Ephraim Asculai

Rethinking the Nuclear Non-Proliferation Regime



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Preface

"A time to rend and a time to sew"
Ecclesiastes 3:7

"When written in Chinese the word 'crisis' is composed of 2 characters. One represents danger, and the other represents opportunity."
John Fitzgerald Kennedy

That something is gravely amiss with the nuclear non-proliferation regime in general, and the Nuclear Non-Proliferation Treaty (NPT) in particular, is a reality slowly being accepted by the world community. As was made clear at an NPT-related conference, "multilateral instruments such as disarmament, IAEA safeguards, security guarantees and nuclear transfer restrictions and export controls might not be sufficient as a whole to deal with new forms of nuclear threats and challenges. . . . Symptomatic for problems and difficulties in these areas are unresolved compliance concerns in NPT States Parties, notably Iraq and North Korea, as well as a sense of helplessness and cluelessness with respect to the nuclear weapon capabilities of Non States Parties."[1]

It is a moot point who or what is to blame for the present state of affairs, and mourning the situation will not do anyone any good. Rather, recognition of a problem is the first step in dealing with it. Now that the inadequacy of the regime has been identified, although perhaps not yet universally recognized, the next step is to try and remedy it. There are two apparent ways in which this can be done: patchwork and starting afresh from the beginning. In the case of the nuclear regime, patchwork seems to be the route that was tried but found lacking, since it attempted to tackle one of the major issues – verification – and did not deal with any other aspect of non-proliferation. Beginning again from first principles is the opposite approach. However, in the present state of affairs, scrapping the past achievements would probably be like pouring the baby out with the bathwater. Therefore, what remains is to take a comprehensive remedial approach, and make the transition from one regime to the other as smooth as possible.

The present work is an attempt towards that end. As it currently stands, it can be viewed as an intellectual exercise. At the same time, it will propose changes that could be applied to the present nuclear non-proliferation regime, and as such embodies a more immediate, practical potential. Though not posited as the only solution, it is coherent, comprehensive, and one that has a chance of success, if the seriousness of the situation is recognized and if it receives the wide-ranging support that is necessary for its application.

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Introduction

The Nuclear Non-Proliferation Treaty (NPT), which came into being in the late 1960s and entered into force in 1970, has long been the cornerstone of the non-proliferation regime. Although one cannot be certain how many states abandoned their military nuclear ambitions because of this treaty, there can be no doubt that the international atmosphere improved greatly because of it. During the time the treaty has been in force, all but three states joined it, thus making its acceptance almost customary under international law.

The NPT is not a purely declarative treaty. In addition to the principles delineated by the treaty, it establishes implementation rules, including obligations for action by the states that are parties to the treaty, and verification provisions for the assurance that states are not violating its rules. It is also a discriminatory treaty, distinguishing between nuclear weapons states (NWS) and non-nuclear weapons states (NNWS), setting different rules of behavior for these categories. Certainly its most important provision is that states parties to the treaty that have not acquired a nuclear weapons capability by a certain date are obligated not to acquire this capability nor assist others in doing so. This is can be seen as the starting point for a future universal nuclear disarmament.

Verification of the states' compliance with the treaty obligations was entrusted to the International Atomic Energy Agency (IAEA), which was established in 1957 for the promotion of peaceful uses of this relatively new but very promising source of energy and technologies. For the purpose of verification, the IAEA implemented its safeguards capability, which included an inspectorate as well as the development of new techniques and technologies to assist the inspectors in carrying out their duties. Although many states did not fulfill their obligations to conclude safeguards agreements with the IAEA, this was not seen as a serious violation of the treaty, and no action other than mention of the fact was taken. Another obligation that was disregarded was not to assist any state in the development of nuclear weapons. However, while innumerable instances of supplying sensitive technologies and know-how to developers of these weapons were uncovered, it was still debatable whether

a state had done so either knowingly or by turning a blind eye, or whether the entire blame rested on commercial entities for having conducted illicit transactions with the offending states.

All went relatively well until the early 1990s, when serious cracks in the treaty appeared as Iraq and North Korea, both parties to the NPT, were found to have been developing nuclear weapons. The reaction of the international community was two-pronged: dealing with the offending states and improving the verification mechanism. The hope was that these actions would close the loopholes and restore the faith in the system, but this proved not to be the case. In 2002, information began to emerge that Iran was conducting activities and procuring materials contrary to its obligations. In late 2003, Libya admitted that it too was involved in clandestine uranium enrichment activities. Suspicions began to surface concerning other states, but because of the weaknesses of the present verification system, there is no way the international community can legally confirm or negate them.

Notwithstanding the unfolding dangerous situation, the NPT five-year review conferences have not taken any action to remedy the declining state of affairs, and in 1995 the NPT was extended indefinitely, without any change to the treaty provisions or its language. Moreover, since the IAEA Department of Safeguards, the agent responsible for verification, has not been very effective, the United States became the driving force behind the efforts that led to uncovering the illicit activities of the four above-mentioned states, which further weakened the international nuclear non-proliferation regime. Complementing the lapses has been the complex matter of the three states that have not joined the treaty, India, Pakistan, and Israel. In 1998 two of them conducted underground nuclear tests, and thus de facto became nuclear weapons states. The world community, although angered at these tests and at the states for defying an accepted international norm, did not take any decisive action other than to condemn them.[1]

Hence the current situation whereby the NPT itself as well as the international non-proliferation norm have been abused, with no action to remedy the situation in sight. Accordingly, it is incumbent on the forthcoming 2005 NPT Review Conference to address the issue. If it does not, the deterioration will continue, probably leading to serious developments with other states embarking on nuclear weapons development programs, and possibly even resulting in the disintegration of the international regime that was so painstakingly set up.

The incentive to rethinking the principles and application of the nuclear non-proliferation regime is thus the present deteriorating situation. Before delving into the subject, we might project the possible outcomes should the current state of affairs

continue unchanged. An optimistic scenario envisions the following: North Korea, the most blatant case of noncompliance with the NPT, will be persuaded to rescind its intentions, dismantle its military nuclear program, and submit to Additional Protocol safeguards. Iran would also agree to this framework. Other states under the original verification system would accede to the Additional Protocol, as would all states that have not concluded any safeguards agreements with the IAEA.

A more realistic assessment depicts the present situation continuing, but with no new acute developments. This assumes, for example, that the North Korea crisis, while not resolved, would not further deteriorate (the Security Council would not adopt any resolution condemning North Korea and North Korea will not take any action to become a proven de facto nuclear weapons state); that Iran would ratify the Additional Protocol and abandon its nuclear weapons ambitions; that no new proliferators would be uncovered; and that no new legal instruments would be adopted. This script, however, would not lead to the resolution of the situation. On the contrary, the downhill gradient would remain the same, leading to the third, most probable, and bleakest outcome. If North Korea does not cease its fissile materials production activities, it will eventually acquire a considerable nuclear arsenal. Combined with its missile capability and its aggressive external policies and internal difficulties, this arsenal will pose a significant threat to world peace. Clearly, a stable equilibrium will not be achieved in this situation.

Iran, even if it accedes to the Additional Protocol, will be able to proceed towards the acquisition of a considerable inventory of fissile materials or advanced source materials (from which the production of military grade materials is but a short step), mainly though not entirely in the area of uranium enrichment. All this could be accomplished legally, under the umbrella of the NPT and its safeguards provisions. All that would remain between Iran and nuclear weapons would be a withdrawal from the NPT, under any pretext allowed by the treaty. This could then be followed by the rapid production of fissile materials, the most essential component of a nuclear explosive device.

The underlying assumption of the work that follows is that an international regime is still the best answer to the non-proliferation issue, since any nationally led solution would not be universally accepted. The purpose here, therefore, is to examine the treaty and the evolving deterioration concerning its implementation and suggest changes that should be made if the treaty's mission is to be upheld. Maintaining the present attitude that changes are to be resisted can only aggravate the situation. Rather, a fresh look is needed to underscore that changes would be of universal benefit and might relieve the world of an increasingly volatile state of affairs.

The study below discusses two approaches to remedy the situation: making the regime stronger, while making it more attractive to adhere to its requirements, and making the verification regime stronger and less prone to cheating. To that end, the study reviews the main components that form the nuclear non-proliferation regime: the Nuclear Non-Proliferation Treaty (NPT), the Nuclear Suppliers Group (NSG), the verification mechanisms, and possible future instruments: a Fissile Materials Cutoff Treaty (FMCT) and the goal of total nuclear disarmament. The Comprehensive Test Ban Treaty (CTBT), although part of the regime, will not be considered, since it is a stand-alone legal instrument, not influenced by the others. Within the discussion of the NPT this study will also attempt to tackle the issue of the three states that are not parties to it.

The main problems facing the regime are the inefficiency of the verification mechanism, and the possibility of states acquiring all necessary technologies for the production of fissile materials, the basic component of any nuclear explosive device, and then withdrawing from the NPT. The seriousness of this second problem was amply demonstrated in the case of North Korea, and has become a cornerstone issue in the case of Iran. A related challenge that is not managed effectively is the supply of materials, know-how, and technologies to countries seeking a nuclear weapons capability. The gravity of this issue was demonstrated in the cases of Iran and Libya, which received both know-how and technologies from a third party.

Current measures designed to address the problems are the Additional Protocol, which deals with the deficiencies of the verification mechanism, the Nuclear Suppliers Group, and the proposed Fissile Materials Cutoff Treaty. However, these do not comprise a comprehensive solution, and the main problem remains the ability of states to attain "legally" the potential to produce the fissile materials and engage in production after abandoning their legal obligations. The following proposal for a new, improved regime will focus on these problems and their potential resolution, along with the conundrum of the three non-NPT states.

Chapter 1

Nuclear Non-Proliferation: Past, Present, and Possible Future

The Treaty

The Nuclear Non-Proliferation Treaty has not been amended or modified since its inception.[1] The stated purpose of the treaty is to stop the spread of nuclear weapons beyond the five nuclear weapons states (NWS) that existed at the time the treaty entered into force.[2] The longer range aim of the treaty is the cessation of production of new nuclear weapons, leading ultimately to the destruction of existing stockpiles and, finally, universal nuclear disarmament. However, any realization of these ultimate aims lies far in the future, and hence the emphasis on the immediate purpose of the treaty, reserving a look at the long term for later in the study. Below is a concise review of the treaty provisions that are relevant to the present discussion.

- The Preamble to the treaty sets forth the principles that are embodied in the articles that follow, including the need "to avert the danger of such a war . . . [to conform with the UN resolutions] calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons . . . to co-operate in facilitating the application of International Atomic Energy Agency safeguards . . . [to make available] the benefits of peaceful applications of nuclear technology . . . [which] should be available for peaceful purposes to all Parties to the Treaty. . . [declaring] their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament." In addition, "States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State."
- Articles I and II of the NPT address the NWS and the NNWS, respectively. The first obligates the NWS to deny assistance to NNWS that would facilitate their

quest for nuclear weapons, while the latter obligates the NNWS themselves to refrain from developing any such weapons or seeking assistance for developing them.

- Article III establishes the requirement of all NNWS to accept safeguards and to conclude an agreement with the IAEA for this purpose.
- Article IV affirms the right of all states to utilize nuclear energy and technologies to the fullest extent, without discrimination, for peaceful purposes. It urges cooperation on this matter by all parties to the treaty.
- Article V is almost irrelevant today, since it deals with the possibility of making use of peaceful nuclear explosions. The Comprehensive Test Ban Treaty (CTBT), adopted in 1996, did away with this possibility.
- Article VI is an undertaking by all parties to the NPT to pursue discussions on the cessation of the production of nuclear armaments, leading to the ultimate aim of universal nuclear disarmament.
- Article VII affirms the continued right of states to conclude separate regional treaties to promote the absence of nuclear weapons in their territories.
- Article VIII defines the provisions for amendments to the treaty and outlines the mechanisms for their adoption.
- Article IX includes the definition of the NWS: "a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to January 1, 1967."
- The final article that is significant for the present discussion is Article X, which considers the option of withdrawing from the treaty. The article states that "each party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests."

What is missing from the treaty? Most notably, the treaty does not include any enforcement provisions. Its language demonstrates that when the treaty was conceived, it was viewed as a proclamation of good will, and as such, did not provide for any action against those who choose to disregard their obligations.[3]

The treaty does not provide for a technical secretariat. The IAEA serves as the verification branch of the treaty, but it deals only with NPT issues related to verification and not with issues of enforcement or the treaty's legal issues. If anything is amiss, the IAEA may report to the UN Security Council but according to the treaty, it is not obligated to do so. The only mechanism the treaty stipulates is a five-year review cycle, "with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized." However, this does not provide the mechanism that is essential if adherence to the treaty is to be followed closely.[4]

Threats to the Regime

The Regime Track Record

The implementation of the NPT, or more accurately of the nuclear non-proliferation regime, has been and will continue to be the topic of discussion for a long time to come. It is common to begin any such discussion with a review of the many accomplishments of the regime, and many there were. The gloomy forecasts that many states would acquire a military nuclear capability were disproved, and all but three states joined the NPT. Moreover, quite a few states abandoned their plans for the production of nuclear weapons either in the planning stages, in an advanced stage, or, in the case of South Africa, even when nuclear weapons had been already produced.

However, this is not good enough. Even a single NNWS party to the NPT producing nuclear weapons undermines the nuclear non-proliferation regime, and unfortunately cases like this are not unknown. North Korea, a self-declared nuclear state, has withdrawn from the treaty. Iraq was proven to have almost reached a military nuclear capability, and Iran is strongly suspected of trying to achieve this objective. Libya has admitted to having had a nuclear weapons development program, and Algeria is also suspected of activities and capabilities that contradict the aims of the NPT. Beyond the treaty, two of the non-NPT member states, India and Pakistan, conducted nuclear tests and have declared a nuclear military capability, and Israel has long been suspected of possessing nuclear weapons.

Moreover, there are many states that are in noncompliance with the NPT, although this fact is little noticed, since a "technical" misdeed is often dismissed as negligible in comparison with the major issue of proliferation. However, the "technical" issue is that more than a quarter of the parties to the treaty have not concluded the required safeguards agreements with the IAEA, in spite of the very detailed guidelines set

down in Article III, which thus constitutes more than a simple technical oversight. In some cases, this might be a serious omission that could potentially backfire into the face of the world. For example, in Saudi Arabia, which failed to sign a safeguards agreement, terrorist groups in addition to the state could be in possession of nuclear materials, yet the IAEA does not have the required mandate to carry out any basic inspection, let alone inspections according to the stricter Additional Protocol.[5]

Five principal outstanding issues of the nuclear non-proliferation regime that threaten its enforcement are:

- The illicit quest for and development of nuclear weapons
- The provision of illicit assistance (know-how, equipment, and materials) to states developing nuclear weapons
- The failure in the implementation of Article IV
- The possibility of withdrawal from the NPT
- The three non-NPT states

The Illicit Quest for and the Development of Nuclear Weapons

Four states, parties to the NPT, were found to be in serious breach of their NPT obligations: Iraq, North Korea, Iran, and Libya. Each case differs from the others. Iraq was confirmed by special Security Council-appointed inspection teams as having sought a military nuclear capability; North Korea's plutonium production activities were accidentally discovered by IAEA inspectors; Iran's violations became known upon disclosure by an Iranian dissident group; and Libya's activities were uncovered by US intelligence. Were these a single case of noncompliance, they would not be viewed as seriously detrimental to the nuclear non-proliferation regime. However, the fact that there were at least four states that were willing to incur the risk of discovery is serious enough to test the strength of the regime. The motivating impulses for each case are different, but two conclusions are certain: these states considered that the goal was important enough for them to make the effort, and they thought they could escape premature detection.

