONMENT 217, 222 (R. Dupuy ed. 1984).

tions and legal scholars must strive to objectively define specific, acceptable limits within which countries may legally conduct their nuclear production programs, whether for peaceful purposes or — until such time as it is held illegal under international law — for the manufacture of weapons. This initiative must be conducted at both the domestic and international levels. In so doing, states must arrive at a collective understanding of what standard liability can most fairly be apportioned in the event of a nuclear accident involving transboundary ecological damage. It is the position of this paper that such liability must be imposed on a strict basis without regard to fault or circumstances, and that producing states must be responsible for insuring that victims receive compensation.

To date, governments of both developing[39] and developed countries have resisted attempts to establish strict or absolute[40] liability as a formal concept of state responsibility. This is due in part to the fact that, politically, the very issue of liability is an extremely sensitive subject. Sovereign states traditionally object to the idea of assigning liability without precisely determining fault. To the political realist participating in international relations, accepting strict liability as a standard of compensation implies foregoing legal control over vital economic activities within the country's respective territory. Attesting to this continuing political quandary is the lack of substantive progress thus far on the part of the United Nations International Law Commission (ILC) in its work on "international liability for injurious consequences arising out of acts not prohibited by international law."[41] Moreover, the secrecy inherent in the military context of nuclear weapons only complicates the matter further.

Another reason offered against making strict liability the standard for compensation has been the practical difficulties foreseen in fairly assessing causation and economic costs, including mitigation and reparation efforts by victims following a nuclear accident.[42] The recent tragedy at

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39. On the attitudes of developing countries, see Biswas, *Environment and Law: A Perspective From Developing Countries*, in *id.* at 389.

40. Both "strict" and "absolute" can be used to indicate a "no-fault" liability standard. "Absolute liability" is often used to indicate a standard for which there can be no defenses, whereas "strict liability" permits such defenses or qualifications. *See, e.g.*, Goldie, *Development of an International Environmental Law*, in LAW, INSTITUTIONS AND THE GLOBAL ENVIRONMENT 104, 133-34 (J. Hargrove ed. 1972). Herein, no distinction is made between the two chiefly because that is the practice followed in many multilateral treaties purporting to establish a standard of care for transboundary harm from pollution. *See, e.g.*, Paris Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, art. 1, 956 U.N.T.S. 251, discussed *infra* notes 146-156 and accompanying text.

41. *See Report of the International Law Commission on the Work of its Thirty-Ninth Session*, 42 U.N. GAOR Supp. (No. 10) at 89, U.N.Doc. A/42/10 (1987) [hereinafter 1987 ILC Report]; Mcgraw, *Transboundary Harm: The International Law Commission's Study of "International Liability,"* 80 AM. J. INT'L L. 305 (1986). *See also infra* notes 117-34 and accompanying text.

42. *See* Handl, *supra* note 29, at 242-47; Pelzer, *Current Problems of Nuclear Liability Law in the Post-Chernobyl Period: A German Standpoint*, 39 NUCLEAR L. BULL. 66 (1987).

Chernobyl underscored and, in a negative sense, validated this assertion.[43] The responsible government, the Soviet Union, refused to pay compensation for transboundary radiation injuries, arguing there was no legal basis for imposing liability.[44]

The argument has been made[45] that in fact international law does provide the basis for holding states strictly liable in this situation based on the principles of such cases as the *Trail Smelter Arbitration*,[46] the *Corfu Channel* case,[47] and others such as the *Lake Lanoux Arbitration*.[48] Whether a court would hold this to be the case cannot be said. However, as the development of technology and the interdependence of the world expands, nations are increasingly forced to confront the consequences of other nations' actions.[49] The time is perhaps drawing near when international law will formally adopt a concept of true state responsibility.

II. NUCLEAR POLLUTION — INTERNATIONAL RESPONSES

Pollution is an international problem. Increasingly, it demands attention at an international level. However, although it is developing rapidly,[50] the law of international environmental regulation is a relatively young field. Such is indeed the case with the regulation of nuclear pollution. Not until recently did widespread appreciation develop for the "intrinsically international" dimension of the hazards associated with nuclear power operations.[51] Work had long been underway at the United Nations and within regional organizations to institute standards and to provide a coherent regulatory framework for the safe operation of national nuclear power installations. But unfortunately, it was not until the 1986 nuclear reactor explosion at Chernobyl in the Soviet Union[52] that

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43. On Chernobyl, see *infra* notes 55-74 and accompanying text.

44. *See, e.g.*, Handl, *supra* note 29, at 223 and authorities cited; Pincus, *Chernobyl is Focus of IAEA Session; Political Maneuvering May Threaten Environmental Moves*, Wash. Post, Sept. 30, 1986, at A22, col. 1.

45. *See, e.g.*, J. SCHEIDER, WORLD PUBLIC ORDER OF THE ENVIRONMENT: TOWARD AN INTERNATIONAL ECOLOGICAL LAW AND ORGANIZATION 168-71 (1979); Handl, *The Environment: International Rights and Responsibilities*, 74 PROC. AM. SOC'Y INT'L L. 223 (1980); Goldie, *supra* note 36, at 306.

46. Trail Smelter Arbitration, 3 R. INT'L ARB. AWARDS 1911 (1938); 3 R. INT'L ARB. AWARDS 1938 (1941).

47. Corfu Channel Case [1949] I.C.J. at 4.

48. Lake Lanoux Arbitration (Spain v. France), 12 R. INT'L ARB. AWARDS 281 (1957).

49. *See* Barnes, *The Growing International Dimension to Environmental Issues*, 13 COLUM. J. ENVTL. L. 389 (1988) (Deputy Administrator of the U.S. Environmental Protection Agency emphasizing global interdependence).

50. *See, e.g.*, Nanda, *Trends in International Environmental Law*, 20 CAL. W. INT'L L. J. 187 (1990); Nanda, *The Establishment of International Standards for Transnational Environmental Injury*, 60 IOWA L. REV. 1089 (1975) [hereinafter *International Standards*].

51. *See* Handl, *supra* note 29, at 203.

52. For examples of the vast literature already available on the Chernobyl incident, see Z. MEDVEDEV, THE LEGACY OF CHERNOBYL (1990); Handl, *supra* note 29; Levy, *supra* note 29; *Compensating Damage*, *supra* note 29; *After Chernobyl*, *supra* note 29; Chaze, *Chernobyl's Fiery Story Emerges*, U.S. NEWS & WORLD REP., May 19, 1986, at 23; Trafford & Wellborn,

the international community truly recognized just how easily an unintentional release of radiation could have a dramatic physical impact on much of the rest of the world. Almost immediately, governments began a concerted effort to determine, first, how the use of nuclear material could be made safer in order to avoid accidental transboundary harm and, second, how to assure if possible that when accidents do occur in the future, those outside countries suffering harm are compensated. Following Chernobyl, in the words of one analyst, "[p]eople the world over realized that national boundaries are chimerical in an age of nuclear power production."[53]

A. *Chernobyl and Its Ecological Impact*

On April 26, 1986, a runaway chain-reaction of uranium-235 occurred in reactor number four at the Chernobyl nuclear plant in the Soviet Union. This caused what, in effect, was a slow nuclear explosion so powerful that it destroyed the reactor instantly, blowing its roof off and emitting a cloud of lethal, radioactive contaminants.[54] Within thirty-six hours, more than 100,000 people had been evacuated from a radius of some twenty miles around the reactor,[55] and eventually over 130,000 people in the USSR had to be relocated.[56] The direct, physical effects of the explosion began spreading immediately. Two workers died instantly and over 30 others died in the following weeks. The hot debris of the Chernobyl reactor covered an area of more than 5000 square kilometers with nearly twenty million radionuclides, "making human life impossible."[57] The cloud of radioactive residue spread over much of the northern hemisphere, creating areas of serious radioactive contamination in Sweden, Germany, Northern Italy, Poland, Austria, Yugoslavia, Greece and many other countries.[58]

Although the only people held openly responsible for the accident in the Soviet Union were local plant officials and engineers, the onus of responsibility must in reality rest upon the Soviet government. Operators at the plant did indeed make mistakes, but accounts of the accident and

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Stark Fallout from Chernobyl, U.S. NEWS & WORLD REP., May 12, 1986, at 20.

