

Securing our Survival (SOS)

The Case for a Nuclear Weapons Convention

**The Updated Model Convention on the Prohibition of the
Development, Testing, Production, Stockpiling, Transfer, Use and
Threat of Use of Nuclear Weapons and on their Elimination**

**With updated Commentary and Responses
Foreword by Judge C.G. Weeramantry**

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**International Association of Lawyers Against Nuclear Arms
International Network of Engineers and Scientists Against Proliferation
International Physicians for the Prevention of Nuclear War**

The model Nuclear Weapons Convention (NWC) presented in this book is a draft model treaty for the phased elimination of nuclear weapons. It is a revised edition of the model NWC submitted by Costa Rica to the United Nations Secretary-General as a discussion draft, UN Doc. A/C.1/52/7 (1997), and contained in *Security and Survival: The Case for a Nuclear Weapons Convention* (1999).

The book and the model NWC are non-governmental initiatives to further the goal of nuclear weapons abolition. The commentary and revisions to the model reflect governmental and non-governmental responses to the 1997 and 1999 versions.

Drafters and consultants to the model NWC are listed on the inside back cover. Sections 1,3, and 4 were authored by the International Association of Lawyers Against Nuclear Arms, the International Network of Engineers and Scientists Against Proliferation, and International Physicians for the Prevention of Nuclear War, except where otherwise noted. The authors and contributors do not necessarily share all of the views presented here.

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International Physicians for the Prevention of Nuclear War
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ISBN: 978-0-646-47379-6

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We gratefully acknowledge the Poola Foundation (Tom Kantor Fund), the New Zealand Disarmament Education United Nations Implementation Fund and the Samuel Rubin Foundation for supporting the publication of this book.

**Where the mind is without fear and the head is held high;
Where knowledge is free;
Where the world has not been broken up into fragments by narrow domestic walls;
Where words come out from the depth of truth;
Where tireless striving stretches its arms towards perfection;
Where the clear stream of reason has not lost its way into the dreary desert sand of dead habit;
Where the mind is led forward into ever-widening thought and action
Into that heaven of freedom, let my country awake.**

- Rabindranath Tagore

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Foreword: Judge C.G. Weeramantry

The start of a new century invariably gives rise to universal attention to ways in which that century can be made a century of peace. So it was at the dawn of the 20th Century when the great Peace Conference of 1899 sought ways and means of achieving a century of peace. Those hopes were shattered and that century became the bloodiest century in human history.

Yet humanity survived to see the dawn of another century - the first century in human history that has dawned with humanity having the power to destroy itself. That century instead of commencing on a note of peace, has commenced on a note of war. We will not be granted another century to put our house in order. We must do so in this century or all civilizations will perish. That is the urgency of the situation. But the urgency is not perceived as widely as it should be. Certainly it has not seeped through into the corridors of power.

The principal agenda item in our program for human survival in this 21st Century must be the elimination of nuclear weapons, especially because resort to the nuclear weapon is becoming easier year by year, month by month and even day by day.

Why? There are at least fifteen different reasons why the dangers of the use of nuclear weapons by some one, some where, some time is growing ever closer. Increasing knowledge of how to construct a bomb, increasing availability of the materials with which to make a bomb, increasing numbers of people desperate enough to use the bomb, lack of inventories of fissile materials, lack of the international resolve to ban the bomb and banish it from the arsenals of the world – all these are factors which bring the use of the bomb ever closer to us.

Our desired objective of eliminating the bomb can only be achieved through a Convention subscribed to by all powers, nuclears and non-nuclears alike. The nuclears cannot expect the non-nuclears to pursue a policy of abstention while they themselves desire to keep the bomb as a means of projecting their power and might.

The bomb clearly stands categorically condemned by upwards of a dozen basic principles of international law. The International Court of Justice in its Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (1996) has unanimously held that “there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control.”

There cannot be one law for the nuclear powers and another law for the non-nuclear powers. By the very principles of law and justice which the powerful states seek to uphold, the nuclear weapon in any shape or form stands condemned. No policeman can enforce a law which the policeman himself openly violates.

At the close of the 19th Century all the members of the world community agreed that even weapons such as the dum dum bullet which caused unnecessary suffering through its explosion when entering the victim’s body were too cruel to be used in warfare among civilised nations. Civilised nations today still adhere to these principles and will considerably refrain from using dum dum bullets, but will argue that the nuclear weapon does not fall into this category.

A school child of ten would see the absurdity of such a position but the great powers seem to have difficulty in perceiving this absurdity. A visitor from outer space might well wonder on what logical basis we construct the national policies on which the future of humanity depends.

Here shortly stated are the reasons why a case for a Nuclear Weapons Convention is unassailable. It is an SOS for the whole human race. Nations large and small, rich and poor, strong and weak must all agree on the unassailable logic of the proposition that such a Convention is perhaps the most imperative need of our time. I have much pleasure in providing a Foreword to a book that highlights the need for such a Convention.

All creatures great and small are instilled with the instinct for self preservation and when life threatening dangers loom large and clear within their horizon they act instinctively to avoid it. Humans alone seem to react differently despite this threat to their very survival which every child can perceive.

With the nuclear weapons in front of us we only face destruction and annihilation. With the nuclear weapon behind us we can all look forward to reaching that sunlit plateau of peace and justice, which has been the dream of humanity throughout the ages.

Can there be any choice?

Preface to the second edition

Ten years ago, experts in law, science, disarmament and negotiation came together to draft a Model Nuclear Weapons Convention (Model NWC), a draft treaty for the abolition of nuclear weapons. Their purpose was to determine whether nuclear disarmament is possible by exploring the legal, technical and political requirements for a nuclear-weapons-free world, taking into consideration the security concerns of all States and of humanity as a whole.

The process was difficult as drafters placed themselves in the positions of governments, including those of nuclear weapon possessing states, with diverse security needs, asymmetrical nuclear forces and policies, and varying reasons for resisting nuclear disarmament negotiations. After a year of consultations, however, the drafting process was successful in April 1997 and the resulting Model NWC was submitted to the United Nations in the same year and circulated as UN Document A/C.1/52/7.

This was followed in 1999 by the publication of *Security and Survival: The Case for a Nuclear Weapons Convention*, which explained the rationale for a Nuclear Weapons Convention (NWC), explored the political processes for achieving an NWC (or a framework of agreements which would achieve the same results as an NWC), and discussed critical questions about issues such as verification, enforcement, international security, alternatives to nuclear deterrence, terrorism, health and environment, nuclear energy, nuclear knowledge, reversibility, conversion, research and more.

Security and Survival also outlined some of the political and technical developments that make the achievement of a nuclear-weapons-free world (NWFV) a realizable goal. The Model NWC contained in *Security and Survival* and updated in this revised publication offers a vision of what such a nuclear-weapons-free world might look like and a plan for how to get there.

The Model NWC was well received by many governments, academics, scientists, civil society leaders and non-governmental organisations (NGOs). Initiatives by some nuclear weapons possessing states, including studies on verification and new restrictions on specific fuel chain elements, reflected ideas raised in the Model NWC. On the other hand, key nuclear weapons possessing states continue to resist the idea of commencing negotiations that would lead to the conclusion of an NWC.

Major political and social changes since 1997 have affected the broader context in which nuclear non-proliferation and disarmament are addressed. These include the rising spectre of nuclear terrorism, nuclear testing by India, Pakistan and North Korea; concern about nuclear fuel chain capabilities of some non-nuclear weapon states; the debate on missile defence; and the expansion of the nuclear doctrines of some of the nuclear-weapons-possessing states to include the threat or use of nuclear weapons in response to suspected development of weapons of mass destruction and even against threats from conventional weapons.

Former UN Secretary-General Kofi Annan has also noted the growing divide between those countries advocating non-proliferation first and those advocating disarmament first.

This makes revisiting the idea of an NWC timely as it combines both non-proliferation and disarmament measures. Can the NWC approach provide a way to bridge the divide and stimulate constructive steps towards nuclear abolition? Can an NWC address the new security concerns relating to nuclear proliferation risks? Is achievement of an NWC a political possibility or a utopian ideal?

The Weapons of Mass Destruction Commission chaired by Hans Blix regretted the “serious malaise” in disarmament diplomacy in recent years, and recommended that nuclear weapons be outlawed, identifying the key as “dispel[ing] the perception that outlawing nuclear weapons is a utopian goal. A nuclear disarmament treaty

is achievable and can be reached through careful, sensible and practical measures. Benchmarks should be set; definitions agreed; timetables drawn up and agreed upon; and transparency requirements agreed. Disarmament work should be set in motion.”¹

With this updated discussion on *The Case for a Nuclear Weapons Convention*, experts have returned, and been joined by others, to reconsider the NWC in the changed global security dynamic. These experts address the variety of concerns and questions about the call for nuclear abolition under an NWC. They argue that in a world experiencing diverse security challenges and terrorism, nuclear abolition is both an attractive and logical means of reducing and eliminating the dangers of accidents, sabotage or deliberate use of a nuclear device.

They reaffirm the perspective of Nobel Peace Laureates in their 2006 Rome Declaration: “The failure to work for nuclear weapons abolition shreds the fabric of cooperative security. A world with nuclear haves and have-nots is fragmented and unstable, a fact underscored by the current threats of proliferation. In such an environment cooperation fails. Thus, nations are unable to address effectively the real threats of poverty, environmental degradation and nuclear catastrophe. Nuclear weapons are more of a problem than any problem they seek to solve.”²

This book might not answer all relevant questions sufficiently. There may be different perspectives on the degree of verification required for nuclear abolition, or a change in the actual timeframes for the achievement of specific disarmament steps, or differing opinions on the security value of alternatives to nuclear deterrence, or continuing concerns about nuclear technologies used to generate electricity, or a requirement for improved methods of fissile materials disposal.

The Case for a Nuclear Weapons Convention indicates, however, that incomplete answers to these questions should not prevent negotiations on an NWC from starting and being brought to a conclusion in the near future. In fact, many of the answers will evolve from the negotiations themselves.

Although the international security environment today might appear discouraging for nuclear disarmament advocates, the Nuclear Weapons Convention — as a goal, as an indication of change in global security policy, and as a catalyst to further change — does not depend exclusively on arms control and short-term incremental progress. Efforts toward next steps in arms control and non-proliferation are conceivably blocked precisely because they have avoided the fundamental underlying dilemma posed by nuclear weapons: whether a global security regime based on threats of mass destruction, either evenly or unevenly distributed, is consistent with global survival and sustainability.

Since the Model Nuclear Weapons Convention was published, the debate has grown richer, broader in scope, and more nuanced in content. But debate is not enough. The International Court of Justice in 1996 affirmed, “there exists an obligation to pursue in good faith and bring to a conclusion negotiations on nuclear disarmament in all its aspects under strict and effective international control.”

The drafters of the Model NWC and the authors of this publication hope that by demonstrating the feasibility of nuclear disarmament, governments will be inspired to take on the difficult but necessary and increasingly urgent task of commencing, and bringing to a conclusion, nuclear disarmament negotiations. Not to do so will condemn the world to an inevitable catastrophe – unimaginable in scale. To do so will be enacting the will of the democratic majority, building a more cooperative and safe world, and indeed Securing our Survival.

¹ Weapon of Mass Destruction Commission, final report, *Weapons of Terror: Freeing the World of Nuclear, Biological and Chemical Arms* (Stockholm: June 1, 2006), p. 109.

² The Rome Declaration of Nobel Peace Laureates, 19 November 2006. http://www.pugwash.org/reports/nw/Nobelrome_declaration.pdf

The Evolution of a Nuclear Weapons Convention: Treaty, Custom, Norm

The abolition of nuclear weapons will be achieved through a combination of negotiated agreements, national implementation measures, and the comprehensive rejection of nuclear weapons by civil society, political institutions and legal authorities. Thus a Nuclear Weapons Convention will be a combination of treaty, custom and norm.

What	Treaty Negotiated agreement	Custom Accepted practice	Norm Universal principle
Who	Governments	Civil Society	Humanity
When	Legislation	Transformation	Evolution
Why	Legal obligations Human Rights	State Security Human Security	Survival Morality
How	Incremental steps Package of agreements Comprehensive treaty	Arms control Non-acquisition No use of threat of use	Regulation/cooperation Disarmament Abolition

Reversing Proliferation: The Case for a Nuclear Weapons Convention



A boy contemplates a display of missiles and other weaponry at Beijing military museum, China
Photo: AP/Greg Baker

What Is a Nuclear Weapons Convention?

- Convention • n. 1. a way in which something is usually done. Socially acceptable behaviour.
2. an agreement between States.

Concise Oxford Dictionary, 10th Edition

In the strict sense, a Nuclear Weapons Convention (NWC) is an international treaty. An NWC will be similar to other international treaties banning entire categories of weapons such as the Chemical Weapons Convention, the Biological Weapons Convention and the Mine Ban Treaty.

Treaties to prohibit weapons such as these are achieved through negotiations among states. Generally they prohibit all aspects of development and testing of the weapons, and include measures to prevent the spread of technology and know-how in relation to the weapons, as well as a framework for their elimination. The most effective treaties include a system for verifying that no state party is cheating, including declarations, inspections and technical monitoring, as well as a mechanism for the settlement of disputes and enforcement in case of serious violations.

No such treaty exists yet for nuclear weapons, but demands for one have increased in recent years, as have more general demands for complete nuclear disarmament.

In a wider sense, the Nuclear Weapons Convention would be the implementation of the universal societal condemnation of nuclear weapons and the codification of the customary norm against all weapons of mass destruction. It would thus include additional measures at national and international levels further delegitimising nuclear weapons and supporting their prohibition. Its impact will therefore be deeper and more far-reaching than the treaty language itself. Such a treaty would reflect a broader social

and political movement away from reliance on weapons of mass destruction and military solutions to conflicts, and would incorporate the desires and responsibilities of global civil society for a less militarized world. It would realise a profound and near universal desire to finally free this and future generations, human civilisation and the biosphere from the unprecedented and unparalleled threat of nuclear annihilation.

Generated by technical, legal and political experts, the model NWC in this book provides ideas and text suggestions for the usual components of a comprehensive treaty, based largely on the Chemical Weapons Convention, the first treaty completely banning an entire category of weapons and providing for their verified elimination. It is also based on the International Atomic Energy Agency and UN Security Council procedures aimed at preventing nuclear proliferation. Like other treaty texts, it provides rule-framed expectations of conduct. It also provides schedules for progress, and crystallizes the elements of the problem and solution by defining them precisely.



World Court Project advocates display boxes before the World Court which contains millions of Declarations of Public Conscience submitted to the court as evidence of global opposition to nuclear weapons.

Photo: Ann Marie Janson/
World Court Project

Responses to the Model NWC - A Summary

Since the release of the Model NWC and the publication of *Security and Survival: The Case for a Nuclear Weapons Convention* in 1997, there has been considerable discussion in informal and formal settings relating to ideas from these documents. The *Nuclear Weapons Convention Monitor*, in its issues published in 2000, 2001 and 2002, documented and included some of this ongoing discussion. It has focused primarily on the “how” of nuclear disarmament as distinct from the more familiar political debate on “when” it should occur and “whether” it is possible. The main clusters of response to the Model NWC are summarised below. In-depth discussion of many of these issues is covered in the Critical Questions section.

Long-term goal and next steps: To what extent can a focus on the long-term goal of nuclear disarmament facilitate the identification and promotion of next feasible steps and help generate political impetus towards achieving such steps? Is it possibly too ambitious and counter-productive to discuss the end goal? There is no single answer to these questions. However, a preliminary conclusion appears to be that selective use of the NWC as both a tool to assist short-term goals and as a concrete long-term political objective can be genuinely helpful. In addition, States’ approach to the NWC can serve as a litmus test of commitment to nuclear disarmament.

