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A COMPARISON OF THE ADDITIONAL PROTOCOLS OF THE FIVE NUCLEAR WEAPON STATES AND THE ENSUING SAFEGUARDS BENEFITS TO INTERNATIONAL NONPROLIFERATION EFFORTS

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ABSTRACT

With the 6 January 2009 entry into force of the Additional Protocol by the United States of America, all five declared Nuclear Weapon States that are part of the Nonproliferation Treaty have signed, ratified, and put into force the Additional Protocol. This paper makes a comparison of the strengths and weaknesses of the five Additional Protocols in force by the five Nuclear Weapon States with respect to the benefits to international nonproliferation aims. This paper also documents the added safeguards burden to the five declared Nuclear Weapon States that these Additional Protocols put on the states with respect to access to their civilian nuclear programs and the hosting of complementary access activities as part of the Additional Protocol.

INTRODUCTION

Under the Nonproliferation Treaty (NPT), all nuclear-weapon states (NWS) agree not to assist any non-nuclear-weapon state (NNWS) in the development or acquirement of nuclear weapons. Article III of the NPT obligates all NNWS-members to conclude Safeguards Agreements with the IAEA to prevent diversion of nuclear materials from peaceful uses to military programs.[1] The NWS, the United States, the United Kingdom, France, Russia, and China, are not obligated by the NPT to submit to safeguards, but all concluded Safeguards Agreements with the International Atomic Energy Agency (referred heretofore as the "Agency") "for the purpose of encouraging widespread adherence to the Treaty by demonstrating to non-nuclear-weapon States that they would not be placed at a commercial disadvantage by reason of the application of safeguards pursuant to the Treaty."[2] In choosing from the facilities eligible for the application of safeguards in NWS under their Voluntary Offer Agreements, the Agency considers "whether useful experience may be gained in implementing new safeguards approaches or in using advanced equipment and technology."[3] Drafted in 1997, the Additional Protocol (AP) expanded the scope of the Safeguards Agreements to include non-nuclear materials and equipment. The Additional Protocol also provides for Complementary Access privileges by Agency inspectors to verify the absence of undeclared activities. The NPT obligates no state to ratify the AP, but those that do demonstrate to the international community comprehensive transparency in their civilian nuclear programs. NWS are also not required to ratify the AP, yet all have now signed and ratified customized AP agreements that fit the particular nature of national security interests in each country. The information NWS offer to the Agency through their APs is entirely voluntary and goes above and beyond treaty obligations. The United States Congress has emphasized that "the United States has acceded to the Additional Protocol to demonstrate its commitment to the nuclear nonproliferation regime and to make United States civil nuclear activities available to the same IAEA inspections as are applied in the case of non-nuclear-weapon State Parties."[4] While all NWS have now promoted strengthened safeguards through ratifying the AP and allowing the Agency some measure of authority to monitor activities within their borders, none has adhered to the full Model AP, as eighty-six NNWS now have.[5] To what extent does adherence to the Model AP by NWS promote the aims of the non-proliferation regime? Agency safeguards in NWS, including implementation of the AP, provide

NWS with the opportunity to act in solidarity with the NNWS members of the NPT, to promote the extended safeguards system in other countries (including those *not* party to the NPT, such as India, Pakistan, and Israel), and to share the international economic burden of the integrated safeguards regime. The more fully NWS submit to this regime with NNWS, the more fully they demonstrate the importance, relevance, and practicality of the international nonproliferation effort.