53. Handl, *supra* note 29, at 203. The two nuclear reactor accidents that received widespread publicity prior to Chernobyl occurred at the Windscale nuclear power plant in the United Kingdom in October, 1957, and at the Three Mile Island plant in the U.S. in March, 1979, both of which released small amounts of radiation. *See* Highton, *The Legal Aspects of the Development of Atomic Energy in the United Kingdom*, 12 VAND. L. REV. 223 (1958); S. AVIEL, THE POLITICS OF NUCLEAR ENERGY 75-112 (1982). According to one author, more than 10,000 reactor accidents have occurred in the rest of the world since 1942, but Chernobyl was only "the first nuclear accident in the Soviet Union that Soviet officials eventually reported to the rest of the world." Medvedev, *supra* note 52, at x.

54. *See Ukrainian Nuclear Fire Spreads Wide Tragedy With Radioactive Cloud*, Wall St. J., Apr. 30, 1986, at 1, col. 6 [hereinafter *Ukrainian Nuclear Fire*].

55. Sands, *supra* note 34, at 2.

56. Medvedev, *supra* note 52, at 75.

57. *Id.* at 20.

58. *Id. See also* Anspaugh, Catlin & Golfman, *The Global Impact of the Chernobyl Reactor Accident*, 242 SCI. 1513 (1988).

events leading up to it reveal basic design flaws in the reactor and apparent negligence and inefficiencies at the highest government levels.[59] An investigation of the accident by the International Atomic Energy Agency (IAEA)[60] which concluded with a conference in Vienna in August, 1986, pointed to the fact that on the night of the explosion a test of the reactor's turbogenerators was being performed by inexperienced and incompetent technicians. The timing of the tests combined with the critical design flaws of that type of Soviet reactor (now discontinued) "exacerbated the errors made by the operators and transformed a serious accident into a disaster."[61]

The Soviet government also failed its obvious responsibility to report the occurrence to surrounding countries and the international media in the hours and days immediately following the accident. In the beginning, the Soviets were completely silent regarding the incident. Only satellite photos[62] and, as soon as one day later, significant increases in radioactivity levels in Denmark, Finland and Poland told the world what had happened.[63] Not until some seventy-two hours later did the Soviet representative to the IAEA officially inform the IAEA's director that the accident had occurred.[64] Thereafter, upon realizing the international and political consequences attached to the accident and the attempted cover-up as well as its own responsibility, the USSR began making information widely available on its clean-up activities and the radiation levels at and near the Chernobyl site.[65]

The Chernobyl accident resulted in billions of dollars in economic damages to human beings and the ecology in both the Soviet Union and

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59. *See* MEDVEDEV, *supra* note 52, at 20-26, *citing* INTERNATIONAL NUCLEAR SAFETY ADVISORY GROUP (INSAG), SUMMARY REPORT ON THE POST-ACCIDENT REVIEW MEETING ON THE CHERNOBYL ACCIDENT, International Atomic Energy Agency, Safety Series No. 75-INSAG-1-STI/PUB/740 (1987). *See also* N.Y. Times, Aug. 16, 1986, at 1, col. 2; and Sands, *supra* note 34, at 4.

60. The IAEA is an international organization established as part of the United Nations in 1957 to promote and provide regulatory standards for the peaceful use of nuclear energy. The agency also provides institutional guidance in arms reduction and the control of nuclear proliferation. *See, e.g.*, P. SZASZ, THE LAW AND PRACTICE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY (1970). Its membership consists of industrialized and developing countries as well as countries with centralized economies. *See* Reyners & Lellouche, *Regulation and Control by International Organizations in the Context of a Nuclear Accident: The International Atomic Energy Agency and the OECD Nuclear Energy Agency*, in NUCLEAR ENERGY LAW AFTER CHERNOBYL 1 (P. Cameron, L. Hancher & W. Kuhn eds. 1988) [hereinafter LAW AFTER CHERNOBYL]. *See* discussion, *infra* notes 128-140.

61. Medvedev, *supra* note 52, at 20.

62. *See Ukrainian Nuclear Fire*, *supra* note 54, at 24.

63. *See* Salo, *Information Exchange After Chernobyl*, 28 IAEA BULL. 18 (1986). Subsequently, increased radiation levels were observed, *inter alia*, in Austria, German Democratic Republic, Hungary, Italy, Norway, Yugoslavia (April 29), France (May 1), Belgium, Greece, Netherlands, United Kingdom (May 2), and Iceland (May 7). Low-level increases were also detected in Japan and the United States. Sands, *supra* note 34, at 1.

64. Sands, *supra* note 34, at 1.

65. *Id.* at 3-4.

far beyond. From 1986 to 1989, 9.2 billion rubles ($15.4 billion at the official exchange rate) were spent cleaning up.[66] The Soviet parliament recently appropriated 16 billion rubles to continue the work and to address medical emergency needs, and the republic Byelorussia is asking for another 17 billion rubles to rehouse displaced residents and continue cleaning up.[67]

Moreover, the ecological impact of Chernobyl is unequaled in size or scale, excluding only perhaps the bombed Japanese cities of Nagasaki and Hiroshima. Pine trees surrounding the station died within a few days; 400 hectares of pine forest died in all. Leafy trees such as birch and oak only survived the first year.[68] As a result of the disaster, approximately 130,000 people had to be permanently resettled, along with the Soviet-documented, intensive decontamination of more than 780 "population centers," usually villages and small towns throughout 1986 and 1987.[69] It was necessary to create an extensive fenced exclusion zone which included 5000 square kilometers of land considered heavily contaminated.[70] Besides this exclusion zone, the Soviet government undertook a large-scale decontamination program which included removal of vast amounts of topsoil, the destruction of forests and bushland, and the construction of dams to ensure the hydrological isolation of the most contaminated areas.[71] Regarding the earth's natural ecological dispersion capacity, one Soviet academician was quoted as stating:

> In nature there is a mighty process of dilution and dispersion of radionuclides and this saved us . . . . I am referring to the trees, earth and the water of the Kiev reservoir which received and absorbed the main ejection of radioactivity. How many times have we cursed the Kiev reservoir . . . in this situation, however, it turned out to be very useful, absorbing part of the radionuclides in its silt which then settled on the bottom of the lake . . . . [W]e hope that . . . dilution of the radionuclides to an insignificant concentration will take place.[72]

The entire extent of Chernobyl's ecological impact will not be known for years, if ever; but its ramifications for the international legal community have already begun to be apparent.

