The Chernobyl Accident: A Case Study in International Law* Regulating State Responsibility for Transboundary Nuclear Pollution**

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On Saturday April 26, 1986, at 1:23 a.m., the worst accident in the history of nuclear energy[1] began at the Chernobyl Nuclear Power Plant.[2] In the fourth and newest reactor at the site, a crisis of potentially catastrophic proportion started with a massive loss of coolant in the reactor's core.[3] The world did not know for months the precise sequence of events. The Chernobyl reactor was a graphite reactor generally considered to be an outmoded type of reactor which has been largely abandoned outside the Soviet Union.[4] The prevalent concern over use of graphite reactors even prior to Chernobyl was in large part due to a fire which oc

An abbreviated version of this article was presented on September 30, 1986, at the Annual Meeting in Plymouth, England of the Agricultural Law Association of Great Britain and the Comite Europeen de Droit Rural.

** Transboundary pollution may be defined as substance that originates in one nation, moves through natural medium such as air or water, and imposes harmful effects in another nation. Comment, *Liability for Transnational Pollution Arising from Offshore Oil Development: A Methodological Approach*, 10 ECOLOGY L. Q. 641 (1983). It has been suggested that pollution should not be defined to include any change in the environment, but to encompass "a threshold level of damage of interference which is legally significant. Springer, *Towards Meaningful Concept of Pollution in International Law*, 26 INT'L & COMP L. Q. 531, 532 (1977).

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1. After visiting the Chernobyl plant, Hans Blix, Head of the International Atomic Energy Agency, stated, "It' clear that the radioactive consequences of this accident also are more serious than any accident so far, and also that radioactive releases to the atmosphere are far more serious. N.Y. Times, May 10, 1986, at A1, A4, col. 3. As of May 15, nine people had died and 299 others had been hospitalized for radiation sickness. Within 19 mile radius, 84,000 people were evacuated, some not until week after the accident. *A Fearful Flight from Chernobyl*, NEWSWEEK, May 19, 1986, at 36.

2. Barnathan & Strasser, *Meltdown*, NEWSWEEK, May 12, 1986, at 22 [hereinafter *Meltdown*].

3. *Id.* at 23.

4. *Id.*

curred in 1957 at Britain s Windscale graphite reactor [5] However the acknowledged advantage from use of a graphite reactor is its utility in the production of weapons-grade plutonium for nuclear weapons.[6]

The Chernobyl reactor had a rudimentary emergency backup system. More significantly it had no containment structure to control radioactive releases in the event of an accident.[7] The emerging scientific consensus as to what occurred is this: on Friday April 25, for reasons initially explained by one Soviet official as "human error" [8] there was a failure in the water cooling system for the uranium fuel rods surrounded by graphite blocks.[9] At a press conference in Moscow the Soviet Union revealed that the accident was the result of an experiment designed to determine how long the reactor would continue to produce electricity in the event of an unexpected power cutoff.[10] Technicians deliberately lowered the reactor s power level and, most importantly shut off the plant's emergency cooling system.[11] The operators, however continued to let the reactor run with the emergency cooling system turned off—a violation of Soviet safety protocols.[12] As a re sult, radioactive xenon gas built up and destabilized the fuel core.[13] Compounding their error the technicians removed all but a few of the control rods and disconnected the automatic rod control system.[14] From this point, the technicians proceeded to go through a series of steps to counterbalance the destabilized reactor until they eventually blocked the emergency water and pressure level warning signals (that might have triggered an automatic shutdown for safety reasons) so that they could proceed with the experiment.[15] Without proper coolant, the fuel rods were heated to a temperature of 3,500 degrees Fahrenheit, warping the zirconium alloy around the fuel assemblies.[16] At approxi-

5. *Id.*

6. *Id.* For further discussion of the graphite reactor, *see* Sullivan, *Calamity Highlights Old Reactor — Design Debate*, N.Y. Times, May 1, 1986, at A11, col. 1.

7 *Meltdown, supra* note 2, at 23.

8. *Id.*, N.Y Times, May 3, 1986, at A6, col. 3.

9. *Meltdown, supra* note 2, at 23.

10. *Anatomy of Catastrophe*, NEWSWEEK, Sept. 1, 1986, at 26 [hereinafter *Anatomy*].

11. *Id.*

12. *Id.* at 27

13. *Id.*

14. *Id.*

15. *Id.*

16. N.Y. Times, May 1, 1986, at A11, cols. 1-2.

mately 5,100 degrees the uranium-oxide fuel itself begins to melt.[17] Before this point, the reactor ordinarily would have flooded itself with water and shut down automatically but this did not occur [18]

At 1:23 a.m. on April 26, nevertheless, the experiment was begun.[19] The operators shut off valves to prevent steam from reaching the turbine unit they wanted to test.[20] Before doing so, they had bypassed the system that would have automatically made the reactor shut down.[21] Within seconds there was a heat and steam buildup in the core.[22] Within forty seconds, the shift manager tried to stop the reactor but it was too late.[23] The remaining water in the system turned into steam and reacted with the graphite, fuel and zirconium to produce flammable hydrogen methane and carbon monoxide.[24] On Saturday April 26, at 1:23 a.m., there were two gas explosions, blowing the roof off the reac tor building.[25] The resultant fire (with 100 foot high flames due to the lack of containment[26] from the then burning graphite bricks), burned in the open air and released a cloud of smoke, gas, and radiation.[27] The fire would continue to burn or smolder for at least a week.[28] On Monday a worker at a nuclear power plant in Sweden walked past a radiation detector and set off its alarm.[29] After checking on its own plant, Sweden discovered monitoring stations throughout the country were registering unusually high levels of radiation.[30] The radiation from Chernobyl that initially swept over Norway Finland, and Sweden on April

17 *The Chernobyl Syndrome*, NEWSWEEK, May 12, 1986, at 23 [hereinafter *Syndrome*]. There is disagreement over whether meltdown in the sense of penetration of the layer of concrete underneath the reactor occurred, but it was announced that the Soviet technicians were trying to entomb the building in concrete, lead, and boron, which would include laying concrete underneath the reactor. *A Fearful Flight*, NEWSWEEK, May 19, 1986, at 37-38.

18. *Syndrome, supra* note 17 at 23.
19. *Anatomy, supra* note 10, at 27
20. *Id.*
21. *Id.*
22. *Id.* at 28.
23. *Id.*
24. *Syndrome, supra* note 17 at 23.
25. *Anatomy, supra* note 10, at 28.
26. N.Y. Times, May 6, 1986, at A1, col. 3.
27 *Id.* at A6.
28. N.Y. Times, May 3, 1986, at A1, cols. 4 & 6.
29. *Syndrome, supra* note 17 at 24.
30. *Id.*

28th was brought into the heart of Europe by shifting winds on May 5th.[31] By May 6, small amounts of radiation had traveled across the Pacific Ocean and over much of the United States.[32] *Pravda* reported that helicopters were dumping sand, clay lead and boron into the reactor to contain radioactivity [33] Diplomats were withdrawn from Moscow [34] tourists returned home,[35] anguished mothers in Poland fought over doses of iodine for their children, sales of milk from grass-fed cows were banned,[36] and the European Community banned imports of fresh food products from Eastern Europe.[37] As of the end of July the Soviet Union had 200 people suffering from acute radiation sickness and 28 people dead as a result of the accident.[38] Surrounding the Chernobyl plant there was approximately 385 square miles that had been contaminated and possibly a nearby water basin.[39] Outside of the Soviet Union, European farmers sustained millions of dollars of damage from crops, livestock and dairy and egg products that could not be sold as a result of potential or actual contamination.[40]

The Chernobyl incident brings into focus the inadequacy of domestic law to protect the global environment. Pollution and radiation do not recognize national boundaries. Any legal recourse for the damage inflicted by the accident must come from international law [41] As one notable international law scholar has asked, "Should these decisions of such consequence for the future of the world and for humanity as a whole be left within the province of national jurisdictional determination?"[42]

31. N.Y. Times, May 6, 1986, at A6, col. 1.
32. *Id.* at col. 3.
33. N.Y. Times, May 8, 1986, at A10, col. 1.
34. *Syndrome*, *supra* note 17 at 29.
35. *Id.*
36. N.Y. Times, May 1, 1986, at A11, col. 3.
37 N.Y. Times, May 8, 1986, at A10, col. 4.
38. *Chernobyl' Goal*, NEWSWEEK, July 28, 1986, at 33.
39. *Id.*
40. Washington Post, June 8, 1986, at A1, col. 4.
41. On international environmental law generally, *see* TECLAFF & UTTON, INTERNATIONAL ENVIRONNMENTAL LAW (1974) and A. SPRINGER, THE INTERNATIONAL LAW OF POLLUTION (1983).
42. Falk, *The Global Environment and International Law: Challenge and Response*, 23 KAN. L. REV. 385, 403 (1975).

After the Chernobyl accident, the Soviet Union was threatened with a flurry of litigation.[43] But potential and actual litigants soon discovered that although the Soviet Union was cer tainly responsible for damage from the the accident under inter national law recovery was uncertain and enforcement virtually impossible. A global community that had often ignored international law was suddenly calling for its expansion and enforcement. The community asked, why are there not a global safety standards for nuclear reactors? Why are there not global early warning systems for nuclear accidents? It asked why the Soviet Union not obligated to pay compensation for the damage caused by what the Soviet Union itself acknowledged was negligent oper ation of a nuclear reactor?

Conflicts over transboundary pollution are not recent developments. The seminal case in international law governing recovery for transboundary pollution was decided in 1941 and was a har binger of the present controversy over acid rain.[44] International law does provide rules of substantive liability for transboundary pollution but enforcement is hampered by and dependent upon state cooperation. Utilizing the Chernobyl accident as a case study this article will focus on current international law governing transboundary nuclear pollution, deficiencies in the cur

43. On May 15, the European Parliament called for the Soviet Union to pay compensation to Western European farmers. Xinhera General Overseas Service, May 16, 1986. On July 12, 1986, Oregon declared it would bill the Soviet Union $73,000.00 for the cost of radiation tests on air, water and vegetables. Los Angeles Times, July 12, 1986, at A16, col. 1. The British Agriculture Minister said that consideration was being given to seeking compensation, but there was hesitation because it might set precedent for claims against Great Britain by Scandinavian countries for acid rain damage. United Press International, June 30, 1986, AM cycle. Swedish officials studied the possibility of suing Moscow for damages but said it was unlikely they could do so. 1986 Reuters North European Service, May 23, 1986 AM cycle. The West German government demanded that the Soviet Union pay damages to their farmers because it was required to pay its farmers for damages under its own domestic law; *Id.* A Belgian farmer declared he was going to sue the Soviet Union himself for $1500.00. Reuters North European Service, May 13, 1986, AM cycle. A Dutch insurance company hired the International Legal Institute in the Hague to determine whether suit could be brought under Dutch, Soviet or international law, and farmers in Italy and Austria urged their governments to bring suits for agricultural damage. Associated Press, May 9, 1986, AM cycle. An Italian farmer sued the Soviet Union for $730.00 in damages in an Italian court. United Press International, May 7 1986, PM cycle. Farmers in Northern England asked for compensation for lambs that could not be slaughtered and sold. Reuters North European Service, June 30, 1986, AM cycle.

