

The NPT, IAEA Safeguards and Peaceful Nuclear Energy: An “Inalienable Right,” But Precisely To What?[†]

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In mid-October 2006, a few days after North Korea’s surprise detonation of a nuclear explosive device, the Director General of the International Atomic Energy Agency (“IAEA”) sounded the alarm on what he now sees as a troubling trend: the growing number of states seeking to enrich uranium, reprocess spent nuclear fuel to separate from it plutonium, and engage in other sensitive nuclear fuel-making activities that provide direct access to weapons-ready fissile material.¹ During an address to the IAEA’s symposium on international safeguards, Dr.

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[‡] The author wishes to acknowledge the literature upon which his essay’s argument is built. Notable examples include: Victor Gilinsky and William Hoehn, *Nonproliferation Treaty Safeguards and the Spread of Nuclear Technology*, R-501 (Santa Monica, CA: RAND Corporation, May 1970); Albert J. Wohlstetter, *et al.*, *Moving Toward Life in a Nuclear Armed Crowd?*, ACDA Report No. PH-76-04-389-14, December 4, 1975 (Revised April 22, 1976); Wohlstetter, *et al.*, *Towards a New Consensus on Nuclear Technology*, Vol. 1, ACDA Report No. PH-78-04-832-13 (Marina del Rey, CA: Pan Heuristics, July 6, 1979); Arthur Steiner, “Article IV and the ‘Straightforward Bargain,’” PAN Heuristics Paper 78-832-08, in Wohlstetter, *et al.*, *Towards a New Consensus on Nuclear Technology*, Vol. II (Supporting Papers), ACDA Report No. PH-78-04-832-33 (Marina del Rey, CA: Pan Heuristics, 1979), pp. 1-8; Wohlstetter, *et al.*, *Swords from Plowshares: The Military Potential of Civilian Nuclear Energy* (Chicago, IL: University of Chicago Press, 1979); Eldon V.C. Greenberg, “NPT and Plutonium: Application of NPT Prohibitions to ‘Civilian’ Nuclear Equipment, Technology and Materials Associated with Reprocessing and Plutonium Use,” Nuclear Control Institute, 1984 (Revised May 1993); Marvin M. Miller, “Are IAEA Safeguards on Plutonium Bulk-Handling Facilities Effective?,” Nuclear Control Institute, August 1990; Henry D. Sokolski, *Best of Intentions: America’s Campaign Against Strategic Weapons* (Westport, CT: Praeger, 2001); Paul Lettow, “Fatal Flaw? The NPT and the Problem of Enrichment and Reprocessing,” unpublished essay, April 27, 2005; Sokolski and George Perkovich, “It’s Called Nonproliferation,” *Wall Street Journal*, Apr 29, 2005, p. A16; and Perkovich, “Defining Iran’s Nuclear Rights,” Carnegie Endowment for International Peace, September 7, 2006.

¹ After negotiations for the *Treaty on the Nonproliferation of Nuclear Weapons* concluded in 1968, a handful of analysts warned, in classified and unclassified reports in the years following, that the spread of nuclear fuel-making would encourage the emergence of many more non-nuclear-weapon states within months, or even days, of completing a nuclear explosive device. For example, see Richard Rosecrance, *After the NPT, What?*, U.S. Department of State, Policy Planning Council, May 28, 1968, SECRET (Declassified on December 6, 1994), Declassified Documents Reference System Document (“DDRS”) No. CK3100082939; Victor Gilinsky and William Hoehn, *Nonproliferation Treaty Safeguards and the Spread of Nuclear Technology*, R-501 (Santa Monica, CA:

Mohamed ElBaradei acknowledged that nuclear fuel-making “creates many new challenges, both for the international community and for [the Agency], because verifying enrichment facilities or reprocessing facilities is quite difficult, and the so-called conversion time”—that is, the time required to convert fissile material for use in a nuclear explosive device—“is very short.”² Then, in a moment of candor, the IAEA Director General went so far as to say that when non-nuclear-weapon states become nuclear fuel-makers, then “we are dealing with what I call *virtual nuclear-weapon states*.”³

As North Korea’s recent nuclear detonation and Iran’s ongoing nuclear intransigence demonstrate, the emergence of more nuclear fuel-making states—of what ElBaradei now calls *virtual nuclear-weapon states*—not only challenges the continuing relevance of the *Treaty on the Nonproliferation of Nuclear Weapons* (“Nuclear Nonproliferation Treaty” or “NPT”)⁴ and the IAEA safeguards system, but also threatens the security of the many nuclear-weapon states and non-nuclear-weapon states that participate in the NPT-IAEA safeguards system. For if a non-

RAND Corporation, May 1970); and Albert Wohlstetter, *et al.*, *Moving Toward Life in a Nuclear Armed Crowd?*, PH-76-04-389-14, final report to the U.S. Arms Control and Disarmament Agency (“ACDA”), Contract No. ACDA/PAB-263, (Los Angeles, CA: PAN Heuristics, December 4, 1975 [Revised April 22, 1976]).

² Dr. Mohamed ElBaradei, “Addressing Verification Challenges,” Statement of the IAEA Director General to the *Symposium on International Safeguards*, Vienna, Austria, October 16, 2006 <available at <http://www.iaea.org/NewsCenter/Statements/2006/ebsp2006n018.html>>. The author of this essay attended the symposium.

³ *Ibid.* ElBaradei’s arguments about what he now terms *virtual nuclear-weapon states* are similar to those that Albert Wohlstetter and colleagues made in studies on the military potential of civilian nuclear energy that were conducted for various U.S. government agencies in the 1970s. For example, as Wohlstetter and company argued in a 1979 report to the Arms Control and Disarmament Agency:

If, in fact, technological transfers can bring a “nonnuclear weapons state” within weeks, days or even hours of the ability to use a nuclear explosive, [then] *in the operational sense* that “nonnuclear weapon state” will have nuclear weapons. The point is even more fundamental than the fact that effective safeguards [according to the IAEA] mean timely warning. A necessary condition for timely warning is that there be a substantial elapsed time. But if there is no substantial elapsed time before a government may use nuclear weapons, [then] in effect it has them.

See Albert Wohlstetter, Gregory Jones and Roberta Wohlstetter, *Why the Rules Have Needed Changing*, Part I of II in *Towards a New Consensus on Nuclear Technology*, Vol. 1, PH-78-04-832-33, a summary report prepared for ACDA, Contract No. AC7NC106, (Los Angeles, CA: Pan Heuristics, July 6, 1979), pp. 36-37.

⁴ *Treaty on the Non-Proliferation of Nuclear Weapons*, July 1, 1968 (entered into force on March 5, 1970), 21 U.S.T. 483, 729 U.N.T.S. 161. (Hereinafter “NPT.”)

nuclear-weapon state has acquired nuclear fuel-making capabilities sufficient to produce and accumulate stocks of fissile material, principally highly enriched uranium or separated plutonium, then that state has cleared *the* most difficult and crucial obstacle on the path to building its first nuclear explosive device. That is why then-Secretary-General of the United Nations Kofi Annan drew attention to what he called the “Janus-like character” of enrichment, reprocessing and other nuclear fuel-making technologies in May 2005, during the quadrennial NPT review conference. As Annan argued,

The [nonproliferation] regime will not be sustainable if scores more States develop the most sensitive phases of the fuel cycle and are equipped with the technology to produce nuclear weapons on short notice—and, of course, each individual State which does this only will leave others to feel that they must do the same. This would increase all the risks—of nuclear accident, of trafficking, of terrorist use, and of use by States themselves.⁵

The extent to which the Nuclear Nonproliferation Treaty precludes—or should be interpreted as precluding—“the most sensitive phases of the fuel cycle” remains unclear, however. On the one hand, the NPT’s Articles I and II articulate the fundamental, corresponding and overriding obligations of the legally-recognized nuclear-weapon signatories and non-nuclear-weapon signatories, the *sine qua non* obligations which make this treaty a *nonproliferation* treaty.⁶ On the other hand, the NPT’s Article IV recognizes both the “inalienable right” of signatories to “nuclear energy for peaceful purposes without discrimination

⁵ Kofi Annan, “Secretary-General’s Address to the Nuclear Non-Proliferation Treaty Review Conference,” New York, NY, May 2, 2005 <available at <http://www.un.org/apps/sg/sgstats.asp?nid=1427>>.

⁶ Article I of the NPT states:

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II states:

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

and in conformity with articles I and II,” as well as the right of signatories “to facilitate” and “participate in” the “fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy.”⁷ In this context, precisely what Articles I and II prohibit, and when and how these prohibitions should apply to Article IV and the most weapons-relevant civilian applications of nuclear technology, continue to be a matter of heated debate.

Although Article IV never explicitly mentions enrichment, reprocessing and other nuclear fuel-making activities, some governments nevertheless interpret Article IV as implicitly recognizing the specific or *per se* right of signatories to any nuclear technological activities that can be conceivably labeled “peaceful”—short of actually inserting fissile material into a nuclear explosive device.⁸ Under this interpretation, all that is required is that a non-nuclear-weapon signatory, in accordance with the NPT’s Article III, conclude a comprehensive safeguards agreement with the IAEA; that the IAEA administer safeguards on the nuclear materials

⁷ Article IV of the NPT states:

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.

⁸ For example, a number of Non-Aligned Movement (“NAM”) governments that are signatories of the NPT argued in the 2006 NAM summit’s non-legally-binding final document that: “each country’s choices and decision in the field of peaceful uses of nuclear energy should be respected without jeopardizing its policies or international co-operation agreements and arrangements for peaceful uses of nuclear energy and its fuel-cycle policies.” *See* Fourteenth Summit Conference of the Heads of State or Government of the Non-Aligned Movement, *Final Document*, NAM 2006/Doc.1/Rev.3, September, 16, 2006, para. 95 <available at <http://www.cubanoal.cu/ingles/docadoptados/docfinal.htm>>.

involved in the civilian nuclear activities of the signatory; and that the signatory be in full compliance with its NPT and IAEA safeguards obligations.⁹

The Islamic Republic of Iran has pushed the *per se* right interpretation of Article IV much further. In 2003, the IAEA became aware of the broad range of sensitive nuclear materials and technologies that the Iranian government had concealed from the Agency for nearly two decades.¹⁰ Iran subsequently failed to cooperate fully and transparently with IAEA inspectors as they attempted, for over two years, to reconstruct the shrouded history of the Islamic Republic's nuclear program and ensure the absence of undeclared nuclear activities in Iranian territory.¹¹ In response, the IAEA Board of Governors found Iran to be in noncompliance with its NPT and IAEA safeguards obligations in September 2005.¹² As a consequence, the Board—and later the Security Council of the United Nations—called upon Iran to suspend all nuclear fuel-making activities until the IAEA fully resolves the many serious issues surrounding Iran's history of noncompliance.¹³ In rejecting any suspension, though, Iranian officials have argued that no

⁹ For a discussion of the NPT's Article III and its relation to the IAEA safeguards system, see below the section of this essay titled, "IAEA Safeguards and the NPT."

¹⁰ See IAEA, *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Report by the Director General, GOV/2003/40, June 6, 2003, *esp.* paras. 32-35 <available at <http://www.iaea.org/Publications/Documents/Board/2003/gov2003-40.pdf>>; *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Report by the Director General, GOV/2003/63, August 26, 2003, *esp.* paras. 47-53 <available at <http://www.iaea.org/Publications/Documents/Board/2003/gov2003-63.pdf>>; *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Report by the Director General, GOV/2003/75, November 10, 2003, *esp.* paras. 45-56 <available at <http://www.iaea.org/Publications/Documents/Board/2003/gov2003-75.pdf>>.

¹¹ See IAEA, *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Report by the Director General, GOV/2004/83, November 15, 2004, *esp.* paras. 85-114 <available at <http://www.iaea.org/Publications/Documents/Board/2004/gov2004-83.pdf>>; and *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Report by the Director General, GOV/2005/67, September 2, 2005, *esp.* paras. 42-52 <available at <http://www.iaea.org/Publications/Documents/Board/2005/gov2005-67.pdf>>.

¹² See IAEA, *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, Resolution Adopted by the IAEA Board of Governors, GOV/2005/77, September 24, 2005 <available at <http://www.iaea.org/Publications/Documents/Board/2005/gov2005-77.pdf>>.

¹³ See *ibid.*, and Security Council of the United Nations ("UNSC"), *Resolution 1696*, S/RES/1696, July 31, 2006 <available at <http://www.un.org/Docs/sc/unscreolutions06.htm>>, *Resolution 1737*, S/RES/1737, December 27, 2006 <available at <http://www.un.org/Docs/sc/unscreolutions06.htm>>, and *Resolution 1747*, S/RES/1747, March 24, 2007 <available at <http://www.un.org/Docs/sc/unscreolutions07.htm>>.

circumstance whatsoever, not even a finding of noncompliance by the IAEA Board or a resolution from the UN Security Council, can limit what they interpret to be their government's "specific and undeniable right" to enrichment, reprocessing and other sensitive nuclear fuel-making activities under the NPT.¹⁴ In short, the Iranian government claims that Article IV recognizes not merely the *per se* right, but rather the *per se* right without any qualification whatsoever, of signatories to nuclear fuel-making.

Although some governments continue to insist on reading the NPT as affirming the *per se* right—and now in Iran's case, the unqualified *per se* right—of signatories to nuclear fuel-making, Article IV need not be interpreted as constituting a loop-hole to *virtual nuclear-weapon state* status. Indeed, the NPT can be read in a more sustainable way.¹⁵

¹⁴ In early 2006, for example, the Iranian ambassador to the IAEA argued before the Agency's Board of Governors that his government possessed an "inalienable right [to] peaceful uses of nuclear energy, including nuclear fuel cycle and research and development, as envisaged in the Agency's Statute and the NPT." See "Statement by Ali Ashgar Soltanieh, Resident Representative of the Islamic Republic of Iran to the IAEA," Vienna, Austria, February 2, 2006, p. 10 <available at <http://www.iaea.org/Publications/Documents/Infcircs/2006/infcirc666.pdf>>.

