Vanderbilt Law Review

Volume 32
Issue 4 *Issue 4 - May 1979*

Article 1

5-1979

International Nuclear Development in the Age of Interdependence

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VANDERBILT LAW REVIEW

VOLUME 32 MAY 1979 NUMBER 4

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I. INTRODUCTION

Winston Churchill once noted that "[i]f we open a quarrel between the past and the present, we shall find that we have lost the future."[1] While this statement is almost a truism, unfortunately it is not one that has been universally recognized in the ongoing

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1. Address, House of Commons (June 18, 1940), *reprinted in* J. BARTLETT, FAMILIAR QUOTATIONS 921 (14th ed. 1968).

debate over the proper controls that should be exerted over international nuclear commerce.[2] Unlike the vast majority of items in transnational trade, nuclear-related transfers from their inception have been governed by an international legal regime providing for nondiscriminatory access to materials and equipment in exchange for assurances against their misuse for military purposes. Consisting of an intricate array of multilateral and bilateral agreements, this superstructure has permitted peaceful applications of nuclear energy to move from the laboratory to industrial maturity within twenty-five years, while providing a significant deterrent to the proliferation of nuclear weapons.[3]

Despite the broad acceptance of this regime among countries of differing political persuasions, several nations, including the United States, have recently upset the delicate balance between access to supplies and safeguards by imposing unilaterally new and more stringent conditions on their nuclear exports. While it may be natural for each generation to reexamine its predecessor's policies, these actions threaten to undermine the foundation of the existing superstructure at a particularly difficult time in trade relations between the developed and developing nations. Many states believe that the key tradeoffs embodied in the less-than-ten-year-old Non-Proliferation Treaty[4] remain valid today. The result is a lack of current stability in international nuclear commerce and an attendant weakening of the broad-based consensus that heretofore had joined the nations of the world. If this trend continues, the possibility that a number of additional nations will acquire nuclear weapons increases dramatically.

Because of and perhaps despite these events, the international community is moving slowly toward a consensus on a new nonproliferation regime. While only its broad outlines are now apparent and many obstacles still remain, this regime will augment the foundations of the current legal system by prescribing a more detailed code of conduct governing international nuclear energy cooperation. In so

2. *See, e.g.*, H.R. 15377, 94th Cong., 2d Sess., *reprinted in* H.R. REP. No. 1469, 94th Cong., 2d Sess. 1 (1976).

3. Proliferation falls into two categories: vertical proliferation, which refers to an increase in the number and types of nuclear weapons possessed by weapons states; and horizontal proliferation, which refers to the spread of nuclear weapons or the ability to make them by nonweapons states. Control of vertical proliferation is the purpose of the strategic arms limitations talks (SALT). Control of horizontal proliferation is the purpose of the web of treaties, international agreements, and other arrangements discussed in this Article.

4. Treaty on the Non-Proliferation of Nuclear Weapons, *opened for signature* July 1, 1968, 21 U.S.T. 483, T.I.A.S. No. 6839, 729 U.N.T.S. 161 [hereinafter cited as Non-Proliferation Treaty]. One hundred and four nations have now ratified the Treaty.

doing, the international community will be taking an unparalleled step. Never before has a vital commodity in transnational commerce been regulated in this manner. This regime could become a paradigm for conjugating future international legal regimes governing complex technologies.

II. 1954-1973: CREATION OF THE CURRENT INTERNATIONAL NUCLEAR REGIME

On few matters have the nations of the world shown a greater willingness to work together than on the development and safeguarding of the peaceful uses of nuclear energy. From the very beginning of this effort in the mid-1940's,[5] the international com-

5. The first multinational effort to deal with nuclear energy on an international scale was the Three Nation Agreed Declaration, in which the United States, the United Kingdom, and Canada agreed to share with all nations the scientific information associated with the peaceful development of atomic energy. The Declaration acknowledged, however, that the information required for the industrial development of nuclear energy was virtually the same as that needed for weapon production. It was agreed, therefore, that it was necessary to withhold this information until appropriate safeguards could be established to insure that the information would be used only for peaceful purposes. To this end, the three heads of state suggested that the United Nations establish a commission that would make recommendations regarding the international control of nuclear energy. *See* U.S. DEP'T OF STATE PUB. NO. 2702, THE INTERNATIONAL CONTROL OF ATOMIC ENERGY, GROWTH OF A POLICY (1947). The U.S.S.R. agreed to these principles the next month in the Moscow Declaration, a joint U.S.-U.K.-U.S.S.R. statement that contained the text of a proposed United Nations resolution to establish the commission. *Id.* at 125-27. This resolution was accepted by the General Assembly a short time later. G.A. Res. 1, U.N. Doc. A/64 (1946), *reprinted in* 1 UNITED NATIONS RESOLUTIONS, 1946-1948, at 5 (D. Djonovich ed. 1973).

In an attempt to give substance to the proposal to share nuclear-related information, the first United States representative to the United Nations Atomic Energy Commission (UNAEC), Bernard Baruch, in a plan that was to later bear his name (although the speech was based on the Acheson-Lilienthal Report), proposed the creation of an International Atomic Energy Development Authority. This Authority would be entrusted with all phases of the development and use of atomic energy. It would control or own all atomic energy activities potentially dangerous to world security, and would control, license, and inspect all others. Its functions would include fostering the beneficial uses of atomic energy and conducting research and development in the field in order to remain at the forefront of new developments. Once the Authority was established, the production of all nuclear weapons would be halted and existing nuclear weapons would be destroyed. Moreover, the Authority would possess all the information associated with atomic energy. Statement by Bernard M. Baruch, United States Representative to the United Nations Atomic Energy Commission (June 14, 1946), *reprinted in* SENATE COMM. ON GOVERNMENT OPERATIONS, 94TH CONG., 1ST SESS., PEACEFUL NUCLEAR EXPORTS AND WEAPONS PROLIFERATION: A COMPENDIUM 203 (Comm. Print 1975) [hereinafter cited as COMPENDIUM].

While the United Nations was discussing the Baruch plan, the United States Congress passed the Atomic Energy Act of 1946, Pub. L. No. 79-585, ch. 724, 60 Stat. 755 (repealed 1954). This Act forbade the exchange of information with foreign countries on the use of atomic energy for industrial purposes until Congress declared "by joint resolution that effective and enforceable international safeguards against the use of atomic energy for destructive purposes have been established." *Id.* § 10(a)(1), 60 Stat. at 766. Such a joint resolution had not been passed at the time the Act was repealed.

munity recognized that the development of nuclear energy was accompanied by the danger that nations could use its fruits for military purposes. This awareness arose from two immutable facts: (1) all forms of nuclear reactors involve the use and/or generation of materials that are capable of being employed in nuclear explosive devices;[6] and (2) any moderately industrialized nation has the technological ability to convert or reprocess the irradiated fuel removed from the reactor into a material directly usable in a nuclear weapon, employing unclassified information and commercially available materials and equipment.[7] Given the early widespread distribution of fissionable materials, the individual states found themselves in an extremely powerful yet impotent position. Thus, the nations found it advantageous to collaborate in the establishment of institutional mechanisms that would give them access to the materials and equipment necessary for peaceful purposes, while assuring the rest of the world that the transfers would not be diverted to military uses.

The symmetry between supply and safeguards is evident in the two cornerstones of the present international regime—the Statute of the International Atomic Energy Agency[8] and the Non-Proliferation Treaty. The former established an International Atomic Energy Agency (IAEA) under the aegis of the United Nations for the twin purposes of facilitating the distribution and safeguarding of materials and equipment in international nuclear commerce. While the protective function of the IAEA has drawn the most attention over the past several years, the Agency also was conceived

6. Most nuclear reactors in operation today use uranium or its byproduct as fuel. As uranium exists in nature, its ore contains about 0.7% U-235. To make it acceptable for use in a reactor, the ore must be refined and converted into various chemical forms and then, in most cases (the exception being the so-called heavy water reactors), "enriched" in U-235 content. The resulting compounds are fabricated into fuel pellets and placed in metal tubes to form fuel rods. These fuel rods are irradiated in the reactor, in which the fissile U-235 burns up and plutonium is created. Plutonium can be used as material for a nuclear weapon once it is separated in pure form from the fuel rod; the low-enriched uranium used in most reactors cannot. It should be noted, however, that a few reactors do use high-enriched uranium, which can also be employed in the production of nuclear weapons. Moreover, a few reactors use thorium as a fuel. Its byproduct during irradiation is U-233, a very desirable weapons grade material. *See generally,* OFFICE OF TECHNOLOGY ASSESSMENT, CONGRESS OF THE UNITED STATES, NUCLEAR PROLIFERATION AND SAFEGUARDS (1977).

7. Reprocessing is the step whereby the fuel assemblies are chopped into pieces or dissolved and the residual uranium and plutonium are separated in streams from the fuel so that they may be used for new fuel fabrication. Unlike an enrichment plant, the other sensitive facility in the peaceful nuclear energy cycle, a reprocessing facility is relatively inexpensive, small in size, and primarily an adaptation of commonly known chemical engineering processes. *Id.*

8. Statute of the International Atomic Energy Agency, *opened for signature* Oct. 26, 1956, 8 U.S.T. 1093, T.I.A.S. No. 3873, 276 U.N.T.S. 3.

to assist in the "development and practical application of, atomic energy for peaceful uses throughout the world . . . ."[9] Indeed, it was given broad latitude "to perform any operation or service useful in research on, or development or practical application of, atomic energy for peaceful purposes,"[10] including acting as an intermediary for the transfer of nuclear material, equipment, facilities, and services between members of the Agency.[11]

As a counterbalance, the IAEA was required to administer safeguards on the materials and equipment it transferred in order to ensure that they were not used for weapons purposes. The Agency could also impose these safeguards at the request of the parties to a multilateral agreement or at the request of an individual state concerning its own nuclear activities.[12] The broad scope of this protective function was unprecedented: the Agency's inspectors were given the right to make on-site inspections with "access at all times to all places and data . . . as necessary."[13] The Agency also was given a discretionary right to designate the facilities in which plutonium in excess of the country's peaceful needs was to be stored.[14] In the event any state did not fulfill its obligations under the Statute, the IAEA was required to suspend or terminate its assistance and withdraw any material or equipment supplied by it or a member[15]—a potentially significant penalty in view of the role of the Agency in transferring such material and equipment.[16]

The Non-Proliferation Treaty adds to both sides of this balance, guaranteeing its adherents the benefits of nuclear technology in exchange for their agreement not to develop nuclear weapons and to submit to a broad range of inspections to verify this undertaking. More specifically, states without nuclear weapons must agree to renounce the acquisition of such weapons and to open all activities within their jurisdictions involving nuclear materials to IAEA inspection.[17] In return, they receive the assurance that the safe-

9. *Id.* art. III(A)(1), 8 U.S.T. at 1095, 276 U.N.T.S. at 6. One hundred and one nations have now joined the IAEA.

10. *Id.*

11. *Id. See also id.* art. IX, 8 U.S.T. at 1102, 276 U.N.T.S. at 18.

12. *Id.* art. XII, 8 U.S.T. at 1105, 276 U.N.T.S. at 26.

13. *Id.* art. XII(A)(6), 8 U.S.T. at 1106, 276 U.N.T.S. at 28.

14. *Id.* art. XII(A)(5), 8 U.S.T. at 1106, 276 U.N.T.S. at 27-28.

15. *Id.* art. XII(C), 8 U.S.T. at 1107, 276 U.N.T.S. at 28.

16. *See* Doub & Dukert, *Making Nuclear Energy Safe and Secure*, 53 FOREIGN AFF. 756, 757-72 (1975) (discusses the growth of IAEA activities). *See also* Szasz, *International Atomic Energy Agency Safeguards*, in INTERNATIONAL SAFEGUARDS AND NUCLEAR INDUSTRY 73 (M. Willrich ed. 1973), *reprinted in* COMPENDIUM, *supra* note 5, at 884.

17. Non-Proliferation Treaty, *supra* note 4, arts. II, III, 21 U.S.T. at 487, 729 U.N.T.S. at 171.

guards will be implemented in a manner that avoids "hampering the economic or technological development" of this energy source.[18] They also receive assurance that:

> 1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.
> 2. All the parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.[19]

Finally, all parties to the Treaty undertake to require IAEA safeguards on all transfers of nuclear material and equipment to non-nuclear-weapons states.[20]

This symmetry is further reinforced by a variety of multilateral and bilateral agreements, including the nuclear weapons free zone in Latin America,[21] the nuclear common market in Europe,[22] and bilateral agreements providing the basic framework for nuclear trade between individual nations. The United States bilateral agreements are of particular relevance. Invariably, these agreements have followed a similar format.[23] The United States agrees to cooperate with the recipient in the provision of materials, equip-

18. *Id.* art. III(3), 21 U.S.T. at 487, 729 U.N.T.S. at 172.

19. *Id.* art. IV, 21 U.S.T. at 489-90, 729 U.N.T.S. at 172-73.

20. *Id.* art. III(2), 21 U.S.T. at 488, 729 U.N.T.S. at 172. It sould be noted that two nuclear weapons states—France and the People's Republic of China—are not parties to the Treaty, nor are a number of states that are believed to have both the technical capability and the possible incentive to acquire nuclear weapons, such as Israel, Pakistan, India, Brazil, and Argentina.