THE UNITED STATES ADDITIONAL PROTOCOL

The AP entered into force in the United States on 6 January 2009. The United States adopts the full text of the Model AP but includes what is now known as the National Security Exclusion (NSE) in Article 1.b: "The United States shall apply, and permit the Agency to apply, this Protocol, excluding only instances where its application would result in access by the Agency to activities with direct national security significance to the United States or to locations or information associated with such activities."[6] Additionally, Article 1.c of the United States' AP states that managed access may be used to protect activities and locations of direct national security significance, whereas the Model AP only provides for the use of managed access to protect commercially sensitive information or meet safety requirements.[7] The NSE is a provision unique to the Additional Protocol of the United States. The United States may choose to invoke the NSE unilaterally and without justification to the IAEA or to other member states. The NSE shall be used to exclude access to or to invoke the use of managed access procedures to protect all activities, locations, and information under the jurisdiction of the Department of Defense (DOD). Some locations and activities of direct national security significance include DOD-owned installations and defense-funded research and development programs, technologies, military capabilities, and intelligence operations, as well as any contractor-owned and operated facilities associated with defense activities critical to maintaining the superiority of the United States military.[8]
Apart from the addition of the NSE in Article 1, the remainder of the text of the United States' AP is identical to the Model. Most notably, the United States volunteers all information specified in Article 2.a, the specific contents of which are outlined in Table 1, and Article 2.b, which relates to nuclear fuel cycle research and development activities not funded or authorized by the government. The United States' AP also includes Articles 4, 5, and 6, which outline the procedures and locations of Complementary Access (CA), as well as Article 9, which allows for wide-area environmental sampling. The AP of the United States excludes no provision that a NNWS must report to the Agency. Table 2 further outlines the contents of each article of the United States AP compared to the Model AP.

The implementation of all provisions of the Model AP significantly increases the burden of safeguards in the United States because it must both collect reports pursuant to Article 2 as well as prepare declared facilities for CA. As a NWS that voluntarily allows inspections under CA, the United States faces a unique burden in submitting to Agency safeguards, for it must thoroughly distinguish civilian activities from DOD-related activities. Preparations for CA include collecting, reviewing, and submitting the declarations for each safeguarded facility in addition to each new facility under the AP, as well as practicing the use of Managed Access and the NSE at facilities where civilian programs and activities of direct national security significance collide. In theory, the NSE provides a mechanism to choose a few isolated, easily accessed programs and facilities at which to apply the AP, or even to block Complementary Access entirely. Under the Safeguards Agreement of the NPT the United States currently volunteers two facilities for safeguards, the Y-12 High Enriched Uranium (HEU) Plant and the K-Area Material Storage site of weapons plutonium in

Savannah River. Under the AP, however, the United States submits several additional research institutions, especially the Department of Energy national laboratories, in the AP declaration to strengthened safeguards, and the time needed to prepare these facilities for CA may explain why the United States did not ratify the AP until eleven years after it opened for signature. As evidenced by the extent of its AP declarations, the United States continues to invest towards the goal of obtaining, as far as possible, transparency in its civilian nuclear activities, despite the complication of a nuclear weapons program residing within the same borders as its declared activities. By including all provisions of the Model AP, the United States establishes a mechanism that allows for continually deepening the breadth and scope of AP declarations in the future.

It is difficult to define what is necessary to encourage wider adherence to the AP and to the NPT, especially before it is known what kind of global influence the precedent of the United States will have. Yet in undertaking implementation of the full Model AP voluntarily, the United States demonstrates its commitment to encouraging adherence to the integrated safeguards system. Each effort to prepare AP declarations and to prepare safeguarded facilities for CA further demonstrates the United States' assertion that the AP is a credible and valuable addition to the safeguards regime. As the United States continues to maximize efforts to submit to the authority of the IAEA, it repeats the message that no country, NWS or NNWS, has the excuse of attempting anything less.