Moreover, when the Iranian government rejected a mid-2006 proposal from the five permanent members of the Security Council and Germany to abandon enrichment and other nuclear fuel-making activities in exchange for political, economic and technological incentives, it asserted:

Development of [Iran's] peaceful nuclear program is based on its *specific and undeniable rights* under the NPT. [Iran] cannot accept deprivation from its legal rights in [the] development and use of peaceful nuclear energy including the fuel cycle, and continuing research and development of enrichment process as underscored in the NPT and IAEA safeguards.

See Islamic Republic of Iran, *Response to the Package Presented on June 6, 2006*, English translation, published by the Council on Foreign Relations on August 22, 2006, emphasis added <available at <http://www.cfr.org/publication/11432/>>.

¹⁵ Individual members of the U.S. government's legislative and executive branches have attempted to counter readings of the NPT that affirm a *per se* right, or unqualified *per se* right, of signatories to enrichment and reprocessing ("ENR") and other sensitive nuclear fuel-making technologies.

For example, see Senators Richard Lugar (R-IN) and Evan Bayh (D-IN), "A Nuclear Fuel Bank Advocated," op-ed, *Chicago Tribune*, October 22, 2006. "For too long, the Nuclear Non-Proliferation Treaty has been exploited," Lugar and Bayh wrote. "We need a new international non-proliferation standard that prevents countries from using the guise of nuclear energy to develop nuclear weapons," they added. "The dangers are so great that the world community must declare that there is no right under the Nuclear Non-Proliferation Treaty to enrich uranium or separate plutonium from spent nuclear fuel."

See also John R. Bolton, "The NPT: A Crisis of Non-Compliance," Statement of the Under Secretary of State for Arms Control and International Security to the Third Session of the Preparatory Committee for the 2005 Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons, New York, NY, April 27, 2004 <available at <http://www.state.gov/t/us/rm/31848.htm>>. With respect to ENR technologies, Bolton asserted, "The Treaty provides no right to such sensitive fuel cycle technologies."

The NPT and Loop-Holes

Treaties demand interpretation. When governments interpret treaties, they generally adhere to a set of internationally-accepted principles that Section Three of the *Vienna Convention on the Law of Treaties* (“VCLT”) seeks to codify.¹⁶ Article 31 of the VCLT identifies the primary means of interpretation as the close reading of a treaty “in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of [the treaty’s] object and purpose.”¹⁷ In addition, the VCLT’s Article 32 endorses the use of “supplementary means of interpretation,” such as a treaty’s negotiation history and other *travaux préparatoires* (“preparatory materials”), in order to confirm an Article 31-derived interpretation, or to determine a treaty’s meaning when such an interpretation “leaves the meaning ambiguous or obscure” or “leads to a result which is manifestly absurd or unreasonable.”¹⁸ To the extent that governments advocating a *per se* right or unqualified *per se* right interpretation of the Nuclear Nonproliferation Treaty’s Article IV have arrived at this reading using the means of interpretation codified by the VCLT’s Article 31, the VCLT’s Article 32 provides a warrant for recourse to the NPT’s negotiation history, at the very least, to confirm whether or not this history supports this reading.

¹⁶ *Vienna Convention on the Law of Treaties*, May 23, 1969 (entered into force on January 27, 1980), 1155 U.N.T.S. 331. (Hereinafter “VCLT.”)

Although the U.S. government is not a party to the VCLT, the *Restatement (Third) of Foreign Relations Law of the United States* notes that the VCLT “represents generally accepted principles and the United States has also appeared willing to accept them despite differences of nuance and emphasis.” See *Restatement (Third) of Foreign Relations Law of the United States* (Washington, D.C.: American Law Institute, 1987), Part III, Ch. 3, Sec. 325, Comment a.

¹⁷ VCLT, Art. 31, para. 1.

¹⁸ VCLT, Art. 32.

The negotiations that led eventually to the NPT's conclusion took place during the mid-to-late 1960s in several multilateral and bilateral contexts.¹⁹ Among the most of important of these was the Eighteen Nation Disarmament Committee ("ENDC").²⁰ Formed in late 1961, the ENDC consisted of five states from the West: Britain, Canada, France, Italy and the U.S.; five states from the Soviet bloc: Bulgaria, Czechoslovakia, Poland, Romania and the U.S.S.R.; and

¹⁹ There are a number of histories of the negotiations that led to the NPT. For examples of unclassified histories, see U.S. Arms Control and Disarmament Agency, *International Negotiations on the Treaty on the Nonproliferation of Nuclear Weapons*, Publication No. 48 (Washington, DC: U.S. Government Printing Office, January 1969); Mohamed Ibrahim Shaker, *The Treaty on the Non-Proliferation of Nuclear Weapons: A Study Based on the Five Principles of UN General Assembly Resolution 2028 (XX)*, Doctoral Dissertation, Department of Political Science, University of Geneva, 1976; Henry D. Sokolski, *Best of Intentions: America's Campaign Against Strategic Weapons* (Westport, CT: Praeger, 2001); and Paul Lettow, "Fatal Flaw? The NPT and the Problem of Enrichment and Reprocessing," unpublished essay, April 27, 2005.

In addition, a number of declassified histories of the NPT negotiations, which were written from the institutional viewpoints of various U.S. government agencies, are now available. For example, see U.S. Arms Control and Disarmament Agency, *The U.S. Arms Control and Disarmament Agency during the Johnson Administration*, Volume I: "Summary and Analysis of Principal Developments," undated (circa 1969), CONFIDENTIAL (Declassified on Aug 21, 1992), DDRS No. CK3100005560; ACDA, *The U.S. Arms Control and Disarmament Agency during the Johnson Administration*, Volume II: "Policy and Negotiations," Part B: "Non-Proliferation of Nuclear Weapons," January 2, 1969, SECRET/NOFORN (Declassified on March 22, 1999), DDRS No. CK3100152990; and U.S. Atomic Energy Commission, *The Atomic Energy Commission during the Administration of Lyndon B. Johnson, November 1963-January 1969*, Volume I: "Administrative History," Part II, undated (circa 1969), SECRET (Declassified May 10, 1994), DDRS No. CK3100062802, esp. Chapter 9, "Negotiation of the Nonproliferation Treaty."

²⁰ The Eighteen Nation Disarmament Committee ("ENDC") grew out of the so-called Ten Nation Committee on Disarmament ("TNCD"). The TNCD was formed in late 1959 through an agreement among the U.S., U.S.S.R., Britain and France. It consisted of five nations from the West: U.S. Britain, France, Canada and Italy; and five nations from the Soviet bloc: U.S.S.R., Bulgaria, Czechoslovakia, Poland and Romania. See "Four-Power Communiqué on Disarmament Negotiations," September 7, 1959, in U.S. Department of State, Bureau of Public Affairs, Historical Office, *Documents on Disarmament, 1945-1959*, Vol. 2 of 2, 1957-1959, Publication No. 7008 (Washington, D.C.: U.S. Government Printing Office, August 1960), pp. 1441-1442.

In late 1960, after negotiations in the TNCD had stalled, the U.S.S.R. proposed adding five states—namely, Ghana, India, Indonesia, Mexico and the United Arab Republic—to the TNCD. The United States, however, did not endorse the proposal, and instead criticized the U.S.S.R. for walking out of TNCD negotiations earlier in the year. See "Soviet Draft Resolution Submitted to the General Assembly: Enlargement of the Ten Nation Committee on Disarmament," September 26, 1960, in U.S. Department of State, Bureau of Public Affairs, Historical Office, *Documents on Disarmament, 1960*, Publication No. 7172 (Washington, D.C.: U.S. Government Printing Office, July 1961), pp. 250-251, and p. 250, *fn.* 1.

In mid-1961, though, the U.S. proposed to the U.S.S.R. that the TNCD be expanded to include twenty members. See "United States Memorandum Submitted During the Bilateral Talks with the Soviet Union: Composition of the Disarmament Forum," July 29, 1961, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1961*, Publication No. 5 (Washington, D.C.: U.S. Government Printing Office, August 1962), pp. 271-273. The Soviet Union initially rejected this proposal, however. See "Statement by the Soviet Government on the Bilateral Talks," September 22, 1961, *ibid.*, pp. 444-458. In mid-to-late 1961, the United States nevertheless pushed this proposal in the U.N. General Assembly. See "Statement by the United States Representative (Stevenson) to the First Committee of the General Assembly," November 15, 1961, in *ibid.*, pp. 616-631.

eight non-aligned states: Brazil, Burma, Ethiopia, India, Mexico, Nigeria, Sweden and the United Arab Republic.²¹ (France, however, declined to participate in the ENDC.)

When the ENDC began meeting in Geneva in March 1962, it initially set out to negotiate and conclude an agreement on “general and complete disarmament under effective international control.”²² Over the next few years, though, negotiations for such an agreement stalled as American and Soviet delegates continually found themselves at loggerheads. But after the People’s Republic of China’s surprise detonation of a nuclear explosive device in October 1964, ENDC delegates changed the focus of their negotiations to concluding a nuclear nonproliferation treaty.²³ As we shall see below, the history of these negotiations suggests that negotiators in the ENDC and other contexts: (1) sought to conclude a nuclear nonproliferation treaty that lacked loop-holes; (2) rejected language that would have expressly recognized, or tended to affirm, the *per se* right of signatories to nuclear fuel-making technologies and activities; and (3) affirmed

²¹ By late 1961, the U.S. and U.S.S.R. were able to agree to an expanded Eighteen Nation Disarmament Committee, which would include the original ten members of the Ten Nation Committee on Disarmament, plus eight non-aligned members—namely, Brazil, Burma, Ethiopia, India, Mexico, Nigeria, Sweden and the United Arab Republic. The U.N. General Assembly endorsed the proposed ENDC with a resolution. See “General Assembly Resolution 1722 (XVI): Question of Disarmament,” December 20, 1961 <available at <http://www.un.org/documents/ga/res/16/ares16.htm>>.

²² U.N. General Assembly Resolution 1722 (XVI) endorsed the formation of ENDC, and recommended that it resume negotiations on an agreement for “general and complete disarmament under effective international control.” See “General Assembly Resolution 1722 (XVI): Question of Disarmament,” December 20, 1961, in *ibid*.

²³ At the opening of the ENDC’s eighth session, the United States called for delegations to focus instead on concluding a nuclear nonproliferation treaty consistent with U.N. General Assembly Resolution 1665 (XVI), also known as “the Irish Resolution.” See “Statement by ACDA Director Foster to the Eighteen Nation Disarmament Committee,” ENDC/PV. 218, July 27, 1965, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1965*, Publication No. 34 (Washington, DC: U.S. Government Printing Office, December 1966), pp. 281-286. For the Irish Resolution’s text, see “General Assembly Resolution 1665 (XVI): Prevention of the Wider Dissemination of Nuclear Weapons,” December 4, 1961 <available at <http://www.un.org/documents/ga/res/16/ares16.htm>>.

For background on how, in the aftermath of Communist China’s 1964 nuclear detonation, the U.S. government came to view the conclusion of a nuclear nonproliferation treaty as an urgent priority, see “Report by the Committee on Nuclear Proliferation (“Gilpatrick Committee”),” January 21, 1965, in U.S. Department of State, *Foreign Relations of the United States*, Vol. 11, No. 64 (Washington, D.C.: U.S. Government Printing Office, 1997) <available at http://www.state.gov/www/about_state/history/vol_xi/g.html>. For a more recent historical account of the Gilpatrick Committee’s role in changing the Johnson Administration’s nonproliferation policy, see Frank J. Gavin, “Blasts from the Past: Proliferation Lessons from the 1960s,” *International Security*, Vol. 29, No. 3 (Winter 2004/2005), pp. 112-113.

that they had concluded a treaty which lacked—and could later be interpreted as lacking—loop-holes.

In mid-1965, when ENDC delegates first began to negotiate in earnest the language of a nonproliferation treaty, they stressed repeatedly the need to conclude a treaty that lacked loop-holes.²⁴ In fact, the ENDC's eight non-aligned delegations went so far as to sponsor a resolution in the General Assembly of the United Nations that urged the quick conclusion of a nonproliferation treaty “void of *any* loop-holes which might permit nuclear or non-nuclear Powers to proliferate, directly or indirectly, nuclear weapons in any form.”²⁵ In November 1965, the General Assembly passed this resolution in a 93-0 vote (with abstentions from Cuba, France, Guinea, Pakistan and Romania) as *Resolution 2028 (XX)*.

It is worth noting that *Resolution 2028 (XX)* also called for a nonproliferation treaty that embodied “an acceptable balance of responsibilities and obligations of the nuclear and non-nuclear Powers.”²⁶ Thus, when we hear today Iranian officials citing the importance of viewing the NPT in a way that balances “between [a signatory's] rights and its responsibilities” in order to defend their unqualified *per se* right readings of the treaty's Article IV, these officials (whether or not they realize it) are appealing at the same time to the authority of a General Assembly resolution that called for the treaty to be “void of any loop-holes which might permit

²⁴ In a legal memorandum on the proliferation dangers of plutonium fuel-making and use, Eldon V.C. Greenberg drew attention to the fact that NPT negotiators sought to negotiate a nuclear nonproliferation treaty that, in conformity with U.N. General Assembly *Resolution 2028 (XX)*, lacked loop-holes. See Greenberg, “The NPT and Plutonium: Applications of NPT Prohibitions to ‘Civilian’ Nuclear Equipment, Technology and Materials Associated with Reprocessing and Plutonium Use,” Nuclear Control Institute, 1984 (Revised May 1993), p. 15 <available at <http://www.nci.org/03NCI/12/NPTandPlutonium.pdf>>.