21. Treaty for the Prohibition of Nuclear Weapons in Latin America, *opened for signature* Feb. 14, 1967, 634 U.N.T.S. 281.

22. The Treaty of Rome, March 25, 1957, 298 U.N.T.S. 3, provided for nuclear cooperation among the members of the European Community in the Treaty Establishing the European Atomic Community (EURATOM), March 25, 1957, 298 U.N.T.S. 167. While the Treaty permitted free transfer of nuclear materials among member states, it also required all nations to submit to EURATOM safeguards. Like the provisions in the United States Agreements for Cooperation, the Treaty mandates that signatories submit to EURATOM's detailed recordkeeping, accounting, and on-site inspection systems. Under the Treaty, EURATOM must approve the techniques used for the chemical reprocessing of irradiated fuels and has authority to require any excess special nuclear materials, not actually being used or ready for use, to be deposited with the IAEA or in facilities that are or can be supervised by the Commission.

23. *See* 1 U.S. ENERGY RESEARCH & DEV. AD., FINAL ENVIRONMENTAL STATEMENT, U.S. NUCLEAR EXPORT ACTIVITIES 3-91 to 124 (1976) (ERDA-1542) [hereinafter cited as FINAL ENVIRONMENTAL STATEMENT].

ment, and nonclassified technology.[24] The recipient grants the United States certain safeguard rights, including inspections, to guarantee that the materials and equipment are used solely for peaceful purposes.[25] The majority of these safeguard rights may be transferred to the IAEA upon the conclusion of a trilateral agreement between the United States, the recipient, and the IAEA.[26] The United States, however, implicitly reserves the right to approve any retransfer or reprocessing of material it supplies,[27] and it will assume all safeguard rights under the bilateral agreement if the trilateral agreement is suspended for any reason.[28]

This comprehensive legal framework governing international nuclear commerce was fundamentally established by 1970. The regime serves as a monument to the proposition that nations can act in concert with neighbors of differing political persuasions when they believe such actions are in their own best interests. In adopting a multilateral mechanism with legal authority to monitor a nation's conduct, the international community indicated its willingness to join together to share the benefits of the peaceful uses of nuclear energy. However natural it might seem today, the concept that compliance with an international obligation should and could be verified by means such as sending international inspectors into the territories of sovereign nations was then both bold and novel. Even more remarkable is the rapidity with which the legal regime was established. For perhaps the first time in the annals of international law, a comprehensive legal regime replaced a vacuum within two decades.

The practical results of this institutional framework, while admittedly imperfect, have been extremely favorable. The maturation of nuclear energy has provided an invaluable contribution to a

24. *See, e.g.*, Agreement for Cooperation for Civil Uses of Atomic Energy, July 11, 1969, United States-Austria, 21 U.S.T. 10, T.I.A.S. No. 6815 (arts. III, IV, V, VII, VIII, X). While such an agreement is a prerequisite to the receipt of facilities and special nuclear materials from the United States, the United States usually is not obligated to provide these facilities and materials. The recipient will obtain these supplies only upon the conclusion of contractual negotiations and the receipt of an export license. *Id.* art. III(A), 21 U.S.T. at 14.

25. *Id.* arts. IX, XI, XII, 21 U.S.T. at 19-28.

26. *Id.* art. XIII, 21 U.S.T. at 28. *See, e.g.*, Agreement for the Application of Safeguards, Aug. 20, 1969, United States-Australia-International Atomic Energy Agency, 21 U.S.T. 56, T.I.A.S. No. 6816, 798 U.N.T.S. 77.

27. Agreement for Cooperation for Civil Uses of Atomic Energy, *supra* note 24. These rights appear in articles IX and X respectively and not article XII—the safeguard rights that are suspended.

28. *Id.* art. XIII, 21 U.S.T. at 28. While the suspending of a supplier's safeguards in favor of those of the IAEA is almost universal, significant differences exist in the safeguards required by the various suppliers. GENERAL ACCOUNTING OFFICE, OVERVIEW OF NUCLEAR EXPORT POLICIES OF MAJOR FOREIGN SUPPLIER NATIONS (1977) [hereinafter cited as GAO OVERVIEW].

world faced with limited energy options. The world's nuclear generating capacity has grown from five MWe (electrical megawatts) in one nation in 1954 to over 100,000 MWe in twenty-two countries today, with twice that capacity now under construction.[29] This expansion was made possible by the smooth flow of nuclear technology, equipment, and material between nations. During this same period the rate of proliferation slowed dramatically. Between 1945 and 1954 three nations developed nuclear explosives;[30] in the next decade two countries did likewise;[31] in the last fourteen years only one nation has done so.[32]

Finally, it should be emphasized that the United States, as the dominant supplier of both material and reactors throughout this period, bore the principal responsibility for the creation of this regime. Indeed, the United States has been the catalyst in developing international controls over nuclear-related transfers. While nuclear technology eventually would have diffused throughout the international community, its rapid dissemination would not have occurred without the Eisenhower Administration's decision to share the United States advanced technological lead with other nations[33] and the passage of the Atomic Energy Act of 1954,[34] which reversed previous law requiring secrecy on all nuclear processes. Moreover, the IAEA, which was first proposed by the United States, was generally granted the same safeguard rights as the United States required in its earliest bilateral agreements under the 1954 Act. Since the Agency's inception, the United States has been unusually innovative and generous in its political and economic support.[35] The

29. Atomic Industrial Forum, Inc., Fifth Annual International Reactor Survey (1978) [hereinafter cited as AIF International Survey].

30. United States, United Kingdom, and U.S.S.R.

31. France and the People's Republic of China.

32. India.

33. *See* Address by President Dwight D. Eisenhower, General Assembly of the United Nations (Dec. 8, 1953) (on the peaceful uses of atomic energy) *reprinted in* 1953 PUB. PAPERS 813 (1960) (papers of Dwight D. Eisenhower). While the United States did not sell the first reactors used in foreign nuclear energy projects, its then dominant economic position coupled with the extensive research involved in its nuclear submarine program provided it with a significant advantage over its economic competitors. In fact, the United States supplied 99% of the reactors sold in the noncommunist world through 1972. *Nuclear Nonproliferation and Export Controls: Hearings on S. 897 and S. 1432 Before the Subcomm. on Arms Control, Oceans, and International Environment of the Senate Comm. on Foreign Relations*, 95th Cong., 1st Sess. 100 (1977) (statement of Dwight J. Porter).

34. Pub. L. No. 83-703, ch. 1073, 68 Stat. 919 (codified in scattered sections of 42 U.S.C.).

35. *See* W. Donnelly, Commercial Nuclear Power in Europe: The Interaction of American Diplomacy with a New Technology 46 (1972) (report prepared for the Congressional Research Service of the Library of Congress), *reprinted in* COMPENDIUM, *supra* note 5, at 837. *See also* U.S. DEP'T OF STATE, REPORT OF THE ADVISORY COMMITTEE ON U.S. POLICY TOWARD

United States also conceived the idea of the Non-Proliferation Treaty, which it nurtured through prolonged negotiations and for whose widespread acceptance it labored assiduously.[36]

Not only was the United States the prime formulator of this nuclear framework, but its actions also provided the necessary degree of confidence in the regime to assure its broad support. The United States made its uranium and reactors available on the world market, thereby assuring other nations of an adequate supply.[37] While America maintained secrecy about its enrichment technology, it did not abuse its monopolistic commercial position. It took repeated actions, including long-term supply contracts with attractive key contractual provisions, to respond to its customers' concerns over relying upon a single source.[38] Aside from enrichment technology, the United States declassified almost all other information relating to the peaceful uses of nuclear energy, including data relating to reprocessing.[39] American reactor manufacturers were freely permitted to license nuclear technology to foreign manufacturers, ensuring close international cooperation on nuclear matters.[40] Underlying these actions was the basic policy belief that

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THE INTERNATIONAL ATOMIC ENERGY AGENCY (1962) (The Smythe Report), *reprinted in* COMPENDIUM, *supra* note 5, at 221.

36. *Id.* It should be noted, however, that the United States, like all other suppliers, historically has not required its trading partners to have ratified the Non-Proliferation Treaty. *See generally* GAO OVERVIEW, *supra* note 28; FINAL ENVIRONMENTAL STATEMENT, *supra* note 23, at 9-20. The Treaty prohibits any party from supplying to any nonnuclear-weapons state (whether or not it is a party to the Treaty) certain types of nuclear items for peaceful purposes, except subject to IAEA safeguards. Non-Proliferation Treaty, *supra* note 4, art. III(2), 21 U.S.T. at 488, 729 U.N.T.S. at 172.

37. 42 U.S.C. § 2074 (1976). Nonenriched uranium could be exported despite the absence of an agreement for cooperation with the recipient. This effort was aided by attractive financing terms. Through the first quarter of 1978, the United States Export-Import Bank authorized nearly $2.8 billion in direct credits and $1.4 billion in guaranties. Remarks of John L. Moore, Jr., President and Chairman, Export-Import Bank of the United States, to the Conference on World Energy Economics, in London (April 27, 1978).

38. *See* E. WONDER, NUCLEAR FUEL AND AMERICAN FOREIGN POLICY: MULTILATERALIZATION FOR URANIUM ENRICHMENT (1977).

39. Major international conferences on the Peaceful Uses of Nuclear Energy, held in Geneva in 1955 and 1958, served as mechanisms for the dissemination of a vast body of technical information on the subject. Enrichment technology, however, remained classified, since the United States felt that these materials and processes were unique and the proliferation dangers sufficiently great that the technology should not be transferred. It should be noted that the Department of Energy retains broad authority to prohibit such transfers under the Atomic Energy Act even if the technology involved is unclassified. 42 U.S.C.A. § 2077(b) (West Supp. I 1978).

40. In 1957 the Atomic Energy Commission generally authorized private parties in the United States to conduct most forms of nuclear transactions outside of the Soviet Bloc, subject to specific licensing requirements on the export of equipment and materials. 10 C.F.R. pt. 810 (1978). The practical effect of this regulation was not only to permit normal commercial sales promotion efforts but also to open the door to the development of licensing arrange-

peaceful nuclear activities could be undertaken without undue threat to United States nonproliferative objectives so long as these activities were subject to international safeguards.

III. 1973-1978: THREATS TO THE REGIME

The Nuclear Non-Proliferation Act of 1978[41] marks the first detailed amendment to the export regulatory regime established by the Atomic Energy Act of 1954. This legislation culminated four years of intensive debate over the conditions under which the United States should participate in international nuclear commerce. While reaffirming traditional American support for the IAEA and the Non-Proliferation Treaty, the Non-Proliferation Act nonetheless reflects an implicit belief that the regime mandated therein is inadequate. Before proceeding to a detailed discussion of the Act and its possible consequences, one should first put the Act in historical perspective.

A. Breakdown of the International Consensus

In 1973 international events began taking an ominous turn, casting doubt on the efficacy of the existing nuclear legal regime. The Arab oil embargo and the related four-fold increase in the cost of oil stimulated a worldwide search for energy alternatives. Nations began seeking the more sensitive parts of the nuclear fuel cycle,[42] and from the American perspective other suppliers seemed eager to fulfill these requests. West Germany, for example, agreed to sell Brazil a full nuclear fuel cycle capability in 1975, and during the same year, France agreed to sell both Pakistan and South Korea a reprocessing plant.[43] In the closing days of the Nixon Administration, the United States also announced its intention to sell reactors to Egypt and Israel. In connection with these arrangements, there was concern that some suppliers were undercutting their competi-

ments, joint ventures, and similar relationships between the United States and foreign firms. The emergence of these relationships, which otherwise would have required time-consuming requests for specific authorization on a case-by-case basis, is one of the key elements in the development of nuclear power industries in Western Europe and Japan.

41. Pub. L. No. 95-242, 92 Stat. 120 (codified in scattered sections of 22, 42 U.S.C.A.).

42. One study by the Energy Research and Development Administration (ERDA) assumes in its analysis that forty-six nations will have a reprocessing capability by 1990. RICHARD J. BARBER ASSOCIATES, INC., REPORT ON LDC NUCLEAR POWER PROSPECTS, 1975-90: COMMERCIAL, ECONOMIC AND SECURITY IMPLICATIONS v-5 (1975) (ERDA-52). ERDA was the "promotional arm" of the Atomic Energy Commission (AEC) before it was folded into the Department of Energy.

43. For a good study of the Brazil-West German deal and the United States reaction, see H. HAFTENDORN, THE NUCLEAR TRIANGLE: WASHINGTON, BONN AND BRASILIA: NATIONAL NUCLEAR POLICIES AND INTERNATIONAL PROLIFERATION (1978).

tors' safeguard requirement to gain commercial advantages. Moreover, international terrorism was on the rise, and many governments feared the possibility of subnational theft and diversion of nuclear materials.[44] More importantly, in May 1974 India exploded a "peaceful" nuclear device, indistinguishable from a nonpeaceful one.[45] In total effect, these events served to fracture the complacency existing after the negotiation of the Non-Proliferation Treaty.