44. For an analysis of recent international efforts to curb acid rain, *see* LaBastille, *International Acid Test*, SIERRA, May-June 1986, at 51.

rent system, and necessary reforms to the system in light of "Chernobyl"

I. LIABILITY FOR TRANSBOUNDARY POLLUTION UNDER CUSTOM AND GENERAL PRINCIPLES OF INTERNATIONAL LAW

Damages from Chernobyl, direct and indirect, are difficult to quantify in monetary terms. The European Economic Community's import ban on Polish food imports cost Poland one million dollars in May of 1986 alone.[45] Austrian farmers in June asked for nearly 5.5 million dollars in compensation from their own government for its failure to exercise enforcement control over vegetable sales.[46] In May Italian farmers claimed they were losing 3.3 million dollars a day and the West German government estimated its damages might be in the billions.[47]

Any analysis of the Soviet Union's liability necessarily begins with the landmark *Trail Smelter* case. In the *Trail Smelter* case,[48] Canada and the United States, pursuant to a treaty specifically drafted for resolution of the conflict, submitted a dispute concerning emissions from a smelter near Trail, Canada for arbitration.[49] The United States contended that sulfur dioxide emissions from the smelter were crossing the border and damaging forests vital to the lumber industry in the state of Washington[50] (sulfur dioxide is now generally acknowledged as the pollutant primarily responsible for the harmful effects of so-called acid rain).[51] In a 1938 interim decision, the arbitration tribunal concluded that there was injury to the Washington forests and that the emissions from the Trail Smelter were the cause of that injury.[52] The tribunal then turned to the issue of damages for that injury.[53] In assessing damages, the tribunal refused to allow damages for the wrong done the United States by Canada's viola-

45. Reuters North European Service, May 13, 1986, AM cycle.

46. Reuters North European Service, June 28, 1986, AM cycle.

47 Associated Press, May 9, 1986.

48. Trail Smelter Case (U. S. v. Canada), Aribitral Tribunal, 3 R. Int'l Arb. Awards 1905, 1938 (1949).

49. *Id.* at 1917

50. *Id.* at 1922.

51. *See* SWEDEN'S CASE STUDY FOR THE UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT, SUPPORTING STUDIES TO AIR POLLUTION ACROSS NATIONAL BOUNDARIES: THE IMPACT ON THE ENVIRONMENT OF SULFUR IN THE AIR AND PRECIPITATION (1972).

52. 3 R. Int'l Arb. Awards, at 1924.

53. *Id.* at 1932.

tion of its sovereignity [54] The fact that pollutants from Canada had crossed the United States border did not trigger liability for damages without a showing of material damage. In addition to those damages which *were* awarded for the injuries to the forests sustained by the United States in the interim decision, the tribunal ordered the Trail Smelter to refrain from causing further damage until issuance of a final decision.[55] That final decision was reported three years later and focused on whether the Canadian Trail Smelter should be required to refrain from causing damage in the future to the State of Washington.[56]

The tribunal concluded that there was no need to determine whether United States domestic law or international law would be applied because the law followed in the United States in dealing with quasi-sovereign rights of states within the United States in regulating air pollution, while more definite than international law was in conformity with "the general rules of international law "[57] Unable to find any precedents from international tribunals addressing air or water pollution, the tribunal turned to decisions of the United States Supreme Court that were premised on the federal common law of nuisance.[58] From these cases adjudicating interstate conflicts over air and water pollution, the tribunal concluded that "under the principles of international law as well as of the law of the United States, no 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 consequences and the injury is established by clear and convincing evidence."[59] Accordingly the tribunal found that Canada was legally responsible for the injurious actions of the smelter under international law and the smelter was required to refrain from causing any further damage to the United States.[60]

Two fundamental principles of international law may be drawn from the *Trail Smelter* decision. First, the Tribunal held that a state is not entitled to legal relief merely upon a showing that

54. *Id.* at 1932-33.
55. *Id.* at 1934.
56. *Id.* at 1962.
57 *Id.* at 1964.
58. *Id.*
59. *Id.* at 1965.
60. *Id.* at 1948, 1966.

emissions or releases from one country have crossed into the ter ritory of another state. There must be a showing of material damage over and above a violation of sovereignity [61] Secondly a state may be held responsible for pollution by private parties within its territory if such pollution results in demonstrable injury to another state or to the property or persons therein.

Support for such a state obligation may also be found outside the pollution context in the International Court of Justice decision in the *Corfu Channel* case.[62] In that case, the United Kingdom sued Albania for physical damage and loss of life sustained by two British warships which ran into moored contact mines in the Straits of Corfu.[63] Although Albania was not found to have lain the mines, the Court determined that the laying of the minefield could not have been done without Albania s knowledge.[64] Holding Albania responsible for damages, the Court stated:

> The obligations incumbent upon the Albanian authorities consisted in notifying, for the benefit of shipping in general, the existence of a minefield in Albanian territorial waters and in warning the approaching British warships of the imminent danger to which the minefield exposed them. Such obligations are based not on the Hague Convention of 1907 No. VIII, which is applicable in time of war but on certain general and well-recognized principles, namely· eliminating considerations of humanity even more exacting in peace than in war; the principle of the freedom maritime navigation and every State s obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.[65]

More than thirty years ago, both these cases recognized the rule of international law which says that permitting extraterritorial damage from intrastate activity which is in and of itself lawful (i.e., manufacturing, or operating nuclear power plants) may render the state responsible for the damage inflicted. In addition, Principle 21 of the Stockholm Declaration on the Human Environment in 1972 provided that states have an obligation to ensure that ac tivities occurring within their jurisdiction or under their control

61. For an analysis emphasizing the limited recovery permitted by the Trail Smelter case, *see* Rubin, *Pollution by Analogy: The Trail Smelter Arbitration*, 50 OR. L. REV. 259 (1971).

62. Corfu Channel Case (U.K. v. Albania), 1949 I.C.J. 4.

63. *Id.*

64. *Id.* at 20-22.

65. *Id.* at 22-23.

do not cause harm in areas beyond their territory [66] Principle 22 requires states to cooperate in broadening liability for environmental damage.[67] As a result, the International Law Commission has since been studying proposals to extend national liability to cover injuries caused by acts lawful per se.[68]

This rejection of an absolute view of sovereignity[69]—that there are limitations on the lawful activities which may be conducted within a state s own territory—may be characterized as the doc trine of "abuse of rights" or the doctrine of "good neighborliness." The source of these doctrines appear to stem from customary international law general principles of law (precepts of law recognized by most civilized nations) or more fundamentally from general doctrines of equity (*ex aequo et bono*).[70] Under inter

66. *Stockholm Declaration of the United Nations Conference on the Human Environment*, U.N. Doc. A/CONF.48/14 (1972), *reprinted in*, 11 I.L.M. 1416 (1972).

67 *Id.* at 1420.

68. *See, e.g., Second Report on International Liability for Injurious Consequences Arising Out of Acts Not Prohibited by International Law*, U.N. Doc. A/CN 4/346, Add. 1 and Add. 2 (1981). *See also Cooperation in the Field of the Environment Concerning Natural Resources Shared by Two or More States*, G.A. Res. 3129, 28 U.N. GAOR Supp. (No. 30) at 48-49, U.N. Doc. A/9030 (1973); *Draft Principles of Conduct in the Field of the Environment for the Guidance of States in the Conservation and Harmonious Utilization of Natural Resources Shared by Two or More States, Report of the Intergovernmental Working Group of Experts on Natural Resources Shared by Two or More States on the Work of its Fifth Session*, U.N. Doc. UNEP/IG.12/2, at 9 (1978), and *OECD Council Recommendation on Principles Governing Transfrontier Pollution*, 14 I.L.M. 234 (1975) (requiring prior notice and information about actions affecting the shared resource); Smith, *The OECD Approach to the Solution of the Transfrontier Pollution Problem* in ENVIRONMENTAL LAW, INTERNATIONAL AND COMPARATIVE ASPECTS, A SYMPOSIUM (1976); *see, e.g.*, Convention on Long Range Transboundary Air Pollution, Nov. 13, 1979, E/ECE/1010, T.I.A.S. No. 1054; Wetstone and Rosencranz, *Transboundary Air Pollution in Europe: A Survey of National Responses*, 9 COLUM. J. ENVTL. L. 1 (1983).

69. Traditionally states have had absolute sovereignty over use of natural resources within their territories. *Permanent Sovereignty Over Natural Resources*, G.A. Res. 3171, 28 U.N. GAOR Supp. (No. 30) at 52, U.N. Doc. A/9030 (1973); *Charter of Economic Rights and Duties of States*, G.A. Res. 3281, 29 U.N. GAOR Supp. (No. 31), at 51; *Stockholm Declaration of the United Nations Conference on the Human Environment, supra* note 66; *see also Declaration on the Establishment of New International Economic Order* G.A. Res. 3201(S-VI), 6th Special Session U.N. GAOR Supp. (No. 1) at 3, U.N. Doc. A/9559 (1954) and *Programme of Action on the Establishment of New International Economic Order*, G.A. Res. 3202(S-VI), 6th Special Session U.N. GAOR Supp. (No. 1), U.N. Doc. A/559 (1954).

70. The accepted sources of international law are set forth in the Statute of the International Court of Justice, 1945, art. 38(1), 59 Stat. 1055, T.S. No. 933:

(1) The Court, whose function 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 conceding states;

(b) international custom, as evidence of general practice accepted as law;

(c) the general principles of law recognized by civilized nations;

national law the most controversial of these two doctrines is the concept of good neighborliness embodied in the latin maxim, *sic utere tuo ut abenum non laedus*: use your own property so that it will not injure others.[71]

By having recognized the doctrine of good neighborliness, the *Trail Smelter* case inevitably raised many more questions than it answered. In analyzing the interrelationship between territorial sovereignity and transnational pollution, acknowledgement of the doctrine fails to adequately delineate the parameters of state obligation.[72] When are the polluting actions of private parties the responsibility of the State? How must causation between action and injury be established? Can state responsibility be established without fault, i.e., based on strict liability for ultrahazardous activities? For what types of injuries may damages be rcovered? Is injunctive relief, as well as damages, appropriate relief under international law?

II. FAULT STRICT LIABILTY AND THE PARAMETERS OF GOOD NEIGHBORLINESS

The doctrine of good neighborliness, as a general principle of law recognized by civilized nations, draws from traditional Anglo-American theories of tort law Tort law governing land use, however may be predicated on fault—i.e., trespass, nuisance, negligence or intentional torts—or on strict liability for ultrahazardous activity [73] Can a State s responsibility for pollution under inter national law be predicated only on fault, or may there be strict liability for pollution damages created by ultrahzardous activities, such as the operation of a nuclear power plant?

(d) subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means;

(2) This provision shall not prejudice the power of the Court to decide case *ex aequo et bono*, if the parties agree thereto.

Although the *Trail Smelter* case was decided pursuant to treaty for resolution of that dispute, the Tribunal based its determination of substantive liability on sources of international law aside from the treaty itself. Article IV of the Compromise governing the case authorized the Tribunal to apply "the law and practice followed in dealing with cognate questions in the United States of America as well as international law and practice. 3 R. Int'l Arb. Awards at 1908.

71. Elkind, *Footnote to the Nuclear Tests Cases: Abuse of Right — A Blind Alley for Environmentalists*, 9 VAND. J. TRANSNAT'L. L. 57 90-91 (1976).

72. Handl, *Territorial Sovereignty and the Problem of Transnational Pollution*, 69 AM. J. INT'L L. 50 (1975).

73. *See, e.g.*, PROSSER AND KEATON ON TORTS, §§ 13-15, 28-34, 86-91 (5th ed. 1984).