EURATOM AND THE ADDITIONAL PROTOCOLS OF THE EUROPEAN UNION, THE UNITED KINGDOM, AND FRANCE

During the Cold War, the United States sought to work with the countries of Western Europe to build a policy integrating nuclear programs in order to share the costs and responsibilities of maintaining the Western nuclear deterrent.[9] After the failure of the European Defense Community Treaty, which created a commission to coordinate the development, production, and trade of all military technologies, both conventional and nuclear, France, West Germany, Italy, Belgium, the Netherlands, and Luxembourg signed the Euratom Treaty in 1957. Rather than announcing specific policy, the treaty invests Euratom with the supranational authority to create the nuclear economic policy that will govern the member states. In essence, the treaty is a constitution which provides for the centralization and standardization of nuclear energy economic policy that will meet the energy needs of European countries. Primarily, Euratom seeks to facilitate the growth of nuclear energy by acting as an economic intermediary between European countries through a common market. While the treaty establishing Euratom does not forbid the production of nuclear weapons, it promotes projects in every area in the nuclear arena except those relating to weapons technology.[10]
Today Euratom falls under the General Energy and Transport Directorate of the European Commission (DG TREN).[11] Currently, all countries belonging to the European Union (EU) belong to Euratom, with the exception of Romania. In the directorate mission statement, EU member states are encouraged to cooperate to overcome the energy and transportation challenges that cannot be properly addressed by any national government acting alone. These challenges include those unique to the development of nuclear energy. As an organization Euratom specializes in the services of security and supply of nuclear fuel; it has become an important liaison between the IAEA and European Union member states. Though the initial goal of Euratom safeguards was transparency through material accountancy rather than the prevention of nuclear weapons programs, recently Euratom renewed its commitment to nuclear non-proliferation by issuing a communication detailing the legal mechanisms in place within Euratom that could be used to extend the nonproliferation regime.[12] Clarifying Euratom's role in nonproliferation will be increasingly

important, especially with the advent of implementation of the Additional Protocol in Europe and the accession of 12 new EU member states since April 2005.

On 30 April 2004 the AP agreement between Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, Euratom, and the IAEA entered into force (INFCIRC 193).[13] As NNWS Parties to the NPT, each of these countries adopted the Model Additional Protocol verbatim. However, reporting responsibilities are divided up between the state and "the Community," or Euratom. This division is due to the limited scope of Euratom safeguards already in place, which are applied only to ores, source materials, and special fissile materials.[14] Under the AP, the Community's jurisdiction is thus limited to activities associated with those materials (Article 2.a.v, vi, and vii). The remaining activities fall outside of Euratom's safeguards and are related instead to research and development and non-nuclear materials and equipment (Articles 2.a.i, ii, iv, ix, and x). Table 1 details the specifics of Article 2.a of the Model AP. Both the state and the Community provide information pursuant to Articles 2.a.iii and viii. An additional Annex III to the AP contains clauses clarifying the reporting responsibilities of the states and the Community, especially in regards to transfers to NNWS outside the Community. Annex III also emphasizes the cooperation of the IAEA and the Community in applying the AP. Although each state and the Community share the responsibility of reporting certain activities to the IAEA, the APs of these countries exclude no provision that a NNWS outside the Community would have to report to the IAEA. Euratom is granted quasi State System Accounting for and Control of Nuclear Materials (SSAC) authority within some member states, and serves to oversee and coordinate certain parts of the declarations made in each member-state of the Community. A member-state of Euratom belongs to one of two categories for implementation of the AP. Site-letter States defer all AP declarations for non-nuclear, civilian activities to Euratom, which serves as a supranational SSAC. Non-site letter States have SSACs independent of Euratom, which take responsibility for declarations under the AP. These states do not defer any authority to Euratom for their AP declarations.

As the Euratom Treaty deals exclusively with peaceful nuclear programs, Euratom safeguards "may not extend to materials intended to meet defense requirements."[15] The Nonproliferation Treaty and the ensuing Safeguards Agreements narrow this privilege to extend only to the nuclear weapon states (NWS) in the European Union, the United Kingdom and France. The Additional Protocols of the United Kingdom and France both entered into force on 30 April 2004. As NWS party to the NPT, the United Kingdom and France have customized their APs to forward the specific goal of preventing the spread of nuclear weapons to a NNWS. Both the United Kingdom and France limit the provisions in Article 2 to those activities done for or in-cooperation with a NNWS. Both APs omit Article 2.a.iii and 2.b.ii of the Model AP. France also omits Article 2.a.vii. Although both countries provide for Complementary Access (Articles 4-8), the United Kingdom allows wide-area environmental sampling only where it will contribute to the Agency's ability to confirm the absence of undeclared materials and activities in a NNWS, and France eliminates wide-area environmental sampling entirely (Article 9). The remainder of the provisions in Article 2 is divided between the state and the Community as previously described.