B. *The Legal Implications of Chernobyl*

Chernobyl revealed a world unprepared for a nuclear disaster. As noted above, the extent of transboundary effects exceeded virtually all previous predictions. The Soviet government has refused to compensate

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66. Worrel, *Chernobyl Still a Tragedy — and a Living Laboratory*, Christ. Sci. Mon., July 24, 1990, at 10-11.
67. *Id.*
68. Medvedev, *supra* note 52, at 89.
69. *Id.* at 91.
70. *Id.* at 81-82.
71. *Id.* at 89-103.
72. *Id.* at 95.

injured parties outside its own national borders, contending that no international mechanism exists for determining liability for nuclear accidents. As the world community reacted to the Soviet accident, several questions related to these issues immediately arose. First, are states obligated under international law to prevent transboundary nuclear releases? If so, what standard of care must states adhere to in order to avoid a nuclear accident? And, if an obligation does exist and an accident occurs causing transboundary harm, is the state liable to make reparations for such damage, and to what extent?

Contrary to the Soviet government's assertion, a sound argument can be made to the effect that once the Chernobyl accident occurred, the Soviets were liable under general principles of international law to compensate injured victims.[73] However, prior to Chernobyl (as well as other nuclear mishaps) no comprehensive and binding legal procedure existed under international law to govern states' use and misuse of nuclear power. What was lacking, and remains lacking today, is a multilateral treaty codifying customary international law and imposing liability directly on states for nuclear accidents causing damage outside their individual boundaries. Without such a direct, affirmative statement of law to which the Soviet Union is a party, it is extremely unlikely that they will ever agree to compensate other states for the damage cause by Chernobyl.[74] Several multilateral conventions do address the issue of liability. These include the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy[75] and the Vienna Convention on Civil Liability for Nuclear Damage.[76] However, the U.S.S.R. is not a party to either,[77] and both

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73. The evidence in favor of this assertion is certainly not conclusive. However, many scholars point to the significant number of incidents in which compensation has been made for transboundary pollution damage, including that caused by nuclear weapons testing. One such instance was the United States payment to Japan for damage caused by U.S. weapons testing in the Pacific. Agreement on Personal and Property Damage Claims, Jan. 4, 1955, United States-Japan, 6 U.S.T. 1, T.I.A.S. No. 3160. Although the U.S. did not admit liability, payment of compensation does help create the expectation that a state is responsible for such conduct if it results in injury or environmental damage. *See* Margolis, *The Hydrogen Bomb Experiments and International Law*, 64 YALE L.J. 629, 637-39 (1955); *see generally International Standards*, *supra* note 50, at 1093-1101. Moreover, as discussed, many have interpreted judicial and arbitral decisions and international declarations as recognizing the obligation to refrain from transboundary harm and to make appropriate reparation under general principles of legal responsibility, *supra* notes 29-46 and accompanying text. *See, e.g.*, Sands, *supra* note 34, at 11-15; Handl, *supra* note 29; Springer, *supra* note 36, at 130-140; Kirgis, *supra* note 34; Barros, *supra* note 36, at 68-70.

74. The Soviet Union has traditionally reserved the right not to recognize particular customary norms offered as international law. *See* Levy, *supra* note 29, at 87-88.

75. Paris Convention on Third Party Liability in the Field of Nuclear Energy, Jul. 29, 1960, 956 U.N.T.S. 251 (1974) (entered into force April 1, 1968) [hereinafter Paris Convention], *reprinted in* 55 AM. J. INT'L L. 1082 (1961). *See* discussion *infra* notes 150-161.

76. Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, 1063 U.N.T.S. 265 (1985) [hereinafter Vienna Convention], *reprinted in* LAW AND COMMUNICATION, *supra* note 34, at 96. *See infra* notes 150-161.

77. The Soviet Union is a party to the Convention on Long-Range Transboundary Air

create liability only for operators of nuclear plants and not states.[78] Combined with the relatively limited number of international agreements concerning transboundary air pollution in general and the current lack of a definite consensus as to the proper standard of state liability, these circumstances caution against seriously arguing that the U.S.S.R. is obligated to compensate the many victims of Chernobyl.

However, this fact only strengthens the argument that a formal, multilateral agreement is desparately needed that could be accepted by all of the world's nuclear weapons producing states as well as those employing nuclear energy.

The world community's swift response to the legal implications of Chernobyl is at least a positive sign in this direction. The Soviet government has itself acted to improve the situation. While still not admitting that the accident was due to design or operation flaws, it has instituted measures to improve the safety of reactors similar to those at Chernobyl, in addition to the assistance provided toward gathering important information on the global effects of the tragedy.[79] Also the USSR recently put forward a proposal entitled the Proposed Programme for Establishing an International Regime for the Safe Development of Nuclear Energy.[80] Therein, the Soviets proposed establishing a comprehensive international regime for the peaceful uses of nuclear energy.[81] They explicitly recognized the importance of the question of liability to the establishment of such a regime, and they suggested that a possible multilateral international legal instrument could be drawn up to deal with this issue.[82] Specifically, the proposal states:

> The question of liability for nuclear damage occupies an important place in activities relating to the international regulation of various aspects of nuclear power safety . . . . A possible multilateral international legal instrument could envisage the liability of States for international damage in terms of the transboundary effects of nuclear accidents, as well as for material, moral and political damage caused by unwarranted action taken under the pretext of protection against the consequences of nuclear accidents (the spreading of untrue information, introduction of unjustified restrictive measures, etc.).[83]

The conclusion to this statement can be taken as an express indicator of

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Pollution, Nov. 13, 1979, ____U.S.T.____, T.I.A.S. No. 10,541, *reprinted in* 18 I.L.M. 1442 (1979); however this agreement does not obligate states to compensate for injuries resulting from transboundary pollution.

78. By providing only for private operator liability, these treaties exclude states from responsibility and permit only relatively limited monetary compenasation. For a brief discussion of these limitations, see *infra* notes 150-161.

79. *See* Sands, *supra* note 34, at 4.

80. IAEA Doc. GC(SPL.1)/8, *reprinted in* LAW AND COMMUNICATION, *supra*, note 34, at 227.

81. *Id.* at 230.

82. *Id.* at 232-33.

83. *Id.*

the difficulty involved in assigning fault following an accident such as Chernobyl. While the Soviets are willing to admit the need to allocate liability prior to a nuclear accident, they refuse to accept full accountability for the damages claimed as a result of Chernobyl.[84] Nor, realistically, could any more be expected of any other country.