As early as 1966, C. Wilfred Jenks, citing treaties governing aviation hazards and nuclear damage,[74] argued that there was "a growing number of significant exceptions to the alleged principle that liability in international law rests exclusively upon fault." Jenks, however went on to question whether such treaty obligations embody a nascient rule of customary international law imposing strict liability for ultrahazardous activity or exceptions by treaty to an established custom requiring fault for state liability [75] Focusing on treaties governing nuclear damage, Jenks set forth the following principles for state responsibility·

> The principle that liability for nuclear damage is "absolute" is generally accepted but the expression is somewhat misleading in that it does not exclude the possibility of exceptions. The principle that such liability by reason of its potential scale, must rest upon a responsible operator who remains responsible while nuclear material is in the hands of intermediaries is likewise generally accepted.
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> For both pollution and nuclear hazards, it is the scale of the possible consequences which converts the ultrahazardous use of a facility involving the liability of the operator into the ultrahazardous use of a territory involving the liability of the State. Fundamentally the question is of public policy [76]

One commentator also relying on the general principles of law has attempted to distinguish between the doctrines of abuse of rights and good neighborliness. Pursuant to the doctrine of good neighborliness, a property owner is bound to accept a reasonable amount of noise, smoke, and other pollution, but when that invasion or trespass exceeds that reasonably necessary then the injured neighbor may seek a legal rememdy to prevent the interference, or seek damages.[77] Fault in the form of malicious or

74. Jenks, *Liability for Ultra-Hazardous Activities in International Law*, 117 HAGUE RECUEIL 99, 106 (1966-I).

75. *Id.*

76. *Id.* at 127 144-45. It should also be noted that the Restatement of Foreign Relations Law has rejected absolute liability for environmental damage:

> (i) A State is obligated to take such measures as may be practicable under the circumstances to ensure that activities within its jurisdiction or control
>
> (a) conform to generally accepted international rules and standards for the prevention, reduction, and control of injury to the environment of another state or of areas beyond the limits of natural jurisdiction;
>
> (b) are conduted so as not to cause significant injury to the environment of another state or of areas beyond the limits of national jurisdiction.

RESTATEMENT OF FOREIGN RELATIONS LAW § 601(1) (1983).

77 Elkind, *supra* note 71, at 91.

negligent conduct is not necessary for liability but is relevant to whether or not the invasion was reasonable.[78] Abuse of rights occurs when activity is motivated by culpable behavior such as malicious intent or negligence. When a property owner harms his neighbor by land uses which do not necessarily physically invade the neighbor's property or cause an unreasonable interference, the only theory for relief is abuse of rights predicated on negligence or malicious intent.[79] Under this formulation of the two doctrines, the conclusion reached is that the doctrine of good neighborliness is the theory for recovery in the *Trail Smelter* case because no showing of malicious intent or negligence was made.[80]

To summarize briefly the extant theories of state liability for transboundary pollution drawing on custom, general principles of law and equity it may be postulated that:

> 1. A State has an absolute duty to protect against transational harm from ultrahazardous activity conducted within its territory and is strictly liable for any resultant damage.
> 2. A State has a duty to use reasonable care to protect States against extraterritorial harm from acts committed within its ter itory and failure to do so renders the State responsible for damage incurred as a result of negligence or intentional harm.
> 3. A State is liable if it permits transboundary pollution from within its territory to exceed that which its neighbors may be reasonably expected to endure.

Of these theories, strict liability appears to be the most tenuous. Recovery under the other two theories, however will depend largely upon a balancing of factors to determine the reasonableness of the invasion or the reasonableness of precautions taken by the state.

Traditionally under international law attributing state responsibility for the conduct of private parties has focused on whether there is a nexus between the state and private conduct sufficient to render the state *originally* accountable to another state for reparations. Such responsibility has traditionally been predicated on fault.[81] The Draft Articles on State Responsibility by the Interna-

78. *Id.*
79. *Id.*
80. *Id.*
81. *See generally* Kelson, *State Responsibility and the Abnormally Dangerous Activity*, 13 HARV. INT'L L. J. 197 199 (1972). The author concludes that: "(1) Where the risk of harm from an activity is substantial in either probability or magnitude of harm, and is transnational in

tional Law Commission, for example, largely reflect this traditional focus.[82] This limited focus fails to provide criteria for determining when a state is under an international obligation to prevent unreasonable risk of harm to other states through measures regulating health, safety and security Thus, "admitting even the possibility that a state may act when it fails to regulate or control private activity is to move in a substantive direction."[83] In short, there has been relatively little refinement of when a state is *vicariously* liable for acts of persons within its borders, and of what the nature of that liability is. Yet under the doctrine of good neighborliness and strict liability for ultrahazardous activities, the state is not only liable if it is the operator of the plant but is also *originally liable* for the harm if an unreasonable interference or harm from an ultrahazardous activity is demonstrated, regardless of whether fault (in the sense of intent, recklessness or negligence) is shown.

character, the State within whose jurisdiction the activity is conducted is under duty to prevent such harm as may be caused by the enterprise; (2) State is under duty to notify any other State which may be threatened by harm from the abnormally dangerous activities which the State permits to be conducted within its jurisdiction; and [less importantly] (3) State, failing to prevent harm, shall be originally responsible and strictly liable for the harm caused by abnormally dangerous activities within its jurisdiction to the residents or property of another State. *Id.* at 242-43.

82. *Draft Articles on State Responsibility*, 33 U.N. GAOR Supp. (No. 10) 187 U.N. Doc. A/33/10 (1979), *reprinted in*, [1978] 2 Y.B. INT'L. L. COMM'N 78, U.N. Doc. A/CN.4/SER.A/1978/Add.1 (Part 2).

The relevant article for state responsibility for international pollution is Article 3:

There is an intentionally wrongful act of State when:

(a) conduct consisting of an action or ommission is attributable to the State under international law; and

(b) that conduct constitutes breach of an international obligation of the State.

Id., art. 3. For history of the article in relation to transboundary pollution, *see* Handl, *Territorial Sovereignty and the Problem of Transboundary Pollution*, 69 AM. J. INT'L L. 50, 58-60 (1975).

The International Law Commission has been studying the law of state responsibility and has affirmed the "principle that States, even when undertaking acts that international law [does] not prohibit [have] duty to consider the interests of other States that might be affected. *Draft Articles on State Responsibility*, *supra*, at 159.

Similarly, the International Law Association in 1982 adopted Rules of International Law Applicable to Transfrontier Pollution. Article 3(1) declares: "States are in their legitimate activities under an obligation to prevent, abate and control transfrontier pollution to such an extent that no substantial injuries caused are in the territory of another State. INT'L LAW ASS'N, REPORT OF THE SIXTIETH CONNFERENCE HELD AT MONTREAL 160 (1983). Significantly, the comments to the rules state that the rules merely restate international law as it exists. *Id.* at 158.

83. Christenson, *The Doctrine of Attribution in State Responsibility*, in INT'L LAW OF STATE RESONSIBILITY FOR INJURIES TO ALIENS: SELECTED CONTEMPORARY ISSUES (R. Lillich ed.).

An additional theory which may be utilized to require States to abstain from polluting the global environment is the public trust doctrine. The concept of protection of the public trust, property interests that belong to the public in general, is fundamental in the domestic law of many countries. It may therefore be considered a general principle of law under international law [84] The public trust doctrine is especially relevant to protection of communal global resources not within any particular state s jurisdic tion—for example, the high seas. The concept is implicitly recognized in the Stockholm Declaration[85] and other resolutions of global environmental policy [86] which supports its recognition as customary international law Along with the responsibility to abstain from injuring the global environment, a state may have an obligation and standing as parens patriae to object to other states' destruction of shared global resources.[87]

84. *See* Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 475, 484-85 (1970); Nanda, *The Establishment of International Standards for Transnational Environmental Injury*, 60 IOWA L. REV. 1089, 1118 (1975); and Tiewul, *International Law and Nuclear Test Explosions on the High Seas*, 8 CORNELL INT'L L.J. 45, 68 (1974).

85. *Stockholm Declaration of the United Nations Conference on the Human Environment, supra* note 66. Principle 1 states that "[m]an bears a solemn responsibility to protect and improve the environment for present and future generations; Principle 2 provides that "[t]he natural resources of the earth including the air, water, land, flora and fauna. must be safeguarded for the benefit of present and future generations through careful planning and management. *Id.* at 1418. *See also* Sohn, *The Stockholm Declaration on the Human Environment*, 145 HARV INT'L L.J. 423 (1973); *The World Charter for Nature*, G.A. Res. 37/7 37 U.N. GAOR Supp. (No. 51) at 17 U.N. Doc. A/37/51 (1982).

86. *See, e.g., United Nations Convention on the Law of the Sea*, U.N. Doc. A/CONF 62/122 (1982), *reprinted in* 21 I.L.M. 1261 (1982) and *Agreement Governing the Activities of States on the Moon and other Celestial Bodies*, G.A. Res. 34/68, 34 U.N. GAOR Supp. (No. 46) at 77 U.N. Doc. A/34/46, art. 11 (declaring certain natural resources to be the common heritage of mankind). *See also* The Antarctic Treaty, Dec. 1, 1959, 12 U.S.T 794, T.I.A.S. No. 4780; Treaty on Principles Governing Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27 1967 U.S.-Britain-Russia, 18 U.S.T 2410, T.I.A.S. No. 6347 610 U.N.T.S. 205; *Resolution on the Question of the Reservation Exclusively for Peaceful Purposes of the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, Underlying the High Seas Beyond the Limits of National Jurisdictions, and the Use of Their Resources in the Interests of Mankind*, G.A. Res. 2574 D (XXIV), 24 U.N. GAOR Supp. (No. 30) 11, U.N. Doc. A/7630 (1970), *reprinted in*, 9 I.L.M. 422 (1970); and *Declaration of Principles Governing the Limits of National Jurisdiction*, G.A. Res. 2749 (XXV), 25 U.N. GAOR Supp. (No. 28) 24, U.N. Doc. A/8028 (1971), *reprinted in*, 10 I.L.M. 220 (1971).

87 Weiss, *The Planetary Trust: Conservation and Intergenerational Equity*, 11 ECOLOGY L.Q. 495, 540-41 (1984). The author further contends that not only should the fiduciary obligation to protect "the planetary trust" be regarded as customary international law, but also as *jus cogens*, preemptory norm which in theory State could enforce before the International Court of Justice. *Id.* at 540-41. The author concedes, however, that "it is

Assuming for the moment that the injured state can make the requisite showing of fault, unreasonable interference or strict liability that state, under international law will face many of the hurdles to relief that a tort plaintiff encounters under traditional Anglo-American tort law The state will have to demonstrate material damage, although the full health and socioeconomic consequences of pollution may not be demonstrable until years after the original infliction of the injury It must also be demonstrated that the damage sustained was caused by pollution from sources in the challenged state.[88] Given the interaction of pollutants and the lengthy latency period for many diseases, it may be difficult or impossible to demonstrate, for example, that emissions from a source A in State B caused cancer in residents of State C.[89]

Even if the prerequisites for liability are established, and material damage is proven, full relief may not be readily available. One suggestion is that damages for transboundary pollution under international law include compensation for loss or damage to an individual's property including loss of an existing tangible asset and temporary or permanent loss of its use, personal injury and damage consequent upon death. Survivors are thus enabled "to obtain compensation for financial loss they may suffer when the victim provided for their support."[90] On the other hand, economic loss is ordinarily not recoverable, although various declarations, resolutions and conventions on pollution include recovery for such loss.[91] Psychological damage or emotional distress must also be considered as a form of damages which may or may not be recoverable.[92] With regard to transboundary pollution there is a trend toward widening the range of compensable damage while limiting the amount of liability [93]

An entirely separate remedial issue is whether a state may continue to permit conduct for which it is liable in damages, or whether prospective injunctive relief would be appropriate which

hard to establish that [such an obligation] already exists as part of customary international law. *Id.* at 542.