Although the proper relationship between Euratom and the IAEA is difficult to determine, the two organizations each contribute uniquely to the international nonproliferation regime. Since the advent of the New Partnership Approach (NPA) in 1992, the Agency and Euratom have worked together to decrease the redundancy of inspections, to increase the use of technologies that would

reduce the physical presence of inspectors at safeguarded facilities, and to cooperate in training of inspectors, while still enabling both organizations to abide by their treaty obligations and reach independent conclusions.[16] On May 7, 2008, the IAEA and Euratom signed a Joint Statement to reinforce cooperation between the two organizations, specifically in the areas of nuclear safety, radiation protection, enhancement of national infrastructures in countries seeking nuclear energy, safeguards and nonproliferation, nuclear security, supply of nuclear material and services, technology and research, human health and agriculture, and environmental protection.[17]

Despite the inherent tension between the IAEA and Euratom arising from the overlap in their activities, the two organizations contribute to and complete each other's missions in many ways. In the Preamble to the Euratom Treaty, the signatories recognize "that nuclear energy represents an essential resource for the development and invigoration of industry and will permit the advancement of the cause of peace" and contribute to the "prosperity of their peoples." In contrast to the NPT, which promotes nuclear energy as a means to eradicate nuclear weapons globally, the Euratom Treaty promotes nuclear energy more constructively and approaches nonproliferation in a more realistic context by recognizing the economic incentives of obtaining an advanced nuclear industry. Part of this difference can be attributed to the historical context of the two treaties. The Euratom Treaty has political roots in the Cold War, during which achieving a balance of power in Europe favorable to the United States was more important than preventing the general spread of weapons technology. The Nonproliferation Treaty, however, highlights the growing threat of a network of non-state actors upon whom the normal rules of supply, demand, and deterrence may no longer apply.[18] While in the world today the Euratom model of promoting the sharing of technology and resources through a supranational federation may not be sufficient to abate this threat, it may provide a scheme that can be adapted to other regions to create stability in the nuclear market, thereby treating one of the causes, and not merely the symptoms, of proliferation. In reality, the independent approaches of the IAEA and Euratom work together in the dual goal of promoting nuclear energy and preventing the dissemination of nuclear weapons technology, which benefits the international nuclear nonproliferation regime more than either could on its own.

THE ADDITIONAL PROTOCOLS OF RUSSIA AND CHINA

A 3 July 1998 Statement from the Government of the Russian Federation to the IAEA Secretariat states that the provisions of the Model Additional Protocol will be applied to activities concerning "nuclear exports to non-nuclear weapon States, Russian nuclear material located on the territory of other States, and international cooperation with non-nuclear-weapon States in the field of the nuclear fuel cycle which has nuclear non-proliferation significance."[19] The Additional Protocol of the Russian Federation entered into force on February 16, 2000 (INFCIRC 327). Article 1 of the document closely resembles the United States' National Security Exclusion: "The Russian Federation shall apply and shall permit the Agency to apply this Protocol, with the exception of only those cases where its application would jeopardize the security or the national interest of the Russian Federation."[20]

Consistent with the goals of the Russian AP as stated in the 3 July 1998 declaration, the scope of information volunteered in Article 2.a is limited to those activities carried out in association with a NNWS. Articles 2.a.iii, vii, and x are omitted. Most importantly, the Russian AP omits Articles 4 through 9 of the Model AP, the sections discussing complementary access and wide-area environmental sampling. No facilities are currently safeguarded within Russia's borders, and Complementary Access under the AP is prohibited. By eliminating complementary access from

their AP, Russia significantly reduces the burden of implementing the AP, for they do not have to prepare for Managed Access of foreign nationals to their nuclear installations, nor do they have to prepare declarations for any additional institutions. Rather, the information that Russia offers through its AP will confirm information on transfers and collaboration with NNWS. Much of this information may be redundant to the IAEA, for it will also receive these declarations from any NNWS also abiding by the AP.