²⁵ “U.N. General Assembly Resolution 2028 (XX): Nonproliferation of Nuclear Weapons,” November 19, 1965, para. 2, emphasis added <available at <http://www.un.org/documents/ga/res/20/ares20.htm>>.

²⁶ *Ibid.*

nuclear or non-nuclear Powers to proliferate, directly or indirectly, nuclear weapons in any form.”²⁷

After the General Assembly’s passage of *Resolution 2028 (XX)*, ENDC delegates continued to reference the resolution as they reiterated their desire to conclude a nuclear nonproliferation treaty that was, and could later interpreted to be, “void of any loop-holes.” To be sure, this was a desire not only of some in the Western and Soviet blocs, but also of some non-aligned members of the ENDC. For example, in March 1967 United Arab Republic delegate Hussein Khallaf cited this resolution as he drew attention to the military potential of civilian nuclear energy. “The development of atomic energy for peaceful purposes must not in any way be an excuse or a device for creating loopholes for the proliferation of nuclear weapons,” Khallaf argued. “[T]he treaty must be able to stop proliferation completely and finally.”²⁸

Second, as ENDC delegates worked to refine the language of what would become the NPT, they collectively rejected several proposals to insert language into the treaty that would have tended to affirm interpretations of the *per se* right of signatories, at the very least, to the supply of enrichment, reprocessing and other sensitive nuclear fuel-making technologies—and, in certain cases, to the acquisition of so-called nuclear explosive devices for civilian purposes!²⁹

²⁷ *Ibid.*

²⁸ “Statement by the U.A.R. Representative (Hussein Khallaf) to the Eighteen Nation Disarmament Committee: Non-Proliferation of Nuclear Weapons,” ENDC/PV. 294, March 16, 1967, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967*, Publication 46 (Washington, D.C.: U.S. Government Printing Office, July 1968), pp. 154-160.

²⁹ Prior to August 24, 1967, no draft nuclear nonproliferation treaty submitted to the ENDC contained any language viewing peaceful uses of nuclear energy through the prism of legal rights. The idea for treaty language affirming the right of signatories to peaceful nuclear energy apparently came from the *Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*, Article 17 of which states: “Nothing in the provisions of this Treaty shall prejudice the rights of the Contracting Parties, in conformity with this Treaty, to use nuclear energy for peaceful purposes, in particular for their economic development and social progress.” See *Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean*, February 14, 1967 (entered into force on April 22, 1968), 634 U.N.T.S. 326, Art. 17. (Hereinafter “Treaty of Tlatelolco.”)

Several proposals stand out. In September 1967, Mexican delegate Jorge Castañeda proposed to the ENDC that the treaty include language in Article IV's second paragraph establishing "the duty" (or express legal obligation) of "[t]hose parties that are in a position to do so ... to contribute, according to their ability, alone or in cooperation with other States or international organizations, to the further development of the production, industries, and other applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States."³⁰ In mid-October 1967, the Romanian delegation to the ENDC submitted a working paper suggesting the inclusion of language in the preamble recognizing the right of signatories to nuclear energy for peaceful purposes as an "absolute right," which is to say, an unqualified

The negotiations for the Treaty of Tlatelolco took place in the mid-to-late 1960s within the context of the Preparatory Commission for the Denuclearization of Latin America (known also by its Spanish acronym, "COPREDAL"). According to a confidential telegram from the U.S. Embassy in Mexico to the Department of State, the Peruvian delegation first proposed to COPREDAL the idea of including an article on nuclear energy for peaceful purposes. See "From U.S. Embassy (Mexico), Telegram No. 2419," U.S. Department of State, February 13, 1967, CONFIDENTIAL (Declassified on January 3, 1980), DDRS Document No. CK3100432606.

Soon after the conclusion of the Treaty of Tlatelolco's negotiations in mid-February 1967, Latin American delegations at the ENDC began proposing that the draft nuclear nonproliferation treaty include language similar to Tlatelolco's Article 17. In late August 1967, the American and Soviet delegations, after months of negotiations with each other and consultations with officials from other governments, tabled in the ENDC identical nonproliferation treaty drafts containing the first, and a much shorter, version of Article IV. See "Draft Treaty on the Nonproliferation of Nuclear Weapons," ENDC/192 (U.S. submission) and ENDC/193 (U.S.S.R. submission), August 24, 1967, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967*, Publication No. 46 (Washington, D.C.: U.S. Government Printing Office, July 1968), pp. 394-395.

³⁰ Mexico's working paper proposed the following formulation for Article IV:

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 this Treaty have the right to participate in the fullest possible exchange of scientific and technological information on the peaceful uses of nuclear energy. Those Parties that are in a position to do so, have *the duty* to contribute, according to their ability, alone or in cooperation with other States or international organizations, to the further development of the production, industries, and other applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States [emphasis added].

See "Mexican Working Paper Submitted to the Eighteen Nation Disarmament Committee: Suggested Additions to Draft Nonproliferation Treaty," ENDC/196, September 19, 1967, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967*, Publication No. 46 (Washington, D.C.: U.S. Government Printing Office, July 1968), pp. 394-395. Mexico's working paper was cited by Greenberg, "The NPT and Plutonium," *op. cit.*, p. 16 and *fn.* 63.

right.³¹ In late October 1967, the Brazilian delegation to the ENDC offered its own working paper proposing that Article IV expressly extend the “inalienable right” of signatories to develop not only “nuclear energy for peaceful purposes,” but all nuclear technologies (presumably including nuclear fuel-making) up to “nuclear explosive devices for civil uses.”³² In early November 1967, the Nigerian delegation (in what appears to be an elaboration and extension of the obligatory “duty” language of Mexico’s September 1967 working paper) proposed that Article IV add several paragraphs that would legally oblige transfers of nuclear material and technology.³³ In early February 1968, the Spanish government, which was not a member of the

³¹ Romania’s working paper proposed the inclusion of the following language in the treaty’s preamble: “Affirming *the absolute right* of all States, whether they possess nuclear weapons or not, to undertake research on the peaceful applications of nuclear energy and to use nuclear energy for peaceful purposes, both now and in the future, on the basis of equality and without any discrimination” (emphasis added).

See “Romanian Working Paper Submitted to the Eighteen Nation Disarmament Committee: Amendments and Additions to the Draft Nonproliferation Treaty,” ENDC/199, October 19, 1967, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967, op. cit.*, pp. 525-526.

³² Brazil’s proposed amendments suggested that Article IV contain the following language:

Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop, alone or in cooperation with other States, research, production and use of nuclear energy for peaceful purposes, *including nuclear explosive devices for civil uses*, without discrimination, as well as the right of the Parties to participate in the fullest possible exchange of information for, and to contribute or in cooperation with other States to, the further development of the applications of nuclear energy for peaceful purposes [emphasis added.]

See “Brazilian Amendments to the Draft Nonproliferation Treaty,” ENDC/201, October 31, 1967, in *ibid.*, p. 546.

³³ In early November 1967, the Nigerian delegation proposed the following amendments to Article IV:

ARTICLE IVA:

Each Party to the Treaty undertakes to cooperate directly or through the IAEA, in good faith and according to its technological and/or material resources, with any other State or group of States Party to this Treaty in the development and advancement of nuclear technology for peaceful purposes, and in the fullest possible exchange of scientific and technological information on the peaceful uses of nuclear energy.

The nuclear weapon States Party to this Treaty shall make available through the IAEA, to all non-nuclear weapon Parties, full scientific and technological information on the peaceful applications of nuclear energy accruing from research on nuclear explosive devices.

The nuclear weapon States Party to the Treaty shall also provide facilities for scientists from non-nuclear weapon countries Party to the Treaty to collaborate with their scientists working on nuclear explosive devices, in order to narrow the intellectual gap which will be created in that field as a result of restrictions imposed by this Treaty on non-nuclear weapon States.

ARTICLE IVB:

Each Party to the Treaty undertakes to communicate annually to the IAEA, full information on the nature, extent and results of its cooperation with any other Party or group of Parties, in the development of nuclear energy for peaceful purposes. The Reports so received by the IAEA shall be circulated by the Agency to all the Parties to the Treaty.

ENDC, submitted a memorandum the committee calling for Article IV's second paragraph to refer expressly to nuclear fuel-making technologies:

The measures in the new draft concerning the right to participate as fully as possible in scientific and technical information for the peaceful uses of atomic energy are sound, and can have important effects on the development of non-nuclear countries. Nevertheless, the Spanish Government takes the view that this information should refer *specifically to the entire technology of reactor and fuels* [emphasis added].³⁴

In mid-February 1968, the Brazilian delegation once again proposed that Article IV's first paragraph affirm the right of all signatories to develop not only "nuclear energy for peaceful purposes," but also all nuclear technology up to so-called peaceful nuclear explosive devices.³⁵

And in late February 1968, the Italian delegation proposed that Article IV's second paragraph be revised to contain instead the following negative declaration:

Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to *the supply of source and special fissionable materials or equipment for the use of source and special fissionable materials for peaceful purposes*.³⁶

All of these proposals were rejected by the ENDC, however. Indeed, the final text of the NPT contained no language explicitly referring to enrichment, reprocessing and other nuclear fuel-

ARTICLE IVC:

Each Party to this Treaty shall take necessary legal and administrative steps to ensure that all organisations working on the development of nuclear energy in territory under its jurisdiction do so conformity with the aims and provisions of the Treaty.

See "Nigerian Working Paper Submitted to the Eighteen Nation Disarmament Committee: Additions and Amendments to the Draft Nonproliferation Treaty," ENDC/202, November 2, 1967, in *ibid.*, p. 558.

³⁴ "Spanish Memorandum to the Co-Chairman of the ENDC," ENDC/210, February 8, 1968, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1968*, Publication No. 52 (Washington, D.C.: U.S. Government Printing Office, September 1969), p. 40. Spain's memorandum was cited by Greenberg, "The NPT and Plutonium," *op. cit.*, p. 16 and *fn.* 64.

³⁵ Brazil proposed that Article IV be revised to read:

Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop, along or in cooperation with other States, research, production and use of nuclear energy for peaceful purposes, *including nuclear explosive devices for civil uses*, without discrimination [emphasis added].

See "Brazilian Amendments to the Draft Treaty on Nonproliferation of Nuclear Weapons," ENDC/201/Rev. 2, February 13, 1968, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1968*, *op. cit.*, p. 64.

³⁶ Italian Working Paper Submitted to the Eighteen Nation Disarmament Committee: Additions and Amendments to Articles IV, VIII, and X of the Draft Nonproliferation Treaty, ENDC/218, February 20, 1968 (Corr. 2, February 22, 1968), in *ibid.*, p. 92.

making activities, or so-called nuclear explosive devices for peaceful purposes—let alone expressly affirming the *per se* right of signatories to nuclear fuel-making.³⁷

Third, after the conclusion of the NPT in mid-1968, the negotiating governments affirmed that they had concluded a treaty which was, and could later be interpreted to be, “void of any loop-holes.” In fact, the NPT itself makes this very point when its preamble calls for the treaty to conform “with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,” such as *Resolution 2028 (XX)*. Since the VCLT’s Article 31 states that “[t]he context for the purpose of the interpretation of a treaty shall comprise,” in particular, “the [treaty’s main] text, including its preamble and annexes,”³⁸ it is therefore significant for the NPT’s interpretation that the treaty’s preamble calls for conformity with *Resolution 2028 (XX)* and other General Assembly resolutions.

In sum, the NPT’s negotiation history suggests that “loop-hole” readings of the treaty—readings which affirm the *per se* right, and now even the unqualified *per se* right, of signatories to nuclear fuel-making—appear to run counter to the intentions of the treaty’s negotiators of concluding a nuclear nonproliferation treaty “void of any loop-holes.” What, then, would it mean for governments to interpret the treaty in a way that lacks loop-holes to *virtual nuclear weapon state* status? Here, a closer reading of the NPT’s text, a reading supported by a careful examination of the treaty’s negotiating history, can provide answers.

³⁷ Moreover, though the NPT views “nuclear energy for peaceful purposes” through the prism of “inalienable rights,” it is worth noting that an “inalienable right” is not an undeniable right. For example, though the *Declaration of Independence* affirms “life, liberty and the pursuit of happiness” as inalienable rights of man, this affirmation does not imply that the U.S. government cannot fine, imprison or even execute an individual if s/he violates certain laws.

³⁸ VCLT, Art. 31, para. 2.

A Sustainable NPT Reading

To be sure, Article IV of the Nuclear Nonproliferation Treaty recognizes the “inalienable right” of signatories to peaceful nuclear energy. However, it also explicitly imposes two qualifications on the “nuclear energy for peaceful purposes” to which NPT signatories have an “inalienable right”: signatories shall develop “research, production and use” of peaceful nuclear energy (1) “without discrimination” and (2) “in conformity with articles I and II of this Treaty.”³⁹ Moreover, when the NPT’s Article III defines the purpose of comprehensive safeguards by the International Atomic Energy Agency as the “verification of the fulfillment of [signatory] obligations assumed under this Treaty with a view to preventing the diversion of nuclear energy from peaceful purposes to nuclear weapons and other nuclear explosive devices,”⁴⁰ it effectively establishes (3) “conformity with Article III” as a third qualification. These three qualifications, when understood in relation to the treaty’s preamble and main text, not only narrow the scope of “nuclear energy for peaceful purposes” to which signatories have an “inalienable right,” but also establish criteria that signatories must meet in order to exercise this right.

Article IV’s Three Qualifications

To begin with, paragraph seven of the NPT’s preamble lays out the principle that addresses the special meaning of Article IV’s first qualification, “without discrimination,” within the context of the treaty.⁴¹ That paragraph affirms:

³⁹ NPT, Art. IV, para. 1.

⁴⁰ NPT, Art. III, para. 1.