88. *See* Handl, *supra* note 72, at 75, n.157

89. *See, e.g.*, Kelson, *supra* note 81, at 238-242.

90. Pontavice, *Compensation for Transfrontier Pollution Damage*, in LEGAL ASPECT OF TRANSFRONTIER POLLUTION 409 (Organization of Economic Cooperation and Development 1977). *See also* RESTATEMENT OF FOREIGN RELATIONS LAW § 602 (1983).

91. *Id.*

92. *Id.*

93. *Id.* at 485.

requires the state to discontinue the harmful conduct. In a seminal article on the United States atomic weapon tests in 1954 in the Pacific Proving Grounds, McDougal and Schlei, writing in 1960, noted:

> No international tribunal has yet unequivocally faced the issue whether a state may continue to carry on conduct for which it is liable in damages, but sound policy decrees that international law should parallel municipal law in this respect. Although no legal issues were formally resolved between Japan and the United States, the settlement in fact reached a desirable legal result. Japan explicitly refused to demand that the United States discontinue its tests, and the United States paid two million dollars in damages without reference to questions of legal liability Only third parties, unembarrassed by responsibilities for the defense and security of the free world, seem unable to preceive the need for an appropriate discrimination between remedy for damage and mutual tolerance for vital interests.[94]

McDougal and Schlei's analysis, however is troubling in several respects. The traditional "balancing of the equities" for injunctive relief under municipal law has been demonstrated to under value environmental concerns. In the guise of protecting the "public's interest" United States courts, for example, have often shown an unwillingness to order cessation of income producing, yet polluting facilities.[95] When faced with unemployment and loss of income that is easily measured, balancing the equities tends to ignore the importance of clean air and water good health, and aesthetic values which are not readily reduced to monetary value. In the guise of "the defense and security of the free world," McDougal and Schlei would similarly strike the balance in favor of military and strategic superiority at the expense of the global environment. Their approach also runs counter to a growing awareness that war is the greatest threat to the environment and that national security encompasses environmental security [96]

94. McDougal and Schlei, *The Hydrogen Bomb Tests in Perspective: Lawful Measures for Security*, 64 YALE L.J. 648, 694-95, (1955).

95. *See, e.g.*, Boomer v. Atlantic Cement Co., 26 N.Y.2d 219, 309 N.Y.S.2d 312, 257 N.E.2d 870 (1970).

96. Treaties restricting nuclear weapons and other weapons threatening environmental destruction include: Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water, Aug. 5, 1963, 14 U.S.T 1313, T.I.A.S. No. 5433; Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *supra* note 86; Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco), Feb. 14, 1967 634 U.N.T.S.

III. Transboundary Pollution of the Global Commons

Transboundary pollution which contaminates the ocean presents its own unique issues of environmental protection under international law [97] The four Geneva Conventions of 1958 took only a preliminary step toward environmental protection of the oceans.[98] Part VII of the Law of the Sea Convention more specifically governs protection and preservation of the marine environment, including enforcement of the Convention s requirement.[99]

281, *reprinted in*, 6 I.L.M. 521 (1967); Treaty on the Non-proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T. 483, T.I.A.S. No. 6839; Treaty on the Prohibition of the Implacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof, Feb. 11, 1971, 23 U.S.T. 701, T.I.A.S. No. 7337· Convention on Prohibition of the Development Production, and Stockpiling of Bacteriological (Biological) and Toxic Weapons and on Their Destruction, Apr. 10, 1972, 26 U.S.T 583, T.I.A.S. No. 8062; *Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*, G.A. Res. 31/72, 31 U.N. GAOR Supp. (No. 39) at 36, U.N. Doc. A/31/39 (1976); *see also* Weiss, *supra* note 87 at 556-57· *Resolution Regarding Weapons of Mass Destruction in Outer Space*, G.A. Res. 1884 (XVIII), 18 U.N. GAOR Supp. (No. 15) at 13, U.N. Doc. A/5515 (1964), *reprinted in*, 2 I.L.M. 1192 (1963).

97 For analysis of state' obligation to prevent environmental damage to international watercourses, *see* Carvell, *The North Dakota Garrison Diversion Project and International Environmental Law*, 60 N.D.L. Rev. 603 (1984).

98. The Convention on the Continental Shelf, April 29, 1958, art. 5(7), 1 U.S.T 471, T.I.A.S. No. 5578, 499 U.N.T.S. 331, makes protection of the living resources of the high seas from "harmful agents mandatory for all coastal states.

The Convention on the Territorial Sea and the Contiguous Zone, April 29, 1958, art. 24 (1), 2 U.S.T 1606, T.I.A.S. No. 5639, 516 U.N.T.S. 205, provides:

> In zone of the high seas contiguous to its territorial sea, the coastal State may exercise the control necessary to:
>
> (a) prevent the infringement of its sanitary regulations within its territory or territorial sea;
>
> (b) punish infringement of the above regulations committed within its territory or territorial sea.

The Convention on Fishing and Conservation of the Living Resources of the High Seas, April 29, 1958, art. 7 1 U.S.T. 138, T.I.A.S. No. 5969, 599 U.N.T.S. 285, allows any coastal state to adopt unilateral measures of conservation appropriate to any stock of fish or other marine resources in an area of the high seas adjacent to its territorial sea, if such measures are not arrived at through negotiations with other interested states within six months.

The Convention on the High Seas, April 29, 1958, art. 24, 13 U.S.T 2312, T.I.A.S. No. 5200, 450 U.N.T.S. 82, requires States to draw up regulations to prevent pollution of the seas by the discharge of oil from ships or pipelines or resulting from the exploitation or exploration of the seabed and its subsoil, taking account of existing provisions on the subject, and similarly art. 25 requires the taking of measures to prevent pollution of the seas from the dumping of radioactive wastes, "taking into account any standards and regulations which may be formulated by the competent international organizations of the seas or air space above, resulting from any radioactive materials or other harmful agents.

99. *United Nations Convention on the Law of the Sea*, *supra* note 86. Art. 194 requires states to take all necessary measures to prevent pollution of the marine environment, including

In recent years there have been numerous multilateral conventions restricting pollution of the seas,[100] such as those in Principles 6, 7 and 26 of the Stockholm Declaration.[101] It has been posited by more than one commentator that "what was once an

the prevention of releases of toxic, harmful and noxious substances from land-based sources, from or through the atmosphere, and by dumping. Under art. 198, state which becomes aware of cases in which the marine environment is in imminent danger of being damaged or has been damaged by pollution shall immediately notify other States it deems likely to be affected by such damage, as well as the competent international organizations, global or regional. Arts. 207 to 211 require states to establish laws to control pollution from land-based sources, seabed activities, dumping, and from vessels. Art. 212 provides:

1. States shall, within air space under their sovereignity or with regard to vessels or air craft flying their flag or of their registry, establish national laws and regulations to prevent, reduce and control pollution of the marine environment from or through the atmosphere, taking into account internationally agreed rules, standards and recommended practices and procedures, and the safety of air navigation.
2. States shall also take other measures as may be necessary to prevent, reduce and control such pollution.
3. States, acting in particular through competent international organizations or diplomatic conference shall endeavor to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment from or through the atmosphere.

100. 1954 International Convention for the Prevention of the Pollution of the Sea by Oil, July, 1958, 3 U.S.T 2989, T.I.A.S. No. 4900, 327 U.N.T.S. 3; 1962 Amendments to the 1954 Convention for the Prevention of Pollution by the Sea by Oil, May 18, 1967 2 U.S.T 1523, T.I.A.S. No. 6109, 600 U.N.T.S. 332; 1969 Amendments to the 1954 Convention for the Prevention of the Pollution of the Sea by Oil, annexed to IMCO Assembly Res. A. 175(vi), Oct. 21, 1969; International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Nov. 29, 1969, Brussels, *reprinted in*, 9 I.L.M. 25 (1970); International Convention on Civil Liability for Oil Pollution Damage, Nov. 29, 1969, Brussels, *reprinted in*, 9 I.L.M. 45 (1970); Agreement Concerning Pollution of the North Sea Oil, June 9, 1969, 704 U.N.T.S. 3, *reprinted in*, 9 I.L.M. 359 (1970); Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, Dec. 17 1971, *reprinted in*, 11 I.L.M. 277 (1972); Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Dec. 18, 1971, *reprinted in*, 11 I.L.M. 284 (1972); Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, Feb. 15, 1972, *reprinted in*, 11 I.L.M. 262 (1972); Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Nov. 13, 1972, 26 U.S.T 2403, T.I.A.S. No. 8165, *reprinted in*, 11 I.L.M. 1294 (1972); International Convention for the Prevention of Pollution from Ships, Nov. 2, 1972, *reprinted in*, 12 I.L.M. 1319 (1973), (Nordic) Convention on Environmental Protection, Feb. 19, 1974, *reprinted in*, 13 I.L.M. 591 (1974); Convention for the Prevention of Marine Pollution from Land Based Sources, Feb. 16, 1976, *reprinted in*, 15 I.L.M. 290 (1976).

101. *Stockholm Declaration of the United Nations Conference on the Human Environment*, *supra* note 66. Principle 6 states:

> The discharge of toxic substances or of other substances and the release of heat, in such quantities or concentrations as to exceed the capacity of the environment to render them harmless, must be halted in order to ensure that serious or irreversible damage is not inflicted upon ecosystems. The just struggle of the peoples of all countries against pollution should be supported.

Principle 7 provides:

inchoate doctrine of "pollution" in international law has since evolved into a coherent and binding principle of customary inter national law or at the very least, into a general principle of law recognized by civilized nations."[102] Historically however waters within the territorial jurisdiction of a nation, state or states were presumed to be solely within their control, and international waters were presumed to be outside the control of any nation state.[103] The 1982 Convention of the Law of the Sea has been heralded as possibly enunciating a general principle of state responsibility and liability for injury to the marine environment.[104] Most international law scholars now take the position that customary international law provides that all nations share responsibility to protect the ocean areas beyond their territories, which includes an obligation to control their citizens to assure such protection.[105]

The *Trail Smelter* case s emphasis on material damage to the ter ritory of another state may be seen as a limitation on recovery for damage to shared global resources, but is perhaps more appropriately seen as a decision simply limited to the issue of damage presented in the arbitration as no issue of injury to the global common resources was alleged.[106] In the Nuclear Test Cases,[107]

> States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Principle 26 focuses on the harmful effects of nuclear weapons:

> Man and his environment must be spared the effects of nuclear weapons and all other means of mass destruction. States must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons.

See also RESTATEMENT OF FOREIGN RELATIONS LAW §§ 611-612 (1983).

102. Tiewul, *supra* note 84, at 55; *compare* McDougal & Schlei, *supra* note 94 (arguing that freedom of the high seas includes the freedom to conduct nuclear weapons tests); and Margolis, *The Hydrogen Bomb Experiments and International Law*, 64 YALE L.J. 629 (1955). Re cently, many nations have joined together to develop standards to control pollution in mutually shared seas, such as the Baltic, the Meditteranean, and the North Seas. *See* Keches, *Regional Seas: An Emerging Marine Policy Approach*, in CENTER FOR OCEAN MANAGEMENT STUDIES, COMPARATIVE MARINE POLICY at 17-20 (1981).