Three main impulses underlay the violations: national threat perception, hegemony/prestige, and aggression/expansionist ambitions. These reasons are not necessarily mutually exclusive. Only in the case of the third reason would the state keep its activities secret until "the right time." In the other two cases, either overt disclosure or at least strong hints of the possibility that the state is in possession of nuclear weapons would serve its purpose. Significantly, none of the illicit activities were discovered by routine inspections. In addition, most cases would not have been

effectively dealt with without the activities of and the pressure exerted by the United States, either on the IAEA or on the offending state.

Assistance to States Developing Nuclear Weapons

The provision of illicit assistance falls into two categories: when a state provides the assistance and when commercial entities or individuals provide it, with or without the tacit agreement of the state. There have been several known cases when states consciously provided technologies, equipment, and know-how to would be proliferators. In addition, there can always be a prolonged legal quibble as to whether the state in question knew the real purpose of the specific desired item or technology. Such was the case regarding the Osiraq reactor in Iraq, or the substantive Russian and Chinese aid to Iran.[6] These instances demonstrate the advisability of taking a more cautious approach to assistance, which in turn would likely impede those states that intend to produce fissile materials with the potential of producing nuclear explosives.

Concomitantly, there is no doubt as to the extent of the assistance provided by commercial entities and individuals to states seeking nuclear weapons capability. The evidence is significant, and Iraq's case, while extensively documented, is certainly not unique. The suppliers must have well known the purpose of the requests, either because of the unique specifications of the equipment and materials or the quantities purchased, and many governments chose to turn a blind eye to this illegal export.

Highlighting the seriousness of the problem of supply is the discovery that one non-NPT state, Pakistan, supplied three or possibly all four of the NPT states that were found to be actively engaged in programs aimed at the production of fissile materials. This occurred both directly and through intermediaries, although it is uncertain whether these agents were acting with the knowledge or compliance of their host states. At the same time, Pakistan itself was not violating any international obligation, and it is also uncertain as yet whether it was actively involved as an accomplice, it tacitly approved, or it was completely ignorant of the actions. Any one of these possibilities is grave.

Nuclear Suppliers and Article IV

Strangely enough, and in contrast with illicit acquisition of materials, Article IV, which provides for cooperation on nuclear energy and technologies for peaceful purposes, is not implemented in the spirit in which it was written. It is difficult for a NNWS to purchase equipment and materials if they appear on "lists" compiled to restrict such purchases.

The two major international agents in the field of nuclear export controls, the Zangger Committee and the Nuclear Suppliers Group (NSG), are complemented by some regional and national regulations. The Zangger Committee's main export control instrument is the Trigger List, a list of sensitive items that, if exported to NPT parties, trigger IAEA safeguards. The Nuclear Suppliers Group – also known as the London Club – is an informal and voluntary arrangement that establishes a norm of conduct. The supply of materials and equipment to any NNWS is not forbidden, but many of the imports must be placed under safeguards. For dual use goods, the NSG arrangements are:

> Suppliers should not transfer an agreed item
>
> i. if it was for use in a nuclear explosive activity or an unsafeguarded nuclear fuel cycle activity,
> ii. when there was an unacceptable risk of diversion to such an activity, or
> iii. where the transfer was contrary to the objective of averting the proliferation of nuclear weapons.
>
> To make a determination regarding any specific transfer, NSG suppliers have agreed on export licensing procedures that include a list of factors which should be taken into account.[7]

Thus, additional factors complicate the acquisition of supplies and technologies to NNWS that seek them. In most cases, this is not restrictive. However, as is in the case of Iran, export controls are used as a tool against those suspected of illicit activities or ambitions. While the intent is noble, it is not in accordance with the stated purpose of Article IV.

Withdrawal from the NPT

To date, only North Korea has withdrawn from the NPT. It did so under the provisions of Article X, which allows for such a possibility. North Korea did what is required under this article: it gave the required notice and in the letter to the Security Council stated its reasons for doing so.[8] In addition, North Korea declared that it is "totally free from the binding force of the Safeguards Agreement with the IAEA, concluded under Article III of the treaty." Under the terms of the NPT, the Security Council is not required to take any action, or even to debate the matter.[9]

There is an approach that argues that the North Korea's withdrawal is illegal since the state did not fulfill all its requirements under Article X. It is also claimed that

Article X is relevant only for states that are in compliance with the treaty. Once they violated it, the rights under Article X so not apply.

North Korea's experience can be viewed as a serious precedent, whereby a state, having (by its own admission) achieved a nuclear capability, chooses the legal way of abrogating its obligations. This is a dangerous state of affairs, as well as a guiding light for those who wish to develop technologies, produce fissile materials under safeguards, and then withdraw from the NPT, deciding "that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country."

The Non-NPT States

The sole obstacle to universal adherence to the NPT is the three states that are not parties to the treaty, India, Pakistan, and Israel, accordingly dubbed here Other States (OS). The first two have demonstrated nuclear weapons capabilities and the third is strongly suspected of being nuclear weapons-capable. However, since according to the NPT (Article IX) the NWS list is closed, the first two have no way of joining the treaty, unless they agree to disarm themselves of all nuclear capability. Moreover, they cannot join the NSG, because membership is restricted to states that are parties to the NPT. This is a catch-22 affair, since while Pakistan has admitted that its scientists supplied other states with sensitive nuclear technologies, there are in fact no legal restrictions to prevent it from doing so. Indeed, no non-NPT state has any obligation under the NPT or any other international legal instrument regarding nuclear proliferation, with the sole exception of the obligations of safeguards of some specific installations.

The non-NPT states issue became more immediate once India and Pakistan conducted underground nuclear tests in 1998. At first, there were those that called for these two states to join the NPT as NNWS. The demand, however, was entirely unrealistic, as India and Pakistan conducted the tests for a purpose, which did not include nuclear disarmament. The third non-NPT state, Israel, has an apparent policy of opacity, that is, it neither confirms nor denies having a military nuclear capability. In addition, Israel stated clearly that in principle it supports the establishment of a Nuclear Weapons-Free Zone (NWFZ) in the Middle East. However, its declared precondition is the establishment of proven peaceful relations among all nations in the region. At the present time, although this may seem more achievable than before given the precedents of peace treaties between Israel and some of its neighbors, it will probably be a long time before all-encompassing peace is realized.

The objective, then, is to bring these OS into the framework of a non-proliferation regime. The two major issues that would have to be resolved are the prevention of dissemination of nuclear technologies by these three and the establishment of a framework under which all peaceful activities in these states will come under safeguards. These aims must be achieved without bestowing on them the NWS status, since this would not be acceptable to NPT members, and without forcing them to accept an NNWS status, since it is unrealistic at the present state of affairs.

Creating a New Regime

The optimal solution to the problem of the nuclear non-proliferation regime is an integrated solution, since independent resolutions of each issue are difficult to implement and coordinate, if not mutually exclusive. What follows, therefore, are proposed amendments to the regime that will, in their concerted and joint impact, in effect create a new, improved regime.

Resolving the Three States Issue

Of the five threats to the regime's effectiveness, the most serious issue is the relationship between the NPT and the three non-NPT states. Thus, changes are urged to the verification regime that would pave the way for all states to join the NPT. In other words, a more successful regime would modify some of the present treaty's clauses in an attempt to include these states, at least partially, within its framework.[10]

In the Preamble to the NPT, the sixth paragraph could be modified to affirm the parties' commitment to "the principle of safeguarding effectively the flow of {source and special} fissi{onab}le materials."[11] In Article I, the words "nuclear-weapon" and "non-nuclear-weapon" should be deleted, so that the text would read as follows: "Each {nuclear-weapon} State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons . . . and not in any way to assist, encourage, or induce any {non-nuclear-weapon} State to manufacture or otherwise acquire nuclear weapons." Deleting the words augments rather than diminishes the scope of the article.

The critical articles for the future of the treaty, however, are Article II (non-pursuit of nuclear weapons capability by NNWS) and Article III (safeguard requirements for NNWS), since they distinguish between the rights and obligations of NWS and the NNWS. Thus, any current endeavor to enhance the existing non-proliferation regime must find a way of including the non-NPT states (OS). In the discussion that follows, NWS denotes the nuclear weapon states that acceded to the treaty before the year

2003, and NNWS denotes the non-nuclear weapon states that acceded to the treaty before 2003. The term "State Party" refers to all parties: NWS, NNWS, and OS.

In the new version, Article II shall remain unchanged but would take on a new meaning, since it would still refer to the NNWS, but exclude the NWS and the OS from its provisions. Article III, however, should be modified, taking into account a newly defined purpose of verification, i.e., to safeguard the flow of fissile materials, removing the necessity of verifying activities concerning source materials. The first paragraph of this article should therefore read:

> Each {non-nuclear-weapon} State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency . . . for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this Article shall be followed with respect to {source or} special fissi{onab}le 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 fissi[onab]le material in all peaceful nuclear activities.

Thus, safeguards would be universally applied (albeit in a discriminatory manner, as at present). In NNWS, they would be applied to all fissile materials, since these states are committed to conducting only peaceful nuclear activities. At the same time, all NWS and OS would place all fissile materials that are being utilized for peaceful purposes under safeguards.

The next issue in Article III is modified to accommodate the newly defined purpose of verification: "Each State Party to the Treaty undertakes not to provide: (a) {source or} special fissi{onab}le material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissi{onab}le material, to any non-nuclear-weapon State for peaceful purposes, unless the {source or} special fissi{onab}le material shall be subject to the safeguards required by this Article." Similarly, the final paragraph of this article shall be amended accordingly: "{Non-nuclear-weapon} States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency." This provision also enhances the regime, and reduces the discrimination among states.

Learning from past mistakes, it is essential that formally becoming a party to the new regime must hinge on the conclusion of the safeguards agreement between the IAEA and the state. Therefore, this condition should be incorporated into Article IX.

The only other article in the treaty that should be reconsidered is Article X (withdrawal). The possibility of acquiring an advanced nuclear status and then withdrawing from the treaty, so that the final production of fissile materials would not be considered a violation of the treaty, is a threatening one, particularly in light of the North Korea experience. This is a route that notably Iran but other states as well might take, thereby negating any benefit gained by a new NPT. Thus, critical here is the establishment of a norm according to its meaning in international law. There can be no doubt that should all states choose to adhere to the NPT, it will then become a customary international law. The consequences of such an occurrence are far-reaching.

Article 43 of the Vienna Convention on the Law of Treaties, "Obligations imposed by international law independently of a treaty" states: "The invalidity, termination or denunciation of a treaty, the withdrawal of a party from it, or the suspension of its operation, as a result of the application of the present Convention or of the provisions of the treaty, shall not in any way impair the duty of any State to fulfill any obligation embodied in the treaty to which it would be subject under international law independently of the treaty." If the NPT becomes a customary international law, Article 43 would then effectively quash any attempt on the part of a state to withdraw from the NPT and claim immunity from international reprisals under the pretext that it operated within its legal rights.

However, these are not the only modifications to the NPT that should be considered. In order to strengthen the NPT and make it more effective, a mechanism for continuous supervision of its application, for the timely reporting of any noncompliance, and for taking timely action, if necessary, must be set up. This supervision should be carried out by a secretariat of the NPT, aided by a technical standing committee, independent of the IAEA, which would supervise verification, approve all major conclusions, and propose changes and additional activities for the enhancement of inspections and confirming situations in cases of doubt. Any conclusions published by the IAEA Director General (DG) shall be accompanied by the seal of approval by this standing committee.[12]

However, modifying the NPT is not a stand-alone issue in the non-proliferation scheme of things. The verification protocols embodied in INFCIRC/153 and 540 must be modified, in order to take into account essential changes in the scope and purpose of verification. The effective means of stopping the illicit supply of technologies to would-be proliferators must also be considered.

The Internationalization of the Nuclear Fuel Cycle

Enhancing non-discrimination among states by reducing the limitations on exchange of nuclear technologies rests on a distinction between two principal categories: technologies related to the nuclear fuel cycle and other technologies. There should not be any restriction regarding the exchange of information, technologies, and materials for promoting the use of nuclear energy for any purpose other than the nuclear fuel cycle.

The best way to deal with proliferation of technologies related to the nuclear fuel cycle is to internationalize the complete nuclear cycle, while economically competitive supplies of nuclear fuel for nuclear power plants and research reactors should be internationally guaranteed.[13] This would negate the need for states to produce their own nuclear fuel, reprocess it, or store the spent fuel. The plutonium produced and the spent fuel would be stored in internationally controlled repositories. If this is accomplished, there would be no need to withhold assistance to states, since no one adhering to the regime would be prevented from the full use of any nuclear technology for power production, research, or use in medical, industrial, or agricultural applications.

The advantages of such an arrangement are significant, both for the states and for international security. The advantages for world security were discussed by the IAEA DG and as such carry much weight.[14] These include the elimination of the need for states to develop their own costly fuel cycle activities, both at the front and the back-end activities, i.e., the production of nuclear fuel and the disposal of the irradiated fuel, either by storage or reprocessing. It would also wield leverage against those who would be found cheating (although this was not mentioned in the DG's article), which would be an additional security feature.

For the states joining in such an arrangement there would be significant benefits: cheap nuclear fuel resulting in cheap nuclear power, since indigenous programs that are either planned or under construction are generally more costly than well-established programs; freedom from inspections of installations producing, irradiating, or storing irradiated nuclear fuel; and unhindered utilization of all other nuclear technologies. Existing facilities would be managed by international consortiums, and would continue to operate, if economically viable.

By moving from state-owned fuel cycle activities to international commercial entities, the potential problem of political control by international organizations would be eliminated. The only role these organizations would have is as guarantors of supplies, but not as controllers. This would eliminate uncertainties in the assurance of supplies, and commercial competition would provide further reassurance. At the

same time, one should not ignore the challenges raised by such a proposal, particularly the transport of irradiated fuel from the production site to the disposal site, and the establishment of these sites, which would need a much larger capacity, even in today's world, and more so if the envisaged growth in the utilization of nuclear power does materialize. These are significant problems that will have to be sorted out.

The internationalization of the nuclear fuel cycle is an essential component of the proposed regime, since without it the NNWS could be left without nuclear fuel for their legitimate use in nuclear reactors. It is not enough to prohibit the use of enrichment and reprocessing technologies, and therefore a solution must be provided for the provision of nuclear fuel and disposal of irradiated fuel.

The Nuclear Suppliers Regime

The problem of the illicit supply of nuclear technologies (including know-how, equipment, and materials) was always existent but not handled very effectively. The findings of the IAEA Action Team in Iraq brought to light the many misdeeds of many commercial entities in many countries by commission, and the misdeeds of governments by omission, in supplying Iraq with everything it needed for its concealed nuclear weapons development program.

However, the disclosure in early 2004 that key technologies were supplied by Pakistan to the Iranian, Libyan, and North Korean nuclear weapons development programs, although long suspected, shocked the world. Thus, it is clearly imperative to improve the nuclear suppliers regime, in order to stem any eventual flow of nuclear technologies to state and perhaps to non-state actors in the proliferation game. Changing the rules and requirements of the NSG does not require major legal upheavals or decisions taken by UN bodies, since the NSG is a self-governing body. This can and should be done independently of any other changes to the nuclear non-proliferation regime.

The purpose of the NSG is the implementation of the obligation not to assist the NNWS or OS in the acquisition of a military nuclear capability. However, there is a catch in this, whereby the OS, non-members of the NPT, cannot be members of the one regime that could prevent them from aiding proliferators. This must be overcome, if anything is to be achieved.