Also important are two conventions resulting directly from the aftermath of Chernobyl. Derived from a proposal by the IAEA Board of Governors convened shortly after the accident,[85] the Vienna Convention on Early Notification of a Nuclear Accident[86] and the Vienna Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency,[87] focus on mitigating the effects of nuclear accidents. Both were adopted in 1986 and soon entered into force. While the conventions do not resolve every issue, their rapid adoption emphasizes the international community's immediate recognition of the seriousness of Chernobyl and of the need for unified global attention to the risks posed by transboundary nuclear incidents.[88]

III. NUCLEAR POLLUTION — U.S. DOMESTIC REGULATION

The United States employs a complex regulatory system for controlling the various aspects of nuclear production. The primary mechanism for regulating radioactive materials and radiation in this country is the Atomic Energy Act of 1954 (AEA), as amended,[89] and its complimentary regulatory program. The AEA regulatory structure includes the Nuclear Regulatory Commission (NRC) which regulates specified materials and persons. The Department of Energy is in charge of the production of nuclear fuel and reactor-produced isotopes, the promotion of nuclear energy, and the production of nuclear weapons. The NRC promulgates regulations governing the possession, storage, use and manufacture of nuclear

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84. In fact, the Soviets are said to favor "establishing a new convention on State liability under public international law." Pelzer, *Concepts of Nuclear Liability Revisited: A Post-Chernobyl Assessment of the Paris and the Vienna Conventions*, in LAW AFTER CHERNOBYL, *supra* note 60, at 97, 114.

85. *See* Statement Summarizing Decisions Taken at the Special Session of the Board of Governors Concerning the Chernobyl Nuclear Accident, May 22, 1986, 25 I.L.M. 1009 (1986).

86. Convention on Early Notification of a Nuclear Accident, IAEA Doc. GC(SPL.1)/2. Annex II, [hereinafter Early Notification Convention], *reprinted in* 25 I.L.M. 1370 (1986) and LAW AND COMMUNICATION, *supra* note 34, at 236.

87. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, IAEA Doc. GC(SPL.1)/2, Annex III [hereinafter Assistance Convention], *reprinted in* 25 I.L.M. 1377 (1986) and LAW AND COMMUNICATION, *supra* note 34, at 262 .

88. *See infra* notes 143-46 and accompanying text.

89. 42 U.S.C. §§ 2011-2096 (1982). The Atomic Energy Act of 1954 remains the basis for the current statutory law regarding the majority of regulated nuclear energy and radioactivity issues. *See* Curlee, *supra* note 29, at 76-78. The 1954 Act replaced the Atomic Energy Act of 1946, Pub. L. No. 79-555, 60 Stat. 755. *See id.* at 76; *see also* S. REP. No. 1699, 83d Cong., 2d Sess. (1954), *reprinted in* 1954 U.S. CODE CONG. & ADMIN. NEWS 3456-59.

materials and devices that contain these materials.[90]

DOE and its predecessor agencies formerly received authority from the Atomic Energy Act and subsequent agency statutes[91] for managing the government nuclear program's hazardous waste and hazardous waste mixed with radioactive materials as well as purely radioactive materials.[92] These Acts, however, provided no practical guidelines or standards for waste disposal. Thus, for more than forty years, DOE and its predecessor agencies have been generating millions of gallons of hazardous waste and mixed waste with little or no real regulatory control.[93]

In 1976, the United States passed the Resource Conservation and Recovery Act (RCRA),[94] this country's most comprehensive federal hazardous waste law to date. RCRA specifically applies to federal facilities. Section 6001 of the Act apparently waives sovereign immunity, subjecting federal facilities to state and local requirements for hazardous and mixed waste management.[95] Yet even though RCRA requires federal agencies to comply with all federal, state, regional and local requirements respecting hazardous and mixed waste disposal,[96] "[s]ince 1976, DOE has continually attempted to avoid full compliance with" the Act.[97]

This outline of the U.S. experience is far from complete. It does indicate the difficulty involved in trying to effectively regulate the production and disposition of nuclear weapons and their byproducts — a difficulty that is only compounded by the reluctance of governmental agencies such as the DOE to comply with broader interpretations of domestic legislation. But recent developments in United States law such as RCRA reflect an enhanced public and Congressional sensitivity to environmental conditions. With respect to regulation of the nuclear weapons industry, this increased concern translates into demands that more rigorous controls be applied and that they be strictly enforced. The call is often raised in this country that the known and suspected environmental hazards of nuclear weapons and the arms race require that further production, testing and deployment cease altogether, or that there at least be serious unilateral

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90. *See* Curlee, *supra* note 29, at 76.

91. *See* The Energy Reorganization Act of 1974, 42 U.S.C. §§ 5801-5891 (1982); Department of Energy Organization Act, Pub. L. No. 95-91, 91 Stat. 565 (Aug. 4, 1977) (codified at 42 U.S.C. §§ 7101-7352 and scattered sections in 3, 5, 7, 12 and 15 U.S.C.) (1982)).

92. The disposal of "high-level radioactive waste" is legislatively controlled by the Nuclear Waste Policy Act of 1982 (NWPA), 42 U.S.C. §§ 10101-10226 (1982); *see* Davenport, *The Law of High-Level Nuclear Waste*, 53 TENN. L. REV. 481(1986). The NWPA does not apply to DOE high-level waste, unless that waste is disposed of in a repository containing commercial waste. 42 U.S.C. § 10107(b) & (c). *See* Montange, *supra* note 15, at 377-80.

93. *See* Finamore, *supra* note 15; Curlee, *supra* note 29; Legal Envtl. Assistance Found. (LEAF) v. Hodel, 586 F. Supp. 1163 (E.D. Tenn. 1984) (the court held that DOE was not exempt from RCRA coverage).

94. 42 U.S.C. §§ 6901-6987 (1982).

95. *See* Finamore, *supra* note 15, at 92.

96. 42 U.S.C. § 6961 (1982).

97. Finamore, *supra* note 15, at 86.

cuts. Whether such demands will prove in any way successful remains to be seen. As superpower tensions continue to ease, the promise grows more favorable that either the U.S. or the U.S.S.R. or both will take just such a step.

What this review of recent U.S. developments also indicates is that perhaps the most practical approach to nuclear waste is to design similar legislation and rules applicable to both nuclear weapons production and to the broader field of nuclear energy. Indeed, it would hardly seem desirable to do otherwise. Although domestic regulation does distinguish between the two for military purposes and private, commercial purposes, the environmental goals sought to be achieved are virtually identical. Obviously, both produce similar waste materials. Both have been developed simultaneously, and both pose equally dangerous production and transportation hazards. The approach under international law is substantially the same.

IV. APPLICABLE INTERNATIONAL ENVIRONMENTAL LAW

A considerable portion of the international community continues to oppose nuclear weapons.[98] However, as long as nuclear nations continue to perceive them as a deterrent to attack (as well as a retaliation), their legal status under international law will remain an issue of conceptual discussion at best.[99]

But this fact has not deterred the United Nations and the international community from attempting to codify a recognized body of law to prevent nuclear accidents and to assure some degree of compensation for transboundary injuries in the event an accident occurs. Indeed, as noted above, this effort has recently gained in interest and impetus.

Formal international regulation of the environmental effects of nuclear weapons, like domestic legislation in the U.S., is intricately tied to the regulation of the use of nuclear energy generally. Radiation from any source easily defies national borders. Especially in the wake of Chernobyl,

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98. For example, in 1986 the U.N. General Assembly, by a vote of 132 to 17 (Western countries), with 4 abstentions, reaffirmed its position "that the use of nuclear weapons would be a violation of the Charter of the United Nations and a crime against humanity, as declared in its resolutions 1653 (XVI) of 24 November 1961, 33/71 B of 124 December 1978, 34/83 G of 11 December 1979, 35/152 D of 12 December 1980 and 36/92 I of 9 December 1981 . . . ." G.A. Res. 41/60 F, U.N. Doc. A/41/53 (Supp. 53) at 85 (1986), *reprinted in* 11 U.N. DISARMAMENT Y.B. 134-35 (1986).