⁴¹ The NPT’s negotiation history confirms that the “benefits-without-discrimination” principle is meant to be understood in relation to Article IV. In August 1967, when American delegate William Foster (along with Soviet delegate Alexey Roshchin) introduced the first version of what we know today as Article IV, he said that the article’s two paragraphs “are *specific elaborations of the principle stated in the preamble* ‘that the benefits of

the principle that *the benefits* of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties of the Treaty, whether nuclear-weapon or non-nuclear weapon States.⁴²

To be clear, neither this principle (which hereinafter I refer to as the “benefits-without-discrimination” principle), nor any other part of the NPT, ever expressly requires that any specific *nuclear technology*, or any specific *peaceful application* of nuclear technology, be made available to all signatories, but rather that only that *the benefits* of a given nuclear technology’s peaceful application be made available somehow. In essence, this principle recognizes that some nuclear technologies and some peaceful applications of nuclear technology—to take an extreme example, so-called “nuclear explosions for peaceful purposes” in civilian mining, excavation or canal-digging operations—may be too uneconomical, too proliferative and too unsafeguardable to permit non-nuclear-weapon states to acquire and use them. Thus, when Article IV’s first qualification applies this principle to peaceful nuclear energy, it appears to permit, in principle, the denial of a given nuclear technology or a given nuclear technology’s peaceful application to a signatory as long as the benefits of the denied nuclear technology’s peaceful application are made available somehow.

Article IV’s second qualification requires that the development of “research, production and use” of peaceful nuclear energy be “in conformity with articles I and II” of the NPT. These two articles articulate the NPT’s main prohibitions against the direct and indirect proliferation of nuclear weapons by treaty signatories. Article I prohibits nuclear-weapon signatories from giving nuclear weapons and other nuclear explosive devices, or control over such devices, to

peaceful applications of nuclear technology should be available for peaceful purposes to all Parties... whether nuclear-weapon or non-nuclear-weapon States.” See “Statement by ACDA Director [William] Foster to the Eighteen Nation Disarmament Committee: Draft Nonproliferation Treaty,” ENDC/PV. 325, August 24, 1967, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967*, p. 345, emphasis added.

⁴² NPT, preamble, para. 7, emphasis added.

“any recipient whatsoever,” and also forbids them from “assist[ing], encourage[ing], or induc[ing]” any non-nuclear-weapon state “to manufacture or otherwise acquire” nuclear explosive devices.⁴³ Article II correspondingly prohibits non-nuclear-weapon signatories from receiving nuclear explosive devices, or control over such devices, and also forbids them from building or acquiring in any way nuclear explosive devices, and from receiving or seeking “any assistance in the manufacture” of such devices.⁴⁴ Article IV’s second qualification therefore effectively narrows the scope of “nuclear energy for peaceful purposes” to which signatories have an “inalienable right” under Article IV, for peaceful nuclear energy “in conformity with articles I and II” excludes *not only* nuclear explosive technology for peaceful or non-peaceful purposes, *but also* other nuclear technology and assistance that could “assist, encourage or induce” non-nuclear-weapon states “to manufacture or otherwise acquire” nuclear explosive technology.⁴⁵

Furthermore, the NPT’s Article III requires each non-nuclear-weapon signatory to conclude a comprehensive safeguard agreement with the IAEA “for the exclusive purpose of

⁴³ NPT, Art. I.

⁴⁴ NPT, Art. II.

⁴⁵ Albert Wohlstetter and colleagues stressed this point in studies conducted for a number of U.S. government agencies in the 1970s. In a 1979 report for ACDA, for example, they argued, “Article IV explicitly states that the inalienable right of all parties to the Treaty to the peaceful use of nuclear energy has to be in conformity with Articles I and II ... [T]hese Articles are what make the Treaty a treaty against proliferation.” *See Wohlstetter, et al., Towards a New Consensus on Nuclear Technology, 1979, op. cit.* pp. 34-35.

A few years later, Eldon V.C. Greenberg reiterated this point in a legal memorandum on the NPT’s relation to plutonium fuel-making and use:

There is, in short, a dynamic tension in the Treaty between its prohibitions and its injunctions to cooperate in peaceful uses of nuclear energy. An analysis of the language and history of the NPT, and particularly the key phrase “in conformity with [articles I and II]” in Article IV, paragraph 1, which is the link between the Treaty’s promises and its prohibitions, tends to support the conclusion that Articles I, II and IV must be read together in such a way that assistance or activities which are ostensibly peaceful and civilian in nature do not as a practical matter lead to proliferation of nuclear weapons. The NPT, in other words, can and should be read as permitting the evaluation of such factors as proliferation risk, economic or technical justification, and safeguards effectiveness in assessing the consistency of specific or generic types of assistance and activities with the Treaty’s restrictions, to ensure that action is not taken in the guise of peaceful applications of nuclear energy under Article IV which in fact is violative of the prohibitions of Articles I and II.

See Greenberg, “The NPT and Plutonium,” op. cit., p. 10.

verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing the diversion of nuclear energy from peaceful purposes to nuclear weapons and other nuclear explosive devices.”⁴⁶ By requiring non-nuclear-weapon signatories to submit to full-scope IAEA safeguards in order to verify the fulfillment of their obligations under Articles I and II, as well as other parts of the NPT, Article III effectively establishes a third legally-binding qualification on the “nuclear energy for peaceful purposes” to which signatories have an “inalienable right” under Article IV. That is, to develop “research, production and use” of peaceful nuclear energy “in conformity with articles I and II” means to do so “in conformity with article III.”⁴⁷ Thus, Article IV’s third qualification appears to recognize the “inalienable right” of a signatory to peaceful nuclear energy only when the signatory’s nuclear activities are effectively safeguardable by the IAEA, and the signatory complies fully with its obligations under Article III of the NPT and related IAEA comprehensive safeguards agreements.⁴⁸

⁴⁶ NPT, Art. III, para. 1.

⁴⁷ It is of interest to note that both the 2000 NPT Review Conference and 2006 summit of the Non-Aligned Movement released a politically-binding final documents affirming that “nothing in the 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, II and III of the Treaty.” See 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, NPT/CONF.2000/28 (Parts I and II), p. 8, para. 2 <available at <http://disarmament2.un.org/wmd/npt/finaldoc.html>>; and Fourteenth Summit Conference of the Heads of State or Government of the Non-Aligned Movement, *Final Document*, NAM 2006/Doc.1/Rev.3, September, 16, 2006, para. 95. I am grateful to Andreas Persbo, a nuclear law and policy researcher at the Verification Research, Training and Information Centre (“VERTIC”) in London, who first drew my attention to this passage of the 2000 NPT Review Conference’s *Final Document*.

⁴⁸ Cf. Henry D. Sokolski and George Perkovich, “It’s Called *Nonproliferation*,” *Wall Street Journal*, Apr 29, 2005, p. A16 <available at <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=OpEd50429ItsCalledNonprolife&PDFFolder=OpEds>>; and Perkovich, “Defining Iran’s Nuclear Rights,” Carnegie Endowment for International Peace, September 7, 2006 <available at <http://www.carnegieendowment.org/npp/publications/index.cfm?fa=view&id=18687>>.

Article IV's Three Qualifications and Nuclear Explosions for Peaceful Purposes

With respect to “nuclear explosions for peaceful purposes,” many of the NPT negotiators argued that, at the time of their negotiations and for the foreseeable future, nuclear explosive technology in civilian projects not only lacked clear and immediate economic benefits, especially when compared to non-nuclear alternatives, but also possessed an unacceptable risk of nuclear proliferation, and could not be effectively safeguarded by the IAEA if non-nuclear-weapon states acquired or applied this technology themselves. Hence, the final text of the NPT denies non-nuclear-weapon signatories access both to nuclear explosive technology and its peaceful applications. In conformity with the preamble’s “benefits-without-discrimination” principle, though, the NPT’s Article V outlines the framework by which non-nuclear-weapon signatories could avail themselves of “the potential benefits” of nuclear explosive technology’s peaceful application, if such economic benefits should ever materialize. The relevant part of Article V reads:

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, *potential benefits* from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a *non-discriminatory basis* and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States....⁴⁹

As the NPT’s negotiation history reveals, many of the non-nuclear-weapon states represented at the ENDC did not view either the denial of nuclear explosive technology and its peaceful applications, or Article V’s framework for providing the “potential benefits” of the

⁴⁹ NPT, Art. V, emphases added.

denied nuclear explosive technology's peaceful applications, as discriminatory.⁵⁰ For example, in late January 1968 Polish delegate Mieczyslaw Blusztajn remarked to the ENDC:

I should like once again to stress that *the right of all countries to conduct peaceful nuclear explosions is not at stake*. The only matter to be settled is the procedure and the conditions to be observed so that countries which forgo the manufacture of nuclear devices shall not be deprived of *the benefits* that may be derived from the use of nuclear explosives.⁵¹

Bulgarian delegate Kroum Christov echoed the Polish delegate's sentiments

[I]t seems to us quite clearly impossible to admit and to include in the non-proliferation treaty the right to manufacture nuclear devices and to carry out nuclear explosions. *There is no question in this case of denying a right; nor should the prohibition of all activity of this nature be regarded as an infraction of that right*. Account is taken of a state of facts which, for reasons which cannot be refuted and which have been explained here at length, renders the manufacture of nuclear devices incompatible with a non-proliferation treaty.⁵²

In retrospect, the efforts of NPT negotiators to limit the spread of nuclear explosive technology for peaceful purposes proved to be well-founded. Indeed, the “potential benefits” of so-called peaceful nuclear explosives (“PNEs”) never materialized as non-nuclear explosive alternatives for mining, excavation and canal-digging operations emerged as safer and more economical choices.⁵³ In fact, in May 1995 the quadrennial NPT review conference made the following conclusions about PNEs:

The Conference records that *the potential benefits* of the peaceful applications of nuclear explosions envisaged in article V of the Treaty *have not materialized*. In this context, the Conference notes that the potential benefits of the peaceful applications of nuclear explosions have not been demonstrated and that serious concerns have been expressed as to the environmental consequences that could result from the release of radioactivity from such applications and on the risk of possible proliferation of nuclear weapons. Furthermore, no requests for services related to the peaceful applications of nuclear explosions have been received

⁵⁰ Exceptions included Brazil, the government of which had argued before the ENDC that non-nuclear-weapon states should be allowed to develop peaceful nuclear explosive devices. For example, see “Brazilian Amendments to the Draft Nonproliferation Treaty,” ENDC/201, October 31, 1967, U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1967*, Publication No. 46 (Washington, D.C.: U.S. Government Printing Office, July 1968), p. 546.

⁵¹ ENDC/PV. 359 (January 25, 1968), p. 6, emphasis added <available at <http://www.hti.umich.edu/e/endsc/>>.

⁵² ENDC/PV. 360 (January 30, 1968), p. 7, emphasis added <available at <http://www.hti.umich.edu/e/endsc/>>.

⁵³ On the comparative economics and proliferation dangers of PNEs, see Thomas Blau, *Rational Policy-Making and Peaceful Nuclear Explosives*, Doctoral Dissertation, Department of Political Science, University of Chicago, December 1972.

by IAEA since the Treaty entered into force. The Conference further notes that no State party has an active programme for the peaceful application of nuclear explosions.⁵⁴

Moreover, though the *Comprehensive Nuclear-Test-Ban Treaty* has not entered into force, it has nonetheless established an international norm against the use of nuclear explosions for peaceful and non-peaceful purposes.⁵⁵

Article IV's Three Qualifications and Nuclear Energy for Peaceful Purposes

In conformity with Article IV's three qualifications, then, both (a) the "benefits-without-discrimination" principle of the NPT's preamble, and (b) the framework by which Article V allows non-nuclear-weapon signatories to avail themselves of the "potential benefits" of nuclear explosive technology's peaceful applications without providing them actual access to the technology or its peaceful application, can be applied to enrichment, reprocessing and other sensitive nuclear fuel-making activities. Under a sustainable reading of the NPT, it is both plausible and consistent for governments to interpret Article IV as affirming the "inalienable right" of nuclear signatories to develop "research, production and use" of nuclear fuel-making only to the extent that such nuclear fuel-making activities: (1) are economically beneficial in accordance with the treaty's preamble (Article IV's first qualification); (2) possess a low risk of proliferation in accordance with Articles I and II (Article IV's second qualification); and (3) are safeguardable and undertaken in full compliance with NPT and IAEA safeguard obligations in accordance with Article III (Article IV's third qualification).⁵⁶ Moreover, it is both plausible and

⁵⁴ *Report of Main Committee III, Treaty on the Nonproliferation of Nuclear Weapons Review and Extension Conference, May 5, 1995, NPT/CONF.1995/MC.III/1, sec. I, para. 2, emphasis added* <available at <http://www.un.org/Depts/ddar/nptconf/162.htm>>.

⁵⁵ *Comprehensive Nuclear-Test-Ban Treaty*, September 10, 1996, 35 I.L.M. 1430.

⁵⁶ Here, I use what I view to be Article IV's three qualifications on the "nuclear energy for peaceful purposes" to which NPT signatories have an "inalienable right" to elaborate Eldon V.C. Greenberg's argument for the specific facts and circumstances under which peaceful nuclear energy should not be permissible:

consistent with the treaty to deny signatories from developing, acquiring and using nuclear fuel-making technologies that can assist them in manufacturing nuclear weapons under some circumstances—at the very least, when they fail to comply with their obligations under the NPT’s Article III and related IAEA safeguards agreements—as long as the benefits of peaceful applications of such nuclear fuel-making technologies are made available to them.⁵⁷

As the NPT’s negotiation history reveals, ENDC delegations from both nuclear-weapon states and non-nuclear-weapon states viewed nuclear fuel-making in a manner similar to nuclear explosives for peaceful purposes: that is, as potentially aiding and even constituting the manufacture of nuclear weapons. For example, in September 1962 British delegate Sir Michael Wright told the ENDC:

The thing which is unique to a nuclear weapon is its warhead. And what is there in a nuclear warhead that is found in no other weapons? ... It is the fissile material in the warhead; that is to say, the plutonium and uranium-235, the two fissile materials now most commonly used in nuclear weapons.