"The NSG Guidelines aim to ensure that nuclear trade for peaceful purposes does not contribute to the proliferation of nuclear weapons or other nuclear explosive devices which would not hinder international trade and cooperation in the nuclear field. The NSG Guidelines facilitate the development of trade in this area by providing the means whereby obligations to facilitate peaceful nuclear cooperation can be

implemented in a manner consistent with international nuclear non-proliferation norms."[15] The NSG participants are committed "to improve transparency in nuclear related export controls and to cooperate more closely with non-NSG States to achieve this objective. In so doing, it aims to encourage wider adherence to the NSG Guidelines."[16]

This purpose must stand if export controls are to be maintained. However, the control lists must be amended, to conform to the newly defined purpose of the NPT: the control of technologies related to fissile materials production, utilization, and storage. In addition, membership in the NSG must be expanded to include the OS. The NSG conditions for participation in the export control regime include:

- Adherence to the Guidelines and action in accordance with them;
- Enforcement of a legally based domestic export control system which gives effect to the commitment to act in accordance with the Guidelines;
- Adherence to one or more of the NPT, the Treaties of Pelindaba, Rarotonga, Tlatelolco, Bangkok or an equivalent international nuclear non-proliferation agreement, and full compliance with the obligations of such agreement(s);
- Support of international efforts towards non-proliferation of weapons of mass destruction and of their delivery vehicles.[17]

All conditions with the exception of the third point should be fairly easily fulfilled by the three OS. The first condition, which sets the export control mechanisms, should post no difficulty for India and Israel. Pakistan has denied that it is officially assisting others in the development of nuclear weapons, and has taken steps against individuals who acted against this principle. It too should therefore have no difficulty in adhering to this condition. The second condition is a technical one, and its acceptance should not pose any difficulty for any state.

Pursuing the aims of the NSG should pose no problem to any state, unless it intends to export sensitive technologies and abuse its membership for this aim. Yet the sensitive issue of the exchange of information is more complicated. As stated in an NSG document, "Members of the NSG . . . pursue the aims of the NSG through adherence to the NSG Guidelines . . . and through an exchange of information, notably on developments of nuclear proliferation concern."[18] The NSG membership includes many NNWS. These range from states with considerable technical knowledge and the technical capability to produce nuclear weapons should they decide to do so (e.g., Germany and Japan) to some that do not have any nuclear-related infrastructure (e.g., Luxembourg and Cyprus) and are included only because they could become transit points in the transfer of nuclear technologies and materials. Thus, if proliferation

is of concern, the knowledge gained from NSG membership has already exceeded the bounds of NWS. The issue is then not the three OS but those who are parties to the NPT and are suspected of having a clandestine nuclear weapons development problem. Including the OS states would therefore only strengthen the regime and not weaken it. The same holds also for the fourth point, supporting the effort to prevent the proliferation of weapons of mass destruction and of their delivery vehicles. Thus, the NSG conditions for membership should be reformed to enable the inclusion of the Other States in the regime.

Implementing the New Regime

Implementing the Changes to the NPT

There are two possible ways for implementing the proposed modifications to the NPT: amending the present treaty or drafting a new treaty that would replace the old one for all those who accede to it. Strange as it may seem, the amendment route could be the more difficult to achieve. This is based on past experience, such as trying to amend the Statute of the IAEA, which has proven to be a cumbersome and lengthy process and difficult to implement, even after approval by the General Conference. Creating a new arrangement could achieve a large following in a much shorter time. The requirements of Article VIII of the NPT state that in order for an amendment to come into force, it needs

> a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency.

This is certainly an inefficient way to proceed and by no means assures success. It could also take many years to achieve, since in effect a veto power is accorded to many of the parties to the NPT. Therefore, it is suggested that a new treaty be drafted, with legal intricacies left to lawyers. It should replace the old one for all those NPT

members who accede to it, and the conditions for its entry into force should be few and easy to accept. Since these two treaties are not contradictory, no formal withdrawal from the NPT is necessary for those who accede to the new regime.

The Transition from the Old to the New

The preeminent requirement for the transition from one regime to the other is that it be as smooth as possible. The second requirement is that no loopholes that enable misdeeds be included in the process.

There can be no doubt that the suggestion to move from one nuclear non-proliferation regime to another will encounter severe resistance. The sources for this resistance will be quite varied:

- States that have not concluded safeguards agreements with the IAEA will find themselves not included in the regime, since becoming a state party to the new regime will depend on the conclusion of such an agreement.
- States that had no intention of acceding to the Additional Protocol will automatically find themselves in such a verification regime should they join in the new regime.
- States that were not greatly affected by the present regime, such as is the case of states with little or no nuclear infrastructure, will try to exact a price for adhering to the new regime.
- States with present or possible future military nuclear development ambitions (states that do not want to close all their options) will not want to become part of a more stringent regime that could lay put to such ambitions.
- And, perhaps the most serious issue, the inclusion of the Other States (OS) in the new regime is liable to generate much opposition.

On the other hand, as already noted, there are strong enticements for joining the new proposed regime:

- The relief of the burden of inspections, especially for NNWS with extensive nuclear power programs
- The lower degree of prohibitions on the supply of nuclear technologies
- The assurance of the supply of nuclear fuel for nuclear reactors
- The universality of the regime
- The less discriminatory nature of the new regime

Therefore, the requirements for the new regime's entry into force and the procedure for the transition from the old regime to the new one should follow carefully delineated plans, based on the following principles:

- The existing formal arrangements for any state, including safeguards and other obligations, shall remain in force for that state until it becomes party to the new arrangements.
- Conclusion of safeguards agreements according to the new regime shall be a condition for the entry into force of the new regime for any state.
- The new regime will enter into force when all NWS and OS ratify the regime and fulfill the conditions for its entry into force.

As an interim arrangement, because there is great urgency to the present situation, an agreement on the principles of the new regime should be concluded among the NWS and the OS. However, no arrangement can take place until a serious discussion of the verification requirements and mechanisms are established, compatible with the proposed new regime.

Chapter 2

Verification: The Main Implementation Instrument

The Failures of Verification

Verifying the declarations made by a state has two aims: to verify their correctness and to verify their completeness. While the first aim is straightforward, the second one is difficult to achieve. "Absence of proof is not proof of absence": not having proof or even indications to the contrary is still not a proof of compliance with NPT obligations.

If we define verification as the sum total of all measures taken to assess a situation and detect noncompliance, there have been numerous cases of success, when a state was shown to be in contravention of its obligations either according to the NPT or to its safeguards agreements. However, these are outweighed by the gravity of the failures, where every case is potentially very dangerous to world peace.

The failures of verification can be divided into two distinct modes: failures in the *timely detection* of noncompliance and the *non-detection* of noncompliance. The cases of the first kind, which represent the most conspicuous, are demonstrated with Iraq and its failure to declare facilities and activities in Iraq, up to the point where it was very close to the production of a first nuclear weapon; and with North Korea, which is suspected of having produced nuclear weapons from indigenously produced fissile materials by the time inspections showed North Korea's declarations to have been false. Verification failed in North Korea because of the intransigence of the state, in that it did not permit thorough inspections and refused permission for a Special Inspection (which, technically, was its right under the safeguards agreement).

The second category of failure includes instances where verification is unable to assess the situation and neither confirms nor negates the suspicions, and Libya and possibly Algeria are cases in point. Iran too most certainly belongs to this second category, since its activities were not detected by the verification mechanism. Only after information was received from outside sources was Iran first shown to have

acted in contravention of its obligations when it imported significant quantities of nuclear materials without notifying the IAEA.

These failures, grave in their own right, were compounded by the fact that the IAEA was not transparent enough to declare that a problem might exist as soon as it became evident that something was amiss. It later did so only under external pressure. In addition, the corporate culture of the IAEA lauds apparent cooperation on the part of the state when this in fact should be an automatic response on the part of the inspected state and not commended as an outstanding virtue.[1] According to the prevailing culture, only incidents where cooperation was withheld should be mentioned. In addition, the IAEA secretariat differentiates between "technical" misconduct, such as not reporting the imports of materials, and "substantial" noncompliance with the NPT obligations.[2] This distinction is cause for alarm, since a technical misconduct is not taken, as it clearly should be, as an indication of being a part of a larger scheme, leading first to R&D work and later to a weapons development program. Were it not so, there would have been no cause at all for reporting illicit materials, as in the case of Iran.

The Verification Mechanisms

The majority of the present IAEA safeguards activities are carried out according to safeguards agreements based on IAEA document INFCIRC/153 – commonly (mis)named "full-scope" or "comprehensive" safeguards: "The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons." The purpose of the whole safeguards process is defined as the prevention and detection of the diversion of nuclear materials for the purpose of production of nuclear explosives. The main method by which the objectives of these safeguards are achieved is material balance and accounting, whereby all nuclear materials are followed from beginning, when they first achieve "nuclear purity," to the end, when they are no longer capable of producing fissile materials – plutonium or high enriched uranium (HEU), the materials from which nuclear explosives are made.

Thus, in the case of the plutonium production route, the nuclear materials are followed and accounted for from the uranium conversion facility that produces the basic uranium compounds to the enrichment stage (if they are to be used, e.g., in nuclear power reactors fueled by low enriched uranium (LEU)), to the fuel rod production facility, to the reactor, from the reactor, when they have completed the irradiation cycle, to the reprocessing plant or the fuel storage facility, to the waste disposal facility, and to the safeguarded plutonium storage.

The safeguards for the uranium enrichment route are only somewhat less complicated. Material accounting takes place at "strategic points," and the whole material inventory must be balanced, i.e., the actual input and outflow inventories of material at these points must tally. The accounting is usually statistically based. Up to the present time, with the two notable exceptions of Iraq and North Korea, no diversion was detected, and it was therefore assumed by the IAEA that none has taken place. In the cases of chemical processes, however, there is always an uncertainty involved in the accounting, because of errors in analysis and because of inherent process losses, resulting in "materials unaccounted for." Since the initial plutonium inventory is based on calculations, an additional source of uncertainty is introduced.

The complacency with which people regarded the efficacy of safeguards was rudely exposed with the discovery that Iraq proceeded with a program designed to produce nuclear weapons in parallel with its declared program. This was possible because of severe shortcomings in INFCIRC/153. The main one was that although a state was required to declare all nuclear facilities, no provision for the assessment of the completeness of this declaration was included in the agreement. It was assumed that all states are honest and that they declare all relevant facilities and materials. An additional demonstration of the inadequacy of the full-scope or comprehensive safeguards system was the discovery of the evidence indicating that North Korea's declaration was false.

Both cases prompted the IAEA to launch its "93+2" program (so called because it was initiated in 1993 and took two years until completion) with the purpose of designing a better verification system, taking into account the shortcomings of the full scope system. This program culminated in the production of a protocol, appended to the existing safeguards system, in a document numbered INFCIRC/540 and entitled "Model Protocol Additional to the Agreement(s) Between [the state] and the International Atomic Energy Agency for the Application of safeguards," which became known as the "Additional Protocol." [3]

The Additional Protocol is a much stronger document than the previous one, and goes a long way to alleviate the lapses of the existing system. The additional measures it mandates include:

- *Measures involving broader access to information*
  This would make the nuclear program of states more transparent, thereby enhancing the level of assurance as to the peaceful nature of the program. The measures include: an expanded declaration; environmental sampling at locations selected from among the locations to which the IAEA has access; and improved information analysis.

- *Measures related to physical access: no-notice inspections*
  These are, however, of limited scope.
- *Measures for optimizing the use of the present system, including the utilization of safeguards technology advances; increased cooperation with states and their State System of Accounting and Control (SSAC); a more time efficient use of the safeguards implementation parameters; and the utilization of the expanded declarations*
  The existing situation whereby only "facilities" were declared by a state is remedied by requiring the presentation of complete and detailed descriptions and information on buildings and activities at a site where these facilities are located. Moreover, all present and planned nuclear R&D activities owned, funded, or authorized by the state and related to nuclear fuel cycle activities (with special emphasis on irradiated fuel reprocessing or uranium enrichment) and their status must also be declared. The expanded declaration must include information on uranium mining, which was not included in the former arrangements, as well as information on the production and import and export of specific equipment and non-nuclear materials.
- *Increased physical access*
  The increased physical access is designed to verify the correctness of the declarations. This allows access, including no-notice access, to any place on a site (where facilities are located) and access to other locations identified in the expanded declarations and to other locations for the purpose of taking environmental samples. It should be noted that the requirement for multiple entry, long term visas was incorporated under Part 1 of the 93+2 Program, which considered what actions could be undertaken under the provisions of INFCIRC/153 provisions. These are essential for no-notice inspections.
- *Improved Auxiliary Arrangements*
  The improved auxiliary arrangements contain many requirements that facilitate the work of the inspectors. These include the use of simplified procedures for the designation of inspectors and the use of independent, direct communication systems between the field and the IAEA headquarters.
- *Location-specific and wide-area environmental sampling*
  The technique of environmental sampling is employed for detecting materials emitted to the environment from nuclear processes. The location-specific environmental sampling is one of the strongest technical means for assessing the situation at a given location.

Adherence to the Additional Protocol is not obligatory, not even for the many states that have no safeguards agreements with the IAEA. There is no primary inducement for adhering to it, and therefore perhaps predictably, none of the states of concern have joined it voluntarily, since doing so would deprive them of the possibility of carrying out illicit activities without the risk of being detected. The case of Algeria, where many facilities that are suspected of housing facilities for the production of plutonium cannot be investigated, demonstrates this situation.[4] Only with Iran was political pressure applied for its joining the Additional Protocol.

The other major fault in the Additional Protocol is that it implies that the IAEA can confirm the absence of illicit nuclear materials and activities in a given state. The IAEA tries to achieve this by employing a concept of sufficiency, reporting these absences when convinced that it has done enough to assure itself that no illicit activities exist, or that no illicit materials are located within the state's area. This is a logical flaw, which could lead to serious consequences if the conclusions are incorrect. The drafters of the Additional Protocol overlooked – consciously or not - that the absence of proof is not proof of absence. This is another example of the triumph of politics over common sense, where the need to achieve agreement was stronger than the need for total technical integrity, so that compromises were an inevitable part of the negotiations process.

At the same time, one cannot ignore the major benefit of the Additional Protocol – its power of deterrence. Even though the IAEA rights of investigative inspections are not all-encompassing, they are powerful enough to prevent all but the very determined from conducting a well-concealed nuclear weapons development program. The success or failure of the Additional Protocol depends to a large degree on the determination of the verification organization. Should it utilize all its rights and all available information, the chances of success will be much higher than by treading softly, fearing the antagonism of the inspected state and thereby bypassing important information that could be vital to the success of the mission.

However, this aggressive approach to verification goes against the grain of the IAEA corporate culture. In the present mode of operation, dictated both by the requirements of the Additional Protocol and by tradition, the IAEA assumes that all's well until proven otherwise. This approach failed the IAEA conspicuously in Iraq, when it was ready to assume that all was well in the spring of 1995, only to be shown to be in error by additional information that came to light a few months later.

Another factor that determines the IAEA's approach to verification and reporting is the political situation. When the IAEA was established in 1957, it was to be a technical organization aimed at promoting the peaceful uses of atomic energy, promulgating

the "Atoms for Peace" vision of President Eisenhower. At that time, many of the permanent representatives to the organization were technical experts. This situation changed over the years, and the policymaking organs of the organization became politicized, with the decisions concerning proliferation and verification politically based. Thus, instead of arriving at technically based conclusions of verification activities and leaving the political considerations to other bodies, such as the UN Security Council, the IAEA became judge and jury. As a recent example showed, the IAEA Board of Governors (BOG) did not decide to transfer the noncompliance of Iran to the Security Council, but just to "deplore" the "breaches" of its obligations.[5] This was clearly a political decision, but in this way the IAEA undermined its own credibility, which could have far-reaching effects on the non-proliferation regime.