Low levels vs. zero: There are varying opinions on the relative difficulty of verifying low levels of nuclear weapons as opposed to verifying maintenance of a nuclear-weapons-free world, and thus on whether it is realistic to aim for zero nuclear weapons. It might be possible for a NWS to hide a few nuclear warheads and thus possibly remain a single nuclear-armed State in an otherwise nuclear-weapons-free world. In order to prevent such a monopoly, the most that might be possible is to get down to low levels of nuclear weapons. On the other hand, maintaining a nuclear-weapon-free world once the infrastructure had been verifiably dismantled and the nuclear option renounced would be more straightforward than verifying a precise low number of nuclear weapons and trying to enact an absolute policy of no-use and no-threat-of-use while some States still possessed nuclear weapons ‘just in case’. If we consider the two options, it appears that, we would be better off with a comprehensive abolition regime which would include robust mechanisms for verifying, enforcing and dealing with breakout and for ensuring security without nuclear weapons, than we would be with a partial disarmament regime with less capability to detect secret stockpiles and programmes. There will be risks in implementing a NWC, however, these risks pale in comparison to the risks posed by maintaining the status quo or in only developing partial disarmament measures leaving the nuclear option still a possibility.

Compliance: The model NWC envisions a security regime based on incentives for compliance, good faith, institutionalising the norm of non-possession of nuclear weapons, reducing or eliminating the technical possibility for maintaining or developing nuclear weapons, and establishing mechanisms for addressing non-compliance. The Model NWC includes some procedures similar to the Chemical Weapons Convention, but places more emphasis on individual responsibility, and gives the Agency greater powers to impose preliminary sanctions (on technical assistance) in the case of non-compliance before having to refer the situation to the Security Council. Some commentators feel that the Security Council is so biased with respect to nuclear disarmament that situations of non-compliance should not be referred there at all but should instead be referred to the UN General Assembly. Others feel that the NWS

would have to be committed to nuclear disarmament for a NWC to be negotiated and so would by then also be committed to its successful enforcement. There has also been a suggestion of a reform to the Security Council to ensure that any one NWS could not block compliance action regarding its own nuclear weapons programmes.

Verification and the political process: There has been considerable discussion on verification for a nuclear weapons free world since the Model NWC was released. Some, but not all of this has been stimulated by ideas and proposals in the Model NWC. The UK Study on verification of warhead destruction mirrors the warhead identification proposals in the Model NWC. The IAEA additional protocol is similar to the nuclear facilities verification in the Model NWC, although the Model NWC goes further in prohibiting plutonium reprocessing and uranium enriching beyond 20%. There has also been considerable discussion on the emerging technologies for verification, the role of societal verification and political considerations on the degree of certainty required in verification.

The Comprehensive Test Ban Treaty (CTBT) political process benefited from the extensive research on verification and development of verification mechanisms that preceded conclusion of negotiations. The NWC, or a future regime for complete nuclear disarmament, would benefit from similar research and development if it helps establish the feasibility of verifiable disarmament. The more complex and unresolved political and technical questions, however, makes this somewhat more elusive for some than the case of the CTBT. Which facilities should be subject to verification? Facilities that can produce nuclear materials, facilities that can handle or fabricate nuclear components or can transform components back into fissile materials, civil facilities that can fabricate fissile materials into fuel, and assembly/disassembly facilities where components are assembled or disassembled into warheads. On the other hand there are emerging technologies and other developments that make verification much easier. These include increased access to satellite photography, better radioisotope monitoring, a wider range of portal control systems and sampling techniques, real-time or near-real time data communications systems and a greater capacity for monitoring by non-governmental entities.

Costs of disarmament: Discussion of the economic aspects of nuclear disarmament is included in the Critical Questions section. What has not yet been done, but has been recommended, is a full analysis and projection of the costs involved in nuclear abolition and disarmament. It is estimated that such costs will be very high, particularly due to the difficulties in decommissioning and cleaning up nuclear fuel facilities. The costs involved in verification will be hard to assess as these could vary greatly depending on the technologies chosen, degree of certainty required and extent to which existing verification mechanisms can be used. Thus the actual costs for disarmament will revolve as much around political considerations as around baseline costs for specific tasks.

The issue of how to convert nuclear weapons industries to nuclear disarmament industries is covered in the Critical Questions. One of the interesting areas of discussion on this issue has been the degree to which the new wave of ethical investing can be applied to nuclear weapons industries in order to help facilitate their conversion prior to the negotiation of a nuclear weapons convention or whether such economic aspects should be left in the hands of the States parties to an eventual NWC.

Non-participants: There has been considerable discussion over entry-into-force requirements and whether it would be possible for a NWC to be concluded if one or more key States remained outside. The likelihood of states that would not participate in

the political negotiation process or the implementation of a future NWC raises critical questions about its feasibility. At the same time, this question is not unique to the NWC. The NPT was concluded without two NWS (China and France joined later) and four nuclear weapons capable states are outside of the Non-Proliferation Treaty regime today. Focusing on a nuclear disarmament regime might, in fact, serve to draw in these states or, at a minimum, help identify the source of resistance. Thus there has been the suggestion that early commencement of negotiations on a NWC, even without key States in the beginning, would help create the political environment that would move the remaining States to join.

Carrots and sticks: The approach in the model NWC places an emphasis on compliance over coercive enforcement. There are disincentives for non-compliance including targeted sanctions, but it would be useful to explore and develop incentives in order to make compliance more attractive than non-compliance. More carrots, as well as carrot cake, are needed. The NPT provides for assistance in nuclear energy for States parties and some have proposed something similar for the NWC. However, the proliferation and environmental risks of nuclear energy led the drafters of the Model NWC to instead propose assistance in alternative energy for States parties that choose to phase out or not to develop nuclear energy. There are no specific incentives for other States parties to the NWC, other than assurances that they will not be attacked by nuclear weapons and that the world will be a safer place with nuclear abolition. Perhaps other incentives would be desirable.

Societal verification and whistleblowers: The role of societal verification and protection for whistle blowers has been a recurrent theme. Some see this as the most promising approach to nuclear disarmament, including education aimed at increasing scientific and societal responsibility. The capacity for non-governmental access to verification data such as satellite imagery has markedly increased. It was an NGO for example, which alerted the world to the fact that China was preparing for a nuclear test in 1995, using commercially available satellite photography. The potential for whistle blowing by those involved in the nuclear weapons industry is event greater. It has been often noted, however, that in totalitarian regimes whistle blowers run high risk of being punished unless there is a way to report violations anonymously. In the US, protections have been moderately effective – returning whistleblowers to the job and awarding damages. However in Israel and Russia, whistleblowers such as Mordechai Vanunu and Alexandr Nikitin have been imprisoned with long sentences. An open question is whether the provisions in the Model NWC are sufficient to both encourage whistle blowing if there are State violations of the treaty, and to protect such whistleblowers from such a State.

A problem with relying too heavily on societal verification is that it increases the openness of the nuclear complex, which could contribute to proliferation of information with respect to nuclear weapons if it is not properly protected.

Implementing agencies: The Model NWC proposes the establishment of an Agency to implement and verify the treaty. However, there is a question as to whether a new body should be established for a NWC or whether we should build on the existing implementation and verification bodies including the IAEA, CTBT and OPCW. Resolution of this question will depend on political structures that emerge, expertise and experience of existing agencies, bureaucratic culture, concerns about duplicating efforts, and the ability to modify or separate the mission(s) of existing bodies.

Nuclear Weapons Convention - the Treaty

A Nuclear Weapons Convention

Defines terms in precise detail to establish thresholds and limits

Creates rules so that everybody understands what is prohibited and what is allowed

Establishes a schedule for sequenced steps to remove the threat of nuclear weapons by separating them from delivery vehicles and dismantling them

Outlines patterns of behaviour and cooperation that will enhance the communication and transparency in implementing the treaty, and those that will arouse suspicion and possible sanctions

Establishes verification measures to make sure that no one is cheating.

While some governments believe that calls for a comprehensive NWC are premature, the majority of states in the world want negotiations to commence. In December 2006 at the UN General Assembly, 125 governments - including nuclear-armed China, India and Pakistan - called upon states to immediately fulfil their nuclear disarmament obligations “by commencing multilateral negotiations leading to an early conclusion of a *nuclear weapons convention* prohibiting the development, production, testing, deployment, stockpiling, transfer, threat or use of nuclear weapons and providing for their elimination”.¹

International desire and demand for the elimination of nuclear weapons have existed since nuclear weapons themselves were first invented. The very first resolution of the United Nations called unanimously for “the elimination from national armaments of atomic weapons...”⁴ – a call repeated in various forms nearly every year since then. Not only do a majority of states want a Nuclear Weapons Convention; opinion polls demonstrate that a majority of citizens – including those of nuclear weapon states – also overwhelmingly want a nuclear-weapon-free future.

Convention as a Customary Norm

“The solution arrived at in this [International Court of Justice] Advisory Opinion frankly states the legal reality, while faithfully expressing and reflecting the hope, shared by all, peoples and States alike, that nuclear disarmament will always remain the ultimate goal of all action in the field of nuclear weapons, that the goal is no longer utopian and that it is the duty of all to seek to attain it more actively than ever... Indeed, it is not unreasonable to think that, considering the at least formal unanimity in this field, this twofold obligation to negotiate in good faith and achieve the desired result has now, 50 years on, acquired a customary character.”

Declaration by Judge Mohammed Bedjaoui, former President of the International Court of Justice, appended to the Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, delivered on 8 July 1996. [Original: French]

There are few recent polls on nuclear weapons but those conducted towards the end of the nineties were strongly supportive of negotiation of a Nuclear Weapons Convention. It is possible that opinion may have moved during the last decade but unlikely to have changed dramatically.

69 % of Europeans polled in France, Italy, Germany, Belgium Turkey and the UK want Europe to be nuclear free. (StratCom for Greenpeace International in March 2006)

87% of those polled in the US agreed, “the US should negotiate an agreement to eliminate nuclear weapons.” (Lake, Sosin and Snell, 1997)

87% of those polled in Britain agreed, “Britain should help to negotiate a global treaty to prohibit and eliminate nuclear weapons.” (Gallup, 1997)

61% of Russians polled agreed that “All nuclear weapons states should eliminate such weapons.” (Vox Populi commissioned by TASS, 1998)

62% of Indians polled agreed that “India should not produce nuclear bombs.” (The Hindu, 1998)

78% of Japanese polled agreed that “all nuclear weapons states should eliminate such weapons.” (Asahi Shimbun, 1998)

92% of Australians polled agreed that “Australia should help negotiate a global treaty to ban and destroy all nuclear weapons.” (Roy Morgan Research Co., 1998)

92% of Norwegians polled agreed that “Norway should work actively for a ban on nuclear weapons.” (4 fakta A/S, 1998)

72% of Belgians polled said they were for “an initiative on behalf of Belgium with an aim of initiating talks concerning a treaty for the abolition of nuclear weapons.” (Market Response, 1998)

93% of Canadians polled agreed that “Canada should take a leadership role in global negotiations to eliminate nuclear weapons” (Angus Reid Group, 1998)

International law comes from both treaties and customary norms, a combination of generally accepted practice and a sense of legal obligation. When a custom becomes self-evident and requires formalization, treaties are negotiated to codify the practice into law. The Mine Ban Treaty the Biological Weapons Convention and the Chemical Weapons Convention are treaties that have prohibited landmines, biological weapons and chemical weapons, respectively.

They evolved from already existing customary prohibitions against weapons that are indiscriminate, that use poison, that cause unnecessary suffering, that do not differentiate between combatants and non-combatants, or that are used in a disproportionate manner that violates neutral territory or causes long-term and severe damage to the environment. Weapons of mass destruction, by their very nature, violate most or all of these principles, many of which were codified in the Geneva and Hague Conventions and the Statute for an International Criminal Court.

“A nuclear disarmament treaty is achievable and can be reached through careful, sensible and practical measures. Benchmarks should be set; definitions agreed; timetables drawn up and agreed upon; and transparency requirements agreed. Disarmament work should be set in motion.”

- *Weapons of Terror, Weapons of Mass Destruction Commission, 2006*

The highest court in the world on general questions of international law is the International Court of Justice (ICJ), the judicial branch of the UN. In 1996, the ICJ applied international law to nuclear weapons, and determined unanimously that the threat or use of nuclear weapons is generally illegal, and that there exists an obligation to pursue and conclude negotiations leading to complete nuclear disarmament.

The court was unanimous on whether governments were obliged to negotiate on disarmament. The judges found that not only were states required by law to begin negotiations, but also they must *achieve* complete nuclear disarmament through good-faith negotiation. The court insisted that talking is not enough; the talk must lead to achievement of a successful outcome. The Court also de-linked the obligation to achieve nuclear disarmament from the objective of comprehensive demilitarization (general and complete disarmament) and insisted that the obligation to achieve nuclear disarmament applies universally to all states, not just the states with nuclear weapons.

In arriving at this conclusion, the ICJ took into consideration the “dictates of public conscience”, which are mentioned in the Hague and Geneva Conventions as an important indication of the legal status of particular weapons systems for which there is no specific treaty prohibition. The ICJ was presented with nearly four million “declarations of public conscience” in 40 different languages, along with evidence of widespread public condemnation of nuclear weapons.

Therefore, an NWC should be seen not as creating an entirely new prohibition against nuclear weapons, but as implementing an existing prohibition against weapons of mass destruction. Nuclear weapons are by far the most potent and destructive weapons ever invented; qualitatively and quantitatively in a different league from any other weapon. They alone have the potential to exterminate much of humanity and other species, end human civilisation, severely damage most ecosystems and disrupt the climate, and cause global radioactive contamination over vast timeframes. Their singular potency accounts in part for the reluctance of the states that possess them to give them up. It also makes their abolition within a proximate timeframe all the more urgent.

An argument has been made that other weapons of mass destruction, namely biological and chemical weapons, continue to pose current and potential future threats, despite treaties for their prohibition. The Biological Weapons Convention and the Chemical Weapons Convention have not yet brought about the complete elimination of these weapons. But a primary reason offered as justification for the pursuit of biological and chemical weapons by less developed states is that they are the “poor man’s nuclear weapons”—that is, they are needed to counter the threat of nuclear weapons. Similarly, the nuclear weapon states justify their retention of nuclear weapons, in part, as deterrents to the use of biological and chemical weapons and as potentially necessary to eliminate such threats pre-emptively. Thus, although the legal regimes addressing nuclear, biological and chemical weapons are distinct, the elimination of nuclear weapons will assist in the elimination of all indiscriminate weapons.

There are valid technical and political reasons for maintaining distinct disarmament and verification mechanisms for the various weapons of mass destruction. But without a general recognition that reliance on the capacity for mass destruction feeds on itself, decision-makers will continue to rely on—and further develop—these capabilities.

The technical difficulties in verifying an NWC are not impediments to the negotiation of such a treaty. The technology to produce chemical weapons is far simpler, more diverse, more widely available, and more difficult to differentiate from legitimate industrial, agricultural, pharmaceutical and other purposes than is the technology required to produce nuclear weapons. The Chemical Weapons Convention includes verification and inspection provisions that are relatively intrusive but widely accepted. On the other hand, the Biological Weapons Convention has been severely constrained by the lack of effective verification and enforcement provisions. The efforts

of many countries over many years to strengthen the BWC through an additional protocol containing verification provisions modelled on those of the CWC have been frustrated by the unwillingness of the current US administration to accept any such provisions. In addition to the technical challenges, major deficiencies in the regimes for minimising chemical and especially biological weapons threats, both current and future, relate to political will.

The Biological and Chemical Weapons Conventions are key milestones for the global community, establishing a clear prohibition of these weapons, spelling out specific obligations to eliminate stockpiles, and providing means to respond to non-compliance. The mechanisms are not flawless, but they impose severe practical and political restraints on the development and use of such weapons, and markedly advance the base from which further efforts to eliminate chemical and biological weapon threats can proceed. A Nuclear Weapons Convention would complete the triad; both building on and reinforcing these other efforts.

More than a Treaty

Not all who support the goal of nuclear abolition see a Nuclear Weapons Convention as the best approach. Some have argued that focusing on a “single” treaty is unrealistic and counterproductive, because it could detract from important intermediate measures that governments are more likely to undertake.