*If we are to deal effectively with nuclear weapons we must concentrate on the fissile material which every nuclear weapon has and which no other weapon has.*⁵⁸

If the [proliferation] risks are great, if there can be no reasonable civilian justification for particular forms of assistance or activities, and if there can be no certainty that safeguards would be effective with respect to such assistance or activities, then a presumption should arise under the Treaty that such assistance or activities are not for permissible, peaceful purpose but are rather for a weapons or explosive purpose and therefore in violation of Articles I and II. Only in this way can there be any assurance that the NPT’s objectives will be achieved.

See Greenberg, “The NPT and Plutonium,” *op. cit.*, p. 13.

⁵⁷ Cf. Eldon V.C. Greenberg’s legal memorandum on the NPT and plutonium fuel-making, which argues:

[T]he distinction between permissible and impermissible activities must come down ultimately to quite pragmatic considerations. Activities must not be free from the Treaty’s prohibitions just by virtue of being denominated “peaceful,” civilian,” power” or “research.” The Treaty must be interpreted as viewing proliferation through something more than an “explosive lens.” Rather, depending upon the facts and circumstances, assistance and activities relating to declared “peaceful,” civilian,” “power” or “research” purposes may be subject to the NPT’s restrictions, if an evaluation of all the facts and circumstances, including such factors as economic or technical justification or effectiveness of safeguards, would indicate that the legitimacy of the assistance and/or activity is questionable. Such a pragmatic, rather than a formalistic reading of the Treaty, is most consistent with the overriding purpose of stemming the proliferation of nuclear weapons.

See Greenberg, “The NPT and Plutonium,” *op. cit.*, p. 24.

⁵⁸ ENDC/PV. 82 (September 7, 1962), p. 37, emphasis added <available at <http://www.hti.umich.edu/e/encd/>>. See also “British Paper Submitted to the Eighteen Nation Disarmament Committee: Technical Possibility of International Control of Fissile Material Production,” ENDC/60, August 31, 1962 (Corr. 1, November 27, 1962), in

To take another example, in February 1966 Swedish delegate Alva Myrdal argued before the ENDC:

[T]o block the road to nuclear weapon development as early as possible... we are facing is a long ladder with many rungs, and the practical question is: on which of these is it reasonable and feasible to introduce the international blocking? ... *To prohibit just the final act of "manufacture" would seem to come late in these long chains of decisions...* Could a middle link be found on which the prohibitory regulation should most definitely be focused?⁵⁹

A month later, during a speech to the ENDC, Burmese delegate U. Maung Maung Gyi answered Myrdal's question:

*An undertaking on the part of the non-nuclear weapon Powers not to manufacture nuclear weapons would in effect mean forgoing the production of fissionable material ... and such production is the first essential step for the manufacture of these weapons and constitutes an important dividing line between restraint from and pursuit of the nuclear path.*⁶⁰

Proponents of the *per se* right or unqualified *per se* right reading of Article IV might counter the NPT's sustainable reading by claiming that Article IV's second paragraph necessarily obliges signatories to transfer any and all nuclear technology, materials and assistance—including nuclear fuel-making—in an unqualified and unfettered manner. The relevant part of that paragraph states:

All the Parties of the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological for the peaceful uses of nuclear energy.⁶¹

It is important to note, though, that this paragraph is carefully worded to call not for "the fullest exchange," but rather for only "the fullest *possible* exchange," and thus actually encourages NPT signatories to exchange nuclear technology, materials and know-how with great care, caution and

U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1962*, Publication No. 19, Vol. 2 of 2 (Washington, D.C.: U.S. Government Printing Office, November 1963), pp. 834-852.

⁵⁹ "Statement by the Swedish Representative [Alva Myrdal] to the Eighteen Nation Disarmament Committee: Nonproliferation of Nuclear Weapons," ENDC/PV. 243, February 24, 1966, in U.S. Arms Control and Disarmament Agency, *Documents on Disarmament, 1966*, Publication No. 43 (Washington, D.C.: U.S. Government Printing Office, September 1967). p. 56, emphasis added.

⁶⁰ ENDC/PV. 250 (March 22, 1966), p. 28, emphasis added <available at <http://www.hti.umich.edu/e/encd/>>.

⁶¹ NPT, Art. IV, para. 2, emphasis added.

restraint.⁶² In May 2005, during a speech to the quadrennial NPT review conference, Christopher Ford (at the time the Principal Deputy Assistant Secretary of State for Verification, Compliance and Implementation) elaborated this point:

The use of the term “fullest possible” is an acknowledgement that cooperation may be limited. Parties are not compelled by Article IV to engage in nuclear cooperation with any given state—or to provide any particular form of nuclear assistance to any other state. The NPT does not require any specific sharing of nuclear technology between particular States Party, nor does it oblige technology-possessors to share any specific materials or technology with non-possessors.⁶³

“[T]o conform both to the overall objective of the NPT-strengthening security by halting nuclear proliferation—and to any Article I and III obligations,” Ford added, “supplier states must consider whether certain types of assistance, or assistance to certain countries, are consistent with the nonproliferation purposes and obligations of the NPT, other international obligations, and their own national requirements.” NPT signatories, Ford concluded,

should withhold assistance if they believe that a specific form of cooperation would encourage or facilitate proliferation, or if they believe that a state is pursuing a nuclear weapons program in violation of Article II, is not in full compliance with its safeguards obligations, or is in violation of Article I.⁶⁴

Moreover, by establishing no *per se* obligation or duty of nuclear exporters to give any specific nuclear technology, material or assistance, Article IV’s second paragraph suggests that nuclear

⁶² As strategist Albert Wohlstetter and colleagues argued in a 1979 report for the U.S. Arms Control and Disarmament Agency:

If the “fullest possible exchange” were taken to include the provision of stocks of highly concentrated fissile material within days or hours of being ready for incorporation into an explosive, this would certainly “assist” an aspiring nonnuclear weapons state in making such an explosive. No reasonable interpretation of the Nonproliferation Treaty would say that the Treaty intends, in exchange for an explicitly revocable promise by countries without nuclear explosives not to make them or acquire them, to transfer to them material that is within days or hours of being ready for incorporation into a bomb The NPT is, after all, a treaty against proliferation, not for nuclear development.

See Wohlstetter, *et al.*, *Towards a New Consensus on Nuclear Technology*, 1979, *op. cit.*, pp. 34-35.

⁶³ Christopher Ford, “NPT Article IV: Peaceful Uses of Nuclear Energy,” Statement of the Principal Deputy Assistant Secretary of State for Verification, Compliance and Implementation, to the 2005 Review Conference of the Treaty on the Nonproliferation of Nuclear Weapons, New York, NY, May 18, 2005 <available at <http://www.state.gov/t/vci/rls/rm/46604.htm>>.

⁶⁴ *Ibid.*

importers, at the same time, have no reciprocal *per se* right to receive or otherwise acquire any specific nuclear technology, material or assistance.⁶⁵

That said, Article III of the NPT contains language that appears to contemplate that both nuclear-weapon and non-nuclear-weapon signatories might acquire and use even some of the most weapons-ready nuclear materials, and the most militarily-relevant civilian applications of nuclear technology. For example, paragraph one of Article III states:

Procedures for the safeguards required by this Article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this Article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.⁶⁶

Paragraph two adds:

Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.⁶⁷

While these provisions describe the scope of responsibility for IAEA safeguards, they do not explicitly address the range of nuclear activities that are prohibited or permitted. The key to

⁶⁵ According to Henry D. Sokolski,

[The Principal Deputy Assistant Secretary of State for Verification, Compliance and Implementation] had attempted, to my knowledge, to get more cleared than what he was able to say [at the 2005 NPT Review Conference]. What he was able to say and what was cleared was that the United States at least is under no duty or obligation under Article IV to supply enrichment and reprocessing technologies to anyone. I think what he wanted to say might have included that countries really don't have a *per se* right to acquire this from others or to develop it even indigenously, but that was not approved.

See "Statement of Henry D. Sokolski," in *Assessing "Rights" Under the Nuclear Nonproliferation Treaty*, a hearing before the Subcommittee on International Terrorism and Nonproliferation, Committee on International Relations, U.S. House of Representatives, 109th Congress, Second Session, Serial No. 109-148, March 2, 2006 (Washington, D.C.: U.S. Government Printing Office, 2006), p. 28 <available at <http://www.foreignaffairs.house.gov/archives/109/26333.pdf>>.

⁶⁶ NPT, Art. III, para. 1.

⁶⁷ *Ibid.*, para. 2.

harmonizing these provisions with the NPT's larger prohibitions against proliferation lies in Article III's third paragraph, which states: "The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty..."⁶⁸ If Article IV is read broadly and permissively to permit any nuclear activity short of inserting fissile material into a nuclear explosive, then the IAEA safeguards required by Article III will play, at best, a formalistic role, and the importance of their effectiveness (or lack of effectiveness) will be of little consequence. In contrast, if Article IV—as well as Articles I and II, the NPT provisions to which Article IV must conform—are read narrowly and less permissively, then the extent to which the IAEA safeguards are effective will play a crucial role in determining whether or not a signatory's peaceful nuclear activities are, or are not, in conformity with Articles I and II.

In sum, governments need not interpret the NPT as affirming the *per se* right—let alone the "specific and undeniable right"—of signatories to nuclear fuel-making. Rather, a close reading of the NPT's text, a reading which is supported by the treaty's negotiation history, provides governments with a powerful counter to the "loop-hole" reading of the NPT leading to *virtual nuclear-weapon state* status. The NPT's sustainable reading clarifies Article IV's stringent qualifications on the "nuclear energy for peaceful purposes" to which signatories have an "inalienable right," and how a signatory can be denied, in some circumstances, nuclear fuel-making technology and its peaceful applications as long as the benefits of the denied technology's peaceful applications are somehow made available to it. Such circumstances include not only a signatory's noncompliance with its NPT and IAEA safeguards obligations, but also the IAEA's inability to safeguard effectively a given nuclear fuel-making technology or its peaceful applications.

⁶⁸ *Ibid.*, para. 3.

IAEA Safeguards and the NPT

The Nuclear Nonproliferation Treaty's preamble not only affirms "the principle of *safeguarding effectively* the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points," but also expresses support for "research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system," of this principle.⁶⁹ This raises an issue: To what extent can the IAEA effectively safeguard nuclear material involved in civilian applications of nuclear fuel-making technology?

In the past, when the IAEA avoided discussion of this issue, such avoidance served to promote the mistaken belief that Agency safeguards are always effective, even when applied to uranium enrichment, plutonium reprocessing and other sensitive nuclear activities. In turn, this lent support, implicitly if not also explicitly, to interpretations of the NPT's Article IV affirming the *per se* right, and even the unqualified *per se* right, of NPT signatories to nuclear fuel-making. In October 2006, though, IAEA Director General Mohamed ElBaradei publicly addressed some of the Agency's problems with respect to safeguarding effectively by conceding that nuclear fuel-making "creates many new challenges, both for the international community and for [the Agency], because verifying enrichment facilities or reprocessing facilities is quite difficult, and [because] the so-called conversion time is very short," and admitting that when non-nuclear-weapon states become nuclear fuel-makers, then "we are dealing with what I call virtual nuclear-weapon states."⁷⁰

⁶⁹ NPT, preamble, para. 6, emphasis added.

⁷⁰ ElBaradei, "Addressing Verification Challenges," October 16, 2006.

With even greater candor about the extent to which the IAEA can and cannot effectively safeguard, the Agency can support the efforts of governments seeking to counter the “loop-hole” reading of the NPT with a sustainable interpretation that can help to prevent the emergence of more *virtual nuclear-weapon states*. Indeed, if the IAEA cannot effectively safeguard the nuclear material involved in certain civilian applications of nuclear fuel-making technology, then the Agency must publicly acknowledge this shortfall, and its consequent inability to verify whether or not a non-nuclear-weapon signatory’s development, acquisition or use of such fuel-making technology is “in conformity with articles I and II” of the NPT, as well as “in conformity with article III.” In turn, such unsafeguardable civilian applications of nuclear fuel-making technology—in failing to meet Article IV’s second and third qualifications⁷¹—should be excluded from the “nuclear energy for peaceful purposes”⁷² and from “the fullest possible exchange of equipment, materials and scientific and technological for the peaceful uses of nuclear energy”⁷³ to which NPT signatories have an “inalienable right.”

The NPT’s Article III and the IAEA’s Comprehensive Safeguards

In accordance with the NPT preamble’s principle of effective safeguarding, Article III requires that each non-nuclear-weapon signatory conclude a comprehensive safeguards agreement with the IAEA so that the Agency can verify “the fulfillment of [signatory] obligations assumed under this Treaty with a view to preventing the diversion of nuclear energy from peaceful purposes to nuclear weapons and other nuclear explosive devices.”⁷⁴ In 1972, two years after the NPT entered into force, the IAEA released *The Structure and Content of*

⁷¹ For a discussion of these qualifications, *see* the earlier section of this essay titled, “A Sustainable NPT Reading.”

⁷² NPT, Art. IV, para. 1.

⁷³ NPT, Art. IV, para. 2.

⁷⁴ NPT, Art. III, para. 1.

Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (“Model Comprehensive Safeguards Agreement” or “INFCIRC/153”), which defines the objective of safeguards as: “the timely detection of diversion of significant quantities of *nuclear material* from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection.”⁷⁵ To meet this objective, the *Model Comprehensive Safeguards Agreement* identifies the IAEA’s means as “the use of material accountancy as a safeguards measure of fundamental importance, with containment and surveillance as important complementary measures.”⁷⁶

When the IAEA concluded INFCIRC/153, the Agency had not determined the specific methods and metrics to evaluate the effectiveness of safeguards. In the mid-to-late 1970s, however, the IAEA’s Standing Advisory Group on Safeguards Implementation (“SAGSI”) used the numerical estimates of four terms from INFCIRC/153—namely, *significant quantity*, *timely detection*, *risk of detection*, and *probability of raising a false alarm*—to define more precisely the Agency’s “detection goals.”⁷⁷ In theory, these detection goals provide the IAEA with ways to measure the extent to which it is not only obtaining INFCIRC/153’s safeguards objective, but

⁷⁵ IAEA, *The Structure and Content of Agreements Between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, INFCIRC/153 (Corrected), June 1972, para. 28, emphasis original.

In February 1992, after the IAEA had discovered the extent to which Ba’athist Iraq had failed to declare a host of nuclear materials and activities, the Agency’s Board of Governors affirmed that INFCIRC/153’s objective of detecting and deterring the diversion of nuclear material applies not only “to nuclear material declared by a State,” but also to “any nuclear material [and related activities] subject to safeguards that *should have been declared*.” See IAEA, *The Safeguards System of the International Atomic Energy Agency*, undated (circa 2002), para. 13 <available at http://www.iaea.org/OurWork/SV/Safeguards/safeg_system.pdf>.

⁷⁶ INFCIRC/153 (Corrected), para. 29.

⁷⁷ For background on SAGSI, see Marvin M. Miller, “Are IAEA Safeguards on Plutonium Bulk-Handling Facilities Effective?,” Nuclear Control Institute, August 1990, emphasis added <available at <http://www.nci.org/k-m/mmsgdrds.htm>>. As Miller notes, “The values recommended by SAGSI for the detection goals were carefully described as provisional guidelines for inspection planning and for the evaluation of safeguards implementation, not as requirements, and were so accepted by the Agency.”

also verifying “the fulfillment of [signatory] obligations assumed under” the NPT. In practice, though, the Agency cannot meet these goals with respect to a wide range of nuclear materials and civilian applications of nuclear fuel-making technology. Although it is far beyond the scope of this essay to describe in exhaustive detail every difficulty that the IAEA faces in attempting to safeguard effectively, the sections below summarize key examples of these difficulties.

Nuclear Materials: Conversion Time vs. Timely Warning

When the IAEA safeguards, it aims to account and inspect declared nuclear materials in civilian applications of nuclear technology frequently enough to detect the diversion of a significant quantity (“SQ”) of nuclear material before it has been, or can be, converted into a bomb. A *significant quantity* is defined by the Agency as “the approximate amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded.”⁷⁸ *Table 1* below gives the SQ values that the IAEA currently uses. It is worth noting that some analysts have argued that the IAEA’s current SQ values are inadequate. For example, in October 2005 Thomas Cochran of the National Resources Defense Council argued that “the IAEA’s SQ values for direct use materials are not technically valid or defensible,” and instead proposed that, in some circumstances, “the SQ values for direct use plutonium and highly enriched uranium (HEU) [should] be reduced by a factor of about eight.”⁷⁹

⁷⁸ *IAEA Safeguards Glossary*, 2001 Edition, International Nuclear Verification Series No. 3 (Vienna, Austria: IAEA, June 2003), sec. 3, para. 14.

⁷⁹ See Thomas B. Cochran, “Adequacy of IAEA’s Safeguards for Achieving Timely Detection,” an essay presented at *After Iran: Safeguarding Peaceful Nuclear Energy*, London, UK, October 2005 p. 2 <available at <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Paper050930CochranAdequacyofTime&PDFFolder=Essays>>. See also Cochran and Christopher E. Paine, “The Amount of Plutonium and Highly-Enriched Uranium Needed for Pure Fission Nuclear Weapons,” Natural Resources Defense Council, August 22, 1994 (Revised April 13, 1995) <available at <http://www.nrdc.org/nuclear/fissionw/fissionweapons.pdf>>.

Table 1: IAEA's Estimated Values for Significant Quantities

Direct-Use Material	SQ
Plutonium (containing < 80% ²³⁸ Pu)	8 kg Pu
Uranium-233	8 kg ²³³ U
Highly Enriched Uranium (²³⁵ U ≥ 20%)	25 kg ²³⁵ U
Indirect-Use Material	SQ
Uranium (²³⁵ U < 20%) ^a	75 kg ²³⁵ U (or 10 t natural U or 20 t depleted U)
Thorium	20 t Th

a. Including low enriched, natural and depleted uranium.

Data Source: IAEA Safeguards Glossary, 2001 Edition, International Nuclear Verification Series No. 3 (Vienna, Austria: IAEA, June 2003), sec. 3, para. 13, table II.

To express quantitatively the extent to which a non-nuclear-weapon state in possession of at least one SQ of nuclear material could pose an immediate proliferation threat, the IAEA uses a metric known as *conversion time*, defined as “the time required to convert different forms of nuclear material to the metallic components of a nuclear explosive device.”⁸⁰ In order to provide timely warning of a non-nuclear-weapon state’s diversion of nuclear material “from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown” so that governments can organize diplomatic and others forms of pressure on the diverting state, the numerical value of the IAEA’s *timeliness detection goal* for a given category of nuclear material should be, in principle, much less than the value of its estimated *conversion time* for that category of nuclear material.⁸¹

⁸⁰ IAEA Safeguards Glossary, 2001 Edition, sec. 3, para. 13.

⁸¹ As Marvin Miller of the Massachusetts Institute of Technology argued in August 1990:

[Timely warning of diversion] is taken to be detection of a diversion quickly enough to take diplomatic action to prevent the fabrication and insertion of the diverted material into a first bomb that is otherwise complete. Thus, detection time must be even shorter than conversion time, in order to allow for evaluation and response.

See Marvin M. Miller, “Are IAEA Safeguards on Plutonium Bulk-Handling Facilities Effective?” See also Paul Leventhal, “Safeguards Shortcomings: A Critique,” Nuclear Control Institute, September 12, 1994 <available at

Even in principle, though, this is not always the case. *Table 2* below compares the IAEA’s estimated *conversion time* for special and source nuclear materials with its corresponding *timeliness detection goals* in states where either the IAEA’s Additional Protocol (a voluntary agreement which grants the Agency greater inspection authority) has not entered into force; or the Agency has not concluded the absence of undeclared nuclear material or activities.

Table 2: IAEA’s Estimated Conversion Time vs. Timeliness Detection Goal

Type Nuclear Material	Est. Conversion Time	Timeliness Detection Goal
Unirradiated Direct-Use (Metallic Form) ^a	7 – 10 days	1 month
Unirradiated Direct-Use (Chemical Compounds/ Mixtures) ^b	7 – 21 days	1 month
Irradiated Direct-Use ^c	1 – 3 months	3 months
Indirect Use ^d	3 – 12 months	12 months

a. Pu, HEU or ²³³U metal.

b. PuO₂, Pu(NO₃)₄ or other pure Pu compounds; HEU or ²³³U oxide or other pure U compounds; MOX or other non-irradiated pure mixtures containing Pu, U (²³³U + ²³⁵U ≥ 20%); Pu, HEU and/or ²³³U in scrap or other miscellaneous impure compounds.

c. Pu, HEU or ²³³U in irradiated fuel.

d. U containing <20% ²³³U and/or ²³⁵U; Th.

Data Source: IAEA Safeguards Glossary, 2001 Edition, International Nuclear Verification Series No. 3 (Vienna, Austria: IAEA, June 2003), sec. 3, paras. 13 and 20.

To take the most time-sensitive proliferation scenario, if a non-nuclear-weapon state has acquired at least one SQ of highly enriched uranium, uranium-233 or separated plutonium in metallic form, then the IAEA estimates that such a state requires roughly seven-to-ten days to

<http://www.nci.org/p/plsgrds.htm>>; and Thomas B. Cochran, “Adequacy of IAEA’s Safeguards for Achieving Timely Detection,” *op. cit.*, pp. 5-12.

prepare such unirradiated, direct-use fissile material for insertion into a nuclear weapon.⁸² Yet in terms of detecting a non-nuclear-weapon state's diversion of such material, the IAEA sets its *timeliness detection goal* as one month.⁸³

Other plausible proliferation scenarios raise serious alarms because they illustrate how non-nuclear-weapon states, through the possession of overt or covert nuclear fuel-making technologies, can clandestinely acquire weapons-ready nuclear material long before the IAEA's is able to detect such clandestine acquisition. For example, if a non-nuclear-weapon state possesses irradiated direct-use materials, such as the sort of plutonium-laden spent nuclear fuel generated by light water reactors ("LWRs"), reprocessing experts from Oak Ridge National Laboratory suggested in an August 1977 technical brief illustrated how such a state, using simple industrial tools and a compact facility, could build a concealed "quick and dirty" reprocessing plant.⁸⁴ Or if such a state possesses declared or clandestine centrifuge enrichment capability and nuclear fuel containing lightly enriched uranium ("LEU"), an "indirect-use" material used in LWRs, former Nuclear Regulatory Commissioner Victor Gilinsky, MIT professor Marvin Miller and former weapons-lab physicist Harmon Hubbard describe in a 2004 report the relative ease and rapidity with which such a state could enrich this LEU to weapons-usable highly enriched uranium.⁸⁵ "It is now generally appreciated that gas centrifuge plants for LEU can fairly easily

⁸² IAEA *Safeguards Glossary*, 2001 Edition, sec. 3, para. 13, table I.

⁸³ *Ibid.*, sec. 3, para. 20.

⁸⁴ See D.E. Ferguson, "Simple, Quick Processing Plant," Memorandum to F.L. Culler, Oak Ridge National Laboratory, August 30, 1977. See also J.A. Hassberger, "Light-Water Reactor Fueling Handling and Spent Fuel Characteristics," Fission Energy and Systems Safety Program, Lawrence Livermore National Laboratory, circa February 26, 1999.

⁸⁵ As Gilinsky, Miller and Hubbard argued:

Having a gas centrifuge plants producing LEU makes it much easier to construct and operate a clandestine one. The presence of the larger plant would mask many of the intelligence indicators and environmental indications of a clandestine one so it would harder to find.

But even in the absence of any commercial enrichment—in the case of a country with one or more stand alone LWRs—the presence of LWRs means that a substantial supply of fresh LWR fuel would also be present at times. That such fresh fuel can provide a source of uranium for clandestine enrichment is another possibility

be turned into plants for HEU,” Gilinsky and company explained. “It is less appreciated that LEU at, say, 4 percent enrichment, is about 80 percent of the way to HEU. It takes comparatively little additional ‘separative work’ to upgrade LEU to HEU. It would be difficult for the IAEA to keep close enough track of all the LEU to stay ahead of any such conversion.”⁸⁶

Nuclear Facilities: Detecting Abrupt and Protracted Diversions

When applying safeguards to nuclear material at facilities, the Agency has further translated its detection goals into what it now terms the *IAEA inspection goal*, defined as “[p]erformance targets specified for IAEA verification activities at a given facility as required to implement the facility safeguards approach.”⁸⁷ In determining the components of the IAEA inspection goal at facilities, the Agency uses the concept of a “material balance period”—that is, the amount of time between inventory accounts of declared nuclear materials at a given facility⁸⁸—to categorize the rate at which diversions at facilities can occur: *abrupt diversions*, which occur when “the amount diverted is 1 SQ or more of nuclear material in a short time (*i.e.*, within a period that is less than the material balance period)”; and *protracted diversions*, which

that has received essentially no attention in proliferation writings. Since the fuel is already low enriched uranium, a much smaller gas centrifuge plant would suffice to raise the enrichment to bomb levels than would be the case if the starting point is natural uranium. By starting with such LEU fuel pellets, which are uranium oxide (UO₂), the enricher would be able to skip the first five processes required to go from uranium ore to uranium hexafluoride gas, the material on which the gas centrifuge operate. To go from the uranium oxide pellets to uranium hexafluoride the would-be bomb-maker would crush the pellets and react the powder with fluorine gas. Suitably processed, the LEU pellets could provide feed for clandestine enrichment.

See Gilinsky, *et al.*, *A Fresh Examination of the Proliferation Dangers of Light Water Reactors* (Washington, DC: Nonproliferation Policy Education Center, October 22, 2004), p. 14.

⁸⁶ *Ibid.*

⁸⁷ *IAEA Safeguards Glossary*, 2001 Edition, sec. 3, para. 22.

⁸⁸ The *IAEA Safeguards Glossary* more technically defines a “material balance period” as:

Under an INFCIRC/153-type safeguards agreement, the term is used to refer to the time between two consecutive physical inventory takings (PITs) as reflected in the State’s material balance report. Under an INFCIRC/66-type safeguards agreement, the term is used to refer to what more accurately should be called the book balance period, since the beginning and the ending dates of the period are not necessarily linked to PITs.

See *ibid.*, sec. 6, para. 47.

occur when “the diversion of 1 SQ or more occurs gradually over a material balance period, with only small amounts removed at any one time.”⁸⁹ The IAEA inspection goal at facilities thus consists of two corresponding components: the *timeliness component*, which “relates to the periodic activities that are necessary for the IAEA to be able to draw the conclusion that there has been no abrupt diversion of 1 SQ or more at a facility during a calendar year”⁹⁰; and the *quantity component*, which “relates to the scope of the inspection activities at a facility that are necessary for the IAEA to be able to draw the conclusion that there has been no [protracted] diversion of 1 SQ or more of nuclear material over a material balance period and that there has been no undeclared production or separation of direct use material at the facility over that period.”⁹¹

However, when the Agency administers safeguards on nuclear material at so-called “bulk-handling” facilities—such as “plants for conversion, enrichment (or isotope separation), fuel fabrication and spent fuel reprocessing, and storage facilities for bulk material,”⁹² it sometimes faces difficulties in meeting the IAEA inspection goal. In using materials accountancy to establish the timeliness and quantity components of the IAEA inspection goal at facilities, the Agency generally assumes a “detection probability” of 95%, a “false alarm probability” of 5%, and a measurement error of $\pm 1\%$. The *false alarm probability*, which the IAEA defines as “[t]he probability ... that statistical analysis of accountancy verification data would indicate that an amount of nuclear material is missing when, in fact, no diversion has occurred,”⁹³ depends on both the estimated total amount of nuclear material going through the

⁸⁹ *Ibid.*, sec. 3, para. 10.