The Additional Protocol entered into force in China on 28 March 2002.[21] In addition to limiting the information provided to the Agency pursuant to Article 2 to activities conducted for or in-cooperation with a NNWS, China eliminates Articles 2.a.i-iii of the Model AP. The Chinese AP omits Article 2.a.ix of the Model AP, which would allow the Agency to request to confirm imports into China of non-nuclear materials and equipment listed in Annex II. As in the Russian AP, all Articles related to Complementary Access by the Agency and wide-area environmental sampling (Articles 4-9) have been eliminated. Article 10, which details the information provided by the Agency to China regarding its activities and conclusions, has also been omitted. All other articles are identical to the Model AP. Like Russia, China limits the provisions of the AP to those activities done for or in-cooperation with a NNWS, and thereby also limits the burden of organizing and collecting declarations for additional facilities as well as preparing such locations for Complementary Access by Agency inspectors.

Russia and China tailor their AP declarations to the specific goal of preventing proliferation to a NNWS. By implementing the AP, albeit a modified version, these countries go above and beyond their treaty obligations and openly reaffirm their interest in cooperating with the IAEA and in promoting the strengthened safeguards system. However, the scope of information volunteered to the Agency within their AP declarations is limited. For example, Article 2.b of the Model AP requests extensive information about the research and development of the fuel cycle not specifically funded, authorized, or controlled by the state. China reduces the depth of information provided through this clause to those activities undertaken in association with a NNWS, and volunteers to provide this information upon request of the Agency.[22] Often the information volunteered by China and Russia is repetitive of information that NNWS submit via their own declarations to the Agency. In terms of the breadth of information, the AP declarations of China and Russia are thus limited in scope, and the international nonproliferation effort is benefited more by their statement of cooperation than by the actual information volunteered. Moreover, China and Russia significantly reduce the burden of implementing the AP by eliminating Complementary Access from their AP declarations. Specifically, Article 5 of the Model AP provides the Agency with access to a site, locations and activities under Article 2, and any decommissioned facility. Articles 5 and 6 enable the Agency to carry out verification activities, such as environmental sampling, radiation detection, application of seals, examination of production and shipping records, and item counting. Article 7 details Managed Access procedures. In addition, since Article 2 is limited to activities associated with a NNWS, no declarations for facilities active in strictly domestic activities are affected. By eliminating these provisions of the Model AP, China and Russia reduce the burden of preparing for implementation of the AP in comparison to all NNWS party to the NPT, the United States, France, and the United Kingdom.

CONCLUSION

The Additional Protocol expands the Agency's jurisdiction towards the goal of ensuring the world community that no undeclared, non-peaceful nuclear activities are pursued within that country.

While legal preparations for this strengthened authority are costly to all member-states, the expense, both in time and resources, is more burdensome in those submitting to Complementary Access by Agency inspectors. Complementary Access, though invasive in nature, is necessary for inspectors to go beyond material accountancy and build a comprehensive view of the proliferation risks inherent in the state's nuclear program. Both Complementary Access and environmental sampling are powerful tools that strengthen the Agency's international nonproliferation efforts. By ratifying the Additional Protocol, all NWS party to the NPT have contributed to building confidence in the Agency's efforts. Yet an ongoing attempt to build and maintain transparency in all nuclear activities is needed, especially in NWS, to ensure that the full burden of the strengthened safeguards system is shared. The more fully NWS adhere to the provisions of the Model AP, the more fully they demonstrate the necessary and urgent nature of the Agency's continuing effort.