For a background of nuclear opposition, see COMM'N ON INT'L SECURITY & ARMS CONTROL, NAT'L ACAD. OF SCIENCES, NUCLEAR ARMS CONTROL BACKGROUND AND ISSUES (1985). *See generally* AMERICAN CATHOLIC COMMITTEE, *supra* note 6.

99. *Compare id. with, e.g.*, Almond, *Nuclear Weapons Are Legal Tools*, BULL ATOMIC SCIENTISTS, May, 1985, at 32 (as long as no treaty exists banning nuclear weapons, they are not illegal); DEPT. OF THE ARMY, FM 27-10, THE LAW OF LAND WARFARE art. 35 (1956) (there is no customary rule of international law or convention banning them); DEPT. OF THE AIR FORCE, AFP 110-31, INTERNATIONAL LAW: THE CONDUCT OF ARMED CONFLICT AND AIR OPERATIONS 5 (1976).

international lawyers and policy makers alike recognize that the peaceful production of nuclear power by one sovereign state — if carried out carelessly or if an unforeseen accident occurs — can be just as damaging to the welfare and interests of other states as an incident involving nuclear weapons.

The international legal system does possess the mechanism necessary to control the utilization of nuclear weapons in order to protect the world's ecology. According to Article 38 of the Statute of the International Court of Justice, rules of international law are created primarily by custom, international agreements, and general principles of law.[100] Those sources that are generally considered secondary include judicial decisions and scholarly writings.[101] To this list can be added resolutions and declarations of international organizations such as the United Nations.[102] It is within this framework that international law traditionally functions to regulate the actions of states.

International law creates binding rules in areas such as the environmental effects of the production of nuclear arms, and likewise the production of nuclear power, by first formulating arguments within terms of preventative and remedial actions. Through efforts at all interactive levels, these practical responses can be shaped according to recognized legal principles — such as those of international liability and state responsibility — and then adapted to the needs of the international environment. Recent noteworthy examples of multilateral cooperation include the 1985 Vienna Convention for the Protection of the Ozone Layer[103] and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.[104] The

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100. *See* Statute of the International Court of Justice, June 26, 1945, art. 38 (1), 59 Stat. 1031, 1060, T.S. No. 993. Article 38 (1) provides:

> The Court, whose function it is to decide in accordance with international law such disputes as are submitted to it, shall apply:
> (a) international conventions, whether general or particular, establishing rules expressly recognized by the contesting States;
> (b) international custom, as evidence of a general practice accepted as law;
> (c) the general principles of law recognized by . . . nations;
> (d) . . . judicial decisions and the teachings of the most highly qualified publicists of the various nations as subsidiary means for the determination of rules of law.

This list of sources is considered authoritative. *See* BROWNLIE, PRINCIPLES OF PUBLIC INTERNATIONAL LAW 3 (3d ed. 1979).

101. *Id.*

102. Formal statements of such international bodies as the U.N. General Assembly have been relied upon by the I.C.J. *See, e.g.*, Western Sahara, [1975] I.C.J. 12, 30-37 (Advisory Opinion of Oct. 16). Debate over these instruments as sources of international law centers on whether lawmaking exceeds the authority granted by the U.N.Charter. *See generally* Brownlie, *supra* note 100, at 695-98; Schachter, *The Evolving Law of Development*, 15 COLUM J. TRANSNAT'L L. 1, 3-6 (1976).

103. Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, *reprinted in* 26 I.L.M. 1516 (1987).

104. Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, *reprinted in* 52 FED. REG. 47515 (Dec. 16, 1987), and 26 I.L.M. 1541 (1987). For a discussion

same is true with respect to the industrial and military use of the atom. Conventions such as the Early Notification Convention and the Assistance Convention[105] emphasize the willingness of governments to employ practical measures according to the needs of the situation — especially in time of an emergency. In this manner, the international community succeeds in at least laying the foundation for judging the amount of ecological damage a state may legally inflict outside its own borders.

A. *The 1972 Stockholm Declaration on the Human Environment*

One of the most important provisions of international law regarding liability for transboundary damage is contained in the statement issued in 1972 at a conference of 113 nations held in Stockholm, Sweden, commonly known as the "Stockholm Declaration on the Human Environment."[106] Most significant in the context of radioactive pollution are Principles 21 and 22. In Principle 21, the Stockholm Declaration arguably adopts the concept of strict liability, which the drafters then extended to polluting activities and detrimental effects that occur beyond sovereign territory. According to Principle 21,

> [s]tates have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the *responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.*[107]

The standard of care adopted by Principle 21 reflects the legal rule applied by the arbitral tribunal in the *Trail Smelter Decision* discussed above.[108] It is notable that this responsibility extends also to activities under a state's "control," such as those carried out by or on ships registered under its flag and by its nationals — including operators of nuclear power installations.

Principle 22 continues, requiring states to cooperate toward developing international environmental law and to promote these principles in ways that insure injured victims are compensated. It tentatively recognizes liability for transboundary ecological harm by providing that,

> [s]tates shall co-operate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction.[109]

The extent that the Declaration represents a compromise is espe-

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of these and other recent trends, see Nanda, *supra* note 50.

105. *See infra* notes 135-38 and accompanying text.

106. Stockholm Declaration, *supra* note 31.

107. *Id.* at 5; 11 I.L.M. 1416, 1420 (emphasis added).

108. *See supra* notes 29-33 and accompanying text.

109. Stockholm Declaration, *supra* note 31; 11 I.L.M. 1416, 1420.

cially reflected in Principle 22. Its present form is substantially weakened from that of an earlier proposal to require states to pay compensation for all environmental damage caused by activities carried on within their territory.[110] In the words of one analyst:

> The earlier proposal failed because of concerns on the part of a number of delegates that it would have implied acceptance of a no-fault or "strict" standard of liability in relation to environmental harm. These delegates made clear that in their view liability to pay compensation would only exist where there had been negligence attributable to the State concerned. The relevance of fault in this connection remains controversial.[111]

The major limitation of the Stockholm Declaration is that, even today, almost twenty years after its acceptance, it has no *direct* legal significance, nor does it purport to impose liability for transboundary environmental harm.[112] However, the precise terms of Principle 21 have received considerable support from states. Following the Conference, the U.N. General Assembly expressly recommended these Principles as laying "down the basic rules governing" the international responsibility of states regarding the environment.[113] Although the U.S.S.R. and a number of its former satellites abstained from the vote and did not participate in the Conference,[114] they have since supported the substance of Principle 21 in, for example, Article 30 of the Charter of Economic Rights and Duties of States,[115] which provides: "All States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."[116]

B. *International Law Commission*

The International Law Commission ("Commission" or "ILC"), which is primarily responsible for "the progressive development of international law and its codification,"[117] carries out its mandate through preparatory

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110. *See* LAW AND COMMUNICATION, *supra* note 34, at 134; Springer, *supra* note 36, at 134.

111. LAW AND COMMUNICATION, *supra* note 34, at 134, *citing* U.N. Doc. A/CONF.48/PC.12 Annex 1 at 15 (1971).

112. *See, e.g.*, Handl, *supra* note 45.