⁹⁰ *Ibid.*, sec. 3, para. 24, emphasis added.

⁹¹ *Ibid.*, sec. 3, para. 23.

⁹² *Ibid.*, sec. 5, para. 28.

⁹³ *Ibid.*, sec. 3, para. 17.

facility during an interval of time, and the threshold amount of the facility's nuclear material that the Agency must measure as missing during this time interval before it will begin suspecting a diversion.

The serious risks raised by abrupt diversion were outlined above, in the section discussing the gap between the conversion times of various nuclear materials and the respective IAEA's *timeliness detection goal* metrics for such materials. With respect to protracted diversions, the Agency faces even more serious difficulties in determining whether or not the "measured" missing nuclear material is explained by simply a measurement error or, since the quantity diverted from the facility at any one time over the material balance period need only be small compared to the absolute amount of material accounted for during the period, by an actual protracted diversion.

In a 1990 essay, MIT professor Marvin Miller offers an example in which a State operates a commercial-sized plutonium reprocessing plant, through which 800 metric tons of spent nuclear fuel passes annually. To arrive at a *false alarm probability* of no more than 5% and a corresponding *detection probability* of 95% at such a plant over a one-year material balance period, Miller calculates that the IAEA would have tolerate as much as 246 kilograms of "measured" missing plutonium—an amount equivalent to over 30 significant quantities (or nuclear weapons-worth) of plutonium.⁹⁴

⁹⁴ As Marvin M. Miller explained in 1990:

A relevant example is the planned 800 tonne/yr Rokkasho reprocessing facility at Aomori in Japan. Assuming that: (1) the plant processes spent fuel with an average total plutonium content of 0.9%; (2) the error in measuring the MUF, specified by $\sigma(\text{MUF})$, is dominated by the error in measuring the plutonium input, and is equal to 1% of this input, and (3) the material balance calculation is done once a year, then the absolute value of $\sigma(\text{MUF}) = 72$ kg of Pu/yr. It is straightforward to show that the minimum amount of diverted plutonium which could be distinguished from this measurement "noise" with detection and false alarm probabilities of 95% and 5%, respectively, is $3.3 \sigma(\text{MUF})$, or 246 kg in this example, equivalent to more than 30 significant quantities.

See Miller, "Are IAEA Safeguards on Plutonium Bulk-Handling Facilities Effective?," *op. cit.*

Even if the IAEA should detect a discrepancy pointing potentially to protracted diversion at a nuclear fuel-making facility, resolution of the discrepancy, in all likelihood, would be far from timely. “If a large discrepancy is detected, the Agency will have to spend months working with the plant operator to figure out the technical reason for the discrepancy, prior to officially declaring the discrepancy an anomaly that needs to be resolved,” argued Paul Leventhal. “The process of resolving an anomaly to the point of determining whether a suspected diversion should be reported to the IAEA Board of Governors could take months more, as could the process of the Board determining whether the matter needs to be referred back to the [IAEA] inspectors for further resolution or is of a magnitude to be referred to the UN Security Council.”⁹⁵

With good reason, then, did Dr. Pierre Goldschmidt, the former IAEA Deputy Director General for Safeguards and Verification, concede after leaving the Agency that “there are still problems inherent in ensuring that, in ‘bulk facilities,’ even small amounts of nuclear material—a few kilograms among tons—are not diverted without timely warning.”⁹⁶ Moreover, as Edwin Lyman of the Union of Concerned Scientists, one of many analysts today arguing for the IAEA to accept higher *false alarm probabilities*, recently noted, “The Agency’s reluctance to pursue higher confidence levels for detection of diversion, at the expense of higher false alarm rates, would seem to be a lesser concern in the context of the heightened security levels that have become standard operating practice around the world since the 9/11 attacks.” He added:

Today, most people are willing to tolerate a level of sensitivity for security screening at airports and critical facilities that would not have been acceptable in the past because of a common appreciation that the occasional false alarm is an appropriate price to pay to ensure that policy of

⁹⁵ Paul Leventhal, “Safeguards Shortcomings: A Critique.”

⁹⁶ Pierre Goldschmidt, “The Nuclear Non-proliferation Regime: Avoiding the Void,” Nonproliferation Policy Education Center, February 28, 2006, p. 3 <available at <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Paper060221%20Goldschmidt%20-%20The%20Nuclear%20Non-proliferation%20Regime%20-%20Avoiding%20the%20Void&PDFFolder=Essays>>.

as close to zero-tolerance as possible for the prevention of another 9/11-scale terrorist attack. Similarly, the standards for assurance that safeguards on plutonium used in the civil sector will be stringent enough to ensure an extremely high level of deterrence against diversion or theft should likewise be increased today, *yet it has not been*.

“On the contrary,” Lyman lamented, “a growing appreciation of the inability of current measures to meet quantitative detection goals have led to a retreat from the notion that such goals should even be considered as standards for future achievement.”⁹⁷ He explained:

Although society may tolerate small leaks from a chemical plant to the environment if the hazards are limited, when the material in question can be used to build nuclear weapons, there is no acceptable level of leakage into the hands of hostile states or terrorists. The consequences of a single nuclear weapon falling into the wrong hands would be so catastrophic that there must be a zero-tolerance policy for diversion.⁹⁸

If the very standards which the IAEA has established for safeguarding nuclear fuel-making cannot be met, then claims that the entire nuclear fuel-cycle can be effectively safeguarded should be not merely questioned, but also directly challenged.

Sufficiency of IAEA Resources

The extent to which the IAEA actually possesses sufficient resources to perform its mission remains unclear. In turn, this uncertainty points to the larger issue of whether the Agency can effectively safeguard nuclear activities, and thus verify the fulfillment of the obligations of NPT signatories.⁹⁹

In September 2006, Henry D. Sokolski of the Nonproliferation Policy Education Center warned of the growing gap between IAEA resources and safeguarding responsibilities when he

⁹⁷ Edwin S. Lyman, “Can Nuclear Fuel Production in Iran and Elsewhere Be Safeguarded Against Diversion?,” an essay presented at *After Iran: Safeguarding Peaceful Nuclear Energy*, London, UK, October 2005, p. 7, emphasis added <available at <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=Paper050928LymanFuelSafeguardDiv&PDFFolder=Essays>>.

⁹⁸ *Ibid.*, p. 15, emphasis added.

⁹⁹ For background on the issue of IAEA resources, see Thomas Shea, “Financing IAEA Verification of the NPT,” a paper presented to *Assessing the IAEA’s Ability to Verify the NPT*, Paris, France, November 12-13, 2006 <available at <http://www.npec-web.org/Essays/20061113-Shea-FinancingIAEAVerification.pdf>>.

testified before the U.S. House of Representatives’ Subcommittee on National Security, Emerging Threats, and International Relations. Below *Table 3*, which the author assisted Sokolski in preparing, gives the figures on the IAEA’s safeguards budget obligation in constant dollars, and amounts of unirradiated direct-use nuclear materials for the years 1984 and 2004.¹⁰⁰

Table 3: IAEA Safeguards Budget, and Safeguarded Weapons-Usable Nuclear Materials in Non-Nuclear-Weapon Signatories of the NPT

	As of 1984	As of 2004
IAEA Safeguards Budget Obligation (In Constant Fiscal Year 2004 U.S. Dollars)	\$45.7 million	\$104.9 million
Separated Plutonium (Pu) Outside Reactor Cores	7.7 tonnes	89.0 tonnes
Highly Enriched Uranium (HEU)	11.8 tonnes	32.0 tonnes
Total IAEA Safeguarded Weapons-Usable Nuclear Materials	19.5 tonnes	121.0 tonnes

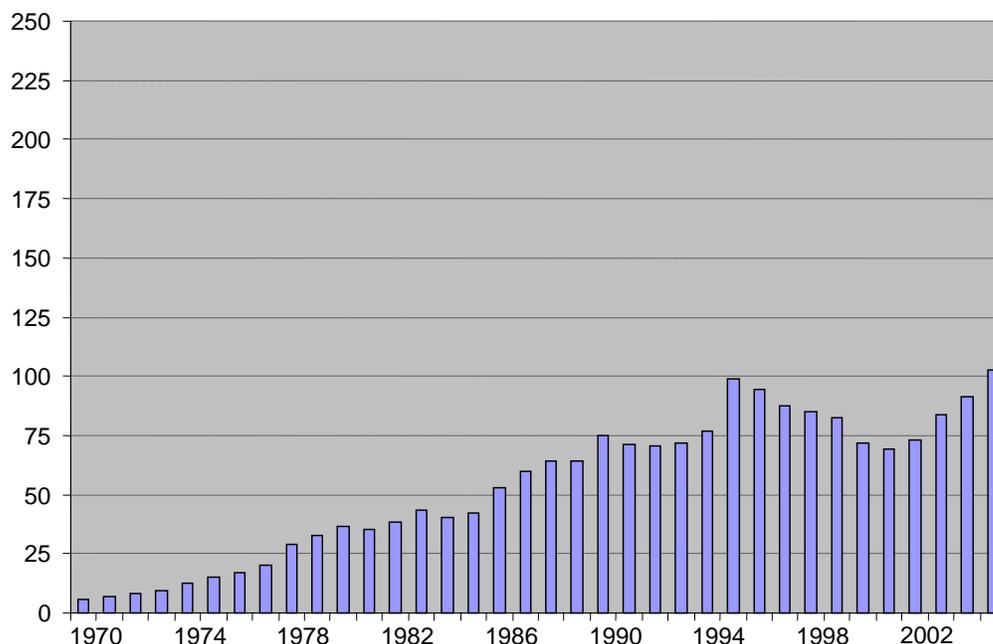
Data Sources: For data on the IAEA’s safeguards budget obligation in current—not constant—U.S. dollars, see *The Agency’s Accounts for 1984*, GC(XXIX)/749, p. 26; and *The Agency’s Accounts for 2004*, GC(49)/7, p. 47. For data on the amount of nuclear material safeguarded by the IAEA, see *Annual Report for 1984*, GC(XXIX)/748 (Vienna, Austria: IAEA, July 1985), p. 63; and *Annual Report for 2004*, GC(49)/5, Annex, Table A19.

Over a twenty year period, the IAEA’s safeguards and verification budget only roughly doubled in constant dollars, while civilian stockpiles of plutonium and highly-enriched uranium in non-nuclear-weapon States—unirradiated weapons-ready nuclear materials for which the Agency must account—increased by a factor of six.

Below, *Figure 1* graphically illustrates the IAEA’s safeguards budget obligation in

¹⁰⁰ *Table 3* is adapted from Henry D. Sokolski, “Clarifying and Enforcing the Nuclear Rules,” prepared testimony before *Weapons of Mass Destruction: Current Nuclear Proliferation Challenges*, a hearing before the Committee on Government Reform’s Subcommittee on National Security, Emerging Threats, and International Relations, U.S. House of Representatives, September 6, 2006 p. 3, *fn.* 2, <available at <http://www.npec-web.org/Frameset.asp?PageType=Single&PDFFile=20060921-FINAL-Sokolski-TestimonyHouseSubcommittee&PDFFolder=Testimonies>>.