In early 1975 a small group of suppliers, at the initiative of the United States, began meeting secretly in London to discuss means to avoid discrepancies in safeguards caused by commercial considerations.[46] By January 1976, participants in what had become known as the London Suppliers Conference reached agreement on a broad number of fronts. An exchange of letters moved the level and comprehensiveness of some areas of the international legal regime substantially beyond that contained in the Non-Proliferation Treaty.[47] In essence, the major suppliers agreed to the application of IAEA safeguards on exports of material, equipment, technology, and replicated sensitive nuclear technology[48] in order to preclude their use in

44. While terrorist threats to nuclear material should not be disregarded, they cannot be defined as proliferation as that term is used in this Article. This distinction is not artificial. Terrorist threats to nuclear material are of a different nature and are susceptible to very different forms of protection than are the risks of governmental diversion and national proliferation. Moreover, governments possess both resources and virtually unlimited authority, including police power, to counter subnational threats, while the risks of national diversion must be dealt with through the relatively limited tools of diplomacy, international institutions, and sanctions.

45. Nuclear explosives are qualitatively indistinguishable from a nuclear weapon, and thus the two terms are used interchangeably in this Article. It should be noted that the international community has not always been willing to accept this fact. *See* Doub & Dukert, *supra* note 16, at 770.

46. A year earlier all major suppliers, with the exception of France, agreed upon the so-called "Zangger List," which implemented article III.2. of the Non-Proliferation Treaty. The inclusion of an item on this list meant that its export would trigger IAEA safeguards designed to ensure that these items were not used in any way for the development of nuclear explosives and also to provide assurances that none of these items was re-exported without similar safeguards. The "trigger list" included complete reactors, reactor components, and certain important materials, such as heavy water and nuclear-grade graphite that are essential for the operation of certain types of reactors. IAEA, Information Circular No. 209 (Sept. 3, 1974), *reprinted in* 14 INT'L LEGAL MATERIALS 543 (1975).

The initial concerns of the nuclear suppliers were formally expressed in the final declaration of the Non-Proliferation Treaty Review Conference held in Geneva in May 1975. This declaration, adopted by consensus, urged that common export requirements relating to safeguards be strengthened.

47. It should be noted that the contents of these letters, which were modified on the basis of later negotiations, were not made public until 1978. *See, e.g.*, Letter from U.S. Representative to the IAEA to the Director General of the IAEA, January 11, 1978, *reprinted in* IAEA, Information Circular No. 254 (Feb. 1978). The inclusion of France, a non-Treaty state, in the conference was particularly significant.

48. *Id.* § 6. Sensitive nuclear technologies refer to those relating to reprocessing, enrich-

nuclear explosive devices, including those for peaceful purposes. They also agreed to apply restraint in the transfer of sensitive technologies[49] and to accept special conditions governing the use or retransfer of sensitive material, equipment, and technologies.[50] As compensation for these provisions, they pledged to encourage the development of multinational regional facilities for reprocessing and enrichment. Additionally, the suppliers agreed to require physical security measures on exported nuclear facilities and materials.[51] Finally, the suppliers provided for concerted action in the event of safeguard violations,[52] but they did not attempt to define the consequences to the erring state of any such transgression.

Concurrent with these developments, the United States, among other nations,[53] began reformulating its nuclear policies by taking actions that ultimately led to the imposition of safeguards that went beyond those agreed upon in London. In 1974 Congress modified the Atomic Energy Act to require congressional review of new and amended bilateral agreements relating to the provision of reactors.[54] Soon thereafter, Congress began considering the Export Reorganization Act of 1975.[55] This measure was originally introduced as a proposal to reorganize the nuclear export functions of the United States government. Succeeding versions, however, contained provisions that would have mandated a massive realignment of agency responsibilities, including the establishment of licensing principles or mandatory and inflexible licensing criteria, as well as frequent congressional review of individual export applications.[56] The proposal

ment, or heavy water production.

49. *Id.* §§ 7-9.

50. *Id.* § 10.

51. *Id.* §§ 3, 11.

52. *Id.* § 14(c).

53. Like other supplier states, Canada concluded a series of bilateral arrangements with consumer states in the 1950's to define the terms on which it would transfer nuclear material, equipment, and technology. Since 1974, however, Canada has significantly revised its nuclear export criteria twice. After India's explosion in 1974 of a peaceful nuclear device constructed from plutonium that came from a Canadian-supplied research reactor, Canada undertook to renegotiate all its existing agreements for cooperation to make clear its prohibition of peaceful nuclear explosives constructed through the use of Canadian nuclear exports. The inability of Canada to conclude such strengthened agreements with India and Pakistan resulted in the suspension of all nuclear trade with those countries.

54. Pub. L. No. 93-485, § 1, 88 Stat. 1460 (current version at 42 U.S.C.A. § 2153 (West Supp. I 1978)).

55. S. 1439, 94th Cong., 1st Sess., 121 CONG. REC. 10212, *reprinted in Export Reorganization Act of 1975: Hearings on S. 1439 Before the Senate Comm. on Government Operations*, 94th Cong., 1st Sess. 499 (1975).

56. S. 1439, 94th Cong., 2d Sess., *reprinted in Export Reorganization Act of 1976, Hearings on S. 1439 Before the Senate Comm. on Government Operations*, 94th Cong., 2d Sess. 1255 (1976), *modified version reprinted in S. 1439: Export Reorganization Act of 1976:*

died with the expiration of the Ninety-fourth Congress,[57] but it was resurrected with the next Congress and ultimately passed two years later.

The effect this flurry of congressional activity had upon other segments of the United States government is difficult to gauge, but it undoubtedly spurred a review of traditional American policies and practices upon which the current regime was built. The effects of this review became immediately evident. Frequent delays were encountered on individual applications in the export process.[58] The Nuclear Regulatory Commission (NRC)[59] began reviewing both con-

Hearings on S. 1439 Before the Joint Comm. on Atomic Energy, 94th Cong., 2d Sess. 68 (1976); H.R. 15419, 94th Cong., 2d Sess., 122 CONG. REC. 9491 (daily ed. Sept. 2, 1976); H.R. 15273, 94th Cong., 2d Sess., 122 CONG. REC. 9083 (daily ed. Aug. 25, 1976); S. Res. 415, 94th Cong., 2d Sess., 122 CONG. REC. 8270 (1976); H.R. Res. 1076, 94th Cong., 2d Sess., 122 CONG. REC. 5572 (1976).

For a detailed discussion of these proposals, see Doub & Fidell, *International Relations and Nuclear Commerce: Developments in United States Policy*, 8 LAW & POL'Y INT'L BUS. 913, 927-51 (1976). *See also* Spodak, *The Search for the Common Defense and Security in the 94th Congress*, 18 ATOM. ENERGY L.J. 202 (1976).

57. The only new nuclear-related legislation enacted during the Ninety-fourth Congress that affected United States nonproliferation policy was the International Security Assistance and Arms Export Control Act of 1976, Pub. L. No. 94-329, 90 Stat. 729 (codified in scattered sections of 22 U.S.C.A.). Approved June 30, 1976, the law amended the Foreign Assistance Act by adding a new section (the Symington Amendment) designed to control and reduce the proliferation of materials that could be used by any country to produce nuclear weapons. The 1976 Act specified that:

> no funds [under this Act, or certain other Acts,] may be used for . . . economic assistance, . . . military or security supporting assistance [or] grant[s] [for] military education and training, or [for] military credits or . . . guarantees, to any country which . . . [1] delivers nuclear enrichment equipment, materials, or technology to any other country or [2] receives such equipment, materials, or technology from any other country, unless before such delivery—
>
> (1) the supplying country and receiving country [agree to place all such items] under multilateral auspices and management when available; and
>
> (2) the recipient country [enters] into an agreement with the [IAEA] to place all such [items] and all nuclear fuel and facilities in such country under [IAEA safeguards].

Note that these sanctions were subsequently changed by the International Security Assistance Act of 1977, Pub. L. No. 95-92, § 12, 91 Stat. 620 (codified at 22 U.S.C.A. § 2429 (West Supp. 1978)). The Act also has a similar provision relating to reprocessing transfers. *See generally* Doub & Fidell, *supra* note 56, at 923-27.

58. The first result was that no export licenses were issued for a short time, which led to an extraordinary press release by the NRC stating that a moratorium was not in effect. NRC Press Release No. 75-90 (April 15, 1975); *see* N.Y. Times, March 27, 1975, § 1, at 34, col. 1 (entitled *Nuclear Agency Suspends Export-Import of Reactors*). This situation did not improve greatly even after this "nonmoratorium" was lifted, with one application taking 30 months for approval. *See generally*, Weiss, *The Role of the NRC in Export Licensing*, 18 ATOM. ENERGY L.J. 85 (1976).

59. Licensing functions are vested in the NRC pursuant to the Atomic Energy Act of 1954, Pub. L. No. 83-703, ch. 1073, 68 Stat. 919 (codified in scattered sections of 42 U.S.C. and § 201(f) of the Energy Reorganization Act of 1974, 42 U.S.C. § 5841(f) (1976)).

troversial and not-so-controversial exports at the Commission level. The NRC forced the executive branch to justify its conclusions on individual applications and used its licensing role as leverage to achieve perceived national nonproliferation objectives. The executive branch, in turn, began employing a more diverse internal decisionmaking process, causing further delay.[60] In contrast to its previous position, the executive branch began questioning the need for several foreign reprocessing plants that it had already tacitly approved. Additionally, President Ford announced in the closing days of the 1976 Presidential election campaign that the United States would accelerate its initiatives with other nuclear suppliers and customer nations to control the spread of plutonium and sensitive nuclear technologies. As a first step, he decided the United States would hold the domestic commercialization of reprocessing in abeyance pending the conclusion of a study to determine whether the use of plutonium could proceed in a manner compatible with nonproliferation objectives.[61]

B. The Nuclear Non-Proliferation Act of 1978

Whether implementation of the Ford policy would have alleviated the concerns causing the reexamination of traditional policies is unknown, for within a week after its announcement James Earl Carter, Jr., was elected President. As a candidate, Carter had stated his intention to give nonproliferation concerns a high priority. In the hope that the international community would follow the United States lead, President Carter announced in April 1977 a major reformulation of American nuclear policy, including, *inter alia,* the indefinite deferral of commercial reprocessing and recycling of plutonium produced in the United States nuclear power program, a restructuring of the United States breeder program to give greater priority to alternative designs, and the undertaking of an "international nuclear fuel cycle evaluation" to consider these and other issues in a multinational context.[62] This statement went beyond the Ford policy in two major respects: (1) the Ford policy had not treated the breeder as an immediate threat to nonproliferation

60. The executive branch review procedures were set forth in Exec. Order No. 11,902, 3 C.F.R. 88 (1976). It was revoked by Exec. Order No. 12,058, 43 Fed. Reg. 20,947 (May 11, 1978). For a detailed description of the decisionmaking process under Exec. Order No. 11,902, see Westinghouse Electric Co., CLI-76-9, 3 NRC 739 (1976).

61. 12 WEEKLY COMP. OF PRES. DOC. 1624 (Oct. 28, 1976).

62. 13 WEEKLY COMP. OF PRES. DOC. 502-04 (April 7, 1977). It should be noted that the breeder now under development in most nations, the liquid-metal fast-breeder reactor, uses plutonium as a fuel. The main advantage of breeders is that they can be operated to produce more plutonium than they consume.

since no decision on commercialization was expected for at least ten years; and (2) the Carter program placed a heavy emphasis upon alternatives to the present nuclear fuel cycle. In sum, the statement reoriented United States nuclear policy—whereas the Ford policy was directed toward finding means by which the United States could live with the use of plutonium, the Carter program sought ways to avoid it.

Accompanying this address and in the months immediately thereafter, the Carter Administration undertook additional action designed to increase the attractiveness of this policy to United States trading partners. The Administration assured other nations that the United States would remain a timely and reliable supplier. In furtherance of this objective the United States announced plans to increase its enrichment capacity and began taking new orders for enrichment services for the first time since 1974.[63] The Administration also announced the willingness of the United States to contribute to the development of international institutional arrangements designed to insure vulnerable countries against interruptions in fuel supplies.[64] To alleviate the pressure for foreign reprocessing of spent fuel, the Administration proposed that the United States accept limited amounts of foreign-generated spent fuel when necessary to further its nonproliferation objectives and undertook studies looking toward the establishment of multinational storage centers.[65] Finally, the Carter Administration undertook to provide a United States waste management plan that would examine, among other things, the need for reprocessing prior to permanent disposal.[66]

A year after its announcement, this policy was enacted, for the most part, with the passage of the Nuclear Non-Proliferation Act of 1978. While the theories underlying both the legislation and the Carter policy were diverse and not always consistent, one can discern several common guiding concepts. Foremost among these was the belief that past proliferation efforts based on the prevention of the actual manufacture or acquisition of nuclear explosive devices was not adequate, given the increasing number of foreign programs already having or contemplating the acquisition of reprocessing facilities. The use of these facilities would increase the amount of separated plutonium available, facilitate national access to this material, and raise problems qualitatively different from those asso-

63. Dep't of Energy News Release No. R-78-289 (July 28, 1978).

64. 13 WEEKLY COMP. OF PRES. DOC. 1566-67 (Oct. 19, 1977).