113. G.A. Res. 2996 (XXVII) *International Responsibility of States in Regard to the Environment*, 27 U.N. GAOR Supp. (No. 30) at 42, *reprinted in* LAW AND COMMUNICATION, *supra* note 34, at 142. The Resolution received 112 votes in favor, zero against and 10 abstentions.

114. This fact was not due to disagreement with the principles of the Conference but instead to the exclusion of East Germany as a result of the Conference's adopted criteria for participation. *See* Sands, *supra* note 34, at 12-13.

115. G.A. Res. 3281, 29 U.N. GAOR Supp. 31, at 50, U.N. Doc. A/9631 (1974).

116. *Id.* at art. 30. *See* Sands, *supra* note 34, at 12-13.

117. Statute of the International Law Commission, art. 1, U.N. Doc. A/Cn.4/4/Rev. 2 (1982). The U.N. Charter, article 13, paragraph 1, provides that the General Assembly "shall

studies and reports on legal issues which may become the subject of multilateral treaties.[118]

The Commission is currently working on two divisible but similar topics related to the present discussion. These are, first, the law of "state responsibility"[119] and, second, the principle of "international liability."[120] International liability, as a topic, derives from state responsibility.[121] The division between the two is based on the Commission's perception of two types of national obligations existing under international law and the definition assigned to each by the ILC and the standard practice of the General Assembly.[122]

While both of these legal principles arguably apply to regulate countries' rights and liabilities for nuclear activities, because of their definitions, international liability is most appropriate. The first, "primary" obligations, are defined as "rules imposing on States, in one or another sector of inter-state relations, obligations the breach of which can be a source of responsibility." Next, "secondary" obligations are those which "purport to determine the legal consequences of failure to fulfill obligations established by the 'primary' rules."[123] In the Commission's view, the

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initiate studies and make recommendations for the purpose of . . . encouraging the progressive development of international law and its codification. . . ." The Assembly established the ILC in 1947 for this purpose. *See* I. SINCLAIR, THE INTERNATIONAL LAW COMMISSION 5-8 (1987).

118. For a recent description of the Commission's work, see 1987 ILC Report, *supra* note 41, at 89-115.

119. *See Report of the International Law Commission on the Work of its Twenty-Ninth Session*, 32 U.N. GAOR Supp. (No. 10) (1977) [hereinafter Twenty-Ninth Session]; *Second Report on State Responsibility*, [1970] 2 Y.B. INT'L L. COMM'N, U.N. DOC. A/CN.4/SER.A/1970/ADD.1; *Report of the Sub-Committee on State Responsibility to the International Law Commission*, U.N. Doc. A/CN.4/152 (1963), *reprinted in* [1963] 2 Y.B. INT'L L. COMM'N 227, U.N. DOC. A/CN.4/SER.A/1963/Add.1 [hereinafter 1963 Subcommittee Report].

120. The ILC has issued several reports concerning its work on this topic since it was separated from that of state responsibility. *See International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law* (Preliminary Report by R. Quentin-Baxter, Special Rapporteur), U.N. Doc. A/CN.4/334 and Adds. 1-2 (1980), *reprinted in* [1980] 2 Y.B. INT'L L. COMM'N, pt. 1, at 247, U.N. Doc. A/CN.4/SER.A/1980/Add.1 [hereinafter Quentin-Baxter's Preliminary Report]; *International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law* (2d Report by R. Quentin-Baxter), [1981] 2 Y.B. INT'L L. COMM'N, pt. 1, at 103, U.N. Doc. A/CN.4/346/ and Add. 1 & 2; *International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law* (3d Report by R. Quentin-Baxter), [1982] 2 Y.B. INT'L L. COMM'N pt. 1, at 51, U.N. Doc. A/CN.4/360 and Corr. 1; *International Liability for Injurious Consequences Arising out of Acts Not Prohibited by International Law* (4th Report by R. Quentin-Baxter), [1983] 2 Y.B. INT'L L. COMM'N, pt. 1, at 201, U.N. Doc. A/Cn.4/373 and Corr. 1 & 2 [hereinafter Quentin-Baxter, 4th Report]; and 1987 ILC Report, *supra* note 41.

121. *See* Magraw, *supra* note 41, at 306-7 and sources cited.

122. *See* Quentin-Baxter's Preliminary Report, *supra* note 120, at 253-56. *See also id.*; McCaffrey, *The Work of the International Law Commission Relating to Transfrontier Environmental Harm*, 20 N.Y.U. J. INT'L L. & POL. 715, 716-17 (1988).

123. *Report of the International Law Commission to the General Assembly*, 31 U.N. GAOR Supp. (no. 10) at 165, U.N. Doc. A/31/10 (1976), *reprinted in* [1976] 2 Y.B. INT'L L.

concept of state responsibility deals only with secondary rules, those for internationally *wrongful* or prohibited acts or omissions, while international liability is concerned with primary rules, or rules involving "liability for injurious consequences arising out of acts not prohibited by international law."[124]

International liability became a separate subject of study in 1978 after the ILC, at the request of the General Assembly, established a working group to consider the subject and later appointed R. Quentin-Baxter as special rapporteur.[125] He produced five reports on the subject of international liability before his death in 1984.[126] The work of Quentin-Baxter and the Commission is based on the principle discussed earlier,[127] *sic utere tuo ut alienum non laedas*, which recognizes that the right of states to freely engage in and regulate activities within their borders is bounded by the corresponding duty to respect and not harm the freedoms and interests of other states.[128] In the words of one commentator, it "would seem appropriate" to consider strict liability as the applicable standard: "[T]he Liability topic covers the question of liability without fault for injurious transfrontier consequences of inherently dangerous but lawful activities."[129] Other commentators have inferred a clear standard of strict liability within the work of the ILC.[130]

One of the most significant achievements of the ILC on this topic is the Schematic Outline produced by Quentin-Baxter and contained as an Annex to his Fourth Report in 1983.[131] It contains the ILC primary obligations, and covers the prevention and minimization of transboundary harm and the provision for reparation. Section 5, Article 3 of the Schematic Outline provides in part that "an innocent victim should not be left to bear his loss or injury . . . ." The document also states:

> Reparation shall be made by the acting State to the affected State in respect of any such loss or injury, unless it is established that the making of reparation for a loss or injury of that kind or character is

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COMM'N, pt. 2, at 1, 71, U.N. Doc. A/CN.4/SER. A/1976/Add. 1. *See also* Quentin- Baxter's Preliminary Report, *supra* note 120, at 253-56; Magraw, *supra* note 41, at 306-7.

124. *See id.*

125. *See Report of the International Law Commission to the General Assembly*, 33 U.N. GAOR Supp. (No. 10), U.N. Doc. A/33/10 (1978), *reprinted in* [1978] 2 Y.B. INT'L L. COMM'N, pt. 2, at 6, 150, U.N. Doc. A/CN.4/SER.A/1978/ Add.1. The ILC began work on "state responsibility" as a general subject of study in 1963 (as opposed to responsibility only for injuries to aliens). *See* 1963 Subcommittee Report, *supra* note 119, at 228; Magraw, *supra* note 41, at 306.

126. *See supra*, note 120; *International Liability for Injurious Consequences Arising Out of Acts Not Prohibited by International Law* (R. Quentin-Baxter's 5th Report), U.N. Doc. A/CN.4/383 and Add.1 (1984).

127. *See supra* notes 30-33 and accompanying text.