Similarly, the Libya issue has yet to be resolved. True, Libya apparently came clean and admitted its transgressions against the regime. Yet no penal code will state that if a crime was committed and later acknowledged, no punishment would be exacted against the criminal. In today's non-proliferation regime, however, Libya will probably be rewarded by the removal of all sanctions against it. In this regard, the IAEA is taking too much upon itself, with politics governing an organization that should have been directed by technical and apolitical concerns only.

Rethinking Verification: Moving from the Old to the New Regime

Redefining the Purpose of Verification

Given the requirements of the proposed new regime, with its revised purpose and different implementation, it is suggested that the purpose of verification be redefined:

a. Verify that a state does not produce unsafeguarded fissile materials[6]
b. Verify that a state does not import fissile materials
c. Sound a timely warning in case that one of the above is suspected or proven to have been violated.

All other activities within a state are irrelevant to the issue of non-proliferation. These definitions thus eliminate the need for verifying "source materials," according to the existing INFCIRC/153 definitions. Source materials are accordingly redefined to mean nuclear materials as they enter the reprocessing or enrichment facilities. This redefinition of the purpose of verification, both in the NPT and in the safeguards arrangements, is an essential part of the new regime and, in its limited but better delineated nature, makes it a viable and attainable goal. The seemingly additional

requirement, that a state does not export fissile materials, is contained in the first one.

The actual consequence of the first requirement is that safeguards would be imposed only on source materials (according to their new definition), and on the materials produced by irradiated-fuel reprocessing plants, in the case of plutonium (Pu) production, and on uranium enrichment plants, for the production of high enriched uranium (HEU).[7] Verifying the first requirement involves a combination of on-site verification of the products of the fissile material production facilities, their storage or disposal, and their movements. In addition, verification must include an ongoing search for undisclosed production facilities and undeclared fissile materials. The necessity for such search activities was recognized by the IAEA following the Iraq debacle and they were thus incorporated into the Additional Protocol.

In effect, the first requirement should be divided into two separate and complementary tasks:

a^1 Verify that all fissile materials that are produced are safeguarded
a^2 Verify that no undeclared fissile material production is taking place

Again, however, while the former is a straightforward purpose, the latter is almost impossible to achieve. One should not view the search for undeclared activities as a task with a conclusion in sight, unless the conclusion is negative, which is that illicit activities or materials were uncovered. The ongoing intensive search for these must be based on all available technologies, and use information from open sources and information supplied by states or other players.[8] The purpose of this search is twofold: the search per se and the deterrence value of the search; the more intensive the search, the higher the deterrence value.

The success of the second requirement rests on customs and border safeguards controls, but unlike the positive component of the first requirement, is difficult to effect and the results uncertain. Since military designated fissile materials in NWS (and in the OS) are not safeguarded, their inventories cannot be checked to detect any illegal exports. There is no way that international border controls in a specific state can be implemented. Therefore, it remains the task of the inspectorate to try and detect the presence of unsafeguarded fissile materials in the NNWS as part of their other inspection duties.

The third requirement, the timely warning function of verification, is as important as the previous two requirements. It too is very difficult to achieve, given the prevailing corporate culture of international organizations. It will take a lot of courage to sound a warning based on circumstantial evidence. However, this must be done and in good time, to give the state in question a chance to disprove suspicions. There is,

however, an earlier stage, made possible by the Additional Protocol, requesting Complementary Access rights (as defined in Article 4 of INFCIRC/540), or, in case the Additional Protocol is not in force, a request for a Special Inspection. While Complementary Access is somewhat limited in its scope and capabilities, a Special Inspection can be a severe measure, designed to remove all suspicions or to confirm them. Particularly if a state denies the request for a Special Inspection, which it is entitled to do, there is additional cause for concern.

Again, however, the problem is that international organizations are generally reluctant to adopt aggressive methods. The IAEA, for example, only approved one Special Inspection, in North Korea (although it was later prevented from executing it), and the Organization for the Prohibition of Chemical Weapons (OPCW) as of the spring of 2004 has yet to approve a single request for a Challenge Inspection, the Chemical Weapons Convention (CWC) equivalent of a Special Inspection.

The redefinition of the verification goals is one of the pillars of the new regime. Application principles for the revised verification mechanism appear in Appendix II.

The Merits of Limiting the Scope of Diversion Detection

Refining the purpose of verification prompts the first major question: what would be the consequences of exchanging the present method of verification with the newly defined purpose?

The negative consequences would probably be:

- A lower deterrent value
- A higher threshold of detection
- A later stage of detection
- A possibility of hoarding more advanced source materials, which would enable the state to acquire a nuclear military capability much sooner after withdrawing from the NPT

The positive outcomes of such application of safeguards would probably be:

- Reduction of budgetary demands to allow concentration of efforts on the tasks deemed most important
- Easing the pressure on states joining the new verification system and the reduction of the resources required from them in comparison with the previous method
- Enhancing the non-discrimination among states

Abandoning the need for inspections at all stages of nuclear fuel processing before actually entering the fissile materials production stage will certainly have the effect of *a lower deterrent value*. The present system of verification, under full-scope INFCIRC/153 safeguards and more so under the Additional Protocol, has a strong deterrence value against illicit, undeclared activities. A state could feel itself free to embark on a comprehensive program aimed at acquiring all techniques and technologies needed for the production of fissile materials, short of their actual production. In this way, the potential lapse between withdrawing from the NPT and production of nuclear weapons would be greatly shortened. However, this is in fact already the case, when all can be done "legally" and under the umbrella of the NPT, and moving to a new verification system would not change this possibility.

If we assign the present system a threshold value, the new system would certainly have *a higher threshold of detection*. However, herein lies an important distinction between technical infractions of obligations and the actual production of fissile materials. In the case of Iran, the IAEA implicitly acknowledged this distinction when it failed to condemn Iran for its failure to declare imports of nuclear materials, and the international community acted in similar lax fashion when it did not consider these inconsistencies to be so serious as to warrant the transfer of the issue to the Security Council. At most, it would censure the offending state, without taking any serious action against it. The international community also failed in not condemning those states that did not conclude safeguards agreements with the IAEA, in direct contravention with their NPT obligations. Who is to say that none of these states do not have undeclared facilities, do not possess fissile materials, or that no such materials are present on the state's territory? It is, then, a fact of life that the threshold perception does not yield a finding of diversion, but only an indication of intentions.

Thus, the aspect of a higher detection threshold concerns the IAEA and the IAEA alone. It enhances the quest for additional information while not producing any other effect. In practice, it does not serve the rest of the world. The IAEA devotes its efforts to resolving the outstanding issues, while not sounding a warning at the same time that something is amiss. Even its reports to member states do not explicitly point a finger at the suspected offending state, unless a major shortcoming is in fact detected. It is altogether another matter when illicit production of fissile materials is detected or strongly suspected, as in Iraq and North Korea. The IAEA did not ignore these and action was taken, either by the IAEA political organs or by referring the case to the Security Council.

Unless the Additional Protocol is in force in an inspected state, there is little meaning to a *later stage of detection*, that is, a time delay in detection from past

provisions, since bypassing the full-scope safeguards is relatively easy, especially when activities are carried out in undeclared facilities. A state can then produce nuclear weapons without being detected at all. A later stage of detection can have a significant negative impact when a state is concealing materials or activities within declared installations. However, only when fissile material activities are detected would a discovery have any political significance, as outlined before.

The most serious outcome of changing from the all-encompassing material balance verification to fissile materials, facility, and material inspections is *the possibility of a state hoarding more advanced source materials*, which would enable it to acquire a nuclear military capability much sooner after withdrawing from the NPT. Source materials that would not be under any safeguards under the new scheme, according to the above defined purposes of verification include: purified natural uranium compounds, including UF_6, and irradiated nuclear fuel elements, including natural uranium elements that are better suited for plutonium production.

Would this have a dramatic effect on the timeline of a state's achieving a military nuclear capability? Consider that a state has declared all enrichment and/or reprocessing facilities. This would not have any effect on the potential to detect and warn against any illicit use of the materials, since these would come under IAEA strict verification activities. The other option is that the state in question is going to use its source materials in undeclared facilities. Having the full-scope system in place would certainly provide assurances against the utilization of declared materials for the undetected production of fissile materials. However, the cases of Iraq and Iran have demonstrated that a state is capable of constructing undeclared facilities for the production of fissile materials without being detected by the full-scope safeguards system. These could, of course, include parallel facilities of producing the source materials, so that the complete parallel production route would be operable for concealed activities, unless detected. It is mainly for this purpose of detection that the Additional Protocol was devised and the task to verify that there is no undeclared fissile material production (listed as a^2) was defined.

To verify that there is no undeclared fissile material production, is it necessary to search for source materials? Although counterintuitive, the answer is no. If the Additional Protocol is an efficient tool for the detection of undeclared fissile materials and facilities, it is not necessary to search for undeclared source materials. However, if the Additional Protocol is not efficient, we are back to square one. Finding a discrepancy in the source materials inventory would be indicative but not conclusive, and the search for fissile materials production would be the essential ensuing verification activity. Therefore, the conclusion is that the search for undeclared fissile

materials production facilities must be as thorough and efficient as possible, and that the benefit of the search for source materials is marginal, at best.

On the positive side of the balance sheet are some substantial considerations. The IAEA was, until recently, severely constrained by its zero real-growth budget, which remained this way for over a decade and was only changed in 2003. However, while funding will always be limited, IAEA tasks have grown, mainly in the safeguards area in non-nuclear states with extensive nuclear programs such as South Africa, Brazil, and CSI. Budget constraints have limited IAEA ability to devote efforts to the growing demands in its other areas of activities, such as nuclear safety, research, and technical assistance to developing countries. Additional, unforeseen safeguards activities, such that are underway in Iran and Libya, are an additional burden both in personnel and other resources that will be diverted from different areas of activity. Although the IAEA maintains that the implementation of "integrated safeguards," merging the existing system with the Additional Protocol inspection duties, would reduce its overall costs, this has yet to be tested.

Implementation of the fissile material verification scheme suggested here would certainly *reduce the budgetary demands in a dramatic way*. According to the IAEA 2002 annual report, safeguards activities were carried out at 909 installations in seventy-one countries. The 199 safeguarded nuclear power reactors account for the overwhelming majority of expenditure of effort and resources. Of the 909 installations, six are reprocessing facilities and ten are uranium enrichment facilities (including R&D facilities or pilot plants). If we take account for all facilities where fissile materials might be present, the number would probably be less than fifteen percent of the overall number of installations under present IAEA safeguards.

In addition to relieving the IAEA of its financial straightjacket, verification of fissile materials would enable the IAEA to *concentrate on the clearly important tasks*: verifying the status of fissile materials and searching for illicit materials and activities.

There can be no doubt that the application of the proposed changes would be *a substantial relief for the inspected states*. The burden of human and financial resources in the existing system would be greatly lightened. The reduction in the number of installations under safeguards in the present system would reduce the number of personnel engaged in escorting the inspectors, in caring for their safety inside nuclear installations, and in preventing the disclosure of sensitive information, including commercial data. There would certainly be an increase in activities related to the inspectors' activities in searching for illicit activities and materials, but these could never reach the magnitude of the previous regime. Only in extreme cases, when there are strong indications of noncompliance, would the burden on the host country be

increased. This would serve as an additional inducement to purchase nuclear fuel from outside sources, instead of producing it indigenously, which in most cases would be more costly.

There is also an accompanying psychological effect in the reduction of the perceived pressure in the inspected state, especially for those with a substantial nuclear power program. In such countries, especially those that do not produce fissile materials or utilize them, the burden will then be reduced to the search for materials and production activities, which would be eased as time goes by, unless there are indications of noncompliance.

Lessening the discrimination among states is manifest in two ways: the obvious one, in that more states will be treated equally, and the less obvious one, in that the effort expenditure in verification which was designed to be equitable resulted both in reduced efficiency where needed and increased burden where it was not needed. Because of the drive to act with comprehensive equality, the criteria for inspections were designed to apply to all, based solely on existing nuclear facilities and not on the states' programs.[9] Under the new verification scheme, most facilities will not come under inspections at all; the effort will be devoted where it is most needed. States having no enrichment or reprocessing facilities will only be inspected to assure that they actually have none. Thus, most states will experience less discrimination than before.

The Effect on IAEA Safeguards

What would be the effect of the shift in scope and emphasis of the new regime on the IAEA safeguards operations? Certainly, the operations would be much more specialized. On the purely technical side, the change would limit the scope of activities, since source materials, reactors, and related R&D activities would no longer be safeguarded in individual states. In addition, the number of enrichment, reprocessing, and fissile materials storage facilities would decrease, and the extent of safeguards activities would be much more limited than at present. On the other hand, fissile materials controls would be much more thorough, and statistical methods would be abandoned. However, the search for undeclared facilities, materials and activities does demand a major shift in methods, technologies, and attitude. Although this is already partially included, at least in principle, in the Additional Protocol, the powers of the inspectorate must be augmented, and the requirements for certifying that nothing wrong was detected must become much stricter than what is presently envisaged. This is the crux of the matter.

Only in Iraq did the role of the inspectors come into serious debate. On one side was the existing corporate culture of the UN system. On the other hand was the need to uncover all. The present system was shown to have failed when, in the summer of 1995, the IAEA was ready to declare that all had been uncovered, just to be proven wrong by a high-level Iraqi defector.[10] This is an even more significant failure than the failure of an Additional Protocol, since the Ongoing Monitoring and Verification (OMV) verification employed in Iraq was a much stricter regime, and it failed nonetheless.

The role of inspectors in the proposed regime will have to be reevaluated, and the conclusions drawn from this reassessment incorporated into their procedures. In addition, the technologies and equipment that will be used in this shift of emphasis will have to be employed more intensively and the evaluation of the results will need to be as thorough as possible. One consequence will, of course, be in revised inspector training. The question that the inspectors will have to answer is not "why did you use this or other technology during your inspections," but rather, "why did you not use any of the rights accorded to you." Thus, the major change will have to be in the attitude of the inspectorate. The burden laid on them to show that all possible was done in the attempt to uncover illicit activities will be much heavier than in the present regime. Their accounts of the inspection activities and the results will have to be clear and detailed, leaving little room for doubting their correctness and comprehensiveness.

The Additional Protocol as the Basis for a Strengthened Verification Regime

The Additional Protocol is a good basis for the verification mechanism of the new regime. It does, however, have its limitations, which must be ironed out if the new regime is to be effective. Chief among these are the proof of absence and the rights of access.

The underlying belief that the IAEA can "draw conclusions about the absence of undeclared *nuclear material* or nuclear activities over a wide area," leading to the ultimate conclusion that a state is free of these materials and activities, lies at the heart of the issue.[11] This is not the purpose of verification and never has been, although it has been the wish of many states that it would be so. At most, the IAEA can state that it had found no indication that something is amiss. The Protocol must be modified to disavow itself of this pretense.

The IAEA corporate culture is one that wants to be kind to its constituent members. After all, the member states are its masters and to anger them could backfire, which could lead to an obvious and serious potential clash of wills. Yet compromise cannot work well in these situations, however strong the inclination. The gravity of the non-

detection issue must be enough to influence the IAEA membership to adopt a more stringent approach to the matter and even to ignore individual convenience for the sake of the ultimate goal: the timely detection of noncompliance.