103. Belsky, *Management of Large Marine Ecosystems: Developing New Rule of Customary International Law*, 22 SAN DIEGO L. REV. 733, 734-742 (1985).

104. Hargrove, *Environment and the Third Conference of Law of the Sea*, in WHO PROTECTS THE OCEAN? 191, 208 (J. Hargrove ed. 1975). There has been considerable debate over whether the rules in the 1982 Convention are customary law. Belsky, *supra* note 103, at 753, n.96.

105. *Id.* at 751-53.

106. Rubin, *supra* note 61, at 279-81.

the International Court of Justice was directly presented with the issue of recovery for environmental damage to the high seas, but, unfortunately dismissed the case as moot. When the French Government indicated it would conduct no further atmospheric tests of nuclear weapons in the Pacific Ocean, the Court held the cases to be moot and denied the request for a declaratory judgment.[108] Yet prior to dismissal, the Court had issued an Interim Order of Protection under Article 41 of the Statute of the International Court of Justice upon a finding of *prima facie* jurisdiction.[109]

In a similar controversy the United States settled *ex gratia* (without reference to liability) a claim from Japan for injury to a Japanese fishing vessel and fishermen caught in the radioactive fallout from an American nuclear test in the Pacific Ocean.[110] In the *Fukuryu Maru* affair the United States paid Japan two million dollars in compensation for the damages sustained, including injuries to the tuna fish industry in Japan.[111] It may certainly be concluded that the settlement reflected *opinio juris* that the settlement was legally compelled.[112] The items of damage, however did not include fish rendered radioactive in the ocean except to the extent they were later caught by Japanese fishermen and, thus, constituted economic injury to Japanese interests.[113]

The special and potentially catastrophic problem of radioactive fallout merits separate analysis, in that radioactive fallout from weapons tests may also violate the Partial Test Ban Treaty [114]

107 Nuclear Test Cases (Australia v. France) 1973 I.C.J. 99 and (New Zealand v. France) 1973 I.C.J. 135.

108. Nuclear Test Cases (Australia v. France) 1974 I.C.J. 253 and (New Zealand v. France) 1974 I.C.J. 457

109. 1973 I.C.J. 99, 102; and 1973 I.C.J. 135, 138. *See also* Elkind, *French Nuclear Testing and Article 41 — Another Blow to the Authority of the Court?*, 8 VAND. J. TRANSNAT'L L. 39 (1974).

110. Rubin, *supra* note 61, at 279.

111. *Id.*

112. *Id.* In the United States, the authority under which *ex gratia* settlements were made to foreign claimants by the Executive was generally limited to meritorious" claims. 10 U.S.C. § 2734 (1964); 22 U.S.C. § 2669(b) (Supp. I, 1965-66); 28 U.S.C. §§ 2672, 2674 (1964); *but see* McDougal & Schlei, *supra* note 94.

113. Rubin, *supra* note 61, at 280.

114. Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, *supra* note 96. A full analysis of whether nuclear weapons tests, participation in the nuclear arms race, or use of nuclear weapons violated international law is beyond the scope of this article. Briefly, however, it should be mentioned that the Statute of the International Atomic Energy Agency, Oct. 26, 1956, art. 2 and 3, 8 U.S.T 1093, T.I.A.S. No. 3873, 276 U.N.T.S. 3, prohibits the use of any special fissionable and other materials, services, equipment, facilities or information made available by the Agency or at its re-

The Partial Test Ban Treaty prohibits states from nuclear explosions in the atmosphere; beyond their territories, including outer space; underwater including territorial waters on high seas, or in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted.[115] If the Partial Test Ban Treaty is evidence of customary international law then any nuclear activity resulting in radioactive fallout outside the State s territory may violate customary international law without further reference to any other rules of international law governing pollution generally [116]

quest or under its supervision or control in such way as to further any military purpose. The Treaty on the Non-Proliferation of Nuclear Weapons, July 1, 1968, 21 U.S.T 483, T.I.A.S. No. 6839, 729 U.N.T.S. 161, forbids "non-nuclear states" (states other than the People' Republic of China, France, the United States, the Soviet Union, and the United Kingdom) from manufacturing or otherwise acquiring nuclear weapons or nuclear explosive devices. It may be argued that the Partial Test Ban Treaty and the Non-Proliferation Treaty have now become customary international law, and that they together with numerous U.N. resolutions indicate customary international law opposed to the acquisition, development, detonation and/or deployment of nuclear weapons and other nuclear explosive devices. *See, e.g., Against Soviet Plan to Explode 50 Megaton Bomb*, G.A. Res. 1632 (XVI), 16 U.N. GAOR Supp. (No. 17) at 3, U.N. Doc. A/5100 (1961); *On an Undertaking by Countries Possessing No Nuclear Weapons Not to Have Such Weapons in their Territory*, G.A. Res. 1664 (XVI), 16 U.N. GAOR Supp. (No. 17) at 5, U.N. Doc. A/5100 (1961); *On Prevention of the Wider Dissemination of Nuclear Weapons*, G.A. Res. 1665 (XVI), 16 U.N. GAOR Supp. (No. 17) at 5, U.N. Doc. A/5100 (1961); *On the Urgent Need for Suspension of Nuclear Tests*, G.A. Res. 1762 A & B (XVIII), 18 U.N. GAOR Supp. (No. 17) at 3, U.N. Doc. A/5127 (1962); *Regarding Weapons of Mass Destruction in Outer Space*, G.A. Res. 1884 (XVIII), 18 U.N. GAOR Supp. (No. 15) at 13, U.N. Doc. A/5515 (1964); *On the Urgent Need for Suspension of Nuclear and Thermo-Nuclear*, G.A. Res. 1910 (XVIII), 18 U.N. GAOR Supp. (No. 15) at 14, U.N. Doc. A/5515 (1963); *see also* Falk, *The Shimoda Case: A Legal Appraisal of the Atomic Attacks Upon Hiroshima and Nagasaki*, 59 AM. J. INT'L L. 759 (1965); U.N. CHARTER art. 2(4), 11(1) and 26(1). However, it may be argued with equal force that the treaties have not been widely enough accepted to become customary international law and that U.N. resolutions by their very nature are not binding in any legal sense. On the legal effect of General Assembly resolutions, *see* R. FALK, THE STATUS OF THE LAW IN INT'L SOCIETY 176 (1970); Johnson, *The Effect of Resolutions of the General Assembly of the United Nations*, 32 BRIT. Y.B. INT'L L. 97 (1956); and Sloan, *The Binding Force of Recommendation of the General Assembly of the United Nations*, 25 BRIT. Y.B. INT'L L. 1-33 (1948).

115. Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water, *supra* note 96.

116. It has even been argued by one commentator that location of nuclear power plant near national boundaries violates international law. The author comes to the conclusion that:

> Assuming that no special authorizing circumstances prevail, conduct of an activity in frontier areas is incompatible with international law if: (a) the activity concerned involves major risk of transnational harm; (b) this risk is function, at least to significant degree, of the location in which the activity takes place; and (c) the activity in that frontier location amounts to an inefficient use between the risk creating and risk ex-

IV JUDICIAL ENFORCEMENT OF CUSTOMARY INTERNATIONAL LAW AND GENERAL PRINCIPLES OF LAW GOVERNING TRANSBOUNDARY POLLUTION

As is so often the case, judicial enforceability is an obstacle to enforcement of international responsibility for extraterritorial pollution. The individual private plaintiff will be essentially restricted to recovery in the domestic courts of state, wherein the environmental injury occurred or the injuries took place.[117] Whether international rules of liability can be utilized will depend primarily upon whether and the extent to which international law is incorporated into the state s domestic law [118] For example, in the United States courts non-resident aliens may sue under 28 U.S.C. § 1350 in the federal courts for extraterritorially effective torts committed within the United States.[119] Foreign nationals may bring suit in federal court based on state tort law under diversity jurisdiction.[120] In the *Paquette Habana* case, the United States Supreme Court has stated that " where there is no treaty and no controlling executive or legislative act or judicial decision, resort must be had to customs and usages of civilized nations. "[121] Thus, to a limited extent, international law may be utilized by the United States courts.[122] Other procedural hur dles, such as sovereign immunity and standing, must, however be overcome. Under the United States Foreign Sovereign Immunities Act of 1976, for example, there is jurisdiction in the United States federal courts over a foreign state for among other things, direct injury in the United States by a sovereign as a result of

posed states of the internationally shared natural resources concerned, provided the risk is not already of such an obvious nature or magnitude as to render the activity incompatible per se with fundamental principles of the sovereign equality and independence of states.

Handl, *An International Legal Perspective on the Conduct of Abnormally Dangerous Activities in Frontier Areas: The Case of Nuclear Power Plant Siting*, 7 ECOLOGY L.Q. 1, 47 (1978).

117 Comment, *Compensating Private Parties for Transnational Pollution Injury*, 58 ST. JOHN'S L. REV. 528, 531 (1984).

118. For comparison of domestic pollution laws, *see* P DOWNING AND K. HUNF, INT'L COMPARISONS IN IMPLEMENTING POLLUTION LAWS (1983).

119. *Compensating Private Parties for Transnational Pollution*, *supra* note 117 at 533.

120. *Id.*

121. The Paquette Habana, 175 U.S. 677 (1900); *see also* Lillich, *Domestic Institutions* in 4 THE FUTURE OF THE INT'L LEGAL ORDER 384, 387-392 (1972).

122. *See* The Paquette Habana, 175 U.S. 677 (1900); Filartiga v. Pena-Irala, 630 F.2d 876 (2d Cir. 1980); *see also* Fischer, *Acid Rain: Deploying Private Damage Actions Against Transboundary Polluters*, 19 TRIAL 57 (1983).

commercial activities.[123] Under the United States Supreme Court decision in *Sierra Club v. Morton*,[124] the plaintiff will have to demonstrate that the plaintiff uses the injured environment and has suffered injury in that use.[125] A promising approach toward overcoming standing obstacles relevant to transboundary pollution is reflected in the Nordic Convention on the Protection of the Environment, granting citizens of the member countries reciprocal access to each other s courts and administrative agencies for "any person affected by a nuisance caused by environmentally harmful activities."[126] Even if the plaintiff succeeds in a domestic court, enforcement extranationally is largely dependent upon the cooperation of the defendant state, and injunctive relief is highly unlikely [127]

For state against state claims, the obvious forum for enforce ment is the Intenational Court of Justice, yet the hurdles to enforcement are at least as imposing as those which may be encountered in domestic courts.[128] The Court's jurisdiction ex tends to "all cases which the parties refer to it and all matters specially provided for in the Charter of the United Nations or in treaties and conventions in force."[129] A suit, however may only be brought by a state against a state.[130] No state is subject to the Court's jurisdiction unless it has consented to be.[131] Any state which has been sued may not only assert its own reservations to consent to be sued (asuming it has consented in the first place),

123. 28 U.S.C. § 1605(a)(2) (1982); *see generally* 28 U.S.C. §§ 1330, 1391, 1441, 1602-1611 (1982). Section 1605 qualifies the doctrine of absolute sovereign immunity by allowing federal courts to have jurisdiction over claims against sovereign based on waiver of immunity, commercial activity carried on within the United States, or outside the United States if the activity causes direct effect within the United States, expropriation, rights in gifts or bequests of immovable property, non-commercial torts, and certain maritime liens. *Id.* § 1605.

124. 405 U.S. 727 (1972).