According to this logic, entire sections of our model treaty might be redundant if nuclear weapon states unilaterally disarm, or fast-track the process by negotiating among themselves. This may turn sections of the comprehensive treaty into separate instruments, to become part of the “framework encompassing a mutually reinforcing set of instruments”, a formulation that some governments prefer to use when describing the nuclear disarmament process.

In the long run it would not matter whether elimination of nuclear weapons were achieved through one treaty or through a framework of treaties, provided that the framework approach did not result in inordinate delay. For a Nuclear Weapons Convention to be meaningful and effective, more than a signed agreement among governments will be necessary. Political will and social motivation on several fronts are required, and are an integral part of the treaty development process—lobbying efforts, drafting, negotiations and implementation.

The policies, institutions and scientific and technical expertise that support today’s nuclear establishment must be reoriented towards nuclear disarmament, and this reversal of direction is the “singular” concept embodied in the Nuclear Weapons Convention. Such a reversal will entail deeper and further reaching developments than a mere treaty, but the treaty process can be used to identify, guide and reinforce these developments towards the singular purpose of complete nuclear disarmament.

Who Makes a Nuclear Weapons Convention?

In the traditional conception of treaty making, governments are the principal actors and the only ones required to consent to the final agreement. Civil society, relevant business actors, international organisations and parliaments, however, are recognized as playing an increasingly important role in the negotiations, treaty acceptance and implementation.³ The Mine Ban Treaty is often cited as a good example of governments working with civil society, medical professionals and military experts to affect the pace and content of this international law. To enhance ongoing and comprehensive implementation, governmental agreement and action should be based on the will, consent and involvement of citizens and its own democratic institutions.

“Nuclear Weapons must be banned and eliminated just as chemical and biological weapons have been prohibited ... through the adoption ... as a first step of a universal and legally binding multilateral agreement committing all states to the complete eliminations of nuclear weapons”
- *Mulhammad Siddique Khan Kanju, Minister for Foreign Affairs, Pakistan, July 1998*

This means that coordinated, voluntary governmental and non-governmental participation is needed. In the case of a Nuclear Weapons Convention, this includes broad expertise and participation of scientific, professional, academic, religious, environmental and social justice organizations, as well as other social groups, at the international, national and local levels.

While not discounting these meaningful contributions to negotiations and to the context in which they occur, the genuine commitment of governments is essential in treaty negotiation - particularly with regard to an NWC - because the question of enforcement is uniquely difficult. Government bodies, whether trans-national or national, are responsible for existing and future implementation mechanisms. They also manage the agencies with the relevant expertise or information to improve and refine such mechanisms when necessary.

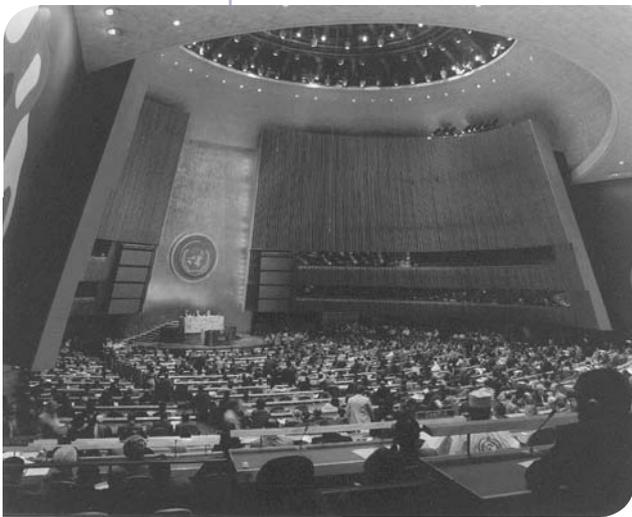
The question of who will participate in the creation and implementation of a nuclear weapons convention must take into account more than six decades of determined and increasingly widespread pursuit of nuclear weapons capability. Enormous resources and effort have gone into creating the current stockpiles, and their ongoing development. Reversing this legacy is complicated, dangerous work, in large part because the materials involved are uniquely hazardous and will outlast anyone living today by many millennia. The US Department of Energy has observed that the environmental problems alone necessitate efforts at least on the scale of the Manhattan Project.⁴ Barring a massive global catastrophe, such as nuclear war, countless future generations have no choice but to continue to safeguard toxic and radioactive nuclear materials.

While abolishing nuclear materials is not feasible, abolishing nuclear weapons is—plausibly within the span of a generation. But however long it takes, uncertainty about the political and social context of future nuclear disarmament work cannot be allowed to prevent progress on the legal and technological foundations. The abolition

of nuclear weapons is essential for human survival and sustainability; the current situation of planned indefinite retention of their nuclear weapons by the NWS feeds proliferation, is unstable, dangerous and unsustainable. Allowing this status quo to remain, and likely deteriorate further, is simply not a realistic option. Future generations may well need to complete and continue many of the complex tasks related to eliminating nuclear weapons, but there is no more important test for current leaders than ensuring that substantial progress has been made in a coherent and convincing framework towards nuclear weapons abolition, and that available, practical steps are not held hostage to uncertainties about the future.

The precise roles of the institutions—the government agencies and the private, commercial, and academic bodies—and individuals who will undertake the work of undoing the cumulative burden of the nuclear age will turn on the particular combination of implementation and verification mechanisms chosen. Decisions about what is to be stored, in what forms and for how long will determine the appropriate combination of reliance on environmental cues, surveillance, inspections and other verification mechanisms. Fortunately, the necessary capabilities already exist. Implementation of these capabilities, however, simply requires continued development and greater production of the relevant technologies in the context of a comprehensive plan.

The knowledge, experience and technology accumulated to date are enough to lay the cornerstone of a regime for the complete elimination of nuclear weapons. The



The UN general Assembly
Photo: UN/DPI
by Eskinder Debebe

work must begin now, with a view to the future roles of policymakers, scientists and engineers. The call for a Nuclear Weapons Convention is not an attempt to predict the future; rather it is a reflection of the desire for a better future.

Implementing the NWC would not necessarily require creation of entirely new mechanisms but, more likely, definition and coordination of functions on the part of existing and emerging agencies as well as effective application of current technology.

The experience of many international and inter-governmental bodies will be useful, whether their current functions remain or change. These include:

- UN General Assembly to both broker agreements and maintain norms;
- UN Security Council to report violations and agree to enforcement action such as the arrangements established under Resolution 1540;
- International Atomic Energy Agency to verify safeguarded global disarmament;
- Conference on Disarmament as the world's primary multilateral disarmament treaty negotiating forum;
- Nuclear-weapon-free zone implementation agencies to ensure regions remain nuclear-weapon-free;
- Comprehensive Test Ban Treaty Organization to detect any nuclear testing;
- International Court of Justice as the world's highest legal authority, to adjudicate on matters flowing from its 1996 Advisory Opinion, and other legal matters including disputes;
- Regional organisations such as the EU to address particular regional issues;
- US and Russian disarmament and non-proliferation bodies, including:
 - Strategic Arms Reduction Treaty (START) and Intermediate Range Nuclear Force (INF) Treaty verification mechanisms
 - Cooperative Threat Reduction (CTR)
 - Material Protection Control and Accounting (MPC&A)
 - Nuclear Cities Initiative.

"Nuclear weapons corrode and democratic rule."
- Avner Cohen,
Israel and the Bomb

When Will a Nuclear Weapons Convention Be Possible?

Because the precise nature of future political actors, structures and events is unknown, some claim that the call for a Nuclear Weapons Convention is premature. This view confuses prediction of the future political context for disarmament with preparation for a better future. The call for an NWC and the drafting of a Model NWC are efforts to address the urgency of formulating and advancing coherent and consistent approaches to the creation of a true nuclear disarmament regime.

There are many perspectives on when an NWC could or should be concluded.

Of the states that possess nuclear weapons, the US, France, Russia and Israel have all argued that even thinking about an NWC is premature. They are unwilling to provide a time reference for beginning, let alone concluding, an NWC. Rather, they are planning on retaining their nuclear weapons arsenals indefinitely into the future and are undertaking replacement and modernisation programs to ensure such long-term possession. The governments of India, China and Pakistan support the commencement of negotiations on an NWC, but have taken no action to advance such negotiations. The UK has accepted the end goal of an NWC and has undertaken some preparatory work on verification requirements⁵, but asserts that it is too early to commence any negotiations and is also planning nuclear weapons renewal programs

to maintain its arsenal into the indefinite future. The Democratic People's Republic of Korea has strenuously emphasised that discussions and negotiations in the Conference on Disarmament (CD) should be oriented towards achieving complete nuclear disarmament.

As already noted, there are 125 governments that want negotiations for an NWC to commence immediately.⁶ In August 1996, the Non-Aligned Movement submitted a proposal to the Conference on Disarmament calling for the entry into force of an NWC by the year 2010 and the complete elimination of nuclear weapons by the year 2020.⁷ The mayors of over 1500 cities in 120 countries support this vision for 2020.⁸

The Canberra Commission on the Elimination of Nuclear Weapons determined that, while there is a need to further develop verification and weapons dismantlement systems, there are no real technological barriers to concluding an agreement or agreements to prohibit and eliminate nuclear weapons. The determining factor is not technology but political will.⁹

When there is sufficient political will, negotiations can be concluded fairly quickly. The Partial Test Ban Treaty, for example, was concluded in ten days of determined negotiating in July 1963, after years of deadlock.¹⁰ Agreements on timeframes for negotiations can sometimes help facilitate the process. The parties to the Non-Proliferation Treaty in 1995 agreed to a timeframe for concluding negotiations on a Comprehensive Test Ban Treaty no later than 1996. Such a timeframe helped to bring the negotiations to a conclusion.¹¹

The Mine Ban Treaty was also concluded very quickly – within a year of the start of negotiations. On the other hand the Chemical Weapons Convention took ten years to negotiate as a high level of verification and confidence building was required in the treaty. It is likely that, unless there are major improvements in relevant global and regional security systems, nuclear weapon states will require a high level of confidence that there will be universal compliance with an NWC for them to agree to eliminate their nuclear weapons. Moreover, the nuclear systems of the different states are asymmetrical, requiring fairly complicated disarmament formulas. Thus, negotiations are likely to be complex and may take some time.

The approach adopted in the Model Nuclear Weapons Convention does not suggest a time bound framework for conclusion of the negotiations or fixed dates for the complete elimination of nuclear weapons. Rather it calls for the immediate commencement of negotiations that ought to be concluded in a quick but comprehensive manner.

At some stage a timeframe for elimination of nuclear weapons will have to be negotiated. The Model NWC suggests that this be done in phases, from entry into force. This is somewhat like incorporating a step-by-step process into a comprehensive approach. The Model NWC attempts to balance the need for a speedy elimination of nuclear arsenals with the concerns of safety, confidence, and irreversibility.

These considerations, while delaying conclusion of an NWC, should not prevent the commencement of negotiations. In fact, it is through the negotiations that these issues can be adequately addressed and resolved. What is desperately needed is the commitment to begin.

According to some analysts, lack of certainty about the future has created obstacles to the willingness to commence nuclear disarmament negotiations. William Walker in 1997 observed that:

[T]he main reason for the resistance of policy elites to disarmament, and for their ability to mount effective campaigns against nuclear abolition within the corridors of power, is that satisfactory answers have not yet been given to three fundamental questions:

1. Would nuclear disarmament increase or decrease national, regional and global security?
2. What exactly is entailed by nuclear disarmament—what is being disarmed,

and when has whatever is being disarmed finally been disarmed?

3. How do we get from here to there safely and securely, and once in the condition of disarmament how can we collectively ensure that we all stay there... ?

Unhappily, there are no clear, unambiguous answers to these questions ... Uncertainty is inherent to the current situation.¹²

Since 1997 considerable attention has been given to these questions by political, academic and military analysts. With respect to the first question, the weight of evidence is overwhelming that regional and global security is seriously threatened by the continued possession and proliferation of nuclear weapons and that such security would be considerably enhanced by nuclear abolition (see “Why pursue an NWC”, below).

There has also been considerable work on the second and third questions, including *inter alia*, drafting of a Model Nuclear Weapons Convention that explores the legal, technical and political elements required for the achievement and maintenance of a nuclear-weapons-free world: papers published in the Nuclear Weapons Convention Monitor;¹³ work undertaken by the Commission on Weapons of Mass Destruction;¹⁴ verification studies on nuclear disarmament conducted by the United Kingdom¹⁵ and VERTIC;¹⁶ informal inter-governmental Article VI Forum meetings on the elements required to achieve a nuclear-weapons-free world;¹⁷ and technical studies on nuclear disarmament coordinated and published by INESAP.¹⁸

Any remaining uncertainty about the second and third questions should not prevent but should stimulate work on an NWC. Uncertainty about the future did not prevent large-scale development and deployment of nuclear weapons, which shaped the international security regime. Similarly, decisive action towards nuclear disarmament will shape the viability of this goal. Uncertainty about the future has rarely prevented human beings from seeking answers—in fact, it is generally an incentive. In the context of nuclear weapons, pursuit of these answers is imperative for a positive outcome.

Significant impediments to the commencement and conclusion of negotiations on an NWC are the belief systems that nuclear weapons provide political power and military security. As long as these beliefs continue to be held by the governments of NWS, commencement of negotiations towards and conclusion of an NWC will remain a pipe dream. Once these beliefs are abandoned, the achievement of an NWC could happen very quickly. Thus, the next section looks at the rationale for abandoning nuclear weapons and moving to a nuclear weapons free world through a Nuclear Weapons Convention. Further discussion on nuclear deterrence and its replacement with security based on nuclear abolition can be found in the Critical Questions section.

Why Pursue a Nuclear Weapons Convention?

The rationale for a Nuclear Weapons Convention is outlined in the Preamble of the Model Nuclear Weapons Convention. It begins:

“We the people of the Earth, through the States signatory to this Convention:

Convinced that the existence of nuclear weapons poses a threat to all humanity and that their use would have catastrophic consequences for all the creatures of this Earth,

Gravely concerned that the use of nuclear weapons might be brought about not only intentionally by war or terrorism, but also through human or mechanical error or failure, and that the very existence and gravity of these threats of nuclear weapons use generates a climate of suspicion and fear which is antagonistic to the promotion of universal respect for and observance of the human rights and fundamental freedoms set forth in the Charter of the United Nations and the Universal Declaration of Human Rights,

“The world is on the edge of warfare”
- Senator Daniel Moynihan,
former US Ambassador to
India, 1998

We must “put the genie back in the bottle. If we do not there is substantial risk that the twenty-first century will witness a nuclear tragedy.”¹⁹

- Robert McNamara, Former
US Secretary
of Defense

Convinced of the serious threats posed to the environment by nuclear arsenals, the economic and social costs and waste of intellectual talent occasioned by these arsenals and the efforts required to prevent their use, the dangers inherent in the existence of the materials used to make nuclear weapons and the attendant problems of proliferation, the medically and psychologically catastrophic effects of any use of a nuclear weapon, the potential effects of mutations on the genetic pool and numerous other risks associated with nuclear weapons,

and concludes,

Convinced that a convention prohibiting the development, testing, production, stockpiling, transfer, use and threat of use of nuclear weapons and providing for their elimination is required to abolish these weapons from the Earth,

Some points made in the preamble deserve further explanation here.

Bridging the Divide between Non-proliferation and Disarmament

Former UN Secretary-General Kofi Annan, in his final major address before retiring in 2006, listed some of the major threats confronting humankind that require collective and comprehensive action. These include economic and social threats (poverty, environmental degradation and infectious diseases), conflicts between and within States, and terrorism.

Annan noted, however, that the greatest danger requiring action is that of nuclear weapons: “Even a single bomb can destroy an entire city, as we know from the terrible example of Hiroshima and Nagasaki, and today, there are bombs many times as powerful as those. These weapons pose a unique threat to humanity as a whole.”

Annan criticised countries for tackling this issue selectively and from two polarised paths. One of these is promoted by the “*non-proliferation first*” advocates (including the Nuclear-Weapons-possessing States), who take no action on their own stockpiles but attempt to prevent anyone else from acquiring nuclear weapons. The other path is pursued by the “*disarmament first*” advocates, who are hesitant to support stronger non-proliferation measures while the NWS make no progress on disarmament.