The right of access is a more serious issue, since it is the key to the success of verification. This was recognized by the international community in the drafting of two important non-proliferation instruments: the Chemical Weapons Convention (CWC) and the Comprehensive Test Ban Treaty (CTBT). The on-site provisions included in these treaties are more intensive than those of the Additional Protocol, although all three have provisions for intrusive inspections: the Special Inspection of the IAEA, the Challenge Inspection of the CWC, and the On-Site Inspections of the CTBT. The problem, then, is not one of authority, but of application. As mentioned before, the only special inspection demanded by the IAEA BOG was not agreed to by the state in question – North Korea; the CWC has yet to approve one; and since the CTBT is not yet in force, there can be no on-site inspections according to its requirements. The challenge inspection is potentially the most intrusive of all, since it has a "red light" provision, that is, it goes ahead with the inspection unless stopped, while the others have to be approved prior to implementation. However, even if the BOG can initiate a request for a special inspection it will hesitate in doing so until unavoidably provoked. A member state can also initiate these inspections, yet although rumors abound of suspected abuses of obligations, there is persistent hesitation by member states to initiate an inspection.

Is there a solution to this deadlock? It is uncertain. The intrusiveness of these inspections could be detrimental to the vital interests of the inspected states, and the potential abuse by the intrusiveness of the inspectors (who are still citizens of their home states) is virtually unlimited. One could come up with a requirement that every state agrees to one such inspection annually, biennially, or a different interval, but the burden and unease would still be very significant. It could be, however, that if every state agrees to a limited-scope managed access inspection whose purpose would be to look for fissile materials at a specified installation (which could be done by sampling and measurement without determining the purpose of the installation), the inspection could be effective. However, an arrangement of this sort would have to be negotiated prior to drafting and implementation.

What if this cannot be done? At worst, this would not be much different than the present situation. Indeed, if it is acknowledge that the IAEA cannot verify an absence, that it sounds an alarm when something is suspected, and that it is willing to demand and perform special inspections, then something in fact was achieved.

The New Regime and Iran: A Case Study

One way to assess the efficacy of the verification mechanism under the proposed regime is to apply it to an existing situation and test its potential value. At present, Iran is legally obligated only by a full-scope (INFCIRC/153) safeguards agreement. It signed the Additional Protocol in December 2003, but has yet to ratify it, though it has promised to abide by its rules even before ratification. Table 1 compares Iran's general situation under the full-scope safeguards, under the Additional Protocol, and under the proposed new regime, while the comparison of table 2 has particular reference to safeguarding materials. Parts 1 and 2 of "Program 93+2" (the Additional Protocol) are grouped together.[12] The last column includes some general comments and some specific comments on Iran's past record of compliance with its safeguards obligations, under its full-scope obligations.

If we accept the DG's distinction between technical and substantial incompliance, we can see that changing from the full-scope (INFCIRC/153) or from the Additional Protocol to the new regime would have little harmful effect on the efficacy of verification in the case of Iran. Were the technical "misdemeanors" the only offenses, the international community most probably would not have even considered taking any action against Iran.

However, the case against Iran relates mainly to the production of fissile materials. Iran did not declare the construction of a large-scale uranium enrichment facility. It did not declare its R&D work of the development of enrichment technologies and it did not declare the probable situation that it had, in fact, run some UF_6 through its gas centrifuge machines, in contravention of its safeguards obligations.[13]

The construction by Iran of a large-scale Uranium Conversion Facility (UCF) is, at best, corollary evidence, suggesting but not proving the possibility that a nuclear weapons development program was underway. It points out the possibility that Iran was going to develop large-scale enrichment capabilities. However, without the evidence concerning the construction of the hitherto undeclared enrichment facility, Iran would not be in any material breach of its safeguards obligations. Nonetheless, this UCF construction should have been declared to the IAEA at least 180 days before the start of construction, under Part 1 of the 93+2 Program, which was adopted by the BOG in 1995 (well before the start of construction at Natanz, the site of the large-scale enrichment facility) and needed no further legal agreements with Iran.[14] Yet it required adaptation of the subsidiary arrangement and facility attachment which Iran failed to do until 2002.

The next question that comes to mind is the projected construction of a 40 MW research reactor at Arak. The critical issue here is the possibility of constructing and operating a reprocessing plant for the separation of plutonium from irradiated natural uranium reactor fuel. Were such an installation to be built, it would be difficult to conceal and operate, since it has a significant environmental signature that would be easily detectable. Moreover, any facility that would carry out even laboratory-scale separation activities would come under the new regime safeguards.[15]

Tables 1 and 2 indicate that adhering to the new regime would have relieved Iran of the necessity to declare the acquisition of uranium and its compounds, and the construction of nuclear reactors and their operation. However, a much stricter verification regime would have been in place, thereby circumventing the need for lengthy negotiations between the IAEA and Iran on access to many sites and facilities for the assurance that no enrichment or reprocessing activities were taking place. While relieving Iran of the many burdens of the past, the intensity and thoroughness of the new safeguards activities, if properly carried out, clearly demonstrate the redefined result-oriented approach to verification.

The new regime also does away with a significant possibility of "legally" acquiring a military nuclear capability, that of obtaining all necessary precursors and the facilities for producing fissile materials, then withdrawing from the NPT (as was the case with North Korea) and producing the necessary fissile materials for the construction of nuclear weapons. We thus see that moving from the Additional Protocol to the new regime would not result in a significant reduction in the quality of verification. On the contrary, by concentrating the verification efforts on the production of fissile materials, the probability of locating undeclared facilities is greatly increased.

Finally, what if Iran would not adhere to the new regime? Iran would then remain within the present regime, unless it chose to withdraw from the NPT. For Iran, the present regime is the preferred rubric. For the world, however, the problem is more serious than if Iran adhered to the new regime, since it would have fewer institutionalized tools for dealing with the situation. Thus, it would be in the international community's interest to encourage Iran to adhere to the new regime.

Implementing the Changes to the Verification Regime

The proper application of the verification mechanism is, perhaps, the most important issue in the nuclear non-proliferation regime. Without the IAEA verification mechanism, North Korea's false declaration would not have been uncovered, and it could have proceeded unhindered with its nuclear weapons development program.

Table 1. **General Comparison of Three Verification Regimes in Iran**

Verification Item	INFCIRC/153	Program 93+2	New Regime	Comments
Sites and facilities	Only facilities and relevant locations outside facilities (LOF)	Site descriptions, facilities and LOF, including nuclear related R&D facilities	Sites and facilities where fissile materials are produced, stored, or utilized	Iran did not declare relevant sites and facilities relevant to fissile material production
Nuclear programs	Not applicable (N/A)	Comprehensive description, including present and future development and R&D activities	When applicable to fissile materials, related R&D facilities and production facilities of specific equipment	Only following demands by the IAEA did Iran declare a program of further nuclear development. It is uncertain whether this declaration was complete
Access to sites and facilities	Limited to strategic points in declared facilities and LOF	Access to any place on a site containing a nuclear facility or LOF, to declared locations with nuclear R&D, or related locations	Access to anywhere within the state, either at declared locations or otherwise, under managed access rules	Iran permitted access to certain sites only following requests by the IAEA once these sites were publicly uncovered
Verification technologies	Sampling of inventoried materials; balancing of material inventories	Variety of techniques and technologies: observation, radiation measurements, seals, environmental and material sampling, etc. at specified locations	All available non-destructive technologies, including sampling, at any location designated by the inspectors; sampling of inventories and other materials	Iran's enrichment activities would never have been discovered under full-scope safeguards. Sampling and other technologies are essential
Sources of information	Information supplied by the inspected state	Information supplied by the inspected state; improved information analysis; (implied) use of open source information	Information supplied by the inspected state; open source information; information supplied by states, including National Technical Means (NTM)	Were it not for externally supplied information, the IAEA would not have known where to look for undeclared sites
Timelines	"The Agency may carry out without advancednotification a portion of the routine inspections."	Short notice inspections of locations on sites and LOF during other inspections	Short notice access anywhere, for non-destructive measurement and sampling	Iran did not permit sampling at a site it declared, until it was ready for it

Table 2. **Comparison of Verification Situations: Safeguarding Materials**

Verification Item	INFCIRC/153	Additional Protocol	New Regime	Comments
Indigenous production and imports of source (uranium) and other nuclear materials	Declare imports and put under safeguards	Declare mines and ore concentration facilities; declare imports and put under safeguards	Not Applicable (N/A)	This is the starting point for imported nuclear materials safeguards; Iran violated this obligation
Natural or depleted uranium conversion activities	Declare facilities as early as possible before nuclear material is introduced, declare and safeguard inventories when reached nuclear purity	Declare facilities as early as possible before *nuclear material* is introduced, declare and safeguard inventories when reached nuclear purity	N/A	This is the starting point for all indigenously produced nuclear materials; Iran violated its obligations
Construction and operation of nuclear reactors	Provide facility information as early as possible before nuclear material is introduced; Provide operations records and inventories; inventories are safeguarded	Provide facility information at least 180 days before the start of construction; provide operations records and inventories; inventories are safeguarded	N/A	Material balance (inventory) verification techniques include containment of material balance areas, statistical techniques, and random sampling
Reprocessing, uranium enrichment and waste treatment and storage	Safeguarded facilities	Safeguarded facilities	Starting point of safeguards	Strict safeguards measures including material balancing
Fissile materials safeguards	No different from any other nuclear material	No different from any other nuclear material	Deterministic inventory verification, in addition to containment procedures	Deterministic verification provides the best diversion detection tool

However, it was North Korea's mistake, as much as it was the inspectors' success. Had North Korea not acceded to the inspectors' request to sample the radioactive waste, which it was legally entitled to do, it would not have been found out. The verification regime cannot depend on chance. States can and will cheat when they have the motivation, capabilities, and willingness to defy their treaty obligations. Appendix II discusses the methods by which states can cheat, some of which were clearly already employed, notably by the USSR, Iraq, and Iran.

One could take the view that nothing much would change in the safeguards regime by the transition to the proposed nuclear non-proliferation regime. On the face of it, the change would result mainly in the significant decrease of scope. Only the verification of fissile materials inventory would change from statistical to deterministic. However, this is a superficial view only, and the more profound impact must be closely examined. No specific Protocol language changes will be proposed, since the details, which should be discussed among the parties to the NPT, are not as important as the principles that should apply.

The two major factors that will determine the success of the verification mechanisms are the verification methodology and the inspectors' determination. Verification methodology has several components: basic information, technologies employed, cross-checks, and peer reviews. In addition, the determination of the inspectors will certainly influence the overall effectiveness of verification. The degree of determination of the inspectorate depends on the inspectors' perception of their duties, the comprehensive utilization of verification rights, and aggressiveness.

The basic information available to the inspectors is of paramount importance, because it serves as the basis for comparison, either for confirmation or negation. The first source for this information is, of course, the state's declaration. This information, after all clarifications have been received, will be compared to subsequent findings by the inspectors. The comparison shall be made with a view to confirming the correctness and the completeness of the declarations.[16] Additional sources of information are open source and National Technical Means (NTM).[17] The importance of open source information was demonstrated in the case of Iran, when a dissident group presented evidence of the existence of hitherto unknown nuclear facilities in Iran. Iran was then forced to admit their existence to the IAEA and open them to inspections. It is somewhat doubtful whether it would have done so otherwise, since at least some of the sites should have been declared by Iran under its safeguards agreement once fissile materials were introduced or produced there.

NTM evidence, if disclosed to the inspectors, will serve as an additional and important source of information, as demonstrated in the case of North Korea, where

such information was presented to the IAEA BOG by the US. The extent of use of NTM is open to debate, since it carries with it the possibility of abuse as well as an invasion of sovereignty, and at times is somewhat limited, e.g., as in the CTBT, to "any relevant technical information obtained by national technical means of verification in a manner consistent with generally recognized principles of international law." In the existing framework of NPT verification, there is no mention of NTM as a possible source of information. Furthermore, INFCIRC/540 (Article 4a.) states: "The Agency shall not mechanistically or systematically seek to verify the information [provided by the state]." This is a limiting imposition that must be eliminated if a thorough inspection is aimed at verifying the correctness and the completeness of the declarations.

The scope of the subject of technologies is an extensive one, ranging from equipment and methods to statistics and reporting. The IAEA is continuously engaged in developing new technologies and techniques. However, these are wide-ranging because of the diversity of materials and installations that have to be inspected and verified. Limiting the scope of verification to fissile materials and to their production facilities will have the additional benefit of narrowing the scope of the technologies needed for verification, thereby providing more effort and resources to a limited field. Inspectors will be able to devote training and application to specific topics and skills, thus making their operation more efficient. In addition, the accuracy of verification will improve by moving from the statistical verification to a deterministic assurance and material accounting. The number of states that will require routine inspections will be reduced, and restructuring the inspectorate and inspection costs (such as setting up more country or area/regional offices) will be beneficial to the operations.

External peer review could be a sensitive issue, since it would possibly imply a lack of confidence in IAEA performance. On the positive side, it would lend the technical conclusions of the safeguards mechanism more credence and would provide the world with more trust in the results of the verification activities. This would come in addition to the provision of general and country-specific guidance and oversight on the execution of the safeguards duties. The introduction of the Additional Protocol makes this all the more necessary, since the Additional Protocol includes more than a hint of the IAEA intention to give states a clean bill of health – a declaration that confirms the absence of "(illicit) nuclear materials and facilities."[18] Yet only in rare cases can this be accomplished. The most that can be hoped for in the cases of countries with a well-developed nuclear program is the conclusion that no indications of noncompliance were detected. These are serious conclusions, if they can be reached. On the other hand, conclusions to the contrary, i.e., that there are indications of

misdeeds on the part of the inspected country, are very grave, and could lead to severe political consequences. Such findings should first be technically validated before being passed to the international political bodies for action, if necessary.

Establishing this external peer review body is also fraught with dangers, as seen from the experience both of UNSCOM and UNMOVIC, the two special commissions that were set up for supervising the dismantlement of Iraq's WMD and missile capabilities. It is only when technical committees were established that any fact-based conclusions could be reached, albeit with some political overtones, since even professionals nominated by states have political obligations. In the same manner, a technical oversight committee should be established with a view to incorporating the most qualified professionals, regardless of their country of origin.[19] Their terms of reference must be very clear and purely technical. They must have access to all technical and other relevant data, which should either enable them to reach conclusions or indicate which follow-up work is needed in order to enable them to reach conclusions.

The other main purpose of the peer review committee would be to oversee the way the inspections are conducted, concentrating specifically on the inspectors' determination.

The change in the philosophy of inspections from the older full-scope safeguards regime to the newer Additional Protocol should have been dramatic. Full-scope safeguards were aimed at verifying the correctness of states' declarations and detecting diversion of declared material. The introduction of the Additional Protocol, which added the task of verifying the completeness of states' declaration, mandates a profound change in this philosophy. The role of the inspectors must shift from that of carrying out inspections for the purpose of verifying the correctness of declarations to that of detectives, attempting to verify the completeness of the declarations. In this, the Additional Protocol resembles the Ongoing Monitoring and Verification (OMV) Security Council mandate for Iraq.[20]

However, for the effective application of the Additional Protocol, the corporate culture of the IAEA must change. The evaluation of the completeness of declarations can only be attempted if the inspections are both thorough and all-encompassing. Niceties can be preserved only if they do not interfere with or hinder the work of the inspectors. If verification prerogatives are not expanded in comparison to those in the Additional Protocol, however, it will be quite difficult to detect the presence of undeclared fissile materials and small-scale production facilities, relying only on environmental sampling.[21] Environmental sampling on a very large scale for the purpose of detecting undeclared nuclear activities is not feasible, especially in states

with large territorial areas, unless directed by additional information that would limit the scale of the sampling activities. An IAEA BOG determination to cede the privilege of a special inspection could undermine the whole process. True, the IAEA additional access privileges could challenge the need of states to protect their non-nuclear sensitive installations, but proper managed access provisions could alleviate this possibility.