125. Weiss, *supra* note 87 at 567

126. Convention on the Protection of the Environment, Feb. 19, 1971, *reprinted in*, 13 I.L.M. 591 (1974).

127 *Compensating Private Parties for Transnational Pollution*, *supra* note 117 at 531-32; Fischer, *supra* note 122, at 58.

128. Of course, the state may pursue diplomatic and international channels to obtain compensatory damages, or attempt arbitration or negotiation. *Compensating Private Parties for Transnational Injury*, *supra* note 117 at 531.

129. Statute of the International Court of Justice, *supra* note 52, art. 36(1); *see also* Weiss, *supra* note 87 at 570.

130. Statute of the International Court of Justice, *supra* note 70, art. 34; *see also Compensating Private Parties for Transnational Pollution*, *supra* note 117 at 538.

131. Statute of International Court of Justice, *supra* note 70, art. 36(2).

but also those of the plaintiff state.[132] Such reservations frequently exempt from the jurisdiction of the Court issues of "domestic" jurisdiction of "national security"[133] Even if these hurdles are surmountable, there must be complete exhaustion of any domestic remedies.[134] Even assuming that all these obstacles may be overcome and the plaintiff state wins, opinions of the Court may only be enforced by the United Nations Security Council, in which the major nuclear powers have the veto power[135]

V LIABILITY FOR TRANSBOUNDARY POLLUTION PURSUANT TO TREATY LAW

Enforcement of international law by treaty is more effective than enforcement of custom and general principles of law[136] Yet on the whole, enforcement provisions in extant treaties are too vague to provide for meaningful enforcement, or not enough nuclear powers are parties to the treaties to provide any meaningful protection.[137] Although a full survey of all such treaty provisions governing transboundary pollution is beyond the scope of this article,[138] there are only a few relevant to transboundary pollution from nuclear accidents.

132. "The states parties to the present Statute may at any time declare that they recognize as compulsory *ipso facto* and without special agreement *in relation to any other state accepting the same obligation*, the jurisdiction of the Court. *Id.*

133. *See generally* WESTON, FALK & D'AMATO, INT'L LAW AND WORLD ORDER 415-426 (1980).

134. *Compensating Private Parties for Transnational Pollution*, *supra* note 117 at 557

135. U.N. CHARTER art. 94.

136. *See, e.g., Compensating Private Plaintiffs for Transnational Pollution*, *supra* note 117 at 557

137 *Id.* at 540-41.

138. The 1972 Stockholm Conference led to the creation of an institution, the United Nations Environmental Program (UNEP) as catalyst and coordinator of international environmental efforts, including international efforts to protect the marine environment. Belsky, *supra* note 103, at 741 n.33. Also following the conference, several national governments and international organizations responded to the dictate of Principle 22 of the Stockholm Declaration calling for states to cooperate to develop international law for transboundary environmental damage. One such response was from the Environment Committee of the Organization for Economic Cooperation and Development (OECD). The OECD is regional economic organization established in Europe in 1961. For view of few regional environmental programs, *see generally* Comment, *Equal Rights of Access in Matters of Transboundary Pollution: Its Prospects in Industrial and Developing Countries*, 14 CAL. W INT'L L.J. 192 (1984); *see also* Bentil, *Implementation of Common Market Environment Protection Laws*, 128 SOLIC. J. 393 (1984); Dickstein, *National Environmental Hazards and International Law*, 23 INT'L & COMP L.Q. 426, 443-444 (1974) (describing Euratom control over radia-

The Vienna Convention on Civil Liability for Nuclear Damage grants jurisdiction over cases for nuclear damage to the courts of the state in whose territory the damage occurred.[139] Article II of the Vienna Convention on Civil Liability for Nuclear Damage [140] makes the "operator" (the person so designated or recognized by the Installation State) of a nuclear installation liable for any "nuclear damge" "Nuclear damage" is defined in Article I(1)(k) to include:

> (i) loss of life, any personal injury or any loss of, or damage to, property which arises out of or results from the radioactive properties or a combinations of radioactive properties with toxic, explosive or other hazardous properties of nuclear fuel or radioactive products or wastes in, or of nuclear material coming from, originating in, or sent to, a nuclear installation; (ii) any other loss or damage so arising or resulting if and to the extent that the law of the competent court so provides; and (iii) if the law of the Installation State so provides, loss of life, any personal injury or any loss of, or damage to, property which arises out of or results from other ionizing radiation emitted by any other source of radiation inside a nuclear installation."[141]

A responsible operator may be an individual, a partnership, any private or public body any international organization having a legal personality under the law of the Installation State.[142] Liability for nuclear damage is absolute except that: the operator may be exempt from liability for damage directly due to an act of

tion hazards); and the Convention on Long-Range Transboundary Air Pollution, Nov. 13, 1979, E/ECE/1010, T.I.A.S. No. 10541. For further elaboration on United Nations efforts to protect the environment and those of other international organizations, *see* Smith, *The United Nations and the Environment: Sometimes Great Notion?*, 19 TEXAS INT'L L.J. 335 (1984); *Developments, The United Nations Environment Programme After Decade: The Nairobi Session of Special Character May 1981*, 12 DENVER J. INT'L L. & POLICY 269 (1982-83); OFFICE OF RESEARCH & DEVELOPMENT, EPA, A SURVEY OF INT'L INTERGOVERNMENTAL ORGANIZATIONS: THE STRATEGIES THEY USE TO ABATE POLLUTION, (1978); STANLEY, ENVIRONMENTAL MANAGEMENT BY THE UNITED NATIONS 1972).

139. Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, *reprinted in*, International Atomic Energy Agency, International Convention on Civil Liability for Nuclear Damage (1974) (Legal Series No. 4). *See also* Teiwul, *supra* note 84, at 61, n.57 The Vienna Convention was unanimously adopted by the IAEA in 1963. The Soviet Union is member of the IAEA but is not party to the Convention. The analysis of Soviet responsibility herein, therefore, is apart from whatever responsibility it may be held to pursuant to this treaty obligation. Despite Tiewul' assertion, art. XI(1) gives jurisdiction only to where the "incident" occurred.

140. Vienna Convention on Civil Liability for Nuclear Damage, *supra* note 139, art. II.

141. *Id.* art. I(1)(K).

142. *Id.* art. I(1)(a), (c).

armed conflict, hostilities, civil war or insurrection;[143] that the damage resulted wholly or partially from the gross negligence or intentional wrong of the victim himself, or that, unless the state otherwise provides, the damage resulted from grave natural disaster of an exceptional character [144] Where the nuclear accident oc curred outside the territory of any state, or where its location cannot accurately be determined, the courts of the installation state have jurisdiction.[145] The Vienna Convention excludes any jurisdictional immunities arising under national or international law once a court has obtained jurisdiction under the Convention.[146] The extent of recoverable damage may not be limited to less than five million United States dollars.[147]

Under Article VI(1) of the Vienna Convention, claims for compensation with respect to nuclear damage are barred, unless presented within ten years from the date of the nuclear accident.[148] This limitation does not apply if under the law of the Installation State, the liability of the operator is covered by insur ance or other financial security or by state funds, for a period longer than ten years.[149] Notwithstanding these provisions, the forum state may erect a limitation period of between three and ten years from the date on which the injured party had or should have had knowledge both of the damage, and of the identity of the operator liable therefor [150] Unless the law of the competent state otherwise provides, a person who has brought a timely ac tion for compensation may at any time before final judgment amend his claim to take into account any aggravation of the injuries.[151] The Installation State shall insure the payment of claims against the operator providing the necessary funds to the extent that the yield of insurance or other financial security is inadequate to satisfy such claims.[152] An optional protocol to the Convention

143. *Id.* art. IV(3)(a).
144. *Id.* art. IV
145. *Id.* art. XI(2).
146. *Id.* art. XIV
147 *Id.* art. V
148. *Id.* art. VI(1).
149. *Id.*
150. *Id.* art. VI(3).
151. *Id.* art. VI(4). In addition to the Vienna convention, there are also several bilateral and regional arrangements for the payment of compensation to victims of nuclear activity or pollution resulting therefrom on the high seas, the scope of liability ranging from partial to absolute. *See* Tiewul, *supra* note 84, at 61 n. 59.
152. Vienna Convention, *supra* note 139, art. VII(1).

provides that disputes concerning the interpretation or application of the Convention are to be decided by the International Court of Justice.[153] Similar provisions for civil damages are contained in the Paris Convention of Third Party Liability in the Field of Nuclear Energy[154] and the Brussels Convention Supplementary to the Paris Convention,[155] which were sponsored by the Organization for Economic Cooperation and Development and on which the Vienna Convention was modeled.

The Vienna Convention entered into force in 1977 but there are only approximately ten states that are parties to the Convention, and none of these states is a major nuclear power.[156] The Paris Convention entered into force in 1968 and the Brussels Supplementary Convention went into force in 1974.[157] The parties to these treaties do include most of Europe, but neither the Soviet Union nor the United States is a party.[158]

Pursuant to the Statute of the International Atomic Energy Agency "[a]ny question or dispute concerning the interpretation or application [of the Statute] which is not settled by negotiation shall be referred to the International Court of Justice in conformity with the Statute of the Court, unless the parties concerned agree on another mode of settlement."[159] The General Conference and the Board of Governors of IAEA, with authorization from the General Assembly of the United Nations, may request an advisory opinion on any legal question arising within the scope of the IAEA's activities.[160] However the Agency has no authority to issue mandatory safety standards and, therefore, this provision

153. Vienna Convention, *supra* note 139, art. I.

154. Paris Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, *reprinted in*, 55 AM. J. INT'L L. 1082 (1961).

155. Convention Supplementary to the Paris Convention of July 29, 1960 on Third Party Liability in the Field of Nuclear Energy, *supra* note 154. *See also* The Convention on the Liability of Operations of Nuclear Ships, Jan. 31, 1963, *reprinted in*, 2 I.L.M. 685 (1963); *see also* Convention on Civil Liability in the Field of Maritime Carriage of Nuclear Material, Dec. 17 1971, *reprinted in*, 11 I.L.M. 277 (1972) (adds to the Paris and Vienna Conventions).

156. ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT NUCLEAR ENERGY AGENCY & INTERNATIONAL ATOMIC ENERGY AGENCY, NUCLEAR THIRD PARTY LIABILITY AND INSURANCE STATUS AND PROSPECTS 47 (1985).

157 *Id.*

158. *Id.*

159. Statute of International Atomic Energy Agency, *supra* note 114, art. XVIIA.

160. *Id.* art. XVIIB. Although the IAEA is authorized to adopt safety standards, the standards are technically without binding effect. *See generally*, Dickstein, *supra* note 138, at 426, 436-38.

would do little or nothing to impose state liability for transboundary damage from unsafe operation of a nuclear reactor IAEA s safety standards are meant to apply only to the agency s own operations and operations carried out at its request or under its control or supervision.[161] Safety standards are merely recommended by the IAEA and are not, therefore, binding on nuclear activities not provided through the NRC. The IAEA, however has negotiated bilateral agreements for safety standards with twenty-one countries.[162]

For pollution of the sea, the 1982 Law of the Sea Convention imposes on the individual state the responsibility to enforce their own laws and to adopt the necessary legislative, administrative, and other measures to implement international rules and standards established through competent international organizations or diplomatic conferences.[163] The provisions of the 1982 Convention, unlike the provisions of the four 1958 Conventions discussed above, in all likelihood establish new principles of international law not codification of pre-existing custom. Therefore, they would be binding only on the parties to the Convention. Perhaps the most forceful enforcement provision in the 1982 Convention is the remedy drawn from customary international law of intervention for maritime casualties to avoid pollution under Article 221 That Article preserves " the right of States, pursuant to international law both customary and conventional, to take and enforce measures beyond the territorial sea proportionate to the actual or threatened damage to protect their coastline or related interests, including fishing, from pollution or threat of pollution following upon a maritime casualty or acts relating to such a casualty which may reasonably be expected to result in major harmful consequences."[164]

161. Statute of International Atomic Energy Agency, *supra* note 114, art. IIA.6. *Compare* Treaty Establishing the European Atomic Energy Community (Euratom) art. 30-39, 77-85, Mar. 25, 1957 298 U.N.T.S. 167 (mandatory safety standards for all members).