Annan expressed concern that because of inaction, the world is not only “sleepwalking towards disaster. In truth, it is worse than that – we are asleep at the controls of a fast-moving aircraft. Unless we wake up and take control, the outcome is all too predictable.”

The answer, according to Annan, is to work on both nonproliferation and disarmament. “An aircraft, of course, can remain airborne only if both wings are in working order. We cannot choose between non-proliferation and disarmament. We must tackle both tasks with the urgency they demand.”

The Nuclear Weapons Convention addresses nonproliferation and disarmament simultaneously and thus bridges the divide between the disarmament-first advocates and the non-proliferation-first advocates. The NWC adopts an abolition approach, which would prohibit proliferation as well as the maintenance of nuclear stockpiles and doctrines and plans for their use.

The NWC would establish legal, technical and political mechanisms that would prevent proliferation and nuclear terrorism and achieve disarmament. These include the comprehensive control of fissile materials, enhanced verification measures applicable to all nuclear-capable States and all nuclear-related facilities, and national implementation measures to prohibit any individual from engaging in nuclear weapons activities regardless of whether such individuals were government officials or non-State actors and whether such activities were related to activities of proliferation concern or to NWS practice of maintaining nuclear arsenals and the policies behind them.

The 21st Century faces an increased risk of a nuclear catastrophe from the proliferation of nuclear weapons to new States; the increasing potential for nuclear weapons acquisition and use by terrorists; and the further development of new, including “more usable”, nuclear weapons and expanded nuclear-use plans of the NWS. The NPT, which entered into force in 1970, provided a non-proliferation and disarmament bargain that has, until recently, been moderately successful in preventing further proliferation and in encouraging NWS to take disarmament steps. The NPT no longer provides this security. An NWC could do this and more – it could make the 21st Century the one in which nuclear weapons became as anachronistic as slavery and colonies.



Survivors walking through the ruins of Nagasaki on August 10, 1945, the day after the US used its second atomic bomb. Photo: Yosuke Yamahata, Hiroshima Nagasaki Publishing Company.

Slippery Slope to Armageddon: the growing risk of a nuclear catastrophe through nuclear terrorism, proliferation and war

The post–Cold War “window of opportunity” for peace and disarmament has not resulted in the predicted peace dividend. Throughout the 1990s, however, a complex and interlocking web of multilateral, regional and bilateral agreements was in place and was seen as a positive foundation for progress on disarmament. Progress was frustratingly slow and at times undermined or challenged by the practices and stated policies of the nuclear weapon states, but the overall trend was towards arms control and solidification of non-proliferation achievements, with a general consensus on the need for progress towards disarmament.

The limited capacity of the NPT and associated safeguards to prevent proliferation was graphically demonstrated in 1991 by the advanced nuclear weapons program that Iraq had developed while a party in apparently good standing to the NPT. Israel’s development of nuclear weapons had already highlighted the weakness of a non-proliferation regime that was not universal. Since the dissolution of the Soviet Union in 1991, public fears of a nuclear war subsided until nuclear tests by India and Pakistan in 1998 and their conflict in 2002 that nearly resulted in all-out war. These provided sobering wake-up calls that not all was well in the nuclear arena. Not only did they raise the appalling spectre of a nuclear exchange between the two countries, they also demonstrated the erosion of the non-proliferation regime and the inevitability of nuclear weapons acquisition by additional countries if a global disarmament regime was not achieved in the near future.

The non-proliferation regime unravelled further in 2003 when North Korea quit the NPT and announced its own nuclear weapons program as a response to the US and UK invasion of Iraq. As North Korea explained, Iraq was invaded **after** they destroyed their weapons of mass destruction. Thus, North Korea articulated a need for their own WMD in order to deter the US from attacking their country.²⁰

The risks of nuclear terrorism have also increased with the growing sophistication of terrorist organisations, the increasing willingness of terrorist organisations to kill larger numbers of people in their attacks, and the increasing availability of nuclear materials and know-how. Both nuclear terrorist and state proliferation risks were highlighted by the discovery of the black-market nuclear trade undertaken by the A.Q. Khan network, an extensive international network which operated for years, with transit points and dealers in 30 countries, selling uranium enrichment centrifuge designs and components, and Chinese nuclear weapons designs.²¹

“Since nuclear weapons can destroy all life on the planet, they imperil all that humanity has ever stood for, and indeed humanity itself ... The work that this committee (United Nations Disarmament Committee) has done in calling for negotiations leading to a Nuclear Weapons Convention must be increased. Those nuclear weapons states resising such negotiations must be challenged, for, in clinging to their outmoded rationales for nuclear deterrence, they are denying the most sacred of aspirations of humanity as well as the opinion of the highest legal authority in the world ... the International Court of Justice”
- Archbishop Renato Martino, Permanent Observer of the Holy See to the United Nations, October 15, 1997

“Now is the time for serious consideration of an integrated approach, encompassing both bilateral and multilateral negotiations, culminating in an international agreement on a total ban on nuclear weapons.”
- Ray Burke, United Nations, September 1997 (Then the Minister of Foreign Affairs of Ireland)

The legal-political foundation of disarmament has been further shaken by a new preventive-use-of-force doctrine in which certain Nuclear Weapon States claim a right to pre-emptively attack other countries that are suspected of developing nuclear weapons or other WMD. In addition, there has been a growing abandonment by a few States of hard-won arms control and non-proliferation achievements, the abrogation of treaties and the blocking of negotiations and treaty bodies. The abrogation by the US of the Anti-Ballistic Missile (ABM) Treaty, the first renunciation of a major nuclear arms control agreement, was an extremely negative precedent.

While international attention has been drawn to the non-existent weapons of mass destruction in Iraq and the nuclear tests in South Asia and North Korea, what is not widely realized is that the nuclear weapon states maintain 27,000 warheads with a combined explosive potential 330,000 times greater than the Hiroshima bomb.²² Several thousand of these weapons are on hair-trigger alert and are ready to be fired at several minutes notice. It is also not widely known that France, the UK, the US and now also Russia maintain policies that permit first use of nuclear weapons—that is, they maintain the option to use nuclear weapons even when nuclear weapons are not used or threatened against them.

In January 2006, French President Jacques Chirac said that France was prepared to launch a nuclear strike against any country that sponsors a terrorist attack against French interests. He said his country’s nuclear arsenal had been reconfigured to include the ability to make a tactical strike in retaliation for terrorism.²³ This opens up the possibility that nuclear weapons could be used in a range of conflicts, not just those between nuclear states. In fact, the US is known to have made explicit threats to use nuclear weapons four times since the end of the Cold War: against Iraq, Libya, Iran and North Korea.

The implications of any use of nuclear weapons need to be spelled out repeatedly – this is the fundamental physical, biological and social reality which must underpin all discussion of nuclear weapons. The International Court of Justice warned in 1996 that any use of even a tactical nuclear weapon would threaten escalation into a devastating nuclear exchange. The Court also noted the uniquely destructive aspects of nuclear weapons in both blast and radiation and stated that “[t]he destructive power of nuclear weapons cannot be contained in either space or time”.²⁴

Nor is the nuclear arms race over. Nuclear weapon states continue to research, design, test, modernise and develop nuclear weapons. Programs to develop reliable replacement warheads, earth-penetrating warheads and mini-nukes are at various stages in the US. The total US budget for nuclear weapons work soared to roughly \$US 6 billion in the 2005-2006 fiscal year from a low of about \$US3200 million in 1994-1995. The Department of Energy plans to spend almost \$90m in fiscal year 2008, and \$300m over the next few years to develop the first of the Reliable Replacement Warhead group of warheads. This new weapon would replace the W-76 Trident warhead in service with the US Navy.

In early 2006, Russian President Vladimir Putin boasted of a new hypersonic missile for delivering nuclear and other weapons that is capable of changing flight path. Laboratory-based expansions of French nuclear weapon design, development and production capacities have been under way for a number of years. For example, more than \$US 3 billion is being spent on a new high-energy laser facility. This year, France is expected to start testing a new missile (the M 51) for its submarine-launched nuclear warheads, which will have an increased range, France is also working on improving the capabilities of its air-launched nuclear delivery vehicle along with a more “robust” warhead, the *tête nucléaire aéroportée*.

On 14 March 2007, the House of Commons voted in favour of the UK government’s plans to renew its Trident submarine-launched ballistic missiles. The UK government has announced its intent to spend more than £1000 million over the next three years on

refurbishing key facilities at its nuclear weapon complex. This includes new facilities for assembling and disassembling nuclear weapons and the handling of high explosives and weapon-grade uranium, as well as a new high-energy laser facility. Plans to recruit more than 1000 new staff over the next three years have also been announced, as has the extension of the nuclear weapon cooperation agreement with the US for another 10 years.

In February 2002, the *Bulletin of the Atomic Scientists* moved the hands of its Doomsday Clock forward from nine minutes to midnight to seven minutes to midnight. On 17 January 2007, the Bulletin's Board of Directors and Board of Sponsors, including 18 Nobel Laureates again moved the hands of the clock forward to five minutes to midnight. They stated:

“Not since the first atomic bombs were dropped on Hiroshima and Nagasaki has the world faced such perilous choices. North Korea's recent test of a nuclear weapon, Iran's nuclear ambitions, a renewed US emphasis on the military utility of nuclear weapons, the failure to adequately secure nuclear materials, and the continued presence of some 26,000 nuclear weapons in the United States and Russia are symptomatic of a larger failure to solve the problems posed by the most destructive technology on Earth.”²⁵

In 2005, Robert McNamara, former US Secretary of Defense wrote of the increased risks of nuclear proliferation and nuclear weapons use because of the policies of the NWS:

Among the costs of maintaining nuclear weapons is the risk—to me an unacceptable risk—of use of the weapons either by accident or as a result of misjudgement or miscalculation in times of crisis. The Cuban Missile Crisis demonstrated that the United States and the Soviet Union—and indeed the rest of the world—came within a hair's breadth of nuclear disaster in October 1962...

Human beings are fallible. In conventional war, mistakes cost lives, sometimes thousands of lives. However, if mistakes were to affect decisions relating to the use of nuclear forces, there would be no learning curve. They would result in the destruction of nations. The indefinite combination of human fallibility and nuclear weapons carries a very high risk of nuclear catastrophe...

If the United States continues its current nuclear stance, over time, substantial proliferation of nuclear weapons will almost surely follow. Some, or all, of such nations as Egypt, Japan, Saudi Arabia, Syria, and Taiwan will very likely initiate nuclear weapons programs, increasing both the risk of use of the weapons and the diversion of weapons and fissile materials into the hands of rogue states or terrorists.

McNamara, former US President Jimmy Carter,²⁶ former Head of US Stratcom General Lee Butler,²⁷ and others, have concluded that the only strategy that can ensure humanity does not risk a nuclear catastrophe is to move towards the complete abolition of nuclear weapons. Prominent Cold Warriors former Secretaries of State Henry Kissinger and George Schultz, and Defense Secretary William Perry, urged the US to lead in creating “a world without nuclear weapons” in the *Wall Street Journal* in January 2007.²⁸ Drawing from their expertise and direct experience in dealing with nuclear weapons, their analysis was that the reliance on nuclear weapons is becoming “increasingly hazardous and decreasingly effective”.

The Legal Obligation

Under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), “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.”²⁹

On 8 July 1996, the International Court of Justice concluded unanimously that “[t]here exists an obligation to pursue in good faith, and bring to a conclusion, negotiations leading to nuclear disarmament in all its aspects under strict and effective international control”.³⁰

The significance of the ICJ decision is that it affirmed that:

- the existence of a good-faith obligation means there is an obligation to achieve the goal, not merely to discuss the possibility or even to negotiate towards it;
- the obligation is not merely to achieve steps toward nuclear disarmament, but to achieve nuclear disarmament “in all its aspects” (that is, to achieve the complete elimination of nuclear weapons);
- the elimination of nuclear weapons should occur under international control; and like any legal obligation, this obligation must be performed within an appropriate timeframe and cannot be postponed indefinitely.

The UN General Assembly, which had originally requested the opinion from the ICJ, determined through yearly resolutions that this obligation should be fulfilled by the immediate commencement of negotiations leading to an early conclusion of an NWC prohibiting the development, testing, production, stockpiling, transfer, use and threat of use of nuclear weapons and providing for their elimination. The European Parliament repeated this call on 13 March 1997.

The conclusions of the General Assembly and European Parliament are not surprising. An NWC provides the most logical way to satisfy the ICJ requirements that nuclear disarmament be negotiated and completed under strict and effective international control. An NWC is also the most logical way to achieve the elimination of nuclear weapons in a non-discriminatory manner that will incorporate the security concerns of states that currently possess nuclear weapons, because the negotiation process will inevitably require consideration of such concerns. The NWC is also the most logical way of drastically reducing, if not to eliminating, the threat from nuclear weapons. Partial steps that leave any number of nuclear weapons in the arsenals of some states will not provide a solution.

The Canberra Commission observed: “The proposition that nuclear weapons can be retained in perpetuity and never be used—accidentally or by decision—defies credibility ... The opportunity now exists, perhaps without precedent or recurrence, to make a new and clear choice to enable the world to conduct its affairs without nuclear weapons, and in accordance with the principles of the Charter of the United Nations.”³¹

This view is now supported by the majority of governments in the world and even more so by citizens, including citizens of the nuclear weapon states and their allies. Public opinion polls in the UK, the US, the Netherlands, Germany, Canada and Belgium consistently show that more than 80 per cent of people support an NWC [see table above]. The Mellman Group poll in the US showed that the public was not generally in favour of nuclear disarmament *unless* it was in the context of an NWC.³²

While the ICJ opinion cited the NPT as an important indication of disarmament responsibility, it did not assert that the obligation is confined to states parties to the NPT. ICJ President Bedjaoui, in his separate declaration, stated that the obligation has “assumed customary force” and that “it is the duty of all to seek to attain [nuclear disarmament] more actively than ever”.³³

The US and the UK argued at the ICJ that their nuclear disarmament obligation was linked to progress in conventional disarmament and in developing alternative security systems to the system of nuclear deterrence. The Court did not accept this argument and, apart from the requirement for international control, made no mention of conditions that were required to move toward nuclear disarmament.

Thus the question to be asked is not why there should be an NWC, but why nuclear weapon states have not yet agreed to start negotiating one.

The Strategic Factor

“The failure to address the nuclear threat and to strengthen existing treaty obligations to work for nuclear weapons abolition shreds the fabric of cooperative security. A world with nuclear haves and have-nots is fragmented and unstable, a fact underscored by the current threats of proliferation. In such an environment cooperation fails. Thus, nations are unable to address effectively the real threats of poverty, environmental degradation and nuclear catastrophe.”

- The Rome Declaration of Nobel Laureates
7th World Summit of Nobel Peace Laureates
19 November 2006

An NWC is the most crucial step towards a world without weapons of mass destruction. These were developed as the logical extension of conventional military thought, according to which the goal of the military is to threaten or use superior force on an enemy in order to protect strategic interests. Historically, governments in conflict have sought to develop ever-larger military force capabilities in order to meet this aim, and these capabilities have, over time and with advances in scientific knowledge and technologies, developed into weapons of mass destruction. Many major new forms of technology, once developed, have been adapted for use in weapons. Prohibition of particular types of weapons, especially weapons of mass destruction, reverses this historical trend. The goal of peace and abolition of the social institution of war itself are at the core of every major ethical and religious tradition, and integral to goals of justice, sustainability, custodianship and human rights.

The possibility for achieving an NWC will be enhanced by efforts that increase the interdependent web of political, social, environmental, legal and economic factors and instruments that increasingly interlink human security worldwide. These developments contribute to and the conclusion of an NWC will in turn contribute to these developments. An emerging NWC will be supported by current social and political change, and will lead to future change. The support globally for a NWC has resulted in part from a paradigm shift in political, social and economic systems and in consciousness. The world is moving away from self-contained nation-state systems to inter-state interdependence combined with globalization. The enterprises and concerns of humanity are becoming much more international through the development of transnational and international corporations, a global market, international institutions, and communications systems. The environmental and social effects of policies and practices, and the influences of civil society organizations and movements, and even a globalization of cultures and identities all contribute to the evolving sense of global interconnectedness.