In addition to the prerequisite of the organization's determination in carrying out its duties, there is a need to enhance the individual inspectors' determination. This is accomplished by the application of both strict inspection and reporting procedures and by backing their performance. Procedures should be used as a starting point, to be followed by additional technical measures, should the need arise. If the organization is determined, this determination will percolate down to the inspectors and affect their work positively. Furthermore, the Additional Protocol, the Security Council resolutions, and the OMV detail the obligations of the states and the rights of the inspecting organizations. In the case of Iraq, many of the rights were not utilized, probably because the organization did not think it necessary or because it was deemed too difficult to do so. This was and is a wrong attitude to take. Had the inspectors employed all the accorded rights, the results would either have been different or the inspectors would be viewed as having done their jobs properly. As it was, the inspectors came under severe criticism for not doing their job adequately.

Thus, the inspectors should utilize all rights and privileges in the course of their work. Should they choose not to do so, they should be held accountable to the peer review mechanism, and either supply a reasonable explanation for not having done so, or go back and utilize them. As it is, their rights are not all-encompassing, and therefore their exploitation of these rights is essential if proper results are to be achieved.

Chapter 3
Assessing the New Regime

The Iraq and North Korea findings led the international community to deal with the extant system of verification, which is clearly inadequate. On the international scene, there is probably no realistic alternative than to be drawn by events, however unfortunate this is. The other catalysts for implementing changes in existing legal and technical instruments are new perceptions and technical developments. However, without compelling events it is difficult to bring about any but very minor modifications to technical systems, and even more so to politically founded treaties and agreements. At the same time, the present state of affairs, if permitted to continue on its current course, could lead to the disintegration of all but the frame of the non-proliferation regime, and even that could suffer. The suggested major changes are one way to preempt this outcome.

The political reality is that it is very difficult to bring about major changes in what has almost become an international norm. States are wary of changes because of anticipated real or perceived problems: additional burdens, limitations of possible routes of action, international intrusion into national affairs, erosion or reduction of national security deterrents, and so on. In addition, states see proposed changes as a chance to exact a price from the international community by linking the changes with areas that could have little to do with the issue at hand. Two examples come to mind in connection with the proposed Fissile Materials Cutoff Treaty (FMCT) under discussion at the Geneva Conference on Disarmament (CD). The first example is the demand by some states that the FMCT include a declaration of fissile materials inventories by all states including the NWS, a demand that is irrelevant if not self-defeating, since it attempts to apply the NPT to the three OS through a back door – certainly not the original declared intention of the FMCT. The second is the linking by China of an FMCT with its demand that the Prevention of Arms Race in Outer Space (PAROS) be discussed at the same time as the FMCT. This appears to have been resolved, although perhaps not permanently.

The inherent obstacles to change, however, should not forestall it completely. The present proposal has many benefits: it resolves the issue of the non-NPT states without giving them a NWS status and, if accepted, will provide additional assurances against proliferation by legally limiting their ability to assist proliferators. The new regime provides for more effective verification by assigning more rights to the inspectors, and by limiting verification to fissile materials for peaceful uses and their production facilities, it relieves both the states and the IAEA of a considerable operational burden. The proposal provides for stronger enforcement measures and oversight facilities, while the NNWS would have much greater access to nuclear technologies. In addition, a procedure for moving from the old regime to the new one is proposed, which provides for the coexistence of both for the interim period.

The two preconditions for this transition are the recognition, at least by the NWS and the OS, that a problem exists, and that this problem must be resolved. At the same time, the incentives for the NNWS to join are significant. On the other hand, the fact that their agreement will not be a decisive factor for the new regime to come into force will limit their powers to set individual conditions. This will enable them to consider the new proposals on their own merits, recognizing the benefits of joining.

How, then, can the new regime be established? The first step would be to hold discussions among the NWS, the OS, and the IAEA. Drawing on past experience and because of practical and realistic considerations, this probably cannot be done within the framework of the CD. If an agreement is reached it has to be signed and later ratified by these participants. In order to gain legitimacy the new regime should be brought to the attention of an international body such as the UN or the CD. However, this should not be an obligatory step on the road to implementation. If an agreement among these parties is achieved, implementation can then begin.

What are the stumbling blocks? The major one is the formal agreement of the IAEA to become a party to the new regime. This could present a problem, since the IAEA is a multilateral international body in which the NNWS have a majority say. This could have the effect of effectively preventing any agreement from being accepted. Again, this problem can either be countered or bypassed. Countering this problem would be by convincing the NNWS that the new regime would be to their great benefit. This could be difficult, but not impossible. Bypassing the issue by creating an alternative inspection body for the new regime is most undesirable, yet if the situation is serious enough, this option has to be considered, albeit reluctantly. Should there be two verification regimes in the same country for the same declared purpose, however, a state might unilaterally wish to leave the previous regime and join the new one without the necessary formal arrangements.

The NNWS that have military nuclear ambitions would constitute the principal opposition to the new regime. On the one hand, it would give them much more freedom to make all preparations for the production of fissile materials. On the other hand, the new regime would make actual production easier to detect, while not giving them the option to withdraw from the agreement for any cause. Nonetheless, these states would find it very difficult to shun a new regime that achieves universal agreement, lest they be identified as would-be proliferators.

One possible bone of contention is abandoning the control of nuclear materials other than fissile materials. Doing away with the need to verify source materials and their production could have two negative effects: the lead time for the transition from a peaceful nuclear program to a military oriented one would be shortened considerably, and the verification mechanisms would not be able to provide adequate warning. The first effect is of little import since any NNWS wishing to acquire source materials and prepare for producing fissile materials can do so overtly under safeguards within the present arrangements. The international community can warn or even threaten to take some action (as in the case of Iran), but unless a state does something stupid, like not declaring purchases when it should have done so, no formal action can be taken against it.

The second possible negative effect, the reduction in the warning time, could be more serious, but this is countered by the increased aggressiveness of the new verification mechanism. In any case, there is a substantial period between the beginning of enrichment or reprocessing programs and the time when enough fissile material for a first nuclear weapon is produced for a well-planned inspection campaign to detect it. Moreover, the substantial difference between the old and new regimes is that in the future it will be more difficult to conceal such production facilities.

Finally, and what could be the more serious issue, is providing the OS with legitimacy. When India and Pakistan conducted their nuclear tests in 1998, they were thus acknowledged as de facto NWS. It was clear that they had not violated any legal obligations since they were not signatories to the CTBT. In addition, there have been accusations that Pakistan and perhaps India have assisted Iran in its nuclear weapons development program, yet this too is not in contravention of their international obligations, since neither is a party to the NPT or the NSG. However, this state of affairs is obviously quite unsatisfactory. The present proposal comes to amend the situation, while not giving the OS a NWS status. It includes them at least within the export limitations regime and might possibly induce India and Pakistan to sign the CTBT. This would be a major achievement on the part of the international community,

and it would be very difficult for them not to adhere to the new regime, which includes some recognition of their special status.

Giving Israel, the remaining non-NPT state, a formal OS status would be more difficult to accept, especially for some Middle East states. However, what is the alternative? Israel's condition for a Nuclear Weapons-Free Zone in the Middle East of a proven, comprehensive peace seems to lie far in the future. Yet leaving Israel out of a new nuclear non-proliferation regime would be counterproductive. It would achieve nothing politically, while closing the door on any possibility of proceeding towards better international cooperation regarding nuclear non-proliferation. It is also quite absurd to think that in order to be accepted into the new regime, Israel would have to conduct a nuclear test (albeit thereby contravening its CTBT obligation), equaling its status to India and Pakistan. The logical conclusion is therefore that Israel must come within the proposed arrangements.

In a way, the NPT and the present verification regime, which relies mainly on INFCIRC/153, was conceived for a quasi-ideal world, in which states do not cheat and if they do, they would be detected. This perfect world, where there is no need for a verifiable regime, was proven to be unrealistic. Yet the remedial stopgap measures have proven inadequate. The Additional Protocol, which attempts to rectify the situation, is not obligatory. The OS issue drags on unresolved, and some states are cheating.

The proposed changes to the nuclear non-proliferation regime uphold the present aims of the regime, as presented in the Preamble to the NPT, but the regime itself would become all-encompassing, more effective, and more cost beneficial. In addition, the enforcement possibilities would provide the world with tools to deal with noncompliance more effectively. Above all, however, it is the way these changes will be implemented that will determine the outcome of the proposed new regime. In order to be effective, the new regime must be well-defined and unambiguous. If too many compromises are reached, the new regime will be doomed.

At the end of the day, much of the success of the new regime will depend on the willingness of the IAEA to carry out rigorous and intensive inspections, utilizing all rights assigned to it by the regime. Verifying inventories is the easier task. Searching for undeclared facilities, activities, and inventories is the more difficult one. Another part of the verification activities, reaching the accurate conclusions without unnecessary extrapolations, has to be fulfilled correctly. If these tasks are carried out conscientiously, the regime will have fulfilled its purpose.

Is the new regime workable? Presumably, yes. Will adherence become universal? It is hard to tell. However, it is clearly time to change the regime, and those who do not support changes will have pointed an accusing finger at themselves.

Chapter 4
And Then What?

Any analysis of the nuclear non-proliferation regime would be incomplete without the discussion of two additional issues: the proposal for a fissile materials production-related treaty, and the goal of universal nuclear disarmament. These issues have their roots in many international resolutions and statements, and any discussion of revisions in the basic regime should also discuss the goals of nuclear non-proliferation, ceasing production, and ultimately dismantling all nuclear weapons and nuclear weapons production capabilities. Whether or not these issues materialize, however, has little to do with the present situation. Resolving the present decline of the nuclear non-proliferation regime is the burning subject. The one way the two issues can influence the present situation is by acting as blackmail and exacting a price, even tacitly, in exchange for an agreement to a change in the present regime. This must be prevented.

Is an FMCT Necessary?

Disregarding for the moment the UN resolution's explicit call for the "prohibition of the production of fissionable material for weapons purposes," and taking into account the NWS' obligations under the NPT "to undertake effective measures in the direction of nuclear disarmament," one should stop and perhaps reconsider the necessity to stop the production of fissile materials as a preliminary step for total nuclear disarmament. Although there have been debates even on the name for such arrangements, the Fissile Materials Cutoff Treaty (FMCT) took hold, and this is the acronym employed here.

Although there is as yet no official treaty language, many proposals for a starting point have been made.[1] The main feature of these proposals is the universal undertaking to stop the production of fissile materials for utilization in nuclear explosives. This means the discontinuation of the reprocessing of irradiated nuclear fuel for the purpose of the production of plutonium for use in nuclear explosives,

and the obligation not to enrich uranium beyond the limit of 20% of U^{235}. However, the provision for the enrichment of uranium to low levels means that states will still be able to enrich uranium, up to this limit. They will then have acquired all necessary technologies and will be able to further enrich uranium to high levels, e.g., 92%, the purity for nuclear explosives, without much further trouble, should they wish to do so. Similarly, plutonium also has peaceful uses: e.g., in nuclear reactors, as a component of a mixed oxide (MOX) nuclear fuel.[2] In addition, one cannot discount the fact that one way for the final disposal of irradiated nuclear fuel is reprocessing and then dealing with each separated component separately. This then means that plutonium would still be produced, albeit under safeguards, and the potential for misuse would remain.

One issue that could block agreement on an FMCT at the Conference on Disarmament (CD) is that of "stocks." There are members of the CD that demand that any treaty language include the provision that states declare all previously acquired stockpiles of fissile materials. The main reluctance to do that, aside from the obvious one that it would force states to declare their military stockpiles, is that this would, in effect, move the whole issue to almost a non-discriminatory NPT. This was not the original intention of the proponents of an FMCT, which was simply to halt the further production of fissile materials.

The points at issue are:

- For whom is the proposed agreement intended?
- What would the agreement achieve?
- Can an FMCT truly be non-discriminatory?
- What non-proliferation issues would remain, if an FMCT does come into force?

Since all non-nuclear weapons states are formally committed to not producing fissile materials for nuclear explosives, it is clear that the FMCT targets are the NWS and the Other States.[3] Therefore, on the face of it, these eight states are the ones that should negotiate a possible FMCT. However, if the outcome of the treaty is the cessation of the production of plutonium and HEU (and any other fissile materials that could be designated as such), these eight must be assured that neither are other states producing fissile materials. Thus, if all NNWS do not adhere to the proposed new regime or, at the very least, adhere to the Additional Protocol, it will be impossible to give any minimal assurance that all is well. Moreover, if the FMCT verification requirements are more stringent than the Additional Protocol, these requirements should be placed on all states, or at least on those with a minimal nuclear infrastructure and program.

Four of the eight states appear to have no problem with stopping the production of fissile materials, as long as maintenance and development of nuclear weapons can go on, within the limitations of any other obligations they may be party to. Moreover, some or perhaps all of the four are willing to reduce their military fissile material inventory. The position of the other four – China and the three OS – is uncertain. China appears to be dissatisfied with the size of its nuclear weapons arsenal, and the arms race between India and Pakistan is apparently still on.[4] Should the verification mechanisms remain the existing ones for the NNWS, they will not be able to provide credible assurances that none of these states are developing military nuclear capabilities.

The requirement for "the immediate commencement and early conclusion of negotiations on a non-discriminatory and universally applicable convention banning the production of fissile material for nuclear weapons" contains the debatable term "non-discriminatory."[5] The requirement that the convention be "universally applicable" is good and proper. However, what is the meaning of "non-discriminatory"? In reality, this is a meaningless sentiment that cannot be comprehensively applied to the FMCT, since it is an offshoot of the NPT, which by definition is a discriminatory treaty. On the formal level, it can only be seen as intended for the NWS and the OS, since all the others have already forsaken the production of such materials. In practice, this principle cannot be applied within the existing verification mechanisms. The universal adoption of the verification mechanism proposed in this work will do much to remove the issue of discrimination, but unless such a system is implemented, the extensive discrimination of the present regime will continue to exist.

Therefore, if an FMCT is to be adopted and applied the procedural steps should be something like:

- Reach an agreement in principle among the eight states
- Reach a decision on the verification mechanism, and on whether this mechanism should be universal
- Depending on the above, decide whether the treaty should be universal, thereby rendering the NPT requirements superfluous for the NNWS, or whether an FMCT should be applied only to the eight states
- If the treaty is to be universal, the conditions for its entry into force should include all eight and at least all states with a not insignificant nuclear program among all parties to the NPT. If not, the treaty should include only the eight.

Maintaining the existing system for the NNWS will not assure the eight that none of the others are violating their NPT obligations. The logical conclusion, therefore, is to proceed in a completely different direction. The new regime suggested here should be adopted first. If a fissile materials production cutoff is to be achieved, it can then be more easily accomplished through negotiations among the eight, and without all the extra burden of the NNWS during the negotiations.