128. *See* Quentin-Baxter's Preliminary Report, *supra* note 120, at 256-65.

129. McCaffrey, *supra* note 122, at 719.

130. *See* Handl, *supra* note 29, at 239-40 and authorities cited.

131. Quentin-Baxter's 4th Report, *supra* note 120, at 223, Annex.

> not in accordance with the shared expectations of those States.[132]

The ILC remains deadlocked on key issues of definition and scope in its efforts to define substantive standards for state liability.[133] Although the Commission may not soon reach agreement, there is no doubt that its work thus far has at least focused attention on the need to address the liability issue at the international level. In addition, the extensive record compiled by the ILC has assisted other international bodies, such as the International Atomic Energy Agency.[134]

C. *The International Atomic Energy Agency*

Since 1957, the International Atomic Energy Agency (IAEA) has been instrumental in formulating and implementing international standards for the safe and secure use of nuclear power. An organ of the United Nations, the IAEA actively participates both in the regulation and development of peaceful nuclear energy as well as in efforts to assist arms reduction and to control nuclear proliferation.[135] Under the Non-Proliferation Treaty[136] the Agency serves a dual role in the context of radiological accidents: that of gathering, processing and disseminating information and providing actual emergency response services following an accident.[137]

Like other international organizations involved in managing nuclear energy,[138] the IAEA does not possess, as part of its delegated authority, direct responsibility for regulating and enforcing nuclear safety standards in the event of a nuclear accident. States maintain this authority exclusively. However, if we consider

> the control of nuclear accidents in the broad sense to encompass prevention and management, then international co-operation, even if it does not necessarily result in regulatory measures, does have a significant role to play. This is true especially as concerns such issues as immediate notification of radioactivity releases, mutual assistance, compensation for damage and the strengthening of safety standards.[139]

Moreover, the Agency's role of developing and applying standards encom-

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132. *Id.* at 224, § 4.2.

133. *See* McCaffrey, *supra* note 122, at 716-17.

134. *See* Sands, *supra* note 34, at 30-33 (discussing both the ILC and IAEA).

135. For a thorough discussion focused primarily on the IAEA's role in regulating and stemming the spread of nuclear weapons, see L. SCHEINMAN, THE INTERNATIONAL ATOMIC ENERGY AGENCY AND WORLD NUCLEAR ORDER (1988).

136. NPT, *supra* note 2.

137. *See* Handl, *supra* note 29, at 220.

138. Other than the IAEA, international nuclear regulatory agencies include the Organization for Economic Cooperation and Development Nuclear Energy Agency (NEA) and the European Atomic Energy Community (EURATOM). For an analysis of the role of the IAEA and NEA in the role of a nuclear accident, see Reyners & Lellouche, *supra* note 39.

139. *Id.* at 3.

passes three distinct areas of operation in the field of nuclear energy: the Agency's own operations, for which the standards apply automatically; national operations conducted with IAEA assistance or association which apply the standards through agreements with the Agency; and situations where the standards serve as examples or guidelines for national regulatory authorities.[140] In addition, the broad international respect enjoyed by the Agency increases the importance attributed by governments to its views and policies. Thus, under limited circumstances, the IAEA can assume more than an advisory position.

The IAEA was especially active in the aftermath of Chernobyl. It helped governments obtain information concerning contamination levels and in evaluating health risks. The organization also helped prepare studies and reports on the radiological consequences of the accident, while extensively reviewing its causes and overall effects.[141] Specifically, the IAEA Board of Governors convened a Post-Accident Review Meeting attended by some 600 technical experts from countries and international organizations around the world.

This effort culminated in September, 1986, when the IAEA adopted by consensus the Early Notification Convention[142] and the Assistance Convention,[143] two integrated conventions aimed at coordinating mitigation of future nuclear accidents. The passage and ongoing implementation of these two conventions was rapid and, by most accounts, highly efficient. They assist in the development of a framework for internationally coordinated management of nuclear accidents. They also expressly assign major new responsibilities to the IAEA.[144] These qualities further the recognition and position of the IAEA in addition to achieving a greater level of international security in all nuclear materials operations.

Yet, the Early Notification and Assistance Conventions are also open to criticism. For one, they "are disappointing in their failure to settle clearly the international rights and obligations of states."[145] In this respect, the two recent conventions, by themselves, do not directly focus efforts to apportion liability for the release of nuclear material. Admittedly, these conventions were not intended to do so; however, their passage as an international reaction to Chernobyl does highlight the absence of an international convention or treaty addressing the question of state liability.

The IAEA is also engaged in work directed specifically toward an international convention on the issue of inter-state liability. As stated by

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140. *Id.* at 4-6.

141. *Id.* at 10-12.

142. Early Notification Convention, *supra* note 86.

143. Assistance Convention, *supra* note 87.

144. *See* Handl, *supra* note 29, at 220 and authorities cited.

145. *Id.* at 218. For a critical review, Handl cites Zehetner, *Grenzuberschreitende Hilfe bei Storfallen und Unfallen*, in FRIEDLICHE KERNENERGIENUTZUNG UND STAATSGRENZEN IN MITTELEUROPA 118 (N. Pelzer ed. 1986).

the Secretariat of IAEA in 1987, there is

> a need to consider the broader question of international liability for the injurious consequences of activities attributable to states in the context of their relations *inter se* and hence to elaborate — in a new multilateral instrument — the principle of international liability for nuclear damage under the law of State responsibility concerning international claims against States.[146]

The Secretariat concluded that "there seems to be no doctrinal obstacle to the elaboration of special rules intended to regulate international liability for nuclear damage."[147]

V. APPRAISAL AND RECOMMENDATIONS

The ILC, in its earliest work on the subject of state responsibility, briefly considered the subject of ultrahazardous activities. As early as 1957, Padilla Nervo, an ILC member, pointed out that,

> [a]ccording to the traditional rule, the international responsibility of a State was involved only when the damage caused resulted from acts or omissions contrary to the international obligations of that State. In other words — as was the case until recently in municipal law — there could be no liability without fault or negligence. However, the damage already caused, or which might be caused, to persons or property on the territory of other States by the manufacture or experimental explosion of nuclear weapons sheds doubts on the advisability or maintaining the traditional rule. According to the traditional concepts of fault and negligence, it was not strictly possible to talk of violation of international obligations when the weapons were exploded on the territory of the State concerned or on the high seas, especially as every conceivable precaution was undoubtedly taken to prevent damage. On the other hand, it was difficult to accept the view that, when such explosions caused damage to the persons or on the territory of other States, no international responsibility, with the corresponding duty of compensation, arose.[148]

The idea that civil liability for harm caused by radiation to third parties at the international level should be on a strict or absolute basis, as opposed to a system based on fault or negligence, originated in the late fifties and early sixties as the arms race between the superpowers accelerated and as nuclear energy became an increasingly feasible alternative to traditional power sources. It is almost universally agreed that no-fault liability is the only kind of liability adequate to confront the risk of inherently dangerous activities such as the handling of nuclear materials.[149] In

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146. Sands, *supra* note 34, at 31, *quoting* IAEA Doc. GOV/INF/509 at § 2.

147. *Id.*

148. [1957] 1 Y.B. INT'L L. COMM'N, at 156.