65. Dep't of Energy News Release No. DOE/SR-77-30 (Oct. 18, 1977).

66. *See generally* Report to the President by the Interagency Review Group on Nuclear Waste Management, TID-28817 (Draft) (Oct. 1978) [hereinafter cited as IRG Report].

ciated with light water reactors. First among these problems was that weapons could be in place with virtually no advance notice to permit effective diplomatic or other counter measures. Since the barriers between peaceful and nonpeaceful uses were breaking down, the Administration and Congress sought to broaden the focus of United States nonproliferation efforts to ensure that between a decision by a non-nuclear-weapon state to divert fissionable material and its actual fabrication into a nuclear explosive device sufficient time existed to allow the international community to undertake an appropriate political, diplomatic, or military response.[67] Thus, the Act imposed requirements for more stringent American safeguard rights in bilateral agreements[68] and additional controls over individual exports,[69] as well as limitations upon the export of certain technology and information.[70] In the event that the recipient violates safeguard obligations, and in certain other specified situations,[71] the Act requires the termination of nuclear exports from the

67. The Non-Proliferation Act provides that the Secretary of Energy may not approve any subsequent arrangement for reprocessing (or for the subsequent retransfer of more than 500 grams of plutonium) except in certain major facilities that have processed power reactor fuel or have been the subject of a subsequent arrangement prior to the date of enactment, unless such reprocessing or retransfer would not in his view and that of the Secretary of State result in a significant increase in the risk of proliferation beyond that which existed at the time approval was requested. In reaching this decision foremost consideration will be given to whether the reprocessing or retransfer will take place under conditions that will insure warning to the United States of any diversion well in advance of the time at which the non-nuclear-weapons state could transform the diverted material into a nuclear explosive device. 42 U.S.C.A. § 2160 (West Supp. I 1978) (adding a new § 131 to the Atomic Energy Act).

The Senate Report accompanying the bill that ultimately became law stated:

> It is important to note that the standard of timely warning, the basic concept upon which the entire international safeguards program rests, is strictly a measure of whether warning of a diversion will be received far enough in advance of the time when the recipient could transform the diverted material into an explosive device to permit an adequate diplomatic response. The amount of warning time required will vary (and cannot be defined in terms of a certain number of weeks or months) depending on the type of resopnse [*sic*] would be needed—i.e., in some cases a bilateral response could be adequate, whereas ain [*sic*] others a coordinated response by several nations and/or international organizations would be necessary. In addition to determining the amount of warning time required, it will be necessary to determine how much time will actualy [*sic*] be available under any specific circumstances.

S. REP. No. 467, 95th Cong., 1st Sess. 11 (1977), *reprinted in* [1978] U.S. CODE CONG. & AD. NEWS 660, 670.

68. 42 U.S.C.A. § 2153 (West Supp. I 1978). *See* note 88 *infra* and accompanying text.

69. 42 U.S.C.A. §§ 2156-2157 (West Supp. I 1978) (adding new §§ 127 and 128 to the Atomic Energy Act). *See* note 94 *infra.*

70. 42 U.S.C.A. §§ 2156-2157 (West Supp. I 1978). *See also id.* § 2153a (requiring inclusion in agreements for cooperation for foreign enrichment of United States origin material and for exports of major critical components of sensitive nuclear facilities if such actions are to occur).

71. These situations include:

United States.[72] Additionally, the Act calls for the establishment of multinational fuel centers under international auspices with limited access to the sensitive technology involved.[73]

The development of a regime to place additional barriers between the peaceful and nonpeaceful uses of nuclear energy will take time. Consequently, the Administration has emphasized and the Act implicitly recognizes the desirability of imposing a "need" concept on international nuclear commerce. For example, the United States has opposed reprocessing for the purpose of recycling the plutonium recovered in light water reactors as having only marginal economic and energy supply benefits. Recognizing that the development and deployment of sensitive nuclear technologies cannot be indefinitely delayed, however, the Administration has sought to postpone this action until national energy programs can show a need for such technology and the international community has time to develop more effective proliferation-resistant programs. Relating this theory to reprocessing, Joseph Nye,[74] one of the principal theorists of the Administration's policy, has written:

> Looking to the future, the Administration could envisage three components of a solution to the reprocessing problem—time, technology and institutions. If reprocessing is deferred until it is economically necessary, the world gains considerable time to develop reprocessing technologies that do not provide ready access to weapons-usable materials and to design possible international facilities for reprocessing. Early commercialization of reprocessing in national (or multinational) plants could deprive the world of the time to develop safer technologies and institutions.[75]

While United States policy has emphasized this concept primarily for plutonium-related activities, the Act seeks to promote the development of energy sources in developing countries other than nuclear reactors by requiring the executive branch to assist these nations to meet their energy needs through alternative energy sources.[76]

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detonat[ing] a nuclear explosive device, . . . engag[ing] in activities involving . . . nuclear material and having direct significance for the manufacture or acquisition of nuclear explosive[s], . . . [and] enter[ing] into an agreement after [the date of enactment of this section] for the transfer of reprocessing equipment, materials, or technology to the sovereign control of a non-nuclear-weapon state except . . . pursuant to a subsequent international agreement or understanding to which the United States subscribes . . . .

Id. § 2158 (adding a new § 129 to the Atomic Energy Act).

72. Termination is required "unless the President determines that cessation of such exports would be seriously prejudicial to the achievement of United States non-proliferation objectives or otherwise jeopardize the common defense and security . . . ." *Id.*

73. *Id.* § 2153b.

74. Deputy to the Under-Secretary of State for Security Assistance, Science, and Technology from Jan. 20, 1977, to Dec. 31, 1978.

75. Nye, *Nonproliferation: A Long-Term Strategy*, 56 FOREIGN AFF. 601, 610 (1978).

76. 22 U.S.C.A. §§ 3261-3262 (West Supp. I 1978). It should be noted that the Adminis-

While seeking tighter controls over international nuclear commerce, the Non-Proliferation Act also recognizes that nonproliferation is an international problem and that United States nonproliferation policy must reflect the realities of the current international situation. Consequently, the Act reaffirms traditional United States support for the IAEA and the Non-Proliferation Treaty.[77] It also implicitly notes that the decision by many nations not to build nuclear explosives is a political one, not based on technical obstacles, and that this situation can best be maintained if these nations perceive that the United States is a reliable supplier and that they need not possess sensitive nuclear technologies.[78] The Act attempts to resolve this problem through various means, including clarifying previously uncertain licensing procedures and criteria,[79] authorizing the NRC to expedite license approval,[80] seeking more comprehensive international safeguards,[81] and instituting a program for nuclear fuel assurances.[82] It further attempts to reflect worldwide realities by giving the executive branch substantial flexibility in implementing its provisions and by stating explicitly that nothing in the Act prohibits the reprocessing of United States supplied fuel[83] or prejudices United States review of the results of the International Nuclear Fuel Cycle Evaluation.[84]

The provisions of the Non-Proliferation Act are emblematic of the diverse themes underlying it. Requiring the amendment of all existing bilateral agreements within two years, subject to Presidential extensions with congressional review,[85] the Act mandates the

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tration would have deleted these sections from the Act.

77. *Id.* § 3241.

78. *Id.* § 3221.

79. 42 U.S.C.A. §§ 2155-2157 (West Supp. I 1978) (adding new §§ 126-128 to the Atomic Energy Act).

80. *Id.* § 2155(a)(2). This can be done in one of several ways: the Commission may make a single finding for more than one application to the same nation, or it may approve licenses merely by finding that there are no materially changed circumstances associated with the application from those existing at the time of the last export to the same recipient. *Id.* The Commission also has authority under § 161 of the Atomic Energy Act to issue general licenses for such activities. 42 U.S.C. § 2201(h) (1976).

81. 22 U.S.C.A. § 3241 (West Supp. I 1978).

82. *Id.* § 3223.

83. 42 U.S.C.A. § 2160(d) (West Supp. I 1978).

84. *Id.*

85. *Id.* § 2153. *See also id.* §§ 2155(a)(2), 2159 (adding a new § 180 to the Atomic Energy Act). The Act requires submissions to Congress in accordance with the procedures of § 2159 in four important instances: if the President decides to override the NRC on issuance of an export license, § 2155(b)(2); if the President decides to exempt the nation from the additional full-scope safeguard criterion, § 2157(b); if the President decides to waive a requirement for the termination of exports, § 2158; and if any new or amended agreements for cooperation are proposed, § 2153.

inclusion of more stringent safeguard rights than previously have been utilized. The most controversial provisions mandate that United States agreements for cooperation include conditions that: (1) non-nuclear-weapons states agree to full-scope IAEA safeguards;[86] (2) retransfers not occur without United States consent; (3) material of United States origin or irradiated in United States supplied facilities, not be reprocessed, enriched, or in some instances, otherwise altered in form or content without the prior approval of the United States; (4) the United States approve the storage facilities used for plutonium, U-233, or highly enriched uranium that is of United States origin or derivation; and (5) derived material[87] be subject to all of the above requirements.[88]

Not only does the Act impose greater substantive obligations upon American trading partners, but it also greatly complicates the United States nuclear decisionmaking process. Under the regulatory regime of the 1954 Act, the NRC made the final decision on export applications involving nuclear fuels and facilities[89] after consulting with the executive branch.[90] For the most part, this review process was informal and governed by interagency understandings. In making its determination the NRC was guided primarily by the broad common defense and security standards of the Atomic Energy Act.[91]

The Non-Proliferation Act substantially modified this regulatory regime. The NRC retains the principal decisionmaking role,

86. With full-scope IAEA safeguards, agency safeguards are required for all nuclear activities within the jurisdiction of the recipient state. *Id.* § 2153(a)(2).

87. Derived material consists of material not of United States origin, but which is irradiated in a United States-supplied reactor. *Id.* § 2153(a).

88. *Id.* § 2153. Other requirements of this section include provisions that the recipient agree to maintain IAEA safeguards in perpetuity on the materials over which it has control, not to use such material or equipment for explosive devices, and to permit the United States to request the return of such materials and equipment if the cooperating party abrogates IAEA safeguards or detonates a nuclear explosive. Section 2153 also requires the recipient to maintain adequate physical security, to request United States consent before retransfering restricted data, and impose similar conditions upon the product of any facility built with the use of United States-supplied sensitive nuclear technology. *Id.*

89. NRC jurisdiction over the export of nuclear power reactors and fuel is provided for in 42 U.S.C. §§ 2073, 2133, 2134, 2139 (1976). Its jurisdiction over components is found in 42 U.S.C. § 2139 (1976). It should be noted that this comprises only a small part of United States nuclear cooperation with other nations. The Department of Energy (DOE), for example, has jurisdiction over technology transfers (under 42 U.S.C.A. § 2077(b) (West Supp. I 1978)) and shares jurisdiction with the Department of State for the conclusion of new agreements for cooperation (under *id.* § 2153) and subsequent arrangements (under *id.* § 2160). The DOE may also export small amounts of material without an export license (under *id.* §§ 2074, 2094).

90. This contact with the executive branch was not statutorily required. *See* note 60 *supra*. In theory, the NRC could have issued a license even if the executive branch would have denied it.

91. *See* note 89 *supra*.

but it cannot approve a license without executive branch concurrence.[92] The entire review process is formalized—timetables are established, and certain agencies are statutorily required to be consulted.[93] The Act also affects the internal NRC decisionmaking process. The number of findings the NRC must make are multiplied due to the establishment of specific criteria against which applications must be measured.[94] If the NRC is unable to reach a decision or if it denies the application, the President may nonetheless direct it to issue a license.[95] In such cases, as well as when the NRC approves an application involving a Presidential waiver, Congress may overturn the decision by passing a concurrent resolution within sixty days.[96]

C. *International Reaction*

Not surprisingly, the immediate foreign reaction to the United States initiative ran the gamut from calm opposition to outrage. The precise reasons for this antagonism varied from nation to nation, and in many instances it resembled the hue and cry associated with the raising of any new idea. Nevertheless, other nations legitimately felt that they were being asked to sacrifice a vital energy source because of the notions of a new American President whom they barely knew and whose wisdom they had no particular reason to trust. In reality, this reaction was the culmination of a growing concern with the United States as a reliable supplier. Foreign confidence in the willingness of the United States to make equipment, fuel, and technology available on a long-term basis at an attractive price and in a timely manner had already eroded by 1977. This lack of confidence was due in part to the perception that United States statutory procedures for the conclusion of new and amended agreements were too cumbersome, that its nuclear policy was not sufficiently stable, and that it was inordinately slow in granting specific export licenses.[97] Whether these perceptions were accurate or not,

92. 42 U.S.C.A. § 2155(a)(1) (West Supp. I 1978).

93. *Id.* § 2155(a)(1), (b)(2). In theory, the executive branch must give the NRC its views within 60 days, and the NRC must reach its decision within 120 days thereafter. These timetables are not binding, however, and are seldom met. The Act also imposes strict requirements regarding the agencies that must be consulted.

94. *Compare id.* § 2156 (which is similar to the provisions that must be included in new agreements for cooperation) *with id.* §§ 2074, 2077(b), 2094, 2153, 2160 (broad common defense and security findings). It should be noted that the latter remains a separate finding despite the criteria found in § 2156.

95. *Id.* § 2155(b)(2).

96. *Id.*

97. These problems in some respects were inherent. Even before the OPEC oil embargo in 1973, nations were expressing concern about committing substantial investments and a

cooperation with the United States, even before the advent of the Carter Administration, no longer seemed so attractive. The actions of that administration only exacerbated these problems.

Whatever the precise reasons for this opposition, the underlying sense was one of betrayal. Other nations had made major investments in the development of nuclear energy based on the assurances, and indeed the encouragement, of the United States.[98] Now the United States was attempting to change the ground rules. While the American hegemony over reactor sales was broken by the early part of this decade, the United States remained the major supplier of enrichment services and continued to be a significant force in the reactor market.[99] This situation gave the United States a considerable degree of control over foreign nuclear programs, and many countries felt that the United States was taking unfair advantage of this leverage in contravention of supply obligations imposed by the current legal regime.