To return to the primary question: is an FMCT a necessary step on the road to total disarmament? The answer to this question is emphatically no. Disarmament can certainly be achieved from the moment the decision is taken. Stopping fissile materials production then follows automatically and not as an interim discrete measure. When the US stopped producing military grade fissile materials did it achieve anything in practical terms? Even after Russia and the US greatly reduced their nuclear arms inventory (according to the bilateral START treaties), they retained a huge nuclear arsenal and the means for their delivery. There should be no doubt that bi- or multilateral arms reduction treaties have a profound psychological effect as confidence building measures, even if they do not reduce the realistic dangers, should a nuclear war break out. However, they fall short of total disarmament, which is the only absolute and ultimate assurance.

Is this confidence building measure a good enough reason for proceeding? Considering the haggling at the CD and the conditions and impositions attempted there, it is doubtful whether the whole exercise is worthwhile. Reinforcing the non-proliferation regime would be a better and more profitable route to take.

In addition, if we review all that has been written on the topic of verifying the FMCT, we can see that the resultant regime would entail a significant additional burden on the verification organization especially if the stringent approaches are adopted, be it the IAEA or another specialized organization. Given the marginal profit of the FMCT, that of pacifying the NNWS while the fissile materials inventories remain intact, one must reconsider the whole issue.

Finally, one should always remember that the effect of an FMCT will be the cessation of the arms race among the eight states, but it will not stop the development of more advanced weapons and weapon systems in states that have nuclear weapons, nor will it effectively stop some of the NNWS from trying to acquire a nuclear weapons capability, given the present state of affairs. The conclusion must therefore be reached that changing the proposed regime will be much more profitable than proceeding with the attempt to establish an FMCT.

Total Nuclear Disarmament?

Disarmament is a key issue in world affairs and international relations. There have been many achievements in this area, both in the reduction of arms and in the prohibition of certain kinds of weapons and warfare methods. The impetus for adopting international arms reduction agreements has been both the cruelty of weapons and agents and their widespread effects. Thus, in addition to treaties on the prohibition of nuclear, chemical, and biological weapons, there are treaties on particular "conventional" weapons, such as anti-personnel mines (which maim people and are difficult to control) and a protocol on the use of blinding laser weapons, with a common purpose to reduce suffering to those that are affected by war, either civilians or people actively engaged in fighting.

It is extremely difficult to estimate the number of organizations, including non-governmental organizations, books, and speeches made in favor of the concept of total nuclear disarmament. The United Nations has the Department for Disarmament Affairs devoted to this purpose; there are the CD and the United Nations Institute for Disarmament Research. The UN First Committee (Disarmament and International Security) debates the issue – to name just a few. However, while the slogan is universally accepted, there are widely diverse opinions on the way to achieve this goal.

When considering the matter of total nuclear disarmament, some of the issues that have to be considered include the following:

- Can wars between nations be eliminated?
- The corollary question, if the answer to the first point is negative: could the elimination of nuclear weapons, accompanied by the inevitable reduced deterrent of war, increase the probability of multinational or global military conflicts?
- Should nuclear disarmament be linked to other major disarmament issues?
- Can nuclear disarmament on the part of the NWS and the OS induce others to follow suit, and not seek the illicit acquisition of nuclear capabilities?
- Following nuclear disarmament, what power will rogue nations or terrorist organizations hold if they develop nuclear weapons?
- Should nuclear explosives technology be eliminated, even if they could be used for the benefit of mankind?

As in the case of medicine whose ultimate aim is to guarantee perpetual health, nuclear disarmament is a noble cause, albeit one that will probably be impossible to

achieve. Nonetheless, all effort must be made to reduce nuclear arms, to eliminate further proliferation, and to promote and enhance peaceful relations among nations, without which no significant reduction of arms can be achieved.

What then, if total disarmament is not achieved? The FMCT is not a legitimate fallback position of non-proliferation, since significant production of precursors (e.g., LEU) and plutonium would go on, under safeguards, as national programs. What has been proposed here, internationalizing supplies and disposal of irradiated nuclear fuel and safeguarding only fissile materials while trying to assure that no undeclared activities are taking place, would be a better stepping stone towards total disarmament than an FMCT, at the same time offering a better utilization of resources and easier way of the application of the peaceful uses of nuclear energy.

Two issues will remain, even if an FMCT is achieved: nuclear proliferation by non-state actors/nuclear terrorism, and total nuclear disarmament. The first is a serious challenge that must be dealt with collectively, and the second will remain open for a long time to come. For the present, the new regime proposed here resolves many of the outstanding issues: non-proliferation, verification, and the promotion of the peaceful uses of nuclear energy. It brings the three non-NPT states into a regime that limits their ability to proliferate military applications of nuclear energy. This may not be palatable to many, but it is better than the existing situation.

APPENDICES

Appendix I

Text of the Nuclear Non-Proliferation Treaty

The States concluding this Treaty, hereinafter referred to as the "Parties to the Treaty",

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war.

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to co-operate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming 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 to the Treaty, whether nuclear-weapon or non-nuclear-weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in co-operation with other States to the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the co-operation of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and underwater in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the world's human and economic resources,

Have agreed as follows:

Article I

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

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transfer or 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.

Article III

Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards,

as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. 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.

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.

The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty.

Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

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 inconformity with Articles I and II of this Treaty.

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.

Article V

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. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

Article VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

Article VIII

Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realized. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article IX

This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January, 1967.

For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article X

1. Each party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.
2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

In witness whereof the undersigned, duly authorized, have signed this Treaty.

Done in triplicate, at the cities of London, Moscow and Washington, the first day of July, one thousand nine hundred and sixty-eight.

Appendix II

Verification: A Potential Battle of Wits

"The sure way to be cheated is to think oneself more cunning than others."
Francçois de La Rochefoucauld

Any regime that requires verification of the completeness of a state's declaration must take into account the possibility that a state is cheating. Otherwise, unless evidence to the contrary comes up, a state will be presumed to be in compliance with its obligations. Such an attitude is contrary not only to the newly defined verification regime, but to the existing Additional Protocol. In preparing to carry out the required verification regime, the inspectorate has to consider the following questions: can a sovereign state carry out activities that are contrary to its international obligations in a way that they will not be discovered and made public, and what is the response of the inspectorate to such a possibility?

The reply to the first question is quite simple: one has only to look at past cases in the history of nuclear development to be able to reply in the affirmative. In addition, there are also interesting cases outside the nuclear area and outside Iraq or the other suspected nuclear would-be proliferators. A fascinating case of developing biological weapons, for example, in contravention of an international treaty has been documented, replete with details of how the information was withheld from inspectors and from the rest of the world by a very large cover-up activity.[1] The story is one of very large scale cheating concerning weapons of mass destruction (WMD), and perhaps the largest uncovered to date.

If a state embarks on the nuclear weapons development path without having an international commitment to the contrary, all it has to do, if it does not want to publicize

1 Ken Alibek with Stephen Handelman, *Biohazard: The Chilling True Story of the Largest Covert Biological Weapons Program in the World–Told from Inside by the Man Who Ran It* (New York: Random House, 1999).

this fact, is to hide its activities, by utilizing one or more of the methods described below. If it does have commitments, it has to cheat, which is, apparently, not too difficult. There are several issues that come to mind when discussing cheating, the main one being what is it that the state wants to hide. Excluding obvious and very legitimate issues such as national security (non-nuclear) and commercially confidential information, we can posit that the state wants to hide information, direct or indirect, that could raise suspicions related to illicit nuclear activities, i.e., activities that are contrary to the state's international obligations.

There are several stages in the development of a nuclear program including:

- Scientific study
- Theoretical development
- Engineering and design
- Procurement
- Construction
- Recruitment and training
- Operations
- Running-in
- Production

Some or all of these stages of a development program contain elements that are innocuous, when compared with the activities needed for the development of a weapons-oriented nuclear development program. At times indicators for illicit activities in the various stages are obvious, while other possible indicators may be very hard to identify. The knowledge of indicators provides the concealment organization with the necessary basis for executing its concealment plan.

Methods of Cheating

There are several methods that a state can employ in order to avoid detection or identifying the location of the site where the illicit activities are taking place. These methods include:

- *Non-declaration,* a sin by omission, as described above. The famous case occurred with Iraq when it declined to declare facilities and activities within the Tuwaitha site and at other sites as it should have, and did not consequently place these under IAEA safeguards. The failure of Iran to submit the required report of imported materials is another example.

- *False declaration* will be committed by a state when it is reasonably sure that the facts attested to will not be revealed as false.
- *Provision of false information* will occur mainly during inspections or when requests for clarifications are presented to the inspected state. The information aims to clarify situations and help present a coherent, albeit false, picture.
- *Concealment* (in the narrow sense of the word) is the act of hiding the activity/facility/personnel/equipment so that these are not visible in any form to an inspector or even a casual visitor.
- *Camouflage* is the act of changing the appearance of the activity/facility/equipment so that an inspector or a casual visitor will not recognize its true nature.
- *Masking* is the act of hiding the true nature of an activity or a product so that it will not be recognized as belonging to an illicit activity.
- *Deception* is the act of waving a red herring or a *decoy* in order to mislead the verification organization into believing that a completely innocent site or facility is in effect a place where illicit activities are taking place and thereby achieving several effects: waste of effort in the wrong place, strengthening the appearance of innocence on the part of the deceiver, thus enabling the deceiver to claim innocence and terminate the inspection activities, and, as a by-product, learning the inspectors' methods of inspection and as such enabling the inspected state to better prepare for inspections at more sensitive sites.
- *Overshadowing* is the act of using a legitimate declared and safeguarded sensitive activity as a shadow, under which the true extent of the illicit activity is hidden.
- *A cover story* is the act of providing the inspector or a visitor with a plausible story, which will present the activity/facility/personnel/equipment as being completely innocent and unaffiliated with illicit activities.
- Although *denial* is not the best cover-up method of cheating, it can be unusually effective if repeated enough times with sufficient conviction. Of course, it also depends on who does the denying and over what.

Precedents and a careful study of the legal issues and technical limitations underscore that it would be very easy for a state to circumvent its treaty obligations should it choose to do so. The INFCIRC/153 type of agreement provides for the verification of a self-contained structure. A state declares a site, an inventory, and activities. Almost everything relevant inside this structure is verifiable, and the declarations would be found to be correct and accurate. However, should the state embark on a nuclear weapons production program, based on indigenous uranium

(for both plutonium production and uranium enrichment) and undeclared activities at undeclared sites outside the previously defined structure, there is virtually nothing that the IAEA can legally do to uncover these activities short of launching a special inspection. Should the state in question be an INFCIRC/540 adherent, the IAEA could try and utilize its sampling privileges for uncovering illicit activities, but this would also not be an easy task to accomplish, and would in effect entail an accusation of the inspected state.

Confronting the Challenge

The first response in dealing with the possibility of cheating is the adoption of the correct attitude by the inspectors, namely, the burden of proof must lie with the inspected state. If the verification mechanism is to be effective, trust must be acquired, not assumed. The old Russian saying "trust but verify" is a cynical one, which should be interpreted as: "observe the niceties but presume nothing as being true." Confirming completeness is almost impossible. Noncompliance, if it exists, is much easier to prove, since one well-established fact to the contrary would be sufficient.

Thus the inspectors should, in any and every case, look for indications that the inspected state employed any of the cheating techniques described in the previous section. In fact, they have to assume the role of detectives; otherwise, their conclusions lack credibility. A basic attitude of distrust is, perhaps, the essential prerequisite for successful verification. Nothing must be taken at face value, especially if there is even a hint of wrongdoing or indication, including political indication, that the inspected state is considering a nuclear weapons production program. In addition, when indications are found or evidence of wrongdoing is uncovered, the inspection organization must not condone or appear to minimize or even accept the damage. Were it to do so, the battle of wits would have been won by the state.

Appendix III

Principles of the Revised Verification Mechanism

Presented below are principles (in italics) and additional comments for the suggested verification mechanism. In no way does this constitute a text proposal, which is an assignment for technical experts, lawyers, and diplomats. In addition, the following include only major points, and many details and refinements will need to be elaborated on in the actual text. The following is based, in part, on existing nuclear and CWC verification documentation.

1. *The objective of safeguards is the timely detection of the production of fissile materials and the diversion of significant quantities of fissile materials from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and the deterrence of such activities by the risk of early detection.*

2. *The purpose of verification is: a) to verify that a state does not produce unsafeguarded fissile materials and, b) to verify that a NNWS does not import unsafeguarded fissile materials.*[1] *In addition, the purpose of verification includes a warning function, which is an essential function of the verification organization.*

3. *Safeguards shall be applied to all facilities that produce fissile materials for peaceful purposes, utilize, or store them. The term "produce" shall be taken to mean the enrichment of uranium and the reprocessing of irradiated nuclear fuel. It shall also include any other process by which fissile materials can be obtained.*

   In principle, safeguards are needed to verify that all the plutonium and HEU that are produced are either placed under safeguards or are assured to be exempt from further controls.

   The last sentence of this principle means, for example, that any unsafeguarded process designed to distill fissile materials from nuclear waste or re-treatment of fissile material that has been irradiated for the purpose of rendering it unusable

1 The term "state" should be taken to mean as in INFCIRC/153, e.g., "within its territory, under its jurisdiction or carried out under its control anywhere."

is forbidden. Re-enrichment of diluted HEU is, of course, contained in the prohibition of enrichment activities.

4. *Because of the limited scope of verification, i.e., the confinement to fissile materials, verification shall be made deterministically, and not rely on statistical sampling.*

   At present, because of the magnitude of the material quantities that are placed under safeguards it is impossible to verify each component. Therefore, statistical sampling is commonly employed. For example, this is the case in the verification of materials stored in barrels, where a statistical sampling is employed.

5. *All uranium enriched to 20% or higher U^{235} content for peaceful purposes, all plutonium with less than 80% content of Pu^{238} for peaceful purposes, and all other isotopes classified as fissile materials shall be placed under safeguards, unless in minute, formally exempt quantities. However, the sum total of such unsafeguarded fissile materials in a given state shall not exceed a fraction of the quantity from which it is possible to manufacture a nuclear explosive device.*

6. *NNWS shall declare and then update the declaration as necessary of all fissile materials inventories, nuclear sites, facilities, and other places where such fissile materials could be produced, utilized, or stored. The declaration shall include design information of the sites, facilities, and other relevant places. The declarations shall be updated by the state as necessary.*

   This requirement is not different from what is in force for the NNWS at present, with the notable exception that it will apply only to fissile materials and their production and not to source materials and their processing.

7. *The starting point of safeguards for NWS and OS shall be the declaration of inventories of fissile materials for peaceful purposes, followed by the declaration of all nuclear facilities and other places where such fissile materials could be utilized or stored. The declarations shall be updated by the state as necessary.*

   From a technical point of view, verifying the activities in the NWS and OS is not essential for the prevention of proliferation. These states can do whatever they wish with their undeclared materials. However, as in the present regime, they should make an effort to minimize the discrimination between them and the NNWS. This requirement is better and makes more sense than the present situation where the NWS declare some facilities (usually power reactors) at their own convenience, just for the sake of appearances. Under the new requirements all facilities holding or utilizing fissile materials will be safeguarded.

8. *It is the responsibility of the inspected state to prove to the inspectors that it is not in noncompliance with its treaty and safeguards obligations.*

Full transparency, if not openness, on the part of the inspected state is an essential requirement. Moreover, the state is obligated to provide the inspectors with all required information and access that will be the first step in the verification process. This will also be the basis for trust and the eventual report that nothing indicating noncompliance was detected.