162. *International Nuclear Safety Concerns: Hearings Before the Subcomm. on Energy, Nuclear Proliferation, and Governmental Processes of the Senate Comm. on Governmental Affairs*, 99th Cong., 2d. Sess., 5 (1986) (statement of Allan I. Mendelowitz, Assoc. Dir., National Security and Int'l Affairs Div., GAO)

163. *See generally United Nations Convention on the Law of the Sea, supra* note 86, art. 213-222.

164. *Id.*, art. 221(1).

VI. Nuclear Accidents and Prevention of Damage Under International Law

It would be remiss to evaluate the Chernobyl accident without recognition of the human anxiety suffering, and loss of life in the Soviet Union, and what may be the loss to the Soviet people of an area of rich, much needed agricultural land. Richard Falk has suggested that human rights must include "the rights of individuals and groups (including those of unborn generations) to be reasonably secure about their prospects of minimal physical well-being and survival (and) the duty of governments and peoples to uphold this right by working to achieve sustainable forms of national and ecological security "[165] Many of the international dec larations that aspire to the most stringent protection of the environment portray the right to a safe and clean environment as a fundamental human right.[166] In the context of the Chernobyl tragedy environmental destruction may be seen as a deprivation of rights tantamount to a deprivation of civil, economic and social human rights.

Though difficult to make an accurate assessment of the damage to Soviet agricultural land around Chernobyl without accurate radiation measurements, some general conclusions can be made. Scientists have testified that radioactivity was likely to have damaged soil, water livestock and crops within a 2000-square-mile region of the Ukraine that surrounds the crippled plant.[167] The Ukraine produces 20% of the Soviet grain crop, and is the Soviet

165. R. Falk, Human Rights and State Sovereignty 146-47 (1981); *see also* W Gormley, Human Rights and Environment: The Need for Int' Cooperation (1976); Cassin, *Les Droits de l'homme*, 140 Recueil Des Cours 321, 327 (1974 IV); Falk, *Toward World Order Respectful of the Global Ecosystem*, Env Affairs 251 (1971); Gofman, *The Existence of Nuclear Weapons: Prime Environmental Threat*, 1 Env. Affairs 782 (1972); *cf. Stockholm Convention supra* note 66, Principles 1, 2, & 4.

166. *See* The Perversion of Science and Technology: An Indictment (Poona Indictment), adopted by the participants in the fourteenth meeting of the World Order Models Project held in Poona, India, July 2-10, 1978, *reprinted in*, 4 Alternatives — A Journal of World Policy 413 (1978-1979); Independent Declaration on the Environment (Dai Dong Declaration), adopted by the participants in the Dai Dong Independent Conference on the Environment, Grainage Stiftsgard, Sweden, June 1-6, 1972, *reprinted in*, 1 Alternatives — A Journal of World Policy 406 (1975); Declaration on the Third World and the Human Environment (Oi Committee Declaration) adopted by the participants in the Conference on Problems of the Third World and the Human Environment, Stockholm, June, 1972, *reprinted in*, B. Weston, R. Falk & A. D'Amato, Basic Documents in International Law And World Order 427 (1980).

167 N.Y. Times, May 6, 1986, at A7 col. 1.

Union s second largest livestock production area.[168] The Chernobyl plant is on the northern edge of the Ukraine farm belt, the location of the country s best soil, and a major source for wheat, sugar beets and forage for livestock.[169] North of the Chernobyl plant is another rich farm belt, and the Chernobyl area itself is an area of dairy farms and cultivation of rye, potatoes, and fiber flax.[170] The accident occurred within months of the harvesting season.[171] Never before has a nation been faced with the possibility of extensive radiation damage to large tracts of farmland.[172] Some have suggested that within six miles of the reactor land must be extremely contaminated and will probably be uninhabitable for generations.[173]

The heaviest radioactive particles produced by the accident could be expected to fall within a fifty mile radius of the plant.[174] Options for detoxifying any radioactive soil are limited.[175] For relatively small areas, surface soil can be stripped and buried elsewhere.[176] The United States has used this technique twice—once when a United States military plane carrying nuclear weapons crashed in Spain in the 1950's, and once as a result of contamination of the Marshall Islands during nuclear weapons tests in the Pacific.[177] With extensive contamination, the only remedy may be to wait several hundred years.[178]

On May 15th Mikhail Gorbachev in a nationally televised address, claimed "the worst has passed" and proposed a global warning system to handle future accidents.[179] Ukrainian Prime Minister Aleksandr Lyashko told reporters in Kiev that Moscow officials did not learn the full gravity of the accident until April 28 when it was reported by the Soviet government (although one can question how long it takes to understand the gravity of an explosion in a nuclear reactor that blows its roof off) [180] On May

168. *Id.*
169. N.Y. Times, May 5, 1986, at A8, col. 1.
170. *Id.*
171. *Id.*
172. N.Y. Times, May 3, 1986, at 4, col. 2.
173. N.Y. Times, May 1, 1986, at A11, col. 4.
174. N.Y Times, May 2, 1986, at A10, col. 6.
175. N.Y. Times, May 3, 1986, at 4, col. 2.
176. *Id.*
177 *Id.*
178. *Id.*
179. N.Y. Times, May 15, 1986, at 1, col. 6.
180. NEWSWEEK, May 19, 1986, at 37

1st the International Atomic Energy Agency sent a telex to the Soviet authorities, urgently requesting further details of the accident.[181] The twelve member countries of the Common Market protested the lack of notice and information.[182] The West German Foreign Minister Hans-Dietrich Genscher said the Soviet Union should authorize experts from the IAEA to visit the site (they subsequently did so).[183] Although agency inspectors had visited Soviet nuclear power states in the past, the agency did not have the authority to order the Soviet government to supply information.[184] One newspaper reported that the United States Secretary of State George Schultz was attempting to persuade the Soviet Union to agree to safety inspections of its plant by the IAEA.[185]

By May 4th, Secretary of State Schultz was arguing that there was "an inherent obligation that states have to provide information" about such events as nuclear accidents which have an effect on people beyond their borders.[186] Also in May in addition to denouncing the Soviet Union, the seven industrial nations at the Tokyo Economic Summit meeting called for a new treaty to establish rules for international behavior in case of nuclear accidents.[187] In 1981, the United States had floated a proposal similar to that of the Economic Summit at the United Nations but the proposal received little attention. On June 3rd, Gorbachev himself called on other nations to join the Soviet Union in strengthening safeguards against nuclear disaster such as Chernobyl in a message to Secretary General of the United Nations calling for an international convention on the subject.[188] The Soviet leader also called for stronger measures to prevent acts of nuclear terrorism.[189] Most important, he said, was "a system of prompt notification in the event of accidents and malfunctions at atomic power plants when such occurences are accompanied by the release of radiation."[190] Mr Gorbachev sug-

181. N.Y. Times, May 1, 1986 at A1, col. 3.
182. *Id.* at A12, col. 6.
183. *Id.*
184. *Id.*
185. N.Y. Times, May 5, 1986, at A6, col. 6.
186. N.Y. Times, May 4, 1986, at 12, col. 3-4.
187 N.Y. Times, May 22, 1986, at A31, col. 5.
188. N.Y. Times, June 4, 1986, at 12, col. 1.
189. *Id.*
190. *Id.*

gested that a nuclear safeguard system be codified in one or more international conventions and that existing agencies like the International Atomic Energy Agency the World Health Organization, the United Nations Environmental Program and the World Meteorological Organization be used to strengthen safety measures for nuclear reactors.[191] On June 10, Gorbachev went even further In Budapest he said that the leading nuclear powers should work jointly to design a new generation of more reliable nuclear reactors and agree to provide free medical care, housing, and other financial assistance to accident victims.[192] Soviet officials, however reiterated Moscow s position that it owed no compensation to other European countries because of damage to agriculture following the nuclear accident at Chernobyl.[193] Soviet officials have argued that damage to agriculture in Europe had been caused by media, consumer and government reaction to the accident, not a threat of radiation, and turned aside questions about compensation.[194] Meanwhile, on June 10th in Vienna at a meeting of the Governing Board of the International Atomic Energy Agency countries with nuclear weapons such as the United States and the Soviet Union seemed undecided whether to allow military nuclear plants to be covered by a treaty requiring prompt notification of any nuclear accidents.[195] Two treaties were under consideration by the IAEA. One would require member countries to inform others immediately of any significant release of radioactive material.[196] The other provides for other countries to give prompt assistance in the event of such an accident.[197] The Governing Board also came closer to agreement on a package of safety measures inspired by Chernobyl.[198] The agency planned to increase the number of inspections it makes to check safety precautions at member countries nuclear installations.[199]

Many officials fear that any attempt to define precisely what kind of accident would have to be reported would be challenged by governments hostile to nuclear power and by any nuclear envi-

191. *Id.* at A12, col. 2.
192. Washington Post, June 10, 1986, at A21, col. 4.
193. *Id.*
194. *Id.*
195. N.Y. Times, June 12, 1986, at A8, col. 1.
196. *Id.*
197 *Id.*
198. *Id.*
199. *Id.*

ronmental organizations. Both the United States and Soviet Union seemed unwilling to report accidents at military nuclear plants if disclosure would oblige them to reveal military secrets.[200] As a result, many officials suspect that the new treaty will be drafted in vague terms, with the burden of deciding whether a nuclear accident could affect other countries resting on the government concerned.

On July 24th, a foreign ministry spokesman for the Soviet Union said that the experiments that caused the Chernobyl nuclear accident were intended to determine how long the plant would continue to produce electricity in an unexpected reactor shutdown. "The important thing is not that the experiment was conducted," the spokesman said, "the important thing is that it was conducted without the necessary precautions."[201] He said the technical details would be available when a report of the Soviet Union Government Inquiry Commission was delivered to the IAEA in Vienna in August. He also denied that engineers of the Chernobyl station were trying to simulate an accident when the real accident occurred.[202] Speculation continued, however that the accident may have been the result of experiments relating to nuclear weapons. Among the officials dismissed after the Chernobyl accident was Aleksindr G. Neshkov First Deputy Minister of Medium Machine-Building, for the production of fissionable material and nuclear arms.[203] The connection between this agency and the generation of commercial nuclear power has not been officially explained. As a result of the Chernobyl accident, the nuclear electricity industry has now been placed under a newly formed separate Ministry of Nuclear Power in the Soviet Union.[204]

Everywhere, there was much talk about the Soviet Union s international obligation "to provide information."[205] Although the international obligation of the Soviet Union to warn other states of the approaching radioactivity and to exchange information was primarily a moral one, some international law scholars argue that

200. N.Y. Times, June 11, 1986, at A4, col. 4; N.Y. Times, Aug. 14, 1986, at A15, col. 1; Reuters, Sept. 24, 1986, AM cycle.