Indeed nuclear weapons are the paramount globalisation issue. The discovery of the nuclear winter effect – the dramatic global climatic consequences of nuclear war between the US and the former Soviet Union – made it clear that every inhabitant of the planet could be drastically affected. Landmark international collaborative studies undertaken in the 1980s under the auspices of the International Council of Scientific Unions predicted that following a major nuclear war, more people would die of starvation in areas such as India and Africa – even without being targeted – than would die of the direct effects of nuclear blasts in the countries directly targeted.³⁴ While counterforce scenarios involving the two nuclear superpowers involved several thousand nuclear explosions and more than 1,000 Mt explosive yield, major climatic consequences could be expected with even 100 nuclear explosions targeted on cities.³⁵

“I would have thought it unnecessary to demonstrate once again the commitment of the United States to nuclear disarmament, a commitment we undertook when we adhered to the NPT ...”

- *United States Delegation to United Nations, Oct 29, 1998 (Statement on Eight Nation Resolution: Towards a nuclear-weapon-free world: the need for a new agenda)*

“Viewing arms limitation those responsible for U.S. nuclear weapons must not lose sight of the fact that the intent of these negotiations is not to disarm the United States. The United States could do that unilaterally if such was in our interest. The intent of U.S. arms negotiators is to disarm them ...”

- *Admiral W.J. Holland, Jr., Nuclear Weapons the Info Age: Who Needs 'Em?, US Naval Institute Proceeding, January 1999, p.47*

“Nuclear weapons diminish the security of all states. Indeed states which possess them become themselves targets of nuclear weapons.”

- *Canberra Commission, August 1996*

Recent studies using state of the art interactive climate models demonstrate that detonation of 50 “low yield” Hiroshima size nuclear weapons (15 kt explosive yield) in each of two countries, would result in tens of millions of direct fatalities; for example, a conservatively estimated 21.7 million immediate deaths following use of 100 such weapons in India and Pakistan. Such a scenario utilises less than 0.1% of the current global nuclear arsenal in terms of weapon numbers, and only 0.03% of the explosive yield of the current global nuclear arsenal. It is estimated that not only Britain, France, and China, but also Israel, India and Pakistan, possess sufficient nuclear weapons to make such a scenario quite plausible. Reducing the yields of nuclear weapons from those typical of the US or Russian strategic arsenals to those more likely to be associated with the newer nuclear weapons states or, potentially, terrorist groups, does not reduce the potential destruction proportionately. Per kiloton of yield, low-yield weapons can produce 100 times the fatalities and 100 times the amount of smoke from fires as high yield nuclear weapons, if targeted at city centres.³⁶

State-of-the-art analyses of the climatic consequences of a nuclear war involving 100 Hiroshima-size (15 kt) bombs exploded on cities in the subtropics demonstrate large and long-lasting climate changes, with significant cooling and drop in rainfall lasting years, which would impact the global food supply.³⁷ Smoke plumes generated by burning cities, the plumes would rise high into the stratosphere, causing climatic changes, that would be more long-lasting, if less dramatic, than previous nuclear winter simulations involving a massive nuclear weapons exchange between the superpowers.

These findings underscore the profound dangers posed by all nuclear weapons to all of the world’s people, wherever they live.

“Progress towards a nuclear weapon free world should not be made contingent upon other changes in the international security environment. Successful nuclear weapon negotiations will benefit other security related negotiations and progress in regional and other political and security related negotiations will enhance the prospect of building a nuclear weapon free world.”

Canberra Commission on the Elimination of Nuclear Weapons

Defending borders with ever-larger military capacities is becoming meaningless in an increasingly borderless world—where power structures are being transformed from state-based to more transnational systems.

Nuclear weapons do not fit into this emerging future but instead hold up its development by reinforcing old and dangerous power paradigms. An NWC, on the other hand, will necessarily involve many different elements of global society in its implementation and will generate new mechanisms for global cooperation. It is both a logical result of global change and an enabler of it. The experience, mechanisms and lessons involved in achievement of an NWC could be expected to have substantial positive benefits for efforts addressing a wide range of other global challenges, and will create a suite of new possibilities to enhance global cooperation and the rule of law. It would liberate massive fiscal, human and technical resources for investment in human development and sustainability. The achievement of an NWC would also be welcomed with enthusiastic celebration and enormous relief worldwide.

Global Support for a Nuclear Weapons Convention

Global rejection of nuclear deterrence and support for the comprehensive abolition of nuclear weapons, encompassing both non-proliferation and disarmament, is growing stronger. Examples of such support can be found on the opposite page. Governmental

and civil society support for a Nuclear Weapons Convention, as the most practical and feasible way to achieve abolition, is also growing, as indicated by the following:

- In November 1995, Abolition 2000, an international network calling for negotiations on an NWC, was established. More than 2000 organizations have now joined this network.³⁸
- Since 1996, the UN General Assembly has adopted resolutions every year specifically calling for negotiations leading to the conclusion of an NWC.³⁹ A number of other resolutions have also supported the call for such negotiations.⁴⁰
- The Canberra Commission on the Elimination of Nuclear Weapons, which included former key policy makers of the NWS,⁴¹ concluded that “The maintenance of a nuclear weapon free world will require an enduring legal framework, linked to the Charter of the United Nations, possibly in the form of a convention on nuclear weapons.”⁴²
- On 13 March 1997, the European Parliament called on all members to support negotiations leading to the conclusion of a convention for the abolition of nuclear weapons.
- The Foreign Ministers of Brazil, Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa and Sweden released a joint statement in 1998 (New Agenda Statement) which noted that “The maintenance of a world free of nuclear weapons will require the underpinnings of a universal and multilaterally negotiated legally binding instrument or a framework encompassing a mutually reinforcing set of instruments”⁴³
- Public opinion polls conducted in Australia, Belgium, Canada, Germany, Holland, Japan, Norway, the UK, and the US have indicated overwhelming public support for a nuclear weapons convention.
- Separate resolutions have been introduced to the US House of Representatives by Representatives Lynn Woolsey,⁴⁴ Dennis Kucinich⁴⁵ and Eleanor Holmes Norton⁴⁶ calling for negotiations leading to the conclusion of a nuclear weapons convention.
- More than 1500 mayors have joined the Mayors for Peace Vision 2020, which calls for the negotiations on a nuclear weapons convention to be concluded by 2010 with complete elimination of nuclear weapons by 2020.
- In October 2005, the Middle Powers Initiative launched the Article VI Forum in order to bring like-minded States together to “identify the legal, political and technical requirements for the elimination of nuclear weapons,” and to undertake “informational and preparatory work for the development and implementation of the legal, political and technical elements, and the exploration of ways to start negotiations on disarmament steps leading to a nuclear weapons convention or a framework of instruments for the abolition of nuclear weapons.”⁴⁷ Approximately 40 middle power governments have participated in Article VI Forum meetings held in New York, the Hague and Ottawa.
- In June 2006 the Weapons of Mass Destruction Commission called on all States to “accept the principle that nuclear weapons should be outlawed, as are biological and chemical weapons (ie. by a comprehensive abolition treaty), and explore the political, legal, technical and procedural options for achieving this within a reasonable time.” The Commission also concluded that “a nuclear disarmament treaty is achievable and can be reached through careful, sensible and practical measures.”⁴⁸

How to Achieve a Nuclear Weapons Convention?

“A key challenge is to dispel the perception that outlawing nuclear weapons is a utopian goal. A nuclear disarmament treaty is achievable and can be reached through careful, sensible and practical measures. ... all states should commence planning for security without nuclear weapons. They should start preparing for the outlawing of nuclear weapons through joint practical and incremental measures that include definitions, benchmarks and transparency requirements for disarmament.”⁴⁹

There are three general views as to how nuclear disarmament can best be achieved. The first, a step-by-step approach, entails negotiations on a limited number of initial steps towards nuclear disarmament. The US, which supports this approach, has indicated that next steps should be bilateral reductions in stockpiles as agreed under the Moscow Treaty⁵⁰, and a treaty to cut off production of fissile material.⁵¹ The NPT Review Conferences in 1995 and 2000 agreed that a Comprehensive Test Ban Treaty was one of these disarmament steps, but the US has since reversed its support for the CTBT.

A divergent perspective calls for comprehensive negotiations on the complete elimination of nuclear weapons under a time-bound framework. The Non-Aligned Movement, for example, has called on the Conference on Disarmament to “commence negotiations ... on a phased program of nuclear disarmament and for the eventual elimination of nuclear weapons within a time-bound framework”.⁵²

A third perspective calls for a middle path between the first two, combining elements of the step-by-step approach and the comprehensive approach into an incremental-comprehensive program. The declaration of eight foreign ministers entitled *Towards a Nuclear-Weapon-Free World: The Need for a New Agenda*, calls for a series of bilateral, plurilateral, and multilateral steps, which would lead towards the elimination of nuclear weapons through a legally binding instrument or framework of instruments.⁵³

Step-by-Step Approach

The US argues that “the step-by-step is the only realistic approach in this highly complex field”, and that it is “yielding significant, concrete results in the area of nuclear disarmament”.⁵⁴ The validity of the second point is hotly contested. While the step-by-step process has delivered a number of limited disarmament and arms control treaties, including the Strategic Arms Reduction Treaties (START I & II), the INF and Moscow Treaty, the Partial Test Ban Treaty (PTBT) and negotiation of the Comprehensive Test Ban Treaty,⁵⁵ these have had little effect on the policies of the nuclear weapon states, on their ability to inflict unimaginable damage worldwide with their remaining weapons, or on their ability to design and develop new weapons and delivery vehicles.

Under START I and the Moscow Treaty the US and Russia are reducing their deployed nuclear weapons to no more than 2200 by 2012. The US, at least, has no intention of reducing these numbers further. The US claims, “This range establishes the lowest possible number consistent with national security requirements and alliance obligations while maintaining a level that provides a credible deterrent.” By “credible deterrent” the US explains that, “US nuclear forces dissuade potential adversaries by being so numerous, advanced, and reliable that the US retains an unassailable edge for the foreseeable future.”⁵⁶

In fact, the US retains the option to reverse these reductions: “The remaining US strategic nuclear weapons remain in storage and serve as an augmentation capability should US strategic nuclear force requirements rise above the levels of the

Moscow Treaty.”⁵⁷ In the words of the WMDC: “While continuing the positive downward trend in deployments, this treaty does not involve any destruction of warheads, as they will simply be put in to storage, nor any counting rules or new verification measures. Under SORT, deployments change but the weapons remain.”⁵⁸

It is unlikely that Russia would unilaterally cut its nuclear forces much below the numbers of US forces. As most strategic weapons have yields of 100-500 kilotons, this will leave an explosive equivalent of approximately 100,000 Hiroshima-sized bombs in US and Russian arsenals in 2012 and into the indefinite future.

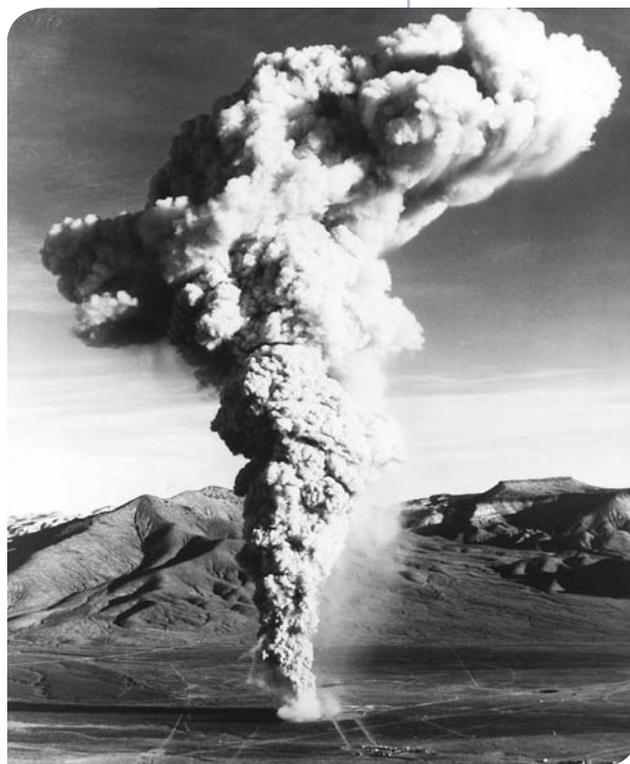
The Partial Test Ban Treaty (PTBT), hailed as an important disarmament step, in fact did not halt nuclear testing, since the nuclear weapon states merely shifted to underground tests. In fact, more nuclear tests have been conducted since the PTBT came into force (1679) than before its implementation (372).⁵⁹ The Comprehensive Test Ban Treaty has been instrumental in curtailing nuclear test explosions by the NWS, but has not prevented testing by other means (see below).

It is also hard to characterize the proposed Fissile Material Cut-Off Treaty (FMCT) as a real disarmament measure, considering that the nuclear weapon states have huge stockpiles of highly enriched uranium (HEU) and plutonium and thus will not be limited by a cut-off in production of these materials—in fact, they have already stopped production unilaterally. The proposed FMCT could possibly help to limit nuclear weapons production and stockpiling by the nuclear weapon states, were it to include a ban on the production of tritium, a warhead component that must be replaced regularly due to fast decay. Tritium, however, has been exempted from the FMCT negotiations.⁶⁰

The achievement of insignificant steps can actually have a detrimental effect on—and delay progress towards—elimination of nuclear weapons, by giving an appearance of progress that can reduce impetus towards more significant steps and that could even derail ongoing negotiations. In the 1961 negotiations on a nuclear test ban treaty, for example, both the Partial Test Ban Treaty and a Comprehensive Test Ban Treaty (CTBT) had been proposed. There was considerable public and political pressure for a CTBT. The conclusion of the PTBT, despite its failure to restrain the number of nuclear tests and the development of new nuclear weapons, was generally perceived as a step towards nuclear disarmament. The PTBT thus took the wind out of the sails of the CTBT campaign. This was a key factor in the long delay before a CTBT was negotiated.

Negotiating the CTBT in the 1990s without incorporating India’s proposals that the treaty be linked to a firm commitment to complete nuclear disarmament may have been a factor in India’s decision to conduct nuclear tests in May 1998—definitely a backward step in global non-proliferation efforts.⁶¹ Another backwards step was taken in October 2006 when the Democratic People’s Republic of Korea tested a nuclear weapon.

The long, drawn-out, step-by-step process that characterizes current arms control efforts ensures that by the time a step has been achieved the nuclear weapon states have generally developed their technology to a stage where they no longer need whatever it was they were negotiating away. For example, by the time nations had agreed to the CTBT, most nuclear weapon states had developed the ability to conduct a range of non-



Venting off radioactivity from the Baneberry underground nuclear test, Nevada Test Site, USA, 1970. Photo: US Department of Energy.

explosive nuclear weapons tests.⁶² This has led some nuclear disarmament advocates to oppose the CTBT in its current form.⁶³ Many would claim, in fact, that the nuclear weapon states have never agreed to any disarmament step until they have developed the technology to replace what they were giving up.⁶⁴

It is arguable, therefore, that the step-by-step approach to the elimination of nuclear weapons has been tried and, on the whole, has failed, despite significant incremental accomplishments. The nuclear weapon states are no closer to nuclear disarmament now than when they accepted their obligation to disarm under the Non-Proliferation Treaty more than three decades ago. As a matter of numbers alone, there has been only modest reduction from the nuclear stockpiles that existed when the NPT entered into force in 1970. At that time there were 39,000 nuclear weapons. Now there are 27,000.⁶⁵ An equally important point is that the nuclear weapon states have made no moves away from policies of threat or use. The UK, the US and France have been joined by Russia in refusing to rule out the first use of nuclear weapons and are continuing to keep thousands of nuclear weapons on alert status. In addition, the threat of use, including even the use in a pre-emptive first strike, has been extended to cover threats from chemical and biological weapons,⁶⁶ terrorism, and conventional weapons. Moreover at a time when vertical proliferation continues, horizontal proliferation is accelerating, the nuclear terrorist risk is growing, and the threshold for use of nuclear weapons has been lowered, the pace of incremental progress in nuclear disarmament has ground virtually to a halt. The CTBT, concluded in 1996, languishes while key states including China, Israel and particularly the US refuse to ratify it, and other NWS (India, North Korea and Pakistan) have yet to sign it. The SORT Treaty is fundamentally flawed - involving time-limited, non-binding, non-verified and reversible withdrawals of weapons from deployment. *No* substantive nuclear disarmament negotiations are currently underway.