Table 1. The Content of Article 2.a of the Model Additional Protocol

Article 2.a	Content
i	Description/location of activities related to nuclear fuel cycle R&D not involving nuclear material, funded/authorized by the State
ii	Expected gains in effectiveness/efficiency on operational activities at or near facilities with nuclear material
iii	Description of use and contents of each building on a site, including maps.
iv	Scale of operations for each location engaged in activities of Annex I
v	Location, status, annual production capacity of uranium mines, and uranium and thorium concentration plants.
vi	For source material not pure enough for fuel fabrication or enrichment: quantity, composition, use, import/export of aggregate of ten metric tons uranium or 20 metric tons thorium
vii	For nuclear material exempted from safeguards pursuant to paragraphs 36b and 37 INFCIRC 153*, the quantity, use, and location
viii	Location and further processing of intermediate or high-level waste containing plutonium, HEU, or uranium-233 on which safeguards were terminated under paragraph 11 of INFCIRC 153**
ix	Annex II material: export (identity, quantity, location, date), import (confirm)
x	Ten year plan for development of nuclear fuel cycle.

*INFCIRC 153 paragraph 36b: Nuclear materials maybe exempted from safeguards when that nuclear material is used in non-nuclear activities, such as the production of ceramics or alloys, if such material is recoverable. The Agency and the State shall agree on the nature of safeguards termination (paragraph 13).
INFCIRC 153 paragraph 37 stipulates that nuclear material may be exempted from safeguards if it does not exceed one kilogram of special fissionable material, defined as plutonium or uranium enriched to specified levels, or ten metric tons total of natural and depleted uranium, twenty metric tons of depleted uranium enriched to 0.5%, or twenty metric tons of thorium.
**INFCIRC 153 paragraph 11: Safeguards on nuclear material shall terminate when the Agency determines that such material has been consumed or diluted in a way that prevents its use for nuclear activity, or when it has become irrecoverable.

Table 2. Comparison of the Model AP to the APs of NWS

INFCIRC		540 Model	288 United States	263 United Kingdom	290 France	327 Russia	369 China
Entry into Force		Printed 1997	6 Jan 2009	30 Apr 2004	30 Apr 2004	16 Oct 2007	28 Mar 2002
Article 1		Relationship: AP vs. Safeguards Agreement	Adds NSE			Adds NSE	
Article 2		Provision of Information		Reports activities done with NNWS. Omits 2.a.iii, 2.b.ii.	Reports activities done with NNWS. Omits 2.a.iii, vii, 2.b.ii.	Reports activities done with NNWS. Omits 2.a.iii, vii, x, 2.b.ii	Reports activities done with NNWS. Omits 2.a.i-iii. Limits 2.b.
Article 3		Timeliness of State Reporting					
Article 4	Complementary Access	IAEA Procedures				Omitted	Omitted
Article 5	Complementary Access	Relevant Locations			Omitted 5.a.i,ii,iii and locations under 2.a.v,vi,viii	Omitted	Omitted
Article 6	Complementary Access	Methods/Activities				Omitted	Omitted
Article 7	Complementary Access	Managed Access				Omitted	Omitted
Article 8	Complementary Access	Additional Locations				Omitted	Omitted
Article 9		Wide-area Environmental Sampling		To help detect undeclared activities in NNWS.	Omitted	Omitted	Omitted
Article 10		Agency's Report to State					Omitted
Article 11		Agency Inspectors					
Article 12		Visas					
Article 13		Subsidiary Agreements					
Article 14		Communication Systems					
Article 15		Protection of Information					
Article 16		Annexes		Adds Annex III	Adds Annex III		
Article 17		Entry into Force					
Article 18		Definitions					
Annex I		Activities in Article 2.a.iv					
Annex II		List of Non-nuclear Material for Article 2.a.ix					

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