201. N.Y. Times, July 25, 1986, at A2, cols. 2-4.

202. *Id.*

203. *Id.*

204. *Id.*

205. N.Y Times, May 1, 1986, at A1, col. 3; *Id.* at A1, col. 5.

there exists a present or emerging rule of internationl law requir ing states to give notice of information concerning possible environmental harm to potentially affected states.[206] Although full analysis of whether such a duty exists is beyond the scope of this article, an agreement incorporating such an obligation and others appears imminent. In fact, when a Soviet submarine carrying nuclear weapons sank off the coast of Bermuda, the Soviet Union immediately notified the United States, on October 4th, in ac cordance with a draft accord requiring prompt notice of nuclear accidents.[207]

VII. THE NEED FOR REFORM

If any State seeks relief under international law against the Soviet Union, the suit will probably not focus on the lack of notice, but rather on the damage to health and agriculture in neighbor ing states. For example, on May 5th, the Federal Republic of Germany said that it was setting up a group to determine whether it could claim compensation from the Soviet Union for eventual damage to crops from fallout from the Chernobyl disaster [208] On May 3, German authorities in Bonn had ordered the impounding of supplies of fresh milk from several dairy regions contaminated by the fallout.[209] Although Germany never brought suit, it and many other countries and private groups gave serious consideration to the international law that would govern such a suit. While under the famous *Trail Smelter* case, one can conclude that a state is responsible for any material damage that occurs to another state, even for conduct which emanates from private parties within the offending state, if both material damage and causation

206. For further discussion concerning whether international law requires notice and exchange of information regarding state' lawful activities which may cause transboundary environmental damage, *see* Carvell, *The North Dakota Garrison Diversion Project and International Environmental Law*, 60 N.D.L. REV. 603, 637-646 (1984); Schneider, *State Responsibility for Environmental Protection and Preservation*, 2 YALE STUDIES IN WORLD PUBLIC ORDER 32, 60-65 (1975); *see also* Handl, *supra* note 116, on the legality of nuclear plant siting in border areas. Article 28(2) of the Atomic Law of the Federal Republic of Germany required the state to compensate victims of the accident for property damage and agricultural damage. *See also* RESTATEMENT OF FOREIGN RELATIONS LAW § 601 comment (1983).

207 N.Y. Times, Oct. 7 1986, at A30, col. 1.

208. N.Y Times, May 5, 1986, at A6, col. 6. Article 38(2) of the Atomic Law of the Federal Republic of Germany required the state to compensate victims of the accident for certain property damage and agricultural losses.

209. N.Y. Times, May 3, 1986, at A4 (picture caption).

can be demonstrated, international law has several roadblocks to recovery

First, what is not clear under international law is the applicable standard for determining liability As discussed above, there are three possible standards: (1) liability which must be predicated on negligence, recklessness, or intentional harm; (2) liability for an unreasonable interference with the natural resources of another state; or (3) liability predicated on absolute liability or strict liability for ultrahazardous activities. Under the second and third standards, the state would be liable even if it was not the operator of the reactor at which the accident occurred. Second, the damages that would be recoverable are even more uncertain. Under international law damages are obtainable for loss of property and personal injury Recovery for economic loss, however seems somewhat less sure, as do damages for emotional distress and psychological impairment.

Third, the major failing of international law in this area is the lack of means for actual enforcement. The primary means of enforcement would be in the domestic courts of the transgressor state, but the availability of international law in such forums would depend on the extent to which the state incorporates international law into its own domestic law and holds it to be enforceable. Enforcement would be hampered by many common domestic barriers to jurisdiction and enforcement, e.g. sovereign immunity extra-territorial enforcement, and standing. Though the obvious forum, the International Court of Justice can only be utilized by a state against a state and only if the defendant state consents to jurisdiction. The Soviet Union has not consented to jurisdiction in the International Court of Justice. In addition, decisions of the International Court of Justice are only enforceable by the Security Council of the United Nations, in which the Soviet Union has a veto. Other problems with current international law exist. For example, there is, at best, only an emerging rule of international law that notification and exchange of information is required in the event of an accident that imposes material damage upon another state. Also, the primary treaty specifically governing compensation for victims of a nuclear accident is the Vienna Convention on Civil Liability for Nuclear Damage. Yet its usefulness is hampered by limited participation in the treaty which does not include either the United States or the Soviet Union. As for international standards of safety for nuclear reac

tors to prevent nuclear accidents, the IAEA only has the authority under its statute to inspect nuclear reactors to insure that the information and assistance provided by the agency are not being improperly used for military purposes. Thus, the IAEA has no present authority to impose any binding safety standards.

What then would be the result if a European state attempted to seek compensation from the Soviet Union for the agriculture damage which occurred from the Chernobyl accident? Under the principles of international law analyzed above what would be the likely outcome of such a suit? Assuming that the Soviet Union would not voluntarily provide compensation, successful recovery is very unlikely There is no issue of vicarious liability for the fallout damage because the Soviet Union is responsible directly as the operator of the Chernobyl plant. The next, more troublesome issue would be the standards for liability As noted above, state responsibility is generally predicated on fault, i.e., intentional wrongs, recklessness, or negligence. However it has been argued that international law recognizes strict liability for environmental harm based on ultrahazardous activity The operation of a nuclear power plant should constitute an ultrahazardous activity in which the harm cannot be removed through reasonable care. Fault standards are inadequate to deal with the potential hazards from complex technology The standards of care and tests of forseeability become obscure and inadequate when applied to the possible scope of a nuclear disaster Equity and economic analysis both point toward imposing the burden of compensation on the nuclear industry and, ultimately on the state as the parties best able to reduce risk and absorb damages. In attributing to the state direct responsibility and strict liability the state has a direct incentive to legislate and regulate to minimize the risk of the activity Limitations of causation, force majeure, and dollar limitations on recovery[210] are sufficient to assure that states will not be unduly burdened in such a way as to hamper their discretion in developing national energy resources. It is particularly appropriate in the international context that strict liability should be recognized as the legal standard when material and environmental harm results from ultrahazardous activities. Strict liability for such harm avoids many of the problems

210. Most states have domestic statutes limiting the amount of recovery for nuclear accident. Congress is now reconsidering the Price Anderson Act which sets limit of $665 million for single accident. N.Y. Times, June 15, 1986, § 3 (Business) at 3, col. 3.

associated with fault standards in an international setting, such as discerning norms of conduct that are sufficiently pervasive around the globe to make it clear that deviation below those norms would constitute negligence. Having noted the difficulity of developing internationally recognized definitions of reasonable care, however a relatively strong argument can be made that the lack of a containment structure and adequate backup system at Chernobyl was negligent and would be so recognized almost universally Some Western experts on nuclear technology have asserted that the Soviet Union has the worst nuclear safety planning of any nation, even worse than that in developing countries and the rest of the Soviet block.[211]

However even if we assume that it can be demonstrated in international law that the Soviet Union is liable for damages to those countries which suffered from radioactive fall-out, that liability may not be judicially enforceable. The Soviet Union has not consented to the jurisdiction of the International Court of Justice. Therefore a state s only option for judicial enforcement would be in its own domestic courts or those of the Soviet Union where procedural and jurisdictional obstacles, such as sovereign immunity standing and other obstacles previously discussed, would in all likelihood prevail. In addition, linking death and disease in the general population to the radioactive fall-out would present a difficult causation issue in any forum. Estimates of the number of cancer deaths from the accident, for example, varied from 5,100 to 24,000.[212] And finally even if a state is successful on the mer its in demonstrating the damages, it is not at all clear what types of damages would be recoverable. Damages to person and property would in all probability be recoverable. It is much less clear whether damages for economic loss and damages for pain and suffering could be recovered. To illustrate, Welsh farmers as late as August were unable to take their lambs to slaughter because of a government ban on sale of the lambs exposed to Chernobyl's radiation.[213] Was the damage sustained property damage, which would be recoverable, or economic loss, which would not be re coverable? Arguably if the lambs were actually contaminated there would be property damage, but if the ban was purely precautionary there would only be economic loss. Viewed as an issue

211. N.Y. Times, May 1, 1986, at A12, col. 1.
212. N.Y. Times, Aug. 7 1986, at A1, col. 6.
213. N.Y. Times, July 3, 1986, at A1, col. 2.

of causation, alternatively it would be the state government, not the radiation from the accident, that caused the loss. Certainly that is why the Soviet Union stated that the damage to agriculture was the result of government and media overreaction and not the accident itself. However if viewed as a rule of causation rather than an arbitrary distinction in damages recoverable, it could be argued that such government quarantines are reasonably forseeable as a result of an accident such as Chernobyl.

The difficulty under international law in obtaining compensation from the Soviet Union in what is a relatively straightforward situation of state responsibility for radioactive contamination highlights the inadequacies of customary international law in addressing state responsibility for transboundary pollution. To provide more adequate protection from future "Chernobyls" than that which presently exists, several relatively straightforward reforms should be made immediately in the aftermath of accident's condemnation. To avoid another accident like that at Chernobyl, efforts should be made by bilateral agreements between the IAEA and states to expand inspections by the IAEA to include safety inspections. Twenty-one countries now have such agreements, and there are some indications of willingness on the part of the Soviet Union to enter into such an agreement. Extensive efforts should be made to increase adherence to the Vienna Convention on Compensation for Nuclear Damage. Because the most likely and most serious forms of damage from an accident is agricultural damage, consideration should be given to exempting such losses from the general prohibition against recovery of economic loss. Hopefully under the auspices of the IAEA, a treaty will be promulgated providing for notification and exchange of information in the event of nuclear accidents threatening international environmental harm. Such a treaty should include military reactors as well as civilian reactors, as there is no difference in the environmental harm and it is unlikely that any such requirement would jeopardize any state s national security There should be a specific definition of what types of accidents would qualify for reporting restrictions in order to avoid the very likely possibility of states making their own unilateral and self-serving determination of what accidents should be reported.

There is presently no treaty which generally governs environmental protection of global resources. Such a treaty could incorporate current standards of protection in custom and general

principles of international law while strengthening their enforceability by providing for incorporation of those standards into the domestic law of the treaty s signatories, and by providing for international arbitration in adjudication of transboundary pollution claims. Such a treaty might also require notification and international consultation before development of any project posing an imminent, transboundary threat of environmental damage.

The present time presents a unique opportunity to actually implement many of these suggestions, if for no other reason than that the Soviet Union and the United States are trying to outdo each other in arguing that something must be done. In September Soviet officials announced that entombment of the fourth re actor at Chernobyl was on schedule, and that the first and second reactors would resume operation in November [214] In August, nuclear experts had already expressed concern with the Soviet Union s new safety plans for Chernobyl-type reactors.[215] The IAEA projects that by the year 2000, slightly more than half of the countries with nuclear power plants will be the less technologically advanced, developing countries.[216] The toxic destruction of Bhopal, the tragedy of the Challenger shuttle, and the accident at Chernobyl should serve as striking reminders that technology cannot regulate itself. We are in the technological space age, yet international environmental regulation is still primitive. We can and do make mistakes, and we must be prepared as a global community to handle the consequences.

214. N.Y. Times, Sept. 16, 1986, at A5, col. 4.

215. N.Y. Times, Aug. 28, 1986, at A1, col. 5.

216. *International Nuclear Safety Concerns: Hearings Before the Subcomm. on Energy, Nuclear Proliferation and Governmental Processes of the Senate Comm. on Governmental Affairs, supra* note 162, at 5.