Serious consideration should be given to the validity of the view that “the step-by-step process is the only realistic approach in this complex field”. Nuclear disarmament is complex. There are many political, legal and technical considerations in the process of abandoning nuclear use policies, eliminating the stockpiles, and maintaining a nuclear-weapon-free world. The political considerations may be most important. The governments of nuclear weapon states continue to resist any but the most minimal nuclear disarmament steps, because they believe that nuclear weapons still serve one or more purposes. They continue to assert their belief that nuclear weapons prevent war. The UK, for example, has argued that nuclear weapons are a necessary insurance policy in order to prevent “subjection to conquest which may be of the most brutal and enslaving character”.⁶⁷ The US has argued that “the policy of nuclear deterrence has saved many millions of lives from the scourge of war during the past 50 years. In this special sense nuclear weapons have been used defensively every day for over half a century ... to preserve the peace.”⁶⁸

There is also evidence of an unspoken belief among the nuclear weapon states that nuclear status confers political power. In 1995 the Mexican Ambassador to Geneva noted:

“What is at the heart of this debate is that it ... forces a rethinking of the whole cold war power structure ... Look at France ... The French government thinks that their legitimacy comes from having nuclear weapons. Take away their nukes and their Security Council veto, and what are they? A little more than Italy and less than Germany.”⁶⁹

Until the nuclear weapon states abandon these perspectives, which risk unprecedented worldwide destruction and undermine the security of their own people as much as that of others, they will not agree to a comprehensive approach to nuclear disarmament. Thus, a limited step-by-step approach, minimal as it is, may indeed be the only realistic way some governments see to move forward today. The danger of maintaining the status quo and the increasing instability of the non-proliferation regime may soon alert them to the need for reduced reliance on nuclear weapons, but public pressure is also needed.

The corporate and scientific interest in maintaining a robust nuclear weapons industry also constrains nuclear disarmament to limited steps. Harold Muller notes that “[t]housands of jobs and careers depend on the production, or at least the maintenance, of these weapons.”⁷⁰ Scientists, engineers, bureaucrats and corporations have considerable power to influence government decisions on nuclear policy.

According to Lichterman and Cabasso, the weapons laboratories in the US convinced the Clinton administration that the only way to achieve congressional support for a CTBT was to guarantee a well-funded “nuclear weapons research and testing program of Cold War proportions that will keep nuclear weapons in the arsenal, in the budget, and in the career paths of scientists well into the next century”.⁷¹

Comprehensive Approach

Advocates of the comprehensive approach argue that it is high time the nuclear weapon states abandoned their nuclear deterrence policies and began work on a treaty for their complete elimination of nuclear weapons. Their arguments include the following:

- Nuclear deterrence is inherently unstable and is bound to fail at some point. Deterrence relies on preventing an attack by convincing the enemy that a nuclear response would result. An enemy is only convinced if they perceive a genuine chance that nuclear weapons may be used against them. Thus, the line separating threat from actual use in a conflict situation must remain solid for deterrence to work. Once this line is crossed, deterrence has clearly failed, and when it fails, there is no plan B. In the Cuban Missile Crisis, the Soviet Union approached that line and then backed down. Had they crossed the line, the US would have faced a dilemma: either use nuclear weapons or downgrade their deterrent value. If nuclear deterrence remains an indefinite policy, a conflict between nuclear weapon states—whether through intent, human error, malice or ill will, technical malfunction, inadvertent crisis escalation, sabotage, or terrorist provocation—will inevitably cross the line at some time and thus result in a nuclear exchange.
- Nuclear war could also occur by accident or miscalculation. A number of accidents that could have resulted in an inadvertent nuclear exchange have already occurred.⁷²
- Nuclear deterrence stimulates other states to develop or acquire either nuclear weapons or other weapons of mass destruction in response. For these reasons, nuclear deterrence should be abandoned immediately. There is no valid reason to wait until nuclear disarmament steps have been achieved before dropping policies of first use—or indeed any use—of nuclear weapons.

Proponents of a comprehensive approach also argue that this is the only way to deal with the asymmetries in nuclear arsenals and capabilities, as has been clearly demonstrated in the case of the Comprehensive Test Ban Treaty. The CTBT was originally proposed by India. Yet India rejected the CTBT when it was finally concluded, because by then other nuclear weapon states had developed the means for non-explosive testing while India had not.⁷³

With the US, Russia, France, the UK and some of their allies refusing at this stage to embark upon a comprehensive approach, such a proposal seems unrealistic.⁷⁴ As indicated by the work of the Article VI Forum and others,⁷⁵ however, it is possible for likeminded States to make some progress on the development and implementation of the legal, technical and political elements for a nuclear-weapons-free world even before all NWS have agreed to such a comprehensive approach. A change in political circumstances, governments, or leaders may suddenly enable progress, and such

“As a matter of numbers alone, there has been very little net reduction from the nuclear stockpiles that existed when the NPT entered into force in 1970. At that time there were 39,000 nuclear weapons, Now there are 36,000”

- Canberra Commission, August 1996

changes may be facilitated by public and political pressure and preparatory work.

Advocates of a comprehensive approach, however, believe that it is possible to change the perspectives of the hold-out NWS and their allies. Indeed, rejection of nuclear deterrence and support for a rapid and comprehensive disarmament process has already permeated the consciences of many academics, policy makers, scientists, military leaders, and citizens throughout the world. For example:

- On 6 February 1985, the cities of Hiroshima and Nagasaki launched an appeal calling for the complete prohibition and elimination of nuclear weapons. The appeal has since been signed by more than 80 million people, making it the largest petition in the world.⁷⁶
- On 5 December 1996, General Lee Butler and more than 50 other retired generals and admirals from 17 countries including Russia, the UK, France, India and Pakistan released a statement calling for the comprehensive elimination of nuclear weapons.⁷⁷
- On 17 June 1997, the US National Academy of Sciences released a report calling for a long-term strategy of complete elimination of nuclear weapons and intermediate steps including restricting the role of nuclear weapons to only deterring nuclear threats.⁷⁸
- On 2 February 1998, 117 civilian leaders, including 47 past or present heads of state, (including from France, US, UK, Russia, Germany, Japan and South Korea), released a statement calling for the elimination of nuclear weapons.⁷⁹ On 9 June 1998, the foreign ministers of Brazil, Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa and Sweden released a joint declaration calling for a new agenda for nuclear disarmament culminating in the elimination of nuclear weapons.
- In October 1998, 75 US bishops released a statement condemning nuclear deterrence and called for nuclear abolition.⁸⁰ Fifteen years earlier this same group of bishops had condemned the use of nuclear weapons but had given limited support to nuclear weapons possession and nuclear deterrence.⁸¹
- On 3 October 2000, 70 prominent Americans, including former President Jimmy Carter, Martin Sheen (actor), General Charles Horner (Commander of the Coalition Air Forces in Desert Storm and Former Commander in Chief of US SPAC ECOM), Admiral William J. Crowe Jr. (Former Chairman of the Joint Chiefs of Staff), Walter Cronkite, Ambassador Paul Nitze, Admiral Stansfield Turner (Former Director of Central Intelligence); Elie Wiesel (Nobel Peace Laureate), Mia Farrow, Bill Joy (Co-Founder and Chief Scientist Sun Microsystems), Sally Ride (Astronaut and President of Space.com), Hans Bethe (Nobel Peace Laureate and physicist in the Manhattan Project), Joe Firmage (CEO Project Voyager and Former CEO of US Web), and Steven Kirsch (Founder Infoseek and Chairman and Founder Propel), released a statement in the New York Times calling upon “the United States government to commit itself unequivocally to negotiate the worldwide reduction and elimination of nuclear weapons, in a series of well-defined stages accompanied by increasing verification and control.”⁸²
- On 25 June 2001, the US Conference of Mayors adopted a policy supporting the elimination of nuclear weapons and presented this policy along with a longer Mayors Statement on nuclear disarmament to President Bush when he addressed the conference on the same day.⁸³
- The World Council of Churches, at its 9th Assembly in February 2006 in Porto Alegre, Brazil, issued a Minute on the Elimination of Nuclear Arms, which recognizes “the incontrovertible immorality of nuclear weapons.” The five original nuclear weapons states “must pledge never to be the first to use nuclear weapons, never threaten any use, and remove their weapons from high alert status and from the territory of non-nuclear states.” The Assembly “calls on each member church to urge its own government to pursue the unequivocal elimination of nuclear weapons under the terms of the Nuclear Non-Proliferation Treaty.”⁸⁴
- In June 2006, the Weapons of Mass Destruction Commission issued its report declaring that a nuclear disarmament treaty is achievable and can be reached through careful, sensible and practical measures.⁸⁵

- By October 2006, more than 1,500 mayors in 120 countries had joined Mayors for Peace, which is designed to build solidarity and facilitate coordination among the cities that support the Program to Promote the Solidarity of Cities towards the Total Abolition of Nuclear Weapons.

Advocates of a comprehensive approach have also noted the parallels between nuclear weapons and landmines, for which a comprehensive approach was successful. Francis Sejersted, at that time the Chairman of the Nobel Committee, noted that: “Both hit victims at a vast remove from the actual warfare. They strike mainly at civilian populations, and their effects continue for generations after the end of the armed conflict. They are weapons, which cast the shadow of war also across peace. War’s threat to life and limb is everywhere and never ending.”⁸⁶

For some years, negotiations on landmines were bogged down in a step-by-step process involving negotiations of limited protocols of the Inhumane Weapons Convention.⁸⁷ The shift by the majority of states to a comprehensive approach, led by Canada in the early 1990s, resulted in the rapid conclusion of the Mine Ban Treaty.⁸⁸

A key to the success of the landmines campaign was that the focus on a complete ban, not just on control of landmines or a ban on certain types such as “dumb” mines, captured public attention as a meaningful and visionary measure. During the negotiation process, the comprehensive approach allowed the negotiators to jump over tricky issues such as which types of mines are “smart” and which types are “dumb”, and to sidestep the fact that control mechanisms tend to discriminate in favour of technically advanced countries.

A similar comprehensive approach to nuclear weapons has the potential to capture public attention and to jump over deadlocks in negotiations caused by asymmetries in nuclear capabilities; disagreements over definitions, scope, and relative priorities; a range of complexities regarding reporting and verification; and other issues—deadlocks that cannot be overcome by partial measures.

Canadian Member of Parliament Bill Blaikie had this to say after the achievement of the Mine Ban Treaty: “What we need now is a similar but even more comprehensive and successful dynamic—to abolish nuclear weapons which pose a threat to the entire human prospect.”⁸⁹

An Incremental–Comprehensive Approach

An alternative path forward between the above two extremes has been described as an incremental–comprehensive approach.⁹⁰ This approach incorporates step-by-step measures within a comprehensive framework. It is the approach suggested by the Canberra Commission on the Elimination of Nuclear Weapons,⁹¹ by the New Agenda Coalition⁹² and the Weapons of Mass Destruction Commission.

The UN resolutions in relation to the International Court of Justice advisory opinion on the legality of the threat or use of nuclear weapons also suggest this approach.⁹³ These resolutions call for the implementation of the disarmament obligation through negotiations *leading* to the conclusion of a nuclear weapons convention.

In introducing the follow up of the ICJ resolution, Malaysia noted:

While a model draft convention prepared by leading international nuclear disarmament experts is already in circulation as a basis of discussion, my delegation is not ... suggesting the immediate negotiations on such a convention at this stage. We believe the road towards the total elimination of nuclear weapons will be a long



The US nuclear bomb, the B28R1, was recovered from waters off the coast of Spain after a B-52 bomber collided with its refueler, scattering four nuclear bombs over the Spanish countryside. Photo: Natural Resources Defense Council, Nuclear Weapons Databook, Volume 1.

and arduous one and would be best travelled through a series of well-defined stages, accompanied by proper verification and control mechanisms. Such an approach is, therefore, not incompatible with the step-by-step incremental approaches already mooted by others.”⁹⁴

An incremental–comprehensive approach has many advantages over a purely step-by-step approach. It would ensure that negotiations would continue beyond the achievement of small steps. Negotiators, policy makers and the public would all understand that the goal is not the small step but the complete measure. It could also increase the momentum to complete the elimination process as governments and citizens feel empowered by initial success and develop greater confidence that the final goal is achievable.

An incremental–comprehensive approach would help to overcome the problems of asymmetry in nuclear arsenals. Negotiating parties would be willing to accept temporary imbalances in forces or capabilities because they would be confident that such temporary imbalances would be rectified by subsequent measures that would be part of the negotiating program. Ultimately, the only real balance will occur when no state possesses nuclear weapons. If they recognize a clear program and can see progress to reach that goal, states will more easily agree to the steps along the way.

While the path to nuclear disarmament will not mirror precisely the paths taken towards the abolition of biological weapons, chemical weapons, and landmines, adopting a similar comprehensive goal for nuclear disarmament, as was done in those treaties, will assist the process.

The nuclear weapon states are resisting the incremental–comprehensive approach because they are not prepared to accept the complete elimination of nuclear weapons, and they see this as the slippery slope to elimination.

The UK, for example, opposed the 1998 UN resolution *Towards a nuclear-weapon-free world: the need for a new agenda*⁹⁵ because it “advocates measures which we on the national basis ... concluded ... would be at the present time inconsistent with the maintenance of a credible minimum nuclear deterrence”.⁹⁶

It would probably be more accurate to describe the incremental–comprehensive approach as a path rather than a slippery slope. Once we are on the path, reaching the destination is easier than if we had not begun the journey, but there would still be checks and resting points along the way if confidence and security were not sufficiently developed to advance to the next step. For example, the Model NWC proposes a series of phases for reducing the numbers of nuclear weapons. Before commencing a phase of reductions, states would have the opportunity to affirm their confidence that other states have implemented their obligations under the previous phase.

Stansfield Turner has noted that the most difficult step may be proceeding from a few nuclear weapons to zero. He thus proposes a resting point prior to complete elimination that would provide a “virtual zero”. This could be done by placing all remaining nuclear weapons under a system of “strategic escrow”, which would “lock up” the weapons but make them available if necessary in an emergency and with permission from an international controlling agency.⁹⁷

The very fact that initial steps on the path had been taken would increase confidence to take the next step. For example, the de-alerting of nuclear weapons, with appropriate verification, is one of the suggested early steps in this approach. This measure would increase confidence on all sides that they would not be subject to a surprise attack, or



General Lee Butler and General Andrew Goodpastor address the National Press Club in Washington, DC, to announce the statement by more than 50 other retired generals and admirals calling for the elimination of nuclear weapons.

Photo: Art Garrison

to accidental or inadvertent launch of nuclear weapons. It would enable a move away from launch-on-warning posture, as states would have advance warning of any moves to re-alert an opposing force's weapons before they could be launched.

At the outset, states may prefer not to remove warheads from the delivery vehicles until they have confidence in the verification systems developed through the de-alerting process. Once such confidence has been achieved, it would be much easier to adopt the next disarmament measure.

In addition, an incremental–comprehensive approach would include threshold states⁹⁸ and nuclear capable states⁹⁹ as participants in the negotiating process, thus reducing or eliminating the continuing risk of nuclear proliferation, which has been a key rationale used by the nuclear weapon states to hold onto their nuclear weapons.¹⁰⁰

Where Does the Nuclear Weapons Convention Fit?