9. *Notwithstanding the above, it is the responsibility of the inspectors to verify the correctness of the declarations and, as far as possible, the completeness of the declarations. It is the responsibility of the inspectors to try and verify or negate any information contradicting the declarations. This information could originate from within the inspectorate, including the analysis of verification information, open source, and NTM-originated information.*

   The attitude and intensity of the verification activities will determine their success or failure. Completeness is almost impossible to verify. However, an intensive attempt to verify completeness is essential if noncompliance is to be detected, on the one hand, or that a report is to be made that nothing amiss has been discovered, on the other hand. For such a report to be acceptable, it has to be based on a comprehensive and intensive operation.

10. *The inspectors shall have access anywhere within a NNWS state for the purpose of taking environmental and facility samples. Sampling will be carried out for the purpose of detecting the presence of undeclared fissile material and for the detection of undeclared production and storage facilities. Whenever needed, managed access procedures shall apply. In any case, the inspected state shall make all effort to satisfy the requirements of the inspectors.*

    Environmental sampling is one of the most powerful tools an inspectorate can have. However, it is not trouble-free for many technical reasons, and in some cases the results can be inconclusive. Facility samples (that are not within the rights of the inspectors in the Additional Protocol) will do much better in narrowing the issue, since they contain much more specific information. Managed access for the sake of sampling also provides the inspected state with a much better opportunity to prove its innocence.

11. *If the requirements of the above are not fulfilled to the inspectorate's satisfaction, the DG or the BOG can approve a request for a special inspection. In case the state in question refuses such an inspection or when it fails to satisfy the requirements of the inspectors, as stated above, the issue shall be referred to the Security Council.*

    As mentioned, there is great reluctance on the part of international organizations to approve special or challenge inspections. In some cases (the CWC and the CTBT) there are penalties for the abuse of these measures. On the other hand, the state could have valid reasons for refusing special inspections, as would be

in the case of security sensitive installations. This could be, in some cases, a crucial issue. The Security Council is the only international body that has enforcement powers, if all attempts to resolve the issue have failed.

12. *Conclusions, including significant interim conclusions, shall be transmitted to a Standing Committee for Verification Oversight, together with all relevant information, for review and approval. Following this, any significant conclusions will be promulgated, first to the BOG and then publicly. These shall also include the cases when the inspected state did not provide sufficient information or hindered the work of the inspectors in any other way. An attempt to settle disputes or disagreements on the meaning of facts should be made, but these should also be reported to the Oversight Committee.*

    Two major problems with the present mode of operation became manifest during the last decade: the lack of outside technical review allowed political overtones to seep into the evaluation process, and the lack of transparency of the IAEA actions and decisions caused a public distrust of its conclusions.

13. *Cases where noncompliance has been ascertained shall be reported to the UN Security Council. Cases where suspicions were not allayed by the inspected state or cases where special inspections where not permitted shall be reported to the Security Council.*

    There can be no distinctions and degrees of noncompliance in the technical assessments presented by the IAEA. The requirements of the safeguards agreements are very clear. Disobeying them or non-declaration prior to discovery by the inspectors or by other means is noncompliance.

    The Security Council must be informed about these cases, which have a potential to undermine world security. The Security Council's modes of action are outside the scope of this document.

14. *The members of the inspection team shall be obliged to respect the laws and regulations of the inspected state party or host state and, to the extent that is consistent with the inspection mandate, shall be obliged not to interfere in the internal affairs of that state. The activities of the inspection team shall be so arranged as to ensure the timely and effective discharge of its functions and the least possible inconvenience to the inspected state party or host state and disturbance to the facility or area inspected.*

    Although the inspections under the new regime will be much more aggressive than before, respect for the inspected state and proper behavior must be maintained. This is not a contradiction in terms, and can be made to work. On the other hand, if and when the host state does not provide full assistance, or when it does not display full transparency, this must be reported, both to the BOG and to the public. Cooperation must be the standard and not a commendable courtesy.

Appendix IV

Abbreviations

BOG	Board of Governors
CD	Conference on Disarmament
CTBT	Comprehensive Test Ban Treaty
CWC	Chemical Weapons Convention
DG	Director General
FMCT	Fissile Materials Cutoff Treaty
HEU	High Enriched Uranium
IAEA	International Atomic Energy Association
LEU	Low Enriched Uranium
LOF	Location Outside Facilities
MOX	Mixed Oxide
NMD	National Missile Defense
NNWS	Non-Nuclear Weapons State
NPT	Non-Proliferation Treaty
NSG	Nuclear Suppliers Group
NTM	National Technical Means
NWFZ	Nuclear Weapons-Free Zone
NWS	Nuclear Weapons State
OMV	Ongoing Monitoring and Verification
OPCW	Organization for the Prohibition of Chemical Weapons
OS	Other States
PAROS	Prevention of Arms Race in Outer Space
SSAC	State System of Accounting and Control
TMD	Theater Missile Defense
UCF	Uranium Conversion Facility
UNMOVIC	United Nations Monitoring, Verification and Inspection Commission
UNSCOM	United Nations Special Commission
WMD	Weapons of Mass Destruction

Notes

Preface

1 R. Haug, "What Were Important Substantive Developments and Their Implications?" in Workshop on the Outcome and Implications of the 2002 NPT PrepCom, Annecy, France, July 14-15, 2002.

Introduction

1 The general feeling was that although these two states upset international conventions, they did not violate any legal undertaking, since both were neither parties to the NPT nor signatories to the Comprehensive Test Ban Treaty (CTBT).

Chapter 1, *Nuclear Non-Proliferation: Past, Present, and Possible Future*

1 A complete text of the treaty appears in Appendix I, p. 63.

2 These states are the United States, USSR (later replaced by Russia), United Kingdom, France, and China. India, which carried out a nuclear explosion in 1974, was thus barred from becoming a member of the "nuclear club."

3 In striking contrast, the Chemical Weapons Convention (CWC), which entered into force in 1997, includes as Article XII "Measures to redress a situation and to ensure compliance, including sanctions." This article begins: "The Conference shall take the necessary measures… to ensure compliance with this Convention and to redress and remedy any situation which contravenes the provisions of this Convention." No doubt this inclusion was influenced by the NPT experience.

4 See, e.g., J. Simpson, "Core Non-Proliferation Regime Problems – Noncompliance and Universality," Workshop on the Outcome and Implications of the 2002 NPT PrepCom, Annecy, France, July 14-15, 2002.

5 See, e.g., Ewen MacAskill and Ian Traynor, "Saudis Consider Nuclear Bomb," *Guardian*, September 18, 2003. See also E. Asculai, "Saudi Arabia - A New Player on the Nuclear Scene?" *Tel Aviv Note*s No. 90, October 26, 2003.

6 A Russian official was quoted as saying that Russia wasn't linking its cooperation with Iran to Tehran accepting tighter international oversight of its atomic facilities. *The Guardian*, http://www.guardian.co.uk/worldlatest/story/0,1280,-3154754,00.html.

7 http://cbw.sipri./se/cbw/nsg.htm.

8 UN Security Council document S/25405 (Annex): Letter dated March 12, 1993 from the Minister for Foreign Affairs of the Democratic Republic of Korea addressed to the President of the Security Council.
9 Nonetheless, the Security Council has debated the matter, but did not decide that the reasons presented by North Korea were not substantive enough to warrant its withdrawal from the NPT.
10 Proposed deletions will be noted in curly brackets {}.
11 It should be noted that since "source materials" are not defined in the NPT but in the safeguards agreements, they could be redefined there. However, modifying the treaty language is probably the better route, and only if this would not be possible should the alternate route be taken.
12 See, e.g., the views of former UN Under-Secretary General for Disarmament Affairs Dhanapala in http://cns.miis.edu/pubs/reports/dhana.htm.
13 E. Asculai, "What Nuclear States Should and Should Not Do to Staunch Proliferation," Conference on Nuclear Non-Proliferation, May 31-June 1, 2003, Athens, Greece.
14 M. ElBaradei, "Towards a Safer World." *The Economist*, October 16, 2003.
15 http://www.nuclearsuppliersgroup.org/member.htm.
16 IAEA INFCIRC/539 rev.1, April 2000.
17 http://www.nuclearsuppliersgroup.org/member.htm.
18 Ibid.

Chapter 2, *Verification: The Main Implementation Instrument*

1 Both the chairman of UNMOVIC (the UN Iraq verification organization), in his reports to the Security Council, and the IAEA Director General, in his reports to the IAEA Board of Governors (BOG) chose to highlight the degree of cooperation received from Iraq and Iran, respectively. This served to mitigate the seriousness of some of their findings, and was utilized by some members of the Security Council as an indication that the aims of the inspections would eventually be achieved.
2 In a BBC interview of August 29, 2003, the IAEA DG stated: "[The Iranians] failed in their obligation to report materials, which is different from saying Iran has been working on a nuclear weapons program, or Iran has been enriching uranium."
3 For a detailed discussion of the Additional Protocol see E. Asculai, "The IAEA Additional Protocol: Improving the International Safeguards Regime," *Strategic Assessment* 5, no. 3 (2002): 27-31.
4 D. Albright and C. Hinderstein, "Algeria: Big Deal in the Desert?" *Bulletin of the Atomic Scientists* 57, no. 3 (2001):45-52.
5 The IAEA Board of Governors resolution of November 26, 2003, which can be found at: http://www.iaea.org/Publications/Documents/Board/2003/gov2003-81.pdf.
6 Meant by "fissile materials" are materials that are either pure or in a form from which they can be easily produced. This excludes, e.g., irradiated nuclear fuel or nuclear waste.
7 One could add the isotopes U^{233}, Np^{237}, and Am^{241} to the products of reprocessing plants, if one so wishes.

8 For example, in the case of Iran, the National Council of Resistance actually brought the new sites into the public eyes.
9 For a more detailed description see INFCIRC/153, paragraphs. 78-82, "Frequency and Intensity of Routine Inspections."
10 E. Asculai, "What Is the Role of Inspectors in Iraq?" *Tel Aviv Notes* No. 69, Tel-Aviv University, March 2003.
11 Asculai, "The IAEA Additional Protocol."
12 The IAEA "Program 93+2" resulted in a 2-part implementation project. Part 1, based on hitherto unimplemented rights incorporated in INFCIRC/153 and Part 2, which resulted in the promulgation of the Model Additional Protocol (INFCIRC/540). For a more detailed description see: C. Zak, *Iran's Nuclear Policy and the IAEA, An Evaluation of Program 93+2*, The Washington Institute for Near East Policy, Military Research Papers, No. 3 (Appendix 2), 2002. See INFCIRC/153 at http://www.iaea.org/Publications/Documents/Infcircs/Others/inf153.shtml and the Additional Protocol at http://www.iaea.org/Publications/Documents/Infcircs/1998/infcirc540corrected.pdf.
13 See IAEA document GOV/2003/63.
14 For its part, Iran would probably claim that it was not legally obligated to declare construction at the time, since it had not concluded the necessary "subsidiary arrangements" with the IAEA by the time the Natanz site was uncovered.
15 Safeguards would certainly be applied to the Iranian proposed MIX facility for the production of Molybdenum Iodine and Xenon, which will separate these from irradiated uranium targets, with plutonium as an inevitable by-product.
16 E. Asculai, *Verification Revisited: The Nuclear Case, Institute for Science and International Security*, Washington, D.C., 2002. See also J. Carlson, R. Leslie, P. Riggs, and A. Berriman, "Strengthening the Nonproliferation Regime," INMM 44th Annual Conference, July 4-17, 2003, Phoenix, AZ.
17 National Technical Means are the technical methods by which nations gather intelligence and include, among others, satellite observations, geophysical, and other scientific measurements. Human intelligence (spying) is excluded from this category. The CTBT addresses the use of NTM: "no State Party shall be precluded from using information obtained by national technical means of verification in a manner consistent with generally recognized principles of international law, including that of respect for the sovereignty of States."
18 In his address to the 2003 IAEA General Conference, the DG stated that "in the case of 13 States having in force both a comprehensive safeguards agreement and an additional protocol, the Agency, having found no indication of the existence of undeclared nuclear material or activities, was also able to provide broader assurance, *concluding that all nuclear material in those States had been declared and remained under safeguards"* (emphasis added) The names of these 13 states were not disclosed, nor were the methods by which the IAEA reached this conclusion reported.
19 These should preferably not be civil servants or professionals whose livelihood is politically dependent. However, this would probably be unrealistic.

20 This is not surprising since the Additional Protocol was derived as part of the lessons learned from the Iraq experience.
21 INFCIRC/540, Article 5c.

Chapter 4, *And Then What?*

1 See, e.g., Thomas E. Shea, "The FMCT: Potential Treaty Elements and Perspectives on the Treaty," Proceedings of the INMM 44th Annual Meeting, 2003.
2 MOX, however, is still in the development stages, and there are ample supplies of plutonium in the world, so there would not be an acute problem in the foreseeable future even if all reprocessing would cease.
3 The case of North Korea is unique. If we take the view presented elsewhere that it cannot abrogate its NPT obligations, it will still be considered a NNWS.
4 One of the main reasons being the introduction of National Missile Defense (NMD) and Theater Missile Defense (TMD) policies.
5 This statement appears in several places, here quoted from the 1995 UN resolution A/RES/50/70, C(b).

JCSS Memoranda 1998 – Present

No. 70, June 2004, Ephraim Asculai, *Rethinking the Nuclear Non-Proliferation regime*.

No. 69, January 2004, Daniel Sobelman, *New Rules of the Game: Israel and Hizbollah after the Withdrawal from Lebanon*.

No. 68, November 2003, Ram Erez, ed. *Civil-Military Relations in Israel: Influences and Restraints* [Hebrew].

No. 67, October 2003, Asher Arian, *Israeli Public Opinion on National Security 2003*.

No. 66, October 2003, Shlomo Gazit, *Between Warning and Surprise: On Shaping National Intelligence Assessment in Israel* [Hebrew].

No. 65, June 2003, Daniel Sobelman, *New Rules of the Game: Israel and Hizbollah after the Withdrawal from Lebanon* [Hebrew].

No. 64, May 2003, Shmuel L. Gordon, *Dimensions of Quality: A New Approach to Net Assessment of Airpower*.

No. 63, January 2003, Hirsh Goodman and Jonathan Cummings, eds. *The Battle of Jenin: A Case Study in Israel's Communications Strategy*.

No. 62, October 2002, Imri Tov, ed. *Defense and Israel's National Economy: Exploring Issues in Security Production* [Hebrew].

No. 61, July 2002, Asher Arian, *Israeli Public Opinion on National Security 2002*.

No. 60, August 2001, Asher Arian, *Israeli Public Opinion on National Security 2001*.

No. 59, June 2001, Emily Landau, *Egypt and Israel in ACRS: Bilateral Concerns in a Regional Arms Control Process*.

No. 58, April 2001, David Klein, *Home-Front Defense: An Examination of the National Cost* [Hebrew].

No. 57, September 2000, Paul Rivlin, *World Oil and Energy Trends: Strategic Implications for the Middle East*.

No. 56, July 2000, Asher Arian, *Israeli Public Opinion on National Security 2000*.

No. 55, March 2000, P. R. Kumaraswami, *Beyond the Veil: Israel-Pakistan Relations*.

No. 54, November 1999, Shmuel Even, *Trends in Defense Expenditures in the Middle East* [Hebrew].

No. 53, August 1999, Asher Arian, *Israeli Public Opinion on National Security 1999*.

No. 52, August 1998, Abraham Ben-Zvi, *Partnership under Stress: The American Jewish Community and Israel*.

No. 51, July 1998, Aharon Levran, *Iraq's Strategic Arena* [Hebrew].

No. 50, June 1998, Shmuel Even, *Trends in the World Oil Market: Strategic Implications for Israel* [Hebrew].

No. 49, July 1998, Asher Arian, *Israeli Public Opinion on National Security 1998*.