Although the United States has attempted to implement its

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major segment of their electrical generating capacity to dependence on a single outside source of energy. In other ways, however, these problems were self-induced. Foreign customers felt that the announcement of the long-term fixed commitment contracts in 1973 placed excessive demands and restraints upon their nuclear programs. The United States decision to stop accepting new contracts for enrichment services and related problems associated with this decision increased these doubts. *See* text accompanying note 114 *infra.*

These problems were exacerbated in 1975 when the delays in the issuance of licenses began to occur due to the NRC's expansion of its review process. *See* text accompanying notes 58-59 *supra;* Weiss, *supra* note 58. Consequently, expensive plant delays resulted and foreign customers felt that they were blackmailed into agreeing to new constraints. Due to this situation the United States' reputation as a reliable supplier was put deeply in doubt. *See generally,* Letter from J. L. Sanchez to Senator J. Sparkman (February 1, 1978), *reprinted in* 124 CONG. REC. 1461 (daily ed. Feb. 7, 1978) [hereinafter cited as Sanchez Letter]. Mr. Sanchez is Administration General Manager, *Contraies Nucleares del Norte* (Spain).

98. It was originally assumed that reprocessing and recycling would continue, and economic projections of nuclear power costs routinely included credits for plutonium and recovered uranium. The United States strongly supported the domestic development of reprocessing and breeders at least through 1975. *See* Energy Research & Dev. Ad., Nuclear Fuel Cycle (Mar. 1975) (ERDA-33). Nor did the United States disapprove of similar programs abroad. From 1961 to 1974, approximately 575 transfers of United States-supplied nuclear material were made between foreign countries. General Accounting Office, Assessment of U.S. and International Controls Over the Peaceful Uses of Nuclear Energy (Sept. 14, 1976). These requests involved retransfers for reprocessing by countries that desired the produced plutonium for research and testing in advance reactor concepts. FINAL ENVIRONMENTAL STATEMENT, *supra* note 23, at 9-24.

99. As noted above, the United States supplied 91% of the reactors sold in the noncommunist world through 1972. Since that time the United States has sold less than 50%. In 1978, only two of the projected 29 reactor orders (in seven countries) were anticipated to go to United States firms. AIF International Survey, *supra* note 29, at 2.

Up to this time the United States has supplied almost all the enrichment services for the uranium used as fuel in reactors. This monopoly is likely to be broken within the next year, however, when new facilities become operational in France and the Netherlands.

current nuclear programs within the existing legal framework, other nations believe that this posture is a ruse and that the United States is attempting to renege on its commitments under existing bilateral agreements and the Non-Proliferation Treaty.[100] These agreements, of course, are a straightforward bargain—the United States agrees to supply equipment, materials, and technology in exchange for a certain level of nuclear safeguards. During the past several years, however, the United States has indicated that it will not meet these obligations unless its existing and prospective trading partners accept added conditions,[101] which theoretically permit the United States to shape other countries' domestic nuclear programs. This perception has discouraged most nations from accepting the American position.

Thus, non-nuclear-weapons states that are parties to the Non-Proliferation Treaty almost uniformly have vociferously opposed the American stance. The reaction of West Germany has not been atypical. Since the passage of the Atomic Energy Act of 1954, West Germany has received light water reactor technology and a great majority of its fuel supply from the United States. As early as 1954, it renounced its right to develop or acquire nuclear weapons.[102] In 1956 West Germany became one of the founding members of Euratom, accepting the safeguards imposed by that agreement as well as the organization's cooperative agreement with the United States.[103] Although there was never any question that West Germany would seek nuclear weapons, it hesitated prior to signing the

100. Consider the following observation by the Honorable Mr. Justice Parker:

> Since the production of plutonium by reprocessing and its use in fast breeders was at the time of the [Non-Proliferation] Treaty the accepted future, I find it difficult to see how it can be argued that any party, whether a nuclear-weapon or non-nuclear-weapon party, has not the right (a) to develop and use reprocessing for the production of plutonium (b) to develop and use the fast breeder (c) to have access to the technology and equipment for creating reprocessing facilities and (d) to have access to reprocessing facilities which may exist in the territory of another party and to the plutonium produced by the use of such facilities. I also find it difficult to see how a party, which has developed reprocessing technology or created reprocessing facilities, would be otherwise than in breach of the agreement, if it both refused to supply the technology to another party and refused to reprocess for it.

1 Parker, The Windscale Inquiry 18 (Jan. 26, 1978) (report presented to Great Britain's Secretary of State for the Environment).

101. The legality of the United States action under international law is questionable. It is an established principle that treaties cannot be modified unilaterally by one party without the consent of the other. *See* Vienna Convention on the Law of Treaties, *opened for signature* May 23, 1969, art. 39, *reprinted in* 8 INT'L LEGAL MATERIALS 679 (1969); Dixit, *Amendment or Modification of Treaties*, 10 INDIAN J. INT'L L. 37 (1970).

102. H. HAFTENDORN, *supra* note 43, at 11.

103. *Id. See* Agreement for Cooperation with the European Atomic Energy Community Concerning Peaceful Uses of Atomic Energy, Nov. 8, 1958, 10 U.S.T. 75, T.I.A.S. No. 4173.

Treaty because of the second-class status membership would entail vis-á-vis its Euratom partners who were nuclear-weapons states. Nevertheless, it ratified the Treaty in 1969, emphasizing its understanding that nothing in the Treaty restricted research, development, and commercial uses of nuclear energy.[104]

During the past twenty-five years, West Germany has formulated a comprehensive nuclear program designed to reduce its dependence on foreign sources that now provide fifty-six percent of the country's energy requirements.[105] This program has included a reprocessing capability for three purposes—plutonium recycling, fuel for the breeder, and waste management. Uncertain of the extent of natural uranium resources and suspicious of the reliability of their owners to supply them, West Germany has vigorously pursued reprocessing for the first two reasons. It thought that plutonium recycling could lead to a reduction in the requirement of uranium of approximately twenty percent annually and a reduction in the requirement for enrichment services of fifteen percent.[106] It also believed that breeders could extract at least sixty times more energy from natural or depleted uranium than could thermal reactors.[107] In recent years the waste management purpose has received increasing emphasis, since West Germany has had a political and legal need to resolve this problem before proceeding with any significant additions to its nuclear generating capacity. It should be noted that the United States supported the West German reprocessing program until recently.

The change in American policy has been extremely unsettling to the West German plans. West Germany is one of many nations that believe reprocessing is necessary for waste management purposes.[108] For the immediate future, West German utilities have con-

104. H. HAFTENDORN, *supra* note 43, at 11.

105. This is an Organization of European Cooperation and Development (OECD) figure for the period of 1974-1976, cited by G. Greenhalgh, European Reactions to the U.S. Nuclear Non-Proliferation Policy 2 (January 16, 1978) (report prepared for the Congressional Research Service of the Library of Congress) [hereinafter cited as Greenhalgh]. These OECD figures show indigenous production is less than 30% for Belgium, Luxembourg, Denmark, Finland, France, Ireland, Italy, Portugal, and Spain.

106. Communication from the Commission of the European Communities to the Council, Points for a Community Strategy on the Reprocessing of Irradiated Nuclear Fuels, at 3 (Com (77) 331 (final)) (1977).

107. Communication from the Commission of the European Communities to the Council, The Fast Breeder Option in the Community Context—Justification, Achievements, Problems and Action Perspectives, at 7 (Com (77) 331 (final)) (1977) [hereinafter cited as EEC—Breeder]. The Commission noted that "to give an idea of what this represents, it can be stated that 5000 tons of Uranium could produce, with the help of breeder reactors, the energy associated with the estimated technically recoverable North Sea oil reserves." *Id.*

108. This also has been the conventional wisdom in the United States on the theory that reprocessing simplifies disposal by reducing volume. *But see* IRG Report, *supra* note 66.

cluded reprocessing contracts for about 1700 metric tons of spent fuel with Cogema in France. Concurrently, West Germany has been planning a five billion dollar fuel cycle center—including a reprocessing plant, a waste repository, an intermediate storage facility, and a mixed oxide refabrication plant—at Gorleben in lower Saxony. As previously mentioned, however, the Non-Proliferation Act requires United States approval prior to the reprocessing of United States-origin material or spent fuel that has been irradiated in a United States reactor. This gives the United States a virtual veto over the operation of the Gorleben reprocessing facilities as well as the reprocessing at Cogema, since almost all spent fuel accumulated to this time has originated from the United States. This uncertainty is complicated by the vagaries of the United States review process that operates on an ad hoc, case-by-case basis without a detailed statutory standard. Moreover, this review process involves five agencies, the possible preparation of a Nuclear Proliferation Assessment Statement by the Arms Control and Disarmament Agency, several different approval scenarios, and final congressional review.[109]

Many nations have contended that while the United States requires immediate acceptance of additional safeguards, it is unwilling to assure that even if these conditions are accepted the United States will provide the necessary supplies in a timely manner. While the Non-Proliferation Act commits the United States to be a reliable supplier, these provisions are primarily hortatory. Past history gives little assurance that a nation accepting the additional conditions mandated by the Act will receive the assured supply of nuclear fuel. Indeed, many nations perceive that the procedural and substantive complexities of the Act and the resulting ambiguities create numerous opportunities for mischief that could delay or even block the issuance of necessary export approvals.[110]

Although the first, albeit temporary, cutoff of fuel under the Non-Proliferation Act was to Euratom—the nuclear arm of the European community[111]—developing nations, irrespective of Treaty

109. 42 U.S.C.A. § 2160 (West Supp. I 1978).

110. *See* Sanchez Letter, *supra* note 97.

111. The Euratom cutoff arose because of Euratom's unwillingness to agree to renegotiation of its agreement for cooperation with the United States within 60 days of the enactment of the Non-Proliferation Act. Section 304 of that Act (42 U.S.C.A. § 2155 (West Supp. I 1978)) waives for 24 months the immediately effective requirements of § 2156 that all recipients must agree to United States controls over retransfers and reprocessing provided that the recipient's agreement currently lacks such provisions and the recipient agrees to renegotiate its agreement within 60 days. Euratom took the position that the Act unilaterally abrogated the existing agreement that did not expire until 1995. Energy Daily, April 13, 1978, at 3. The impasse was broken when the Carter Administration accepted a Euratom proposal

membership, have been particularly strident in their opposition to the Act. Yugoslavia, a Non-Proliferation Treaty member, has led the Third World position, questioning the commitment of the United States to fulfill its obligations under the Treaty. The Yugoslav opposition is understandable, since it has encountered significant delays in obtaining export licenses from the NRC, even though its purchase of an American reactor was deemed a significant breakthrough in United States-Eastern European relations. This opposition has manifested itself both in a threat to withdraw from the Treaty because the United States and Soviet Union have not fulfilled their pledge to cooperate under Article IV and in a proposal to convene an international conference on the political aspects of nuclear-related technology transfer.[112]

Developing nations that are not members of the Non-Proliferation Treaty have centered their criticism on similar grounds and, more importantly, have used the present developments to justify the continuation of their own national programs.[113] These nations feel that they have neither the time nor the funds to wait for the commercial development of alternative technologies and resent the degree of discrimination inherent in the United States approach with its emphasis on restraint. As has been true with the whole spectrum of international issues—whether nonproliferation, law of the seas, pollution, or trade—the policies of the developing nations on nuclear matters have been designed to provide maximum flexibility for national action. They perceive nuclear development as an attractive method to develop a secure energy supply for long-term industrial growth and to reduce their political and economic dependence on outside powers. Since few developing countries have domestic uranium resources, they view the establishment of a reprocessing capability as a necessary means to stretch fuel supplies. In turn, they regard any attempt to limit their acquisition of this capability as yet another example of the developed nations' desire to perpetuate the dependency of the Third World. Consequently, there has been little movement among developing na-

to discuss the renegotiation of the agreement for cooperation, with discussions limited to subjects not under consideration in the International Nuclear Fuel Cycle Evaluation. NUCLEONICS WEEK, July 13, 1978, at 8.

112. *See generally* Address by Sigvard Eklund, International Conference on Nuclear Non-Proliferation and Safeguards, in New York City (Oct. 24, 1978) (sponsored by the Atomic Industrial Forum).

113. *See generally* Address by David Fischer, International Conference on Regulating Nuclear Energy, in Brussels (May 18, 1978) (sponsored by the Atomic Industrial Forum), *quoted in* NUCLEAR INDUSTRY, June 1978, at 5 (Mr. Fischer is Assistant Director General for External Relations at the International Atomic Energy Agency in Vienna.).

tions to sign the Treaty in recent years. For most of these nations, it is not that nonproliferation is unimportant, but rather that other concerns are more urgent.