**Figure 1: IAEA Safeguard Budget Obligations, 1970-2005
(Estimated Constant FY2000 \$USD Millions)**



Data Sources: For data on the IAEA’s safeguards budget obligation in current—not constant—U.S. dollars, see *The Agency’s Accounts for 1970*, GC(XV)/459, (Vienna, Austria: IAEA, July 1971), p. 12; *The Agency’s Accounts for 1971*, GC(XVI)/484, (Vienna, Austria: IAEA, July 1972), p. 16; *The Agency’s Accounts for 1972*, GC(XVII)/504, (Vienna, Austria: IAEA, August 1973), p. 16; *The Agency’s Accounts for 1973*, GC(XVIII)/527, (Vienna, Austria: IAEA, August 1974), p. 16; *The Agency’s Accounts for 1974*, GC(XIX)/549, (Vienna, Austria: IAEA, August 1975), p. 13; *The Agency’s Accounts for 1975*, Draft, GOV/1781, (Vienna, Austria: IAEA, April 1976), p. 11; *The Agency’s Accounts for 1976*, GC(XXI)/581, (Vienna, Austria: IAEA, June 1977), p. 13; *The Agency’s Accounts for 1977*, GC(XXII)/598, (Vienna, Austria: IAEA, July 1978), p. 13; *The Agency’s Accounts for 1978*, GC(XXIII)/611, (Vienna, Austria: IAEA, August 1979), p. 16; *The Agency’s Accounts for 1979*, GC(XXIV)/629, (Vienna, Austria: IAEA, July 1980), p. 18; *The Agency’s Accounts for 1980*, GC(XXV)/645, (Vienna, Austria: IAEA, July 1981), p. 18; *The Agency’s Accounts for 1981*, GC(XXVI)/665, (Vienna, Austria: IAEA, July 1982), p. 20; *The Agency’s Accounts for 1982*, GC(XXVII)/685, (Vienna, Austria: IAEA, August 1983), p. 20; *The Agency’s Accounts for 1983*, GC(XXVIII)/714, (Vienna, Austria: IAEA, August 1984), p. 20; *The Agency’s Accounts for 1984*, GC(XXIX)/749, (Vienna, Austria: IAEA, August 1985), p. 26; *The Agency’s Accounts for 1985*, GC(XXX)/776, (Vienna, Austria: IAEA, August 1986), p. 30; *The Agency’s Accounts for 1986*, GC(XXXI)/801, (Vienna, Austria: IAEA, August 1987), p. 46; *The Agency’s Accounts for 1987*, GC(XXXII)/836, (Vienna, Austria: IAEA, August 1988), p. 46; *The Agency’s Accounts for 1988*, GC(XXXIII)/874, (Vienna, Austria: IAEA, August 1989), p. 42; *The Agency’s Accounts for 1989*, GC(XXXIV)/916, (Vienna, Austria: IAEA, July 1990), p. 44; *The Agency’s Accounts for 1990*, GC(XXXV)/954, (Vienna, Austria: IAEA, August 1991), p. 52; *The Agency’s Accounts for 1991*, GC(XXXVI)/1005, (Vienna, Austria: IAEA, August 1992), p. 68; *The Agency’s Accounts for 1992*, GC(XXXVII)/1061, (Vienna, Austria: IAEA, August 1993), p. 24; *The Agency’s Accounts for 1993*, GC(XXXVIII)/4, (Vienna, Austria: IAEA, August 1994), p. 18; *The Agency’s Accounts for 1994*, GC(39)/5, (Vienna, Austria: IAEA, August 1995), p. 22; *The Agency’s Accounts for 1995*, GC(40)/9, (Vienna, Austria: IAEA, August 1996), p. 36; *The Agency’s Accounts for 1996*, GC(41)/9, (Vienna, Austria: IAEA, August 1997), p. 34; *The Agency’s Accounts for 1997*, GC(42)/6, (Vienna, Austria: IAEA, August 1998), p. 50; *The Agency’s Accounts for 1998*, GC(43)/5, (Vienna, Austria: IAEA, August 1999), p. 44; *The Agency’s Accounts for 1999*, GC(44)/5, (Vienna, Austria: IAEA, July 2000), p. 50; *The Agency’s Accounts for 2000*, GC(45)/7, (Vienna, Austria: IAEA, August 2001), p. 46; *The Agency’s Accounts for 2001*, GC(46)/6, (Vienna, Austria: IAEA, July 2002), p. 32; *The Agency’s Accounts for 2002*, GC(47)/4, (Vienna, Austria: IAEA, August 2003), p. 44; *The Agency’s Accounts for 2003*, GC(48)/9, (Vienna, Austria: IAEA, August 2004), p. 39; *The Agency’s Accounts for 2004*, GC(49)/7, (Vienna, Austria: IAEA, August 2005), p. 47; and *The Agency’s Accounts for 2005*, GC(50)/8, (Vienna, Austria: IAEA, July 2006), p. 54.

To convert the current U.S. dollars (USD) into crudely estimated constant FY2000 USD, the author inferred deflators from data of the U.S. Department of Defense’s Office of the Comptroller and the Congressional Budget Office.

constant fiscal year 2000 U.S. dollars from 1970, the year when the NPT entered into force, to 2005. As the graph shows, after 1995 the IAEA safeguards budget obligation did not just experience zero real growth, but rather contracted significantly, and began only within recent years to return to mid-1990s spending levels. Such trends in IAEA funding have led nonproliferation experts like Sokolski to call for drastic revisions to the IAEA's budget and system by which the Agency assess governments for annual funding. "If we are serious about safeguarding against the spread of nuclear weapons and preventing nuclear theft or terrorism," Sokolski told the House subcommittee, "these trends [of under-funding the IAEA] must change." In fact, in October 2006 IAEA Director General Mohamed ElBaradei himself argued emphatically for more Agency resources:

Our [safeguards] budget is only 130 million dollars. That's the budget with which we're supposed to verify the nuclear activities of the entire world.... Our budget, as I have said before, is comparable with the budget of the police department in Vienna. So we don't have the required resources in many ways to be independent, to buy our own satellite monitoring imagery, or crucial instrumentation for our inspections. We still do not have our laboratories here in Vienna equipped for state-of-the-art analysis of environmental samples.¹⁰¹

At a minimum, ElBaradei's argument suggests that more transparent discussion of the extent to which the IAEA, given its limitations in financial and other resources, is capable of administering effective safeguards worldwide.

¹⁰¹ ElBaradei, "Addressing Verification Challenges," October 16, 2006, *op. cit.*

Towards Greater Candor: Effective Safeguards vs. Mere Monitoring

Since the 1991 Gulf War, the IAEA has moved to clarify its legal inspection authority,¹⁰² and improve its technical capabilities.¹⁰³ To meet the danger posed by the emergence of *virtual nuclear-weapon states*, though, the Agency should consider doing much more.

In particular, the IAEA—given its inability at times to meet, in practice, key safeguarding standards, as well as its budgetary limitations—should candidly admit what dangerous nuclear materials (*e.g.*, direct-use materials, such as highly enriched uranium, mixed-oxide fuels and separated plutonium) and activities (*e.g.*, nuclear fuel-making, especially at bulk-handling facilities) for which it cannot provide timely warning of diversion, and thus cannot effectively safeguard. Moreover, the Agency should make a point of describing and identifying its accountancy, inspection, containment and surveillance of these activities and materials as, at best, “monitoring” rather than “safeguarding.”¹⁰⁴ Indeed, with greater candor and clarity about

¹⁰² In February 1992, for example, the IAEA Board of Governors affirmed that the Agency’s comprehensive safeguards agreements apply not only to declared nuclear material, but also to undeclared nuclear material that falls under the safeguards agreements and therefore should have been declared. See IAEA, *The Safeguards System of the International Atomic Energy Agency*, sec. B, para. 13 <available at http://www.iaea.org/OurWork/SV/Safeguards/safeg_system.pdf>.

In May 1997, moreover, the IAEA Board approved the so-called *Additional Protocol*, a voluntary agreement which provides the Agency greater authority to inspect both the nuclear materials and the nuclear activities and technologies of states that have signed and ratified it. See IAEA, *Model Protocol Additional to the Agreement(s) Between State(s) and the International Atomic Energy Agency for the Application of Safeguards*, INFCIRC/540 (Corrected), September 1997.

¹⁰³ See Nikolai Khlebnikov, David Parlse, and Julian Whichello, “Novel Technologies for the Detection of Undeclared Nuclear Activities,” IAEA-CN-148/32, released by NPEC on March 2007 <available at <http://www.npec-web.org/Essays/20070301-IAEA-NovelTechnologiesProject.pdf>>. Co-author Dr. Whichello serves as Head of the IAEA’s Novel Technologies Unit of the Division of Technical Support’s Section for Technical Support Coordination.

¹⁰⁴ Henry D. Sokolski made this point when he testified before the House Subcommittee on National Security, Emerging Threats, and International Relations:

The IAEA may be able to monitor nuclear fuel-making in rough terms, but it cannot inspect these facilities to provide timely warning of diversions or thefts equivalent to many nuclear weapons. It should admit this publicly. This would help put a spotlight on the dangers associated with additional governments trying to create even more nuclear fuel-making plants than already exist.

See Sokolski, “Clarifying and Enforcing the Nuclear Rules,” *op. cit.*

Eldon V.C. Greenberg made a comparable point in 1993, when he wrote: “The NPT negotiators contemplated that safeguards had more than a merely formal role to play. If that role cannot be effectively fulfilled with respect to

the IAEA's safeguarding shortfalls, the Agency can help to clarify the line between effectively safeguardable, and therefore truly "safe," nuclear materials and activities, and those which are not currently safeguardable and thus not merely "sensitive," but also inherently "dangerous."¹⁰⁵ In turn, such candor from the IAEA can substantially bolster the efforts of governments seeking to counter the "loop-hole" reading of the NPT with a sustainable interpretation that can help to prevent the emergence of more *virtual nuclear-weapon states*.

Moving Away from a Crowd of *Virtual Nuclear-Weapon States*

On the morning of October 9, 2006, the Democratic People's Republic of Korea exploded a nuclear weapon.¹⁰⁶ Using the "loop-hole" reading of the Nuclear Nonproliferation Treaty, North Korea became the first ever non-nuclear-weapon state to use the treaty as cover for the overt and covert production of weapons-usable fissile material, and then to quit the treaty, and later build and detonate a nuclear explosive device.¹⁰⁷

The "loop-hole" reading of the NPT will all but guarantee the emergence of more nuclear fuel-making states—of what IAEA Director General Mohamed ElBaradei now terms, *virtual*

particular assistance or activities, then perhaps, in the presence of other factors, i.e., risk, lack of economic viability, such forms of assistance or activities should fall within the Treaty's prohibitions." See Greenberg, "The NPT and Plutonium," *op. cit.*, p. 19.

¹⁰⁵ It is worth noting that the Agency's November 2006 decision to deny technical cooperation with the Iranian government, which has failed to comply fully its NPT and IAEA safeguards obligations, at Iran's heavy-water reactor at Arak is welcome development in the direction of candor. For further background, see IAEA, *Cooperation Between the Islamic Republic of Iran and the Agency in the Light of United Nations Security Council Resolution 1737 (2006)*, Report by the Director General, GOV/2007/7, February 9, 2007 <available at <http://www.iaea.org/Publications/Documents/Board/2007/gov2005-7.pdf>>.

¹⁰⁶ See "Statement by the Office of the Director of National Intelligence on the North Korea Nuclear Test," Office of the Director of National Intelligence ("ODNI") News Release No. 19-06, October 16, 2006.

¹⁰⁷ North Korea acceded to the NPT on December 12, 1985, but officially withdrew from the treaty and terminated its IAEA safeguards agreement on January 11, 2002. See United Nations News Center, "Security Council Notified of DPR of Korea's Withdrawal from Nuclear Arms Accord," January 10, 2003; and IAEA, *Report of the Director General on the Implementation of the Resolution Adopted by the Board on 6 January 2003 and of the Agreement Between the IAEA and the Democratic People's Republic of Korea for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, GOV/2003/4, January 22, 2003.

nuclear weapon states. As we have seen, however, the NPT need not be read this way. The treaty can and should be interpreted in a pragmatic and sustainable way that rejects claims of the *per se* right of signatories to nuclear fuel-making; and the IAEA, through greater candor, can and should support such a pragmatic and sustainable reading of the NPT.

Within the last few years, Iran's nuclear intransigence and North Korea's nuclear detonation have created a greater sense of urgency among governments seeking to curb nuclear proliferation. For example, in an attempt to clarify further the extent to which nuclear technology, materials and know-how should be exchanged, the French Republic went so far as to propose a set of criteria during the lead-up to the 2005 quadrennial NPT review conference, criteria which importing states would need to meet in order to receive nuclear goods. "The export of such materials, facilities, equipment or related technologies," France suggested in a May 2004 working paper, "should only be envisaged in the light of the existence of a set of conditions relevant to the global non-proliferation regime and NPT objectives"—conditions such as:

- an alleged energy need in the [importing] country;
- a credible nuclear power generation program and related fuel cycle needs;
- an economically rational plan for developing such projects;
- an Additional Protocol [granting the IAEA greater legal authority to inspect for undeclared nuclear materials and activities] brought into force and implemented before any physical transfer or transfer of know-how;
- the highest standard of non-proliferation commitments;
- the effective and efficient implementation of an export control system with adequate sanctions;
- the highest standard of nuclear security and safety;
- an analysis of the stability of the country and the region concerned.¹⁰⁸

¹⁰⁸ French Republic, *Strengthening the Nuclear Non-Proliferation Regime*, Working Paper Submitted to the Preparatory Committee for the 2005 Review Conference of the Parties of the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2005/PC.III/WP.22, May 4, 2004, p. 2 <available at <http://disarmament2.un.org/wmd/npt/2005/PC3-listofdocs.html>>.

Within recent months, moreover, the U.S. government has again signaled its support of proposals in the French working paper.¹⁰⁹ That said, the U.S. and like-minded governments have yet to counter directly readings of the NPT's Article IV affirming the *per se* right, or the unqualified *per se* right, to nuclear fuel-making.¹¹⁰

If Article IV of the NPT is international law's equivalent of a Rorschach Test, then what a government claims to see in this treaty provision—either a loop-hole to *virtual nuclear-weapon state* status, or clear criteria limiting the scope of “nuclear energy for peaceful purposes” to which signatories have an “inalienable right”—certainly reveals a great deal about how it views the NPT's fundamental and overriding goal of nuclear nonproliferation. Certainly, the clarity (or confusion) with which governments seeking to curb proliferation interpret Article IV will substantially impact the decisions of other NPT signatories in the not-too-distant future.

Although a consistent and sustainable reading of the NPT, by itself, cannot prevent the emergence of future proliferation problems, it can provide governments with a clear and legal foundation for effective policies which, at the very least, de-legitimize “loop-hole” readings of Article IV, and thus strongly discourage other NPT signatories from imitating, or even improving upon, the North Korean and Iranian examples. In contrast, a confused and muddled answer—or, equally as bad, no response at all—will have precisely the opposite effect. It will encourage ever more signatories to believe, and act on the belief, that they have a right under all circumstances, even noncompliance with NPT and IAEA obligations, to any nuclear activity short of inserting fissile material into a nuclear weapon. In such a world, signatories in full

¹⁰⁹ Christopher Ford, “The NPT Review Process and the Future of the Nuclear Nonproliferation Regime,” Remarks by the U.S. Special Representative for Nuclear Nonproliferation to the NPT-Japan Seminar, *NPT on Trial: “How Should We Respond to the Challenges of Maintaining and Strengthening the Treaty Regime?”*, Vienna, Austria, February 6, 2007 <available at <http://www.state.gov/t/isn/rls/rm/80156.htm>>.

¹¹⁰ As mentioned above (*see fn.* 15), however, individual members of the U.S. government have attempted to counter unqualified readings of Article IV.

compliance with their NPT and IAEA obligations would face, to borrow key phrases from Article 32 of the *Vienna Convention on the Law of Treaties*, the “manifestly absurd” and “unreasonable” outcome of ever more *virtual nuclear-weapon states* like Iran, and ever more actual nuclear-armed states like North Korea.