149. *See* Handl, *supra* note 29, at 237-42. The doctrine of strict liability was perhaps first established in the well-known English case, Rylands v. Fletcher, 159 Eng. Rep. 737 (Ex. 1865), *rev'd* L.R. 1 Ex. 265 (1866), *aff'd* L.R. 3 H.L. 330 (1868). *Rylands* stands "for the

1960, the Paris Convention on Third Party Liability in the Field of Nuclear Energy[150] was passed,[151] and in 1963 the Vienna Convention on Civil Liability for Nuclear Damage was developed under the auspices of the IAEA.[152] The texts of these Conventions provide a strong and enduring statement of international law on this subject. They both establish strict or objective liability as the standard for the operators of nuclear power installations.[153] Under this standard, an injured "person"[154] does not need to prove fault or negligence in order to receive compensation for damage, although they do have to prove a causal link between the accident and their damage.[155]

It is noteworthy that these conventions impose liability solely on the "operator" of a nuclear facility. No other person, e.g., suppliers, will be held liable for nuclear damage even if they alone caused the damage.[156] While it does help insure more legal certainty, channeling liability exclusively on operators is a limitation of the conventions. Not only does it permit otherwise culpable actors such as state regulators to avoid liability,[157] it also tends to channel legal attention away from states and onto private parties.[158] As such this concept of "soft state liability" is a draw-

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proposition that the defendant should be held liable when he damages another by carrying out any unusual activity unduly dangerous in the light of the character of the surrounding area." *International Standards*, *supra* note 50, at 1112. *See* W. PROSSER & W. KEETON, THE LAW OF TORTS § 78 (5th ed. 1984).

150. Paris Convention, *supra* note 75. The Paris Convention has 14 Member States: Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Great Britain, Italy, Netherlands, Norway, Portugal, Spain, Sweden and Turkey. *See* Pelzer, *supra* note 84, at 97, 99.

151. The Paris Convention is supplemented by the Brussels Supplementary Convention of January 31, 1963, *revised* January 28, 1964 and November 12, 1982 (not yet in force), 1041 U.N.T.S. 350 (1977), *reprinted in* 2 I.L.M. 727 (1963).

152. Vienna Convention, *supra* note 76. The Vienna Convention has 10 Member States: Argentina, Bolivia, Cameroon, Cuba, Egypt, Nigeria, Peru, Philippines, Trinidad and Tobago and Yugoslavia. *See* Pelzer, *supra* note 84, at 85.

153. Paris Convention, *supra* note 75, art. 3; Vienna Convention, *supra* note 76, art. IV(1).

154. "Person" is defined in the Vienna Convention, at Art. 1 (a), to include "States." Although the Paris Convention does not define person, it defines "nuclear incident" broadly as "any occurrence or succession of occurrences having the same origin which causes damage" arising out of substances having radioactive properties. Paris Convention, *supra* note 75, art. 1 (a)(i). Nevertheless, the context and scope of both conventions is on civil or private liability and not that of states. *See infra*, notes 156-161 and accompanying text.

155. Paris Convention, *supra*, note 75, art. 3; Vienna Convention, *supra* note 76, at art. II, 1.

156. Paris Convention, *supra* note 75, art. 6; Vienna Convention, *supra* note 76, art. II, 5. The operator is excused from liability only if, the damage results from an act or omission done with intent to cause damage in which case the individual causing the damage is liable, or if it is expressly so provided by contract. *Id.*, art. 6 (f); art. X.

157. *See* Pelzer, *supra* note 84, at 102, pointing out that the U.S., a leading nuclear state and not a party to either convention, did not introduce the legal channeling into national law, "although the U.S. industry profits from this concept when exporting nuclear devices to other States."

158. *See, e.g.*, Handl, *supra* note 29, at 228-37. *But see id.* at 114, stating: "The best

back to assigning full liability and to providing adequate reparation following a transboundary injury. In reality, it represents a private approach to the problem of providing compensation.[159] Unfortunately, private remedies are inadequate to provide relief on an international scale.[160] The severe transboundary damage resulting from an intense release of radiation such as Chernobyl makes this point especially forcefully. Even if the Soviet Union were a party to either the Paris or the Vienna Convention, which it is not, the monetary compensation limits contained therein were greatly exceeded by the damage caused in even the early stages of the Chernobyl explosion.[161] Only by imposing liability directly on the source state can the international community achieve a degree of assurance that the victims of a transboundary nuclear accident will be compensated.

As they are presently written, the Paris and Vienna Conventions are incapable of setting this type of an effective, internationally viable standard for liability or compensation. For some time, work has been underway to streamline and harmonize the two conventions, but these efforts are aimed almost exclusively at improving the effectiveness of the instruments' civil liability system and the level of cooperation among the joint parties. Despite a more favorable attitude among certain elements of the IAEA toward implementing a system of source state liability, the current proposed revisions of the existing conventions retain the private approach.

Allowing states to avoid directly compensating transboundary environmental injuries resulting from activities within their respective borders inhibits promotion of the twin concepts of states' international liability for and responsibility to compensate such harm under the 1972 Stockholm Declaration and the legal principles it represents. The present need could hardly be stronger for a comprehensive, legislative convention

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and most effective remedy for the victim of a nuclear incident is to grant him or her an internationally guaranteed and direct civil laws claim against the operator of the nuclear installation." However, Pelzer continues: "It might be useful to supplement the civil law regime by State liability regulations covering fields where civil liability leaves gaps. This holds especially for compensation for damage to the environment." *Id.*

159. *See* Survey of State Practice Relevant to International Liability for Injurious Consequences Arising Out of Acts Not Prohibited by International Law, U.N. Doc. ST/LEG/15 (Feb. 3, 1984) at 250-68.

160. *See* McCaffrey, *supra* note 122, at 726-30; *International Standards*, *supra* note 50, at 1115.

161. For instance, Article 7 of the Paris Convention limits the operator's liability to 15 million Special Drawing Rights (SDRs) of the International Monetary Fund, which the Contracting Parties may increase or decrease by legislation, provided coverage for a greater amount is available , and provided the lower amount is not less than five million SDRs. *See* Art. 10. In 1963 the Brussels Supplementary Convention, *supra*, note 151, increased the amount of liability to 120 million SDRs, which will rise to 300 million SDRs after the 1982 Protocol enters into force. *See* Pelzer, *supra* note 84, at 104-105. The Vienna Convention contains no such limitation. Article V(1) provides for a minimum amount, not an upper ceiling. It reads: "The liability of the operator may be limited by the Installation State to not less than five million U.S. dollars for any one nuclear incident."

to provide more effective prevention, mitigation and reparation measures against the effects of transboundary nuclear accidents. To be effective, such a regime must impose stict liability directly on states in order to insure the most conscious effort toward prevention as well as the guarantee of adequate compensation in the event of a transboundary accident. In the wake of Chernobyl and the growing realization that global interdependence extends beyond economic and political ties, the international community has begun to take positive steps toward this goal. Of course, major obstacles still need to be overcome, a task that, in the event of another Chernobyl-type incident, could take too long.

One such obstacle is the need to settle on an appropriate standard of liability. Strict liability of states is arguably a part of general international law. Although states have traditionally resisted the idea of strict liability, present-day conditions have effected a change of attitude, and the principle appears to be gaining support among governments. The time is ripe for the international community to codify this emerging standard in the form of a multilateral convention.