The NWC fits into either a comprehensive approach or an incremental–comprehensive approach. It provides a conceptual package for the complete elimination of nuclear weapons, taking into consideration each of the following:

- the security concerns that would need to be the subject of negotiations;
- the technical difficulties in verifying the elimination of nuclear weapons and the safe disposal of weapons materials; and
- the legal mechanisms that would need to be established to implement the process with fairness and enforcement capacity.

In addition, it is framed in order to encourage and encompass incremental measures that could be adopted on the way to negotiating a complete convention.

Process for Negotiation

There are various perspectives on which negotiating forum can best achieve nuclear disarmament. The Non-Aligned Movement has called for the Conference on Disarmament “to establish, as the highest priority, an ad hoc committee to start negotiations on a phased program for the complete elimination of nuclear weapons”.¹⁰¹ The 2000 NPT Review Conference identified the necessity of establishing in the Conference on Disarmament an appropriate subsidiary body with a mandate to deal with nuclear disarmament.¹⁰²

The US, on the other hand, holds that “bilateral efforts which have already produced concrete results in the area of nuclear disarmament remain, for the time being, the only realistic approach to arms control”.¹⁰³ For this reason, the US opposes any negotiations, or even discussions on negotiations, in the Conference on Disarmament.

Negotiations leading to the conclusion of an NWC would most likely require packages of negotiations in different forums. Ultimately, the conclusion of negotiations on an NWC will need to be folded into one specific multilateral forum. Most likely that will be either the Conference on Disarmament or a special negotiating conference. Work in other forums will be necessary, however, if there is to be progress towards the final goal.

Bilateral Negotiations

The US and Russia continue to hold 95% of the world's nuclear weapons – 26,000 of the 27,000 global total (and more than 90% of the 12,000 deployed nuclear weapons).¹⁰⁴ Moreover, they maintain stockpiles of nuclear weapons at functionally close to Cold War levels – much larger arsenals than are needed to strike all significant

“The nuclear weapon is obsolete. I want to get rid of it”

- General Charles Homer,
Former commander of US
Space Command.

military targets, as well as every moderate to large city in the world. Many targets are targeted with multiple warheads. Other nuclear weapon states have indicated that they will not join plurilateral negotiations on reductions until the stockpiles of the US and Russia are brought down to levels comparable with their own. The most appropriate way for US and Russian stockpiles to be further reduced is through bilateral negotiations.

General Lee Butler has observed that numbers are not the key question—policy is.¹⁰⁵ In this case, policy issues include forward deployment, level of authorisation required to launch nuclear weapons, alert status of nuclear weapons, first use, potential and thresholds for use, use against other weapons of mass destruction and non-WMD threats, security assurances, commitment to abolition, transparency, and nuclear weapons research and development. Plurilateral negotiations (amongst Nuclear Weapon States¹⁰⁶ or nuclear-weapons-possessing states¹⁰⁷) and multilateral negotiations, particularly regarding policy aspects of nuclear disarmament, should therefore be held concurrently with bilateral negotiations and should not be held hostage to any difficulties in bilateral processes.

Number reductions, however, are not the only accomplishment in bilateral processes. In negotiating and implementing bilateral treaties,¹⁰⁸ the US and Russia have also established comprehensive missile and warhead destruction processes, verification regimes, and confidence-building measures.

Some of these elements can be usefully included in plurilateral and multilateral procedures yet to be negotiated. Transferring some of them into a multilateral context, however, may be difficult or inappropriate. Certain information that neither state would want to be made available to other states is shared confidentially. Certain technical information could, for example, be useful to a threshold state wishing to advance its nuclear program. Thus, there could be a need for additional bilateral agreements on specific sensitive areas to be negotiated in conjunction with plurilateral and multilateral agreements.

Plurilateral Negotiations

Different suggestions have been made for how negotiations could occur among some or all of the nuclear weapon states recognized under the NPT (the US, Russia, UK, France, and China) and those states that remain outside the treaty with nuclear weapons (India, Pakistan, Israel and North Korea). The Washington Council on Non-Proliferation has suggested five-power or five-power-plus-one negotiations to implement the NPT Article VI obligations for nuclear disarmament.¹⁰⁹ The proposal envisages negotiations among the five NPT nuclear weapons states (China, France, Russia, the UK and the US) with the possibility of including a non-nuclear state. In 1998, then Prime Minister Nawaz Sharif of Pakistan proposed negotiations among China, India, Pakistan, Russia and the US; India proposed negotiations among the then eight nuclear weapon possessing states. In 2000, Russia offered to start negotiations with the US to go down to 1,000 weapons on each side.¹¹⁰

Plurilateral negotiations on certain aspects of nuclear disarmament may be useful. Experience with bilateral negotiations indicates that progress can be made relatively quickly on reductions of stockpiles, on verification and on confidence building when negotiations and implementing mechanisms are kept to a small number of parties. Some security issues regarding nuclear disarmament, particularly in regional contexts, could also be handled more efficiently in negotiations among a small number of parties.

Plurilateral negotiations, however, should take place concurrently with multilateral negotiations. Nuclear-capable states need to be incorporated in the negotiating process in order to ensure that verification and compliance considerations that relate to them are developed with their agreement and participation. Mechanisms and procedures developed bilaterally and plurilaterally will need to be consistent with obligations and approaches developed multilaterally.

Non-nuclear-capable states also have an interest in being involved in the negotiations. Nuclear weapons threaten all states and all people. Therefore, all states and all people have an interest in and, indeed a responsibility for participating in developing a regime for their elimination. As with the CTBT, some non-nuclear-capable states also have expertise and technical facilities useful for the development of implementation procedures and systems. Some non-nuclear-capable states also have experience, skills, resources and creative ideas, communication channels and influence that can make them valuable partners in negotiations, especially in overcoming deadlocks.

Conference on Disarmament

The Conference on Disarmament (CD) was established as the primary multilateral negotiating forum for disarmament. Along with its predecessor (the Eighteen-Nation Disarmament Committee), it was the negotiating forum for the Nuclear Non-Proliferation Treaty, the Biological Weapons Convention, the Chemical Weapons Convention and the Comprehensive Test Ban Treaty.

The CD, however, has some drawbacks:

- all its decisions are taken by consensus, meaning that any member state could prevent the beginning of negotiations or their successful conclusion;
- membership is limited to the current 65 members, although some countries that are not members have expressed an interest in participating fully in such negotiations.

The first drawback would also apply to some degree to other negotiating forums, since it is unlikely that any of the nuclear weapon states will begin negotiations without the involvement of all of the nuclear weapon states. Once all five nuclear weapon states agree to begin negotiations, the other members most likely will also agree. The second drawback may be overcome to some degree if provision is made for non-members to attend sessions as observers and to make their views known unofficially; and/or if membership can be expanded.

Non-Proliferation Treaty as a Negotiating Opportunity?

The parties to an existing treaty could negotiate a protocol, an amendment or even a new treaty in order to further the aims and objectives of the current treaty. The Philippines, for example, suggested in 1996 that the parties to the Non-Proliferation Treaty convene a conference for the purpose of negotiating an NWC as a means to implement Article VI of the NPT.¹¹¹ The Marshall Islands in 1997 proposed that the 2000 NPT Review Conference establish an inter-sessional working group to assist in negotiations on an NWC.¹¹² If such a group were established, considerable preparatory work for an NWC could commence even before the nuclear weapons states agree to enter into negotiations.

Malaysia and Costa Rica submitted working papers to the 2000 and 2005 NPT Review Conferences calling on States Party to the NPT to “agree to commence multilateral negotiations leading to the conclusion of a nuclear weapons convention and invite those States that have not acceded to the Treaty on the Non-Proliferation of Nuclear Weapons to join in such negotiations.”¹¹³

Another proposal is that the parties to the NPT call a special conference to amend the NPT.¹¹⁴

The amendment, in the form of a negotiated protocol to the treaty, would prohibit nuclear weapons and provide for their elimination. While obtaining agreement from the nuclear weapon states on such a protocol could be difficult, the NPT requires a conference to be held to discuss the proposal if one-third of the parties to the treaty

request such a conference. A similar approach was taken in 1991 when one-third of the parties to the Partial Test Ban Treaty requested a conference at which they proposed amending the PTBT to make it a Comprehensive Test Ban Treaty. While the nuclear weapon states did not agree to the amendment, the process did help achieve a negotiating mandate for a CTBT in the Conference on Disarmament.

International Conference

Another possible avenue to negotiations leading to an NWC would be the establishment of an ongoing international conference especially for this purpose. The Law of the Sea, for example, was negotiated through the establishment, by the UN General Assembly, of the Law of the Sea Conferences. The establishment of a special negotiating body allows for the creation of an appropriate negotiating forum. The Law of the Sea Conferences used a combination of formal and informal structures, including a number of working groups, which suited the large number of issues to be negotiated.

In 1998, the UN General Assembly called for “the convening of an international conference on nuclear disarmament at an early date with the objective of arriving at an agreement on a phased programme of nuclear disarmament and for the eventual elimination of nuclear weapons within a specified framework of time through a nuclear weapons convention”.¹¹⁵

Establishing an international conference to negotiate an NWC would have a distinct advantage: this would leave the CD free to continue its work on other disarmament issues, such as prevention of an arms race in outer space and transparency in armaments. The CD would also be able to conclude agreements on certain steps towards nuclear disarmament on which it is already working, such as the Fissile Material Cut-Off Treaty.

Then-UN Secretary-General Kofi Annan called for an international conference at the 2000 NPT Review conference and again in his report to the Millennium Summit. In their initial resolution voted on 4 December 1998, the New Agenda Coalition also called for an international conference. In its 59th recommendation, the WMD Commission also called for the United Nations General Assembly to convene a World Summit on disarmament, non-proliferation and terrorist use of weapons of mass destruction, to meet after thorough preparations. This World Summit should also discuss and decide on reforms to improve the efficiency and effectiveness of the UN disarmament machinery.

United Nations Subcommittees on nuclear disarmament

In 2005, a group of States including Brazil, Canada, Kenya, Mexico, New Zealand and Sweden floated a proposal for the UN General Assembly to establish sub-committees to commence work on four disarmament items – negative security assurances, a fissile materials treaty, nuclear disarmament and prevention of an arms race in outer space.¹¹⁶

This proposal was similar to the idea of a UN negotiating conference, with the difference that it envisaged that the subcommittees would merely commence work that would be concluded by the Conference on Disarmament. The rationale for the proposal was that the commencement of such work should not be delayed by the consensus procedures of the CD – procedures that have allowed one or two States to prevent any substantial progress in the CD on nuclear disarmament items since negotiations on the CTBT were concluded in 1996.

If such committees were established they would provide an opportunity to commence deliberations and negotiations on an NWC even if not all NWS would be ready to participate.

Ottawa-style process

In the early 1990s, efforts were underway to negotiate an additional protocol to the Inhumane Weapons Convention,¹¹⁷ which would restrict or prohibit anti-personnel landmines. When it became clear at the 1996 IWC Review Conference that a prohibition on anti-personnel landmines could not be achieved due to opposition by a few key States, an alternative approach was announced by Canada's Foreign Minister Lloyd Axworthy which became known as the *Ottawa process*. Axworthy invited all interested States to Ottawa to negotiate and adopt a treaty prohibiting anti-personnel landmines. The negotiations concluded with adoption of the treaty in 1997 and it entered into force following the 40th ratification in 1998.

While the Mine Ban Treaty has not been ratified by all States, it has been instrumental in strengthening the global norm against landmines and generating sufficient political will to move some States which previously employed landmines to relinquish them, and others to announce that they intend to do so in due course.¹¹⁸

The situation with nuclear weapons is not the same as with landmines. While both weapons are indiscriminate, inhumane and arguably illegal, their nature, effects, military and political utility differ enormously, as does the current situation with regard to constraint regimes. In the case of nuclear weapons, the world already has an Ottawa-style treaty, i.e. one in which those countries prepared to abandon the weapons have joined: it is the NPT. What is required with nuclear weapons is to go beyond an Ottawa-style treaty and develop a process to involve all States including NWS and non-Parties to the NPT.

Despite these differences, there is considerable merit in the concept of an independent deliberating and negotiating conference on nuclear abolition in which all States are invited to join, and which can begin work on nuclear abolition measures even if not all the NWS currently participate or agree. Like the Ottawa process, such an ongoing conference would generate considerable media coverage and political pressure on NWS and non-NPT States to abandon nuclear deterrence and war-fighting and embrace abolition.

The deliberations could provide a useful forum for developing plans and procedures required for the abolition of nuclear weapons, including consideration of such key issues as security assurances, compliance measures, verification, disposition of fissile material, transparency versus commercial and State confidentiality, development of individual rights (whistleblower protection) and responsibilities (including scientific responsibilities and criminal law).

Such deliberations could also lead to the adoption and implementation of measures that could assist abolition even prior to the beginning of abolition negotiations by the NWS. This could include, for example, establishment of verification systems and adoption of national abolition measures including more robust criminal law and prohibition of transit of nuclear weapons and fissile materials through areas within national jurisdiction, including airspace and territorial waters.

There are a number of possible candidates to initiate or lead an Ottawa-style process including a NWS, a non-Party to the NPT, a State that has relinquished nuclear weapons, a group of States that have abandoned nuclear weapons (such as within NWFZs) or a State or States that have particular political significance in relation to nuclear disarmament (such as Japan or the New Agenda Coalition).¹¹⁹

i) Nuclear Weapon State

A process led by a NWS would be very influential on the other NWS. The most obvious candidate from amongst the NWS would be the United Kingdom which has acknowledged that a Nuclear Weapons Convention will be required at some stage in the future, has reduced the operational readiness of its nuclear weapons, and has begun work on verification of its nuclear weapons as would be required once negotiations

begin. The UK, however, has indicated its unwillingness to take any further disarmament steps until the numbers of weapons held by the US and Russia are down to the hundreds rather than the thousands. UK government plans to renew its Trident nuclear arsenal, supported by the House of Commons on 14 Mar 2007, may preclude the UK taking a lead on nuclear disarmament unless this position is overturned. China has indicated support for negotiations on a nuclear weapons convention, but has been unwilling to take any practical steps that would advance this.

ii) State non-Party to the NPT

The NWS and some of their allies might be dismissive of a process led by a State non-Party to the NPT, as they might see it as an attempt by that State to gain an international platform to criticize the NWS but take no responsibility for its own nuclear policies. Thus, if a non-Party to the NPT led this process, it would need to commit itself to some nuclear disarmament steps from the outset in order to build credibility.

The most likely candidate would be India, which advanced the Rajiv Gandhi plan for nuclear abolition under a previous Congress-led government. The current Congress-led government has indicated an interest in reviving and updating the Rajiv Gandhi plan and on seeking opportunities to make progress.¹²⁰

iii) State which has relinquished nuclear weapons or a nuclear weapons development program

Candidates here would include Argentina, Belarus, Brazil, Kazakhstan, Libya, South Africa and the Ukraine. Each State has nuclear disarmament credibility having willingly relinquished nuclear weapons or nuclear weapons programmes. Argentina and Brazil possibly have more experience than the others in verification of nuclear disarmament agreements as a result of the measures developed under the Agreement for the Exclusively Peaceful Use of Nuclear Energy Argentina and Brazil, 1991. If they worked collectively these States would generate considerable interest and political impetus.

iv) Nuclear Weapon Free Zone States Parties

The regional NWFZs have started inter-zone communication and collaboration in order to strengthen the existing NWFZs, encourage establishment of additional zones and contribute to the achievement of a nuclear weapons-free world. This includes a process led by Brazil and New Zealand to consolidate a Southern Hemisphere and Adjacent Areas NWFZ, and the first meeting of States Parties to NWFZs hosted by Mexico in 2005.