Brazil provides an excellent example.[114] During the last decade Brazil has designed its domestic and foreign policies to foster economic development above all other national objectives. This effort has been extremely successful; the Brazilian gross national product has doubled over the past ten years. A major constraint on this development, however, has been Brazil's dependence on foreign sources for eighty percent of its oil requirements, at a cost of $300 million a month. Brazil thus has regarded the development of nuclear power as an economic necessity and has sought to fulfill this need through a package deal with West Germany. This agreement involved equipment, materials, and technology relating to almost the entire fuel cycle, including mining, enrichment, reactors, reprocessing, and fuel fabrication. It also contained the most stringent safeguards ever required in an individual transaction. It should be noted that this agreement was reached only after the United States, whose firms originally had expected to sell the next group of reactors to Brazil, shifted long-term fuel guarantees for these reactors to "conditional" status and returned the deposit payment. Although the American action occurred solely because it had contracted for all its present capacity and had nothing to do with Brazil per se, the threat of a fuel cutoff increased the incentives to Brazil for seeking the broad range of assistance included in the West German deal. Thus, it is not surprising that Brazil has not yielded to the recent American initiative.

More disturbing, however, other non-Treaty developing nations have used the American position to justify continuation of their indigenous programs, which are not subject to international safeguards. Perhaps the foremost example of this is India, which has several research reactors and an indigenously constructed commercial-size reprocessing facility that are not safeguarded, and is in the process of constructing an experimental breeder reactor.[115] Since its peaceful nuclear explosion in 1974, India has encountered severe difficulties in obtaining low-enriched fuel from the United States.[116] Although this reluctance on the part of the United States

114. *See generally* H. HAFTENDORN, *supra* note 43; Fishlow, *Flying Down to Rio: Perspectives on U.S.-Brazil Relations*, 57 FOREIGN AFF. 387 (1978).

115. *See* Washington Post, Dec. 5, 1977, § A, at 16, Col. 1.

116. *See, e.g.*, 2 NUCLEAR REG. REP. (CCH) ¶ 30,288 (Apr. 24, 1978) (NRC fails in tie vote to approve export license of fuel to India). This decision was reversed in an April 27, 1978, executive order by President Carter. Exec. Order No. 12,055, 43 Fed. Reg. 18,157 (1978).

may be understandable, the international community in 1973 had not yet equated "peaceful nuclear explosions" with a weapons capability. Furthermore, India broke no safeguard agreements in conducting this explosion. Meanwhile, India has taken the position that it does not feel obligated to honor its safeguard commitments if the United States does not meet its supply obligations. This impasse might lead to United States-supplied fuel being reprocessed in an unsafeguarded facility, a situation the United States certainly would not desire.[117] Although India began planning for the above-mentioned facilities prior to 1974, the present difficulties undoubtedly have injected a sense of urgency into their completion.

While equally adverse to the spread of nuclear weapons, other suppliers, including some of America's closest allies, have criticized the United States approach as encouraging these indigenous efforts. These nations note that no failure of international safeguards has ever been known to occur, and they argue that suppliers should offer incentives to other countries to join the present regime and to work within the international community to improve this admittedly imperfect framework.[118] They believe that the United States initiative is at best naive and at worst a guise to further American commercial interests.

These critics also contend the international community should focus more upon reducing motivations toward the development of an explosive capability. They regard the likelihood that a nation would acquire the peaceful fuel cycle as a cover for weapons development as remote, given the billion dollar cost associated with the reactor alone. The likelihood is further reduced since the plutonium derived from reprocessed reactor fuel is of a lesser grade for weapons purposes than that produced from a small plutonium production or research reactor that could be built at less than one-tenth of that

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By a vote of 181 to 227, the House failed to pass H.R. Res. 599, disapproving the proposed export of low-enriched uranium to India. 124 CONG. REC. 6517-31 (daily ed. July 12, 1978); *see* H.R. REP. No. 1314, 95th Cong. 2d Sess. (1978).

117. *See, e.g.*, President Desai's remarks to the Indian Parliament on April 24, 1978:

> For the time being, therefore, we have to wait for such action as the President may take in order to clear our pending requisitions. I have already asked our Atomic Energy Commission to examine every alternative avenue to keep up the supplies of fuel for the Tarapur Plant in case the uncertainties of supplies from the United States becomes a permanent feature. In coming to this decision, I have taken fully into account the obligation of the United States to supply us with fuel and their refusal being a breach of the agreement. I am conscious that any such refusal would bring to an end both the agreement for cooperation and the contract. We cannot allow such an eventuality to interfere with our programme for development of atomic energy . . . .

Donnelly & Kramer, Licensing Fuel for India's Tarapur Nuclear Powerplant 6-7 (Aug. 29, 1978) (prepared for Congressional Research Service of the Library of Congress).

118. *See generally* Greenhalgh, *supra* note 105.

cost.[119] The United States initiative, however, has focused primarily on the peaceful fuel cycle and has ignored the other paths to weapons development. Furthermore, they argue that the United States position and the uncertainties it entails have created additional incentives for nations to construct reprocessing facilities. These facilities are within the capabilities of almost all moderately industrialized nations and are difficult to detect.[120] Thus, they contend that it is wiser and safer to ensure that reprocessing facilities are developed under careful international control and scrutiny rather than to attempt to stop them altogether, an effort they feel is doomed to certain failure.

The naivety perceived in this policy has led some nations to argue that the United States, precluded from expanding its own nuclear developing reprocessing and breeders because of domestic political concerns, is really seeking to forestall the development of international programs. The West Germans, for instance, stress that their domestic nuclear program, heavily dependent on export orders, is being severely curtailed. Other nations have argued that the United States still has access to reprocessing through its military program, for which there is no accountability, and that the United States position on reprocessing is driving up prices on the uranium market, where the United States is a major supplier.[121] Undoubtedly this perception occurs most frequently with regard to the breeder. France and the Soviet Union both are clearly ahead of the United States in breeder development with the United Kingdom about even and West Germany and Japan not far behind.[122]

Even without the perception that the United States position is a guise for commercial considerations, these nations contend that the breeder is necessary because they do not have the domestic fuel reserves that the United States has and/or that the United States by foregoing plutonium fuels, will compete and consume an even

119. *See* J. Lamarsh, On The Construction Of Plutonium-Producing Reactors by Small and/or Developing Nation (1976) (report prepared for the Congressional Research Service of the Library of Congress), *reprinted in Export Reorganization Act of 1976: Hearings on S. 1439 Before the Senate Comm. on Government Operations,* 94th Cong., 2d Sess. 1326 (1976).

120. *See* General Accounting Office, Quick and Secret Construction of Plutonium Reprocessing Plants: A Way to Nuclear Weapons Proliferation? (Oct. 6, 1978); Atlantic Council, Nuclear Power and Nuclear Weapons Proliferation 80-81, 88 (June 19, 1978) [hereinafter cited as Atlantic Council].

121. *See* Rippon, *Comment from Europe: International Agreements Will Never Be the Same Again,* NUCLEAR NEWS, May 1978, at 60.

122. The Soviet Union, for instance, has 12 MWe and 150 MWe breeder reactors already in operation, and breeders of 600 MWe and 1600 MWe under construction. AIF International Survey, *supra* note 29, at 3. By contrast, the proposed United States facility at Clinch River, the construction of which the Carter Administration opposes, would produce 375 MWe.

greater share of the world's uranium and oil.[123] The delay in development sought by the United States would seriously affect ongoing programs and underestimates the long lead-time necessary to deploy the breeder. Almost all nations doubt a decision on the commercialization of the breeder is possible during the next ten years even with no delays in the program. An indefinite deferral, however, would mean a partial dismantling of the governmental research centers, industrial companies, and the complex web of commercial relationships that could not be easily reassembled later. It also would delay the development of reprocessing facilities necessary for breeder deployment. Consequently, these nations argue that adoption of the United States' policy would cause them to lose their existing investment, and cause their research and development efforts to atrophy.[124]

Consequently, the United States initiative has had little direct effect on present foreign nuclear projects. No national enrichment, reprocessing, or breeder program outside the United States has been deferred in the past two years, although plans in some nations that did not have ongoing projects may have been reassessed. The British Parliament has authorized the construction of a new reprocessing facility at Windscale that is heavily dependent for financing on a contract the British signed last year to reprocess 1600 metric tons of Japanese spent fuel. Similarly, the French have concluded contracts with Japan, West Germany, Sweden, Switzerland, Belgium, Holland, and Austria to reprocess about 6000 tons of spent fuel since the announcement of the Carter policy.

IV. 1977-1979: THE UNITED STATES COUNTERREACTION

In reality United States nuclear policy and the administration of the Nuclear Non-Proliferation Act have neither been as harsh as critics portray nor as responsive as the United States contends. From the beginning the United States initiative has suffered from characterization as a policy of "denial" both by nuclear critics within and outside the United States and by the domestic nuclear industry, all of whom have regarded the Carter Administration as antinuclear.[125] The United States policy also has been plagued by a number of unfortunate statements by the Administration, including

123. EEC—Breeder, *supra* note 107. *See generally* Rockefeller Foundation, International Cooperation on Breeder Reactors 4-2 to 10, 4-16 to 18 (1978) [hereinafter cited as Rockefeller Foundation].

124. EEC—Breeder, *supra* note 107; Greenhalgh, *supra* note 105, at 8-9; Rockefeller Foundation, *supra* note 123.

125. *See* EEC—Breeder, *supra* note 107; Greenhalgh, *supra* note 105; Rockefeller Foundation, *supra* note 123.

several from the President himself.[126] Of equal damage was the early "gangbuster's" approach the Administration took in sending Vice-President Mondale to Europe and South America in an attempt to stop the West German-Brazilian arrangement.[127] Together these matters hardened the foreign reaction before any real understanding of the United States position could occur.

Since the inception of this policy, the Administration has stressed the need for international cooperation in resolving the non-proliferation problem. In his press conference of April 7, 1977, President Carter noted that "The United States is deeply concerned about the consequences of the uncontrolled spread of this nuclear weapon capability. We can't arrest it immediately and unilaterally. We have no authority over other countries . . . ."[128] He elaborated on the elements of this policy in response to a question later in the press conference:

> It would be impossible, counterproductive and ill-advised for us to try to prevent other countries that need it from having the capability to produce electricity from atomic power . . . . The one difference that has been very sensitive, it relates to, say, Germany, Japan and others is that they feel that our unilateral action in renouncing the reprocessing of spent fuels to produce plutonium might imply that we criticize them severely because of their own need for reprocessing. This is not the case. They have a perfect right to go ahead and continue with their own reprocessing efforts. But we hope that they will join with us in eliminating in the future additional countries which might have had this capability evolve.[129]

The Administration has repeated these sentiments in the communiques following the 1977 London and 1978 Bonn economic summits.[130]

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126. In his formal statement accompanying the March 10, 1978 signing of the Non-Proliferation Act, President Carter in a conciliatory manner called upon the international community to work together to prevent proliferation. 14 WEEKLY COMP. OF PRES. DOC. 500 (Mar. 13, 1978). President Carter's remarks at the bill signing ceremony, however, had a different tone:

> This is one of the most complicated questions that presents itself to the international community. I think it is accurate to say that some of our friends abroad will have to readjust their policy.
>
> I've discussed them thoroughly with the heads of state who have been here to visit with me and whom I've gotten to know. And I think they will see the wisdom of the action that the Senate and the House have taken in this legislation.

Id. at 498.

127. *See* H. HAFTENDORN, *supra* note 43.

128. 13 WEEKLY COMP. OF PRES. DOC. 501, 503 (Apr. 11, 1977).

129. *Id.* at 505.

130. For example, the July 17, 1978 communique following the Bonn summit where it was agreed that:

> The further development of nuclear energy is indispensable, and the slippage in the execution of nuclear power programmes must be reversed. To promote the peaceful use of nuclear energy and reduce the risk of nuclear proliferation, the nuclear fuel cycle

The Administration has manifested its attitude in various ways. It successfully opposed many of the more restrictive provisions in the early versions of the Non-Proliferation Act that would have cut off nuclear trade with many of the United States close allies. It also successfully supported provisions in the Act that clarify previously uncertain criteria,[131] give the President authority to override any negative decision by the NRC,[132] and establish ground rules governing public participation in the nuclear process.[133] Furthermore, it implemented the Act in a manner fairly responsive to the concerns of United States trading partners. For the most part, export licenses for nuclear fuel and equipment have been forthcoming with a minimum of difficulty.[134]

The United States policy, however, has suffered from a duality of nature. Despite the efforts at cooperation, the United States has not been totally responsive to the legitimate concerns of its trading partners. Although the President's remarks indicated that other nations could proceed with their plutonium-related programs if they desire, it was clear that the Administration hoped to dissuade other nations from these efforts. The United States also placed heavy emphasis upon alternative fuel cycles, as though there were some magical formula that would ameliorate all the nonproliferation concerns that led to the United States initiative.

Moreover, the implementation of the Carter policy and Non-Proliferation Act has not been as smooth as the international community would have desired. The inherent uncertainties in the Act's provisions concerning United States approval of export licenses and reprocessing requests have already been mentioned. Similarly, the United States has not been meeting the Act's time limits for consideration of export applications in the substantial majority of cases. Although the Act expressly states that its provisions do not prohibit

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studies initiated at the London Summit should be pursued. The President of the United States and the Prime Minister of Canada have expressed their firm intention to continue as reliable suppliers of nuclear fuel within the framework of effective safeguards. The President intends to use the full powers of his office to prevent any interruption of enriched uranium supply and to ensure that existing agreements will be respected. The Prime Minister intends that there shall be no interruption of Canadian uranium supply on the basis of effective safeguards.

14 WEEKLY COMP. OF PRES. DOC. 1310, 1312 (Jul. 24, 1978).

131. 42 U.S.C.A. §§ 2156-2157 (West Supp. I 1978). The wisdom of the precise details of this clarification is questionable.

132. The Tarapur nuclear power plant case is an excellent example of the flexibility the Act provides in this regard. *See* note 117 *supra* and accompanying text.

133. 42 U.S.C.A. § 2155 (West Supp. I 1978).

134. *See* 43 Fed. Reg. 25,326 (1978) (executive branch procedures); NRC export-import regulations, 43 Fed. Reg. 21,641 (1978) (to be codified in 10 C.F.R. Pt. 110) (NRC export-import regulations).

the foreign reprocessing of United States-supplied fuel, the Administration has granted such requests grudgingly, demanding additional consideration in the two cases thus far approved.[135] Additionally, the United States has slowly implemented its proposal to store foreign-generated spent fuel. For many nations this is the one clear alternative to reprocessing for waste management purposes.[136] The United States also has been tardy in announcing the details of its plan to contribute to the development of international institutional arrangements to insure vulnerable countries against interruptions in fuel supplies, despite the President's announcement of this policy in October 1977.[137] Finally, the United States may have further complicated the export process by requiring environmental assessment of certain nuclear exports.[138]

This performance, albeit mixed, has been accompanied by a willingness to compromise in certain key areas, thereby revealing a subtle yet dramatic change in the American position. This was made apparent in a speech by Joseph Nye before the Uranium Institute in London on July 12, 1978.[139] After reiterating the usual arguments supporting the Administration's policy, Nye noted that the Administration had not opposed foreign breeder research and development programs and presented what in effect would be a code of conduct governing such activities:

> We ask those who choose to go ahead now with the breeder to include the following factors in their decisionmaking process.
>
> • Avoidance of the temptation to reduce per unit capital costs by premature exports—the commercialization of the breeder (and reprocessing) should be limited to situations where it has compelling advantages. Economies of scale arguments dictate that only the largest nuclear programs could satisfy such a condition for commercialization.
>
> • Fuel cycle facilities should be designed to make their misuse difficult and time consuming, even though such design, as in the case of hot fuel fabrication, may involve additional cost.

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135. *See Hearings on Nuclear Fuel Transfer for Reprocessing Before the Subcomm. on International Economic Policy and Trade of the House Comm. on International Relations*, 95th Cong. 2d Sess. 48 (1978) (testimony of J. Nye).

136. The draft environmental statement was not published until December 1978, and thus it is extremely unlikely that the Department of Energy will meet its original goal of accepting foreign spent fuel by 1982-1983. *See* U.S. DEP'T OF ENERGY, DRAFT ENVIRONMENTAL IMPACT STATEMENT, STORAGE OF FOREIGN SPENT POWER REACTOR FUEL (DOE/EIS-004-D, December 1978).

137. Although § 104 of the Non-Proliferation Act (22 U.S.C.A. § 3223 (West Supp. I 1978)) required a report to Congress by September 10, 1978, no report had been submitted as of January 1, 1979.

138. Statement by the President, Sept. 26, 1978, *reprinted in* 14 WEEKLY COMP. OF PRES. DOC. 1631, 1634 (Oct. 2, 1978).

139. Address by J. Nye, Uranium Institute, in London (July 12, 1978), *reprinted in* DEP'T STATE BULL., Oct. 1978, at 38. [hereinafter cited as Nye].

- Efforts should be made to minimize flows of cold plutonium or fuels with high concentrations of fissionable materials even if this adds to transport costs.
- Multinational institutional arrangements should be utilized where there are compelling reasons to proceed with new technology. While such arrangements could produce benefits in economic efficiency, such steps would be desirable even if they led to a net cost.[140]

Nye went on to review the United States position regarding the elements of a stable international regime. These were (1) full-scope (Treaty-type) safeguards; (2) avoidance of sensitive facilities unless they can be shown to be economically justifiable; (3) use of diversion resistant technology; (4) joint control of sensitive facilities; and (5) institutions to insure the availability of the benefits of nuclear energy.[141]

While the rhetoric has changed only slightly, this speech is indicative of significant adjustments in United States nuclear policy. The emphasis has shifted from attempting to live without plutonium to attempting to contain it. The United States has begun stressing that its policy regarding the breeder and reprocessing is meant as a short-term pause, lasting only until the international community can achieve an effective framework governing the use of plutonium, rather than an indefinite deferral designed to lead to cancellation of such programs. It acknowledges that some countries will proceed with their reprocessing and breeder programs and that the United States is willing to find such programs acceptable under certain circumstances. Finally, the United States has begun emphasizing institutional rather than technical approaches, no longer stressing the nonproliferation advantages of alternative fuel cycles.

V. 1978-1979: A Movement Toward Reconciliation

These modifications of the United States position and the increasing foreign familiarity with the real United States position have softened the international reaction somewhat. Nonproliferation increasingly is being recognized as an important objective of the international community, and other nations are more willing to discuss methods to add barriers to the diversion of nuclear materials. These nations also are undertaking a general reanalysis of long-held assumptions and are reconsidering previously rejected alternatives. Additionally, they have begun working with the United States to strengthen the IAEA safeguard regime, to find institutional arrangements to complement the safeguard system, and to reach a consensus on common safeguard policies.[142]

140. *Id.* at 41.

141. *Id.* at 42.

142. France and West Germany both have announced that they will suspend exporting

One of the primary catalysts leading to these compromises and the forum whereby a new consensus may begin to emerge has been the International Nuclear Fuel Cycle Evaluation (INFCE). As noted earlier, INFCE was originally proposed in President Carter's April 7, 1977, policy statement on nuclear power. The proposal was agreed to at the London Economic Summit a month later. INFCE is intended to be an objective and comprehensive analysis of the nonproliferation, economic, and political implications of alternative fuel cycle options.[143] This study, which is expected to be completed in early 1980, provides a method by which nations can reexamine assumptions and search for ways to reconcile their somewhat different assumptions regarding the risks involved in, and the commercialization of, reprocessing and the breeder. The broad range of factors being considered in INFCE—availability of fuel, availability of enrichment services, supply assurances, reprocessing and plutonium handling, breeder reactors, spent fuel management, waste management, and advanced fuel cycle and reactor concepts—is emblematic of the complex nature of the nonproliferation issue.[144]

While INFCE is primarily a technical exercise and not a negotiating mechanism designed to establish new international structures, the broad participation in this effort—over forty nations and four international organizations[145]—is a step indicative of a spirit of compromise and adjustment that in itself is an essential element of any legal process. Indeed, as the study proceeds, the participants are becoming more pragmatic and realistic, overcoming their initial aggravation with, and suspicion of, the United States position. Moreover, the United States attempts to steer the study towards particular conclusions, such as support for the once-through fuel cycle, have been rebuffed, and the conflict between developed and developing nations has for the most part remained mute. Consequently, it now appears that INFCE will seriously examine the range of options, including institutional matters, that must be considered by the participating nations.

Although it would be premature to speculate on the outcome of INFCE at this time, undoubtedly the evaluation will aid efforts to reach a new consensus. Besides establishing a spirit of coopera-

reprocessing plants. Washington Post, Dec. 17, 1976, § A, at 34, col. 1; *id.*, Dec. 21, 1976, § A, at 1, col. 3.

143. *See generally* Address by E. Hanrahan, International Conference on Nuclear Non-Proliferation and Safeguards, in New York (October 23, 1978) (sponsored by the Atomic Industrial Forum) (remarks on INFCE's contribution to nonproliferation objectives).

144. *Id.*

145. This includes consumers and suppliers, developing and developed countries, eleven nations that have not even joined the Non-Proliferation Treaty.

tion, INFCE has given experts from many nations an opportunity for a full and frank exchange of ideas. Equally important, INFCE may provide a common factual and analytical basis for the use of decisionmakers from all countries in dealing with nuclear energy issues.[146]

VI. 1980 AND BEYOND: A PROPOSAL FOR A NEW CONSENSUS

The process embodied in INFCE already has led to an emerging consensus on the outlines of a new nonproliferation regime. This approach would build upon the foundations of the Non-Proliferation Treaty and IAEA statute and would focus primarily upon limiting national access to plutonium and other potential weapons material. Additionally, it would require the strengthening of the technical effectiveness of safeguards, the utilization of nondiscriminatory limitations on the transfer of sensitive nuclear technologies, the adoption of fuel assurance programs for nations accepting expansive nonproliferation measures, the formation of multinational institutions to undertake certain sensitive activities in the fuel cycle, the establishment of an international regime for the storage and management of excess plutonium under the IAEA statute, and the creation of sanctions for erring nations. Finally, several nations (but it should be emphasized not all) have begun deemphasizing the need to take into account widescale reprocessing for the sake of plutonium recycling, since they believe its economic benefits are marginal at best.[147]

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146. The participants in INFCE have specifically stated:

> The participants agreed that INFCE was to be a technical and analytical study and not a negotiation. The results will be transmitted to governments for their consideration in developing their nuclear energy policies and in international discussions concerning nuclear energy cooperation and related controls and safeguards. Participants would not be committed to INFCE's results.

Final Communique of the Organizing Conference of the International Nuclear Fuel Cycle Evaluation, Doc. 41 (Oct. 21, 1977).

147. Joseph Nye's address before the Uranium Institute (*see* text accompanying notes 139-41 *supra*) contrasts with the following remarks of the West German delegate at the IAEA general conference:

> It appears to be desirable and also possible to identify a bouquet of coordinated measures which at the end of the evaluations might be submitted—with a high degree of consensus—to the governments for their decision. Without prejudging the further development, one might expect to find among these measures some of the following items:
>
> —further technical development of safeguards
>
> —increasing reliability of fuel supply for nuclear power stations
>
> —criteria for the use of highly enriched uranium in research and new reactor types
>
> —closer investigation of possible modifications in some current back-end of fuel cycle technologies
>
> —establishment of a regime for the deposit of excess plutonium as provided in

Although the remaining differences are substantial and still threaten to undermine the existing regime, all nations have powerful incentives to resolve these disputes. Containing proliferation is in almost everyone's self-interest. For a nation to develop a nuclear explosive is almost a pyrrhic victory,[148] since that nation's neighbor will soon follow a similar path. It is notable that safeguards, once imposed as a matter of property rights, are increasingly being looked upon as a nation's international obligation. Furthermore, just as was true in the mid-1950's, the future of worldwide nuclear development depends, to a significant degree, on a reduction in the perceived and real risks of the further proliferation of nuclear weapons. Today, however, nations have a much greater need for the benefits of nuclear energy, and this is likely to motivate them to place a stronger emphasis upon reaching a new consensus. Almost everyone agrees that any new consensus should fit within the existing legal framework, but whether the foundations of the present regime can continue to withstand the stress under which they currently exist is extremely questionable.[149] It has been dangerous to delay this long; to delay further could thwart attaining mutually desirable objectives.

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the IAEA statute

—mechanisms for international or regional institutional cooperation.

Quoted in Address by J. Nye, U.S. and F.R.G. Policies in the Nuclear Industry Field: Common and Divergent Interests, German-American Forum, Georgetown University (Nov. 2, 1978) (remarks prepared for the German-American Forum). *See also* Energy Daily, Dec. 12, 1978, at 3.

148. Except, of course, for the so-called "pariah state" whose neighbors question its legitimacy.

149. The next year or so will be particularly crucial for the international community. INFCE should be completed and the London Suppliers Conference is expected to meet again. Arrangements for international plutonium storage will be the subject of further study as will international spent fuel repositories. Moreover, the international fuel bank idea will be explored in greater detail.

The United States also must make a number of complex decisions in the next few years. These include decisions about the basis on which approvals for reprocessing will be made, the basis on which the reprocessing plant at Tokai Mura will be allowed to continue operating, the possible cutoff of exports to India and other countries that have not accepted the Non-Proliferation Act's full-scope safeguards and the decision to continue nuclear exports to EURATOM at the end of the two-year period provided in the Act for renegotiation of the agreement for cooperation. Further discussions regarding cooperation between the United States and France over enrichment facilities also will be held. In addition, there are the fundamental questions concerning the continued indefinite deferral of reprocessing, the commercialization of breeder technology, and the development of a policy regarding the return of plutonium to countries whose requests for reprocessing have been approved by the United States.

A. The Proposed Approach

While the United States nuclear policy initiative has raised legitimate concerns that need to be addressed, the current American approach continues to ignore several obvious facts. First, the risks of nuclear weapons proliferation cannot be reduced to zero since the knowledge, technical capacity, and basic materials for making nuclear explosives are now widespread in the world. These risks will not decrease in the future. No amount of international policing consistent with present concepts of national sovereignty—let alone the acute sensitivity of many nations today—can prevent nations from developing nuclear explosives. Europe, India, and most likely Japan will continue their work on reprocessing as well as the breeder, and it is likely that other nations will follow their lead. Second, the United States position also ignores the fact that other nations will not respond lightly to foreign fiats. While nations will give up some sovereignty for a larger self-interest, they generally will seek to retain maximum authority over domestic decisionmaking and will not consider another nation's decision on the economics of a particular matter as binding. Third, the United States approach downplays the irrefutable notion that suppliers as well as recipients have obligations under the current legal regime, and that these obligations are not fulfilled by vague promises to be a reliable supplier. Finally, the United States policy focuses too much on acceptance by developed nations rather than by the Third World, in whose states the greatest future nuclear expansion probably will occur, thus posing the greatest threat to any efforts to contain proliferation.[150]

These deficiencies need not be fatal to the reaching of a new consensus, and if modified accordingly, they could be the basis of a much stronger regime than the one that presently exists. In general, the United States initiative does propose the correct mechanism, calling for a code of conduct to govern plutonium-related activities as a supplement to the current regime. As the ongoing negotiations in the Law of the Sea Conference reveal by implication, the time is not yet ripe, if it ever will be, for the emergence of a strong interna-

150. A recent study by the Conservation Commision of the World Energy Conference found that projected nuclear installation in developing countries would increase from 1 GWe (electrical gigawatts) in 1975 (or about 1% of total installed nuclear capacity) to 180 GWe in 2000 (12%) and to 925 GWe in 2020 (18-19%). The primary reason given was lack of indigenous energy sources. CONSERVATION COMMITTEE OF THE WORLD ENERGY CONFERENCE, WORLD ENERGY: LOOKING AHEAD TO 2020, 92-97 (1978); *see* AIF International Survey, supra note 29. *See also* Benson, *Science and Technology: Their Interaction with Foreign Policy*, DEP'T STATE BULL., Oct. 1978, at 54-55.

tional authority having jurisdiction over one or more aspects of the fuel cycle.[151] Furthermore, it can fairly be said that the prospects for a rapid agreement are an inverse function of the amount of change necessary in the current regime to reach consensus.

The United States should propose a code of conduct governing the actions of both recipients *and suppliers.* In furtherance of their obligations under Article IV of the Non-Proliferation Treaty, existing commercial reprocessors[152] should be called upon to guarantee they will provide services on a timely basis and on attractive terms. These suppliers should also pledge that they will make their technology available to multinational entities in accordance with the provisions set forth below. Recipients, on the other hand, should agree to abide by these provisions and accept comprehensive IAEA safeguards on such transfers. While national reprocessing facilities would not be prohibited under such a regime, they would be ineligible for foreign assistance. Since it is likely that nations, for one reason or another, will choose to build national facilities, it may be useful to permit certain types of plants, while offering these nations inducements to join in the construction of multinational facilities.[153]

All facilities, whether national or multinational, located in non-nuclear-weapons states must meet certain conditions under this proposal. The first requirement is that these facilities must be of commercial size. The requirement of commercial size ensures that the countries involved are serious about the use of the facility for energy purposes and are not using it as a cover for the production of weapons material.[154] Second, these facilities must be combined with plutonium fuel fabrication facilities so that no plutonium, except for a few grams when necessary for research purposes,[155] ever leaves the facility other than in fuel rods.[156] IAEA safeguards would

151. *See* Darman, *The Law of the Sea: Rethinking U.S. Interests,* 56 FOREIGN AFF. 373 (1978).

152. Although the proposed regime is not oriented toward enrichment facilities, this proposal could be readily adapted to this aspect of the fuel cycle. Since enrichment technology was not widespread in 1969, however, there is some question whether Article IV should be read as granting access to this technology.

153. The existing Indian reprocessing facility could pose a substantial problem for such a regime. It would not pose an insurmountable obstacle, however, if the United States were willing to exempt it from the proposed regime on a preexisting-basis theory.

154. What constitutes a commercial-size facility is difficult to define. A number of factors could be adopted for its definition, either individually or in combination, including capacity, number of reactors served, or profitability.

155. The supplier of the fuel should exercise approval rights in this instance. Any such research project should be specified, verifiable, and subject to IAEA safeguards.

156. This would negate the need for a detailed release mechanism for plutonium recovered from reprocessing, which has troubled decisionmakers in this area. *See* Nye, *supra* note 139, at 42. It also would eliminate the potential risks involved with the transportation

attach to all material leaving the site, no matter what its form. The plutonium from the time it is separated during the enrichment process to the time it is fabricated into fuel rods would be considered "excess" for the purposes of the IAEA statute[157] and thus would legally be under the custody of the IAEA.[158] Finally, the reprocessing state must agree to the permanent assignment of IAEA inspectors and operational personnel to the site in numbers sufficient to guard against diversion.

Facilities eligible for foreign assistance must be multinational in nature and be "owned" by at least three states, with operation and management control under at least two states party to the Non-Proliferation Treaty.[159] Representatives of states that have not ratified the Treaty will not be granted access to the technology.[160] Any facility constructed by a consortium must be located in a treaty member state. The transferor of the technology would sit as an *ex officio* member of the governing entity of the facility for safeguard purposes. Any retransfer of the technology would require the transferor's assent and could be made only in accordance with the above noted conditions. Finally, all reprocessing facilities built by a consortium within twenty years after the last technology transfer would be conclusively presumed to have resulted from the transfer, thereby triggering the provisions of this paragraph.

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of plutonium in pure form.

157. Statute of the International Atomic Energy Agency, *supra* note 8, art. XII(A)(5), 8 U.S.T. at 1106, 276 U.N.T.S. at 26.

158. While such a proposal would not make the plutonium totally immune from seizure by the host government, it could prove to be a formidable psychological barrier. On December 4-6, 1978, the IAEA held the first in a series of meetings to discuss measures for placing plutonium under international controls. Suggestions ranged from the development of a plutonium bank to the establishment of away-from-reactor spent fuel storage in the feed streams of reprocessing plants. NUCLEAR FUEL, Dec. 11, 1978, at 7.

159. The definition of multinational is purposely left loose. Past proposals would, in effect, create supernational mechanisms for this purpose. These break down into basically four variants: (1) international cooperative with regional affiliates, (2) multinational fuel cycle centers, (3) multinational enclaves, and (4) international fuel cycle authority. *See* Atlantic Council, *supra* note 120, at 106-110. *See also* International Atomic Energy Agency, Regional Nuclear Fuel Cycle Centres (1977). While there is a great deal of theoretical merit to these proposals, they probably are unacceptable politically. It is better to permit loosely knit multinational organizations that provide an additional barrier to national diversion than to concentrate on such academically meritorious, yet unworkable, concepts.

It should be noted that multinational fuel cycle centers have precedents for both enrichment and reprocessing plants. Two enrichment facilities and several reprocessing plants have been built in Western Europe by different public and private groups. Their primary motivation was economic, and the partners were mostly advanced countries not generally considered prime proliferation threats. Nevertheless, these examples demonstrate that the concept is feasible under certain conditions.

160. These countries, of course, would have no claim to access under article IV of the Non-Proliferation Treaty.

This system would be buttressed by the automatic imposition of strong sanctions against nations acting outside the regime. The current framework[161] does not sufficiently apprise states of the consequences of their acts, and the vagueness of what constitutes a violation could permit political factors to intrude. While such political considerations will always be a factor in today's world, they can be minimized by declaring certain specific acts as ipso facto "significant for nonpeaceful purposes," thereby triggering sanctions. Such acts would include, among other things, the construction of laboratory-scale reprocessing facilities, the expulsion of IAEA inspectors, and the diversion of material. The consequences of any of these actions is sufficiently great to justify, at a minimum, the cutoff of all nuclear cooperation with that nation. Since nearly all states are dependent on others in one manner or another for nuclear-related materials, fuels, and equipment, such an action could effectively cripple the transgressor's ability to use its nuclear capacity. Individual states, of course, would remain free to impose broader sanctions.[162]

B. Enactment of the Proposal

Several comments on this proposal are in order. It is designed to be as simple to implement as possible. In fact, it could be included within the existing legal regime through the deposit of letters with the International Atomic Energy Agency.[163] This would permit governments to compromise more easily than would otherwise be the case. What matters is not the grandiosity of design but the function it serves in stabilizing the regime. This proposal is also based on the proposition that indigenous facilities should be discouraged, even if they exist in Treaty member states. Current repro-

161. Under the IAEA statute, Agency inspectors report any safeguard violations to the Director General who thereupon transmits the report to the Board of Governors. The Board calls upon the recipient state or states to remedy forthwith any noncompliance that it finds to have occurred. The Board reports the noncompliance to all members and to the Security Council and General Assembly of the United Nations. In the event the recipient state or states fail to take fully corrective action within a reasonable time, the Board may take one or both of the following measures: directly curtail or suspend assistance being provided by the Agency or by a member, and call for the return of materials and equipment made available to the recipient member or group of members. The Agency may also, in accordance with article XIX, suspend any noncomplying member from the exercise of the privileges and rights of membership. Statute of the International Atomic Energy Agency, *supra* note 8, art. XII(C), 8 U.S.T. at 1107, 276 U.N.T.S. at 28. The Non-Proliferation Treaty has no independent sanctions apart from these.

162. *See* notes 71-72 *supra* and accompanying text (discussion of 42 U.S.C.A. § 2158 (West Supp. I 1978)).

163. This is the method used in announcing the "Zangger List." *See* note 46 *supra*.

cessors should make fuel cycle services so attractive that other nations will not spend the resources necessary to develop them. Similarly, current reprocessors should seek to ensure that states complying with their nonproliferation obligations have a right to expect a reliable flow of needed nuclear materials, fuel, and equipment. Since, as a practical matter, one cannot stop the construction of reprocessing facilities, and since all members of the Non-Proliferation Treaty legally have a right of access to its technology, the proposal seeks to define conditions under which access may acceptably occur. Aside from their technical and economic efficiencies, multinational centers under this proposal would have a number of safeguard barriers not present in national facilities. The practical impossibility of foreclosing the national option, however, makes the inclusion of such facilities within the regime a necessity.

Underlying the entire system is the notion that proliferation is more likely to occur the less nations cooperate with each other. A high degree of interdependence gives the world majority that opposes proliferation significant leverage in discouraging it. Thus, relying on the fact that nations are more prone to moderation when they need outside assistance, this proposed regime would encourage international cooperation so that nations become even more dependent on other states. This is especially important when erring means the cutoff of a commodity vital to future economic growth. As a practical matter, almost all of the suppliers are also recipients for at least one portion of the fuel cycle. This dependency should be further encouraged. Such a course would not only preserve resources, but also would ultimately be one of the best barriers against proliferation.

Finally, the proposed regime is fashioned so that individual nations can take steps within its framework that would provide added incentives for prospective reprocessors to forego that option. The United States, for instance, could consistent with its obligations under this regime: (1) make fuel supplies almost automatic to Treaty states, with some form of binding arbitration in case of delay; (2) offer fuel cycle services at discounted rates;[164] (3) create inducements aimed at alleviating spent fuel storage problems and/or waste management concerns; (4) accept the same safeguards on its reprocessing facilities as non-nuclear-weapons states;[165] (5)

164. The United States would continue to have significant leverage to pursue its nonproliferation objective because it is required by law to charge at cost rather than at a commercial rate. *See* 42 U.S.C. § 2073 (1976).

165. The United States and the United Kingdom already have made voluntary offers to accept IAEA safeguards on their peaceful programs. *See* Doub & Dukert, *supra* note 16, at 758-59.

serve as a back-up supplier if other nations do not provide services for political reasons;[166] and (6) operate the reprocessing facility at Barnwell, South Carolina, as a multinational facility.[167] The United States, or any other nation, would not be free, however, to impose additional safeguard requirements other than those enumerated in the proposal.

VII. CONCLUSION

In a more leisurely period the law could, as Mr. Justice Holmes suggested it should, lag behind the times. The rapid scientific and technical development of today's world, however, has been accompanied by the notion that such development should be governed by certain preexisting legal guidelines. Whether this notion is beneficial is beyond the scope of this Article. It is nonetheless clear that international nuclear commerce will lack the stability necessary for its safe expansion unless nations reach a new consensus. A complex subject such as nuclear energy will always involve a degree of uncertainty. Today, however, that uncertainty is far too great.

The lesson of Nemesis, the Greek goddess of retributive justice who sometimes punished persons by fulfilling their wishes too completely, should not go unheeded. If a nation or a group of nations decides unilaterally to impose stringent new safeguard conditions or to forego international nuclear commerce altogether in order to avoid nuclear proliferation, it (or they) will not be directly responsible for the further proliferation of nuclear weapons. Such actions, however, are likely to go unheeded as other nations seek to lessen their dependence on foreign energy sources. These nations may perceive the problem differently and, although equally opposed to the spread of nuclear weapons, may consider different means of prevention more attractive or efficacious. The final result might be a world nuclear market so splintered that no set of controls is effective. In this event those nations that had originally tried to control the market unilaterally or to withdraw from it entirely would have lost whatever influence they might once have had and would thus, at least indirectly, have helped to create the very evil they most wanted to avoid.

The proposal set forth in the preceding section of this Article admittedly is no full solution to the problem of preventing the

166. The present alternatives being discussed, such as an international fuel bank or fuel authority, are probably too grandiose to be implemented. *See* NUCLEAR FUEL, Feb. 6, 1978, at 2. It would be simpler to have existing enrichers pledge that they will maintain a certain excess capacity and to allow them to sign contracts on a back-up basis.

167. The Carter Administration has adamantly opposed such efforts in the past.

spread of nuclear weapons. Just as important as the control over nuclear materials and technology is the political effort to provide nations with sufficient security so that they perceive little need to develop or acquire nuclear weapons. This Article does assert, however, that a necessary part of any full solution is the cooperative development of a new international consensus regarding the policies governing the international nuclear market and the means to effectuate these policies. Based on the success of the regime that governed the international nuclear market from 1954 to 1973, the awareness of new needs engendered by changes in the world energy market since 1973, and the present willingness, both within and without the United States, to respond to new proposals, there is good reason to rely on international cooperation rather than unilateral activity in developing a stable international nuclear regime.