A nuclear abolition process led by the NWFZ State Parties, now numbering 113, would have the political weight of the numbers of States sponsoring the process, the moral credibility of having forsworn nuclear weapons and an already established connection with the NWS (as signatories to the NWFZ protocols).

v) Japan

Mayors for Peace has proposed a “Hiroshima process” to make progress towards nuclear abolition. They envisage States being invited to Hiroshima to begin deliberations and negotiations for nuclear abolition. A problem with this proposal is that without the support of the Japanese government, other States may be reluctant to see this as a State-State negotiating process. On the other hand the initiative is worth considering given the surprisingly strong development of the Mayors for Peace abolition campaign, which in three years has recruited more than 1500 mayors from cities around the world including the capitals of NWS, and thus their potential to generate political will.

vi) New Agenda Coalition

The New Agenda Coalition (Brazil, Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa and Sweden) has been very effective in advancing a nuclear disarmament

program in such a way as to engage all NPT members including NATO members and the NWS. The success of the 2000 NPT Review Conference is due in large part to the New Agenda Coalition and their skilful diplomatic approach. An independent abolition process led by the NAC would thus hold diplomatic credibility. On the other hand, the NAC as currently functioning may not be able to muster sufficient influence with the NWS or States not Parties to the NPT to generate sufficient political will to move the NWS and non-NPT States to join the process. If the NAC elevated itself to Heads of State level, such as was done by the Six Nation Initiative in the 1980s, backed up with a concerted diplomatic effort, it might be able to generate sufficient political clout to generate real traction.

Participation of Civil Society

As noted earlier, the elimination of nuclear weapons will require participation not just by governments, but also by various sectors of civil society. Scientists, engineers, technicians and corporations working in the nuclear field are the most obvious participants, given their technical expertise and the responsibility they will have to ensure that no work in other nuclear-related fields is diverted into nuclear weapons work. Beyond that, individuals and organizations involved in education, public policy, law, health, human rights, environmental stewardship, social justice, ethics, religion and other fields must be included to ensure that a nuclear-weapon-free regime is widely accepted and promoted. The general norm against nuclear weapons will need to be inculcated at all levels of society in order to make any breakout by states or non-state actors unthinkable and unsupported. Individuals will have a responsibility under an NWC to refuse to participate in activities that would support nuclear weapons, and to report any such activities that come to their attention. Thus, wide awareness and understanding of the NWC throughout global society will be important.

Negotiations for the Mine Ban Treaty and the International Criminal Court included substantial input from non-government organizations (NGOs). Negotiations for an NWC, likewise, should include wide involvement of the constituents of civil society, not only through governments, but also through interested and experienced NGOs.

Political Will

Currently the leaders of the nuclear weapon states do not have the political will to abolish nuclear weapons and are influenced by strong political forces not to develop such will. Barring a massive nuclear catastrophe, or the emergence of new and visionary global leaders, only the combined efforts of citizens and supportive non-nuclear governments are likely to persuade them to move.

The concept of an NWC can be an important tool in these efforts, exploring many concerns that are sure to arise as the nuclear weapon states consider moving away from a security policy that they know and with which they have lived for decades, albeit very dangerously and with many undesired consequences.

The NWC approach also provides a way to ease or reverse the opposition of nuclear weapons scientists, engineers, and corporations to nuclear disarmament. Considerable scientific and engineering expertise and corporate involvement will be necessary for the destruction of nuclear weapons and for the verification of the nuclear-weapon-free



Demonstrations like this one at the former Soviet test site in Kazakhstan helped to close it down. Photos: James Lerager

regime, and for the safeguarding of fissile materials and the means to produce them, for the essentially indefinite future.

Progress on nuclear abolition requires political, legal and technical developments. These are interrelated, and improvement in one area can stimulate improvement in the others. Rather than waiting for progress on one of these fronts before working on the others, therefore, we can improve the chances for overall progress by enabling efforts towards complete nuclear disarmament in any and every relevant sector. To reiterate, the crucial ingredient currently lacking is political will. But it is also clear that, in the words of former US Vice-President Al Gore, political will is a renewable resource. Political will and visionary leadership have never been more urgently needed on an issue of greater moment to our collective future on planet Earth.

Endnotes to Section 1

¹ General Assembly vote on 6 December 2006, 125 in favour to 27 against, with 29 abstentions/A/RES/61/83 Follow-up to the advisory opinion of the International Court of Justice on the Legality of the Threat or Use of Nuclear Weapons, <http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/RES/61/83&Lang=E>

² UN General Assembly Resolution 1 (1) Establishment of a Commission to Deal with the Problems Raised by the Discovery of Nuclear Energy, adopted 24 January 1946.

³ See Tom Farer, (1995), 'New Players in the Old Game: The De Facto Expansion of Standing to Participate in Global Security Negotiations', *American Behavioral Scientist*, Vol. 38 No. 6, p. 842., Margaret E. Keck and Kathryn Sikkink, *Activists beyond Borders* (1998), Cornell University Press, Ithaca, NY and London., Ann. M. Florini, (2000), *The Third Force*. Japan Center for International Exchange, Japan and Carnegie Endowment for International Peace, Washington D.C.

⁴ "Closing the Circle on the Splitting of the Atom", U.S. Department of Energy, Office of Environmental Management, January 1995, p. 9.

⁵ See Nuclear verification: Working paper submitted by the United Kingdom of Great Britain and Northern Ireland, 2000 Conference of States Party to the NPT, <http://www.reachingcriticalwill.org/legal/npt/NPTDocuments/mc1docs/ukwp.html>

⁶ General Assembly vote on 6 December 2006, 125 in favour to 27 against, with 29 abstentions/A/RES/61/83 Follow-up to the advisory opinion of the International Court of Justice on the Legality of the Threat or Use of Nuclear Weapons, <http://daccess-ods.un.org/access.nsf/Get?Open&DS=A/RES/61/83&Lang=E>

⁷ Final Document of the XII Summit of the Non-Aligned Movement, Durban, September 1998.

⁸ The Mayors for Peace is designed to build solidarity and facilitate coordination among the cities that support the Program to Promote the Solidarity of Cities toward the Total Abolition of Nuclear Weapons. Its primary goal is to work internationally to raise consciousness regarding nuclear weapons abolition. It is also formally committed to pursuing lasting world peace by working to address starvation, poverty, refugee welfare, human rights abuses, environmental destruction, and other problems that threaten peaceful coexistence. <http://www.mayorsforpeace.org/english/index.html>

⁹ Canberra Commission on the Elimination of Nuclear Weapons, Canberra, Australia, 1996. Available at Canberra Commission homepage: www.dfat.gov.au/cc/cchome.html.

¹⁰ Daalder, Ivo H. *The Limited Test Ban Treaty*. In: Carnesale Albert, and Richard N. Haass, eds., *Superpower Arms Control: Setting the Record Straight*. Cambridge, Mass.: Ballinger. 1987.

¹¹ NPT Principles and Objectives. See Final Document of the 1995 Review and Extension Conference, Decision 2, paragraph 4: "The achievement of the following measures is important in the full realization and effective implementation of Article VI, including the program of action as reflected below:...(a) The completion by the Conference on Disarmament of the negotiations on a universal and internationally and effectively verifiable Comprehensive Nuclear Test Ban Treaty no later than 1996...."

¹² William Walker, 'Evolutionary versus Planned Approaches to Nuclear Disarmament', *Disarmament Diplomacy* No. 15, May 1997. *Disarmament Diplomacy* is published by the Acronym Institute, website: www.gn.apc.org/acronym/.

¹³ See Nuclear Weapons Convention Monitor: updating the debate on the prohibition and elimination of nuclear weapons, Issue 2, April 2001, <http://www.ippnw.org/PDF%20files/NWMonitor2.pdf>
Nuclear Weapons Convention Monitor: updating the debate on the prohibition and elimination of nuclear weapons, Issue 3, June 2002, <http://www.ippnw.org/PDF%20files/NWCM3.pdf>

¹⁴ See Weapons of Terror: Freeing the World of Nuclear, Biological and Chemical Arms, Final Report of the Commission on Weapons on Mass Destruction, 1 June 2006, Sweden. See in particular Chapter 8. Compliance, verification, enforcement and the role of the United Nations.

¹⁵ Verification of nuclear disarmament: final report on studies into the verification of nuclear warheads and their components', Working Paper submitted to the 2005 NPT Review Conference by the United Kingdom of Great Britain and Northern Ireland, April 18, 2005, NPT/CONF.2005/WP.1

¹⁶ See for example:

- Laying the Foundations for Getting to Zero: Verifying the Transition to Low Levels of Nuclear Weapons, Patricia Lewis, VERTIC, September 1998
- Verifying the Transition from Low Levels of Nuclear Weapons to a Nuclear Weapon-Free World, Tom Milne and Henrietta Wilson, VERTIC, June 1999
- Virtual Nuclear Capabilities and Deterrence in a World Without Nuclear Weapons, George Palocz-Horvath, VERTIC, October 1998
- Sustaining a Verification Regime in a Nuclear Weapon-Free World, Suzanna Van Moyland, VERTIC, June 1999.

¹⁷ See: - 28 States Participate: Inaugural "Article VI Forum" United Nations, New York, October 3, 2005 http://www.middlepowers.org/mpi/pubs/ArticleVI_Report.pdf

- Gaining Confidence in Nuclear Disarmament Steps: Final Report from Second meeting of Article VI Forum, http://www.gsinstiute.org/mpi/pubs/Hague_A6F_Final.pdf
- MPI Hosts Third Meeting of Article VI Forum in Ottawa, MPI Event Report, Ottawa, Canada, September 28-29, 2006. <http://www.middlepowers.org/mpi/archives/000319.shtml#000319>
- ¹⁸ See for example:
- INESAP Bulletin Issue No. 25, April 2005, Transformation of the Nuclear Control Regime From the NPT to Nuclear Abolition, <http://www.inesap.org/bulletin25/index.htm>
- INESAP Bulletin Issue No. 14, November, 1997, Searching For The Bomb: Nuclear Disarmament Verification <http://www.inesap.org/bulletin14/bulletin14.htm>
- ¹⁹ In Retrospect: The Tragedy and Lessons of Vietnam, Robert McNamara, Time Books, 1995, p.346.
- ²⁰ According to a 15 May 2003 press release from the Korean Committee for Solidarity with World Peoples, a mouthpiece for the North Korean government:
- "The Iraqi war taught the lesson that "nuclear suspicion," "suspected development of weapons of mass destruction" and suspected "sponsorship of terrorism" touted by the U.S. were all aimed to find a pretext for war and one would fall victim to a war when one meekly responds to the IAEA's inspection for disarmament. Neither strong international public opinion or big country's opposition to war nor the UN charter could prevent the U.S. from launching the Iraqi war. It is a serious lesson the world has drawn from the Iraqi war that a war can be averted and the sovereignty of the country and the security of the nation can be protected only when a country has a physical deterrent force, a strong military deterrent force capable of decisively repelling any attack to be made by any types of sophisticated weapons."
- ²¹ See Dr. Khan's Nuclear WallMart, Christopher Clary, Disarmament Diplomacy, Issue No. 76, March/April 2004, <http://www.acronym.org.uk/dd/dd76/76cc.htm>
- ²² 5000 MT (BAS Jan/Feb 07 p34) divided by 15 Kt (0.015 MT) = 330,000
- ²³ Jacques Chirac, 19 January 2006, "The leaders of states who would use terrorist means against us, as well as those who would envision using . . . weapons of mass destruction, must understand that they would lay themselves open to a firm and fitting response on our part," Chirac said during a visit to a nuclear submarine base in Brittany. "This response could be a conventional one. It could also be of a different kind."
- ²⁴ Legality of the Threat or Use of Nuclear Weapons (Advisory Opinion of the International Court of Justice (ICJ), July 8), U.N. Doc. A51/218 (1996), reprinted in 35 I.L.M. 809 & 1343 (1996). The Advisory Opinion and separate declarations and opinions of judges are available on the website of IALANA: www.dfh.nl/org/ialana/opiniontable.html.
- ²⁵ Board of Directors. It is 5 minutes to midnight. Bulletin of the Atomic Scientists. 2007;63(1):66-71.
- ²⁶ A Nuclear Crisis, Jimmy Carter, Washington Post, 23 FEBRUARY 2000
- ²⁷ Abolition of Nuclear Weapons, GENERAL LEE BUTLER*, 4 DECEMBER 1996 NATIONAL PRESS CLUB, WASHINGTON, DC
- ²⁸ George P. Shultz, Henry A. Kissinger, William J. Perry, Sam Nunn. A world free of nuclear weapons. Wall Street Journal. 4 Jan 2007, pA15.
- ²⁹ Treaty on the Non-Proliferation of Nuclear Weapons, entered into force 1970.
- ³⁰ ICJ Advisory Opinion, op. cit., note 7.
- ³¹ Canberra Commission, op. cit., note 3.
- ³² Melman Group poll, "Public Attitudes on Nuclear Weapons," commissioned by the Stimson Center, interviews Sept. 10-15, 1997.
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- ⁴⁰ UNGA Resolution 52/38 L adopted on December 9, 1997; UNGA Resolution 52/39 C, adopted on December 9, 1997; UNGA Resolution 53/77 X adopted on December 4, 1998; UNGA Resolution 53/78 D, adopted on December 4, 1998.
- ⁴¹ Members of the Commission included Michel Rocard (former Prime Minister of France), General Lee Butler (former Head of US Strategic Command) and Robert MacNamara (former US Secretary of Defense).
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- ⁴³ 'A Nuclear-Weapons-Free World: The Need for a New Agenda,' Joint Declaration by the Ministers for Foreign Affairs of Brazil, Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa and Sweden, 9 June 1998
- ⁴⁴ H.Res 479, 105th Congress, 2d Session, June 18, 1998, H.Res.82, 106th Congress, 1st Session, February 24, 1999.
- ⁴⁵ Resolution to the 109th Congress calling for nuclear abolition, http://www.gsinstiute.org/pnnd/docs/US_Kucinich_abolition_bill.pdf
- ⁴⁶ H. R. 2545 Nuclear Disarmament and Economic Conversion Act of 1999
- ⁴⁷ "28 States Participate: Inaugural Article VI Forum" United Nations, New York, October 3, 2005 http://www.middlepowers.org/mpi/pubs/ArticleVI_Report.pdf
- ⁴⁸ Weapons of Terror, Recommendation 30,p. 109
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- ⁵⁰ Treaty Between the United States of America and the Russian Federation On Strategic Offensive Reductions, May 2002. <http://www.state.gov/t/ac/trt/18016.htm#1>
- ⁵¹ Statement by John Holum, Acting Undersecretary of State and Director of the US Arms Control and Disarmament Agency, UN First Committee, October 14, 1998
- ⁵² UNGA Res. 50/70 P, 12 December 1995.
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⁵⁵ Other treaties, including the treaties of Tlatelolco, Rarotonga, Pelindaba and Bangkok, (establishing nuclear-weapon-free zones in Latin America, South Pacific, Africa and Southeast Asia, respectively), the Non-Proliferation Treaty and the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil Thereof, act to stop the proliferation of nuclear weapons rather than to implement disarmament of existing stockpiles.

⁵⁶ Doctrine for Joint Nuclear Operations, US Joint Chiefs of Staff, 2006, http://www.nukestrat.com/us/jcs/JCS_JP3-12_05draft.pdf

⁵⁷ US Doctrine for Joint Nuclear Operations, Final Coordination, 15 March 2005, p xii.

⁵⁸ Weapons of terror, p 93.

⁵⁹ NRDC Nuclear Notebook, in Bulletin of Atomic Scientists, November/December 1998, p66.

⁶⁰ An FMCT will nevertheless still be a useful treaty to achieve as it could well develop procedures and accumulate information which will be useful once the nuclear weapon states agree to a path of verified disarmament. Complete monitoring of civilian fissile material production and of stockpiles of fissile material will be necessary to develop confidence in compliance with a nuclear abolition regime (See Section 4, Verification).

⁶¹ The Indian government was one of the first to call for a CTBT and had been a strong supporter of it up until the final stages of the negotiations in the Conference on Disarmament in Geneva. India proposed language in the CTBT linking it with a commitment for nuclear disarmament within a time bound framework. Rather than addressing this proposal in the negotiations, a draft text of the CTBT, which had not been agreed by all delegations at the CD, was presented to the United Nations General Assembly and forced through with a vote. India and Pakistan opposed the resolution. A press statement released by the Indian government on 15 May 1998, following their nuclear tests noted that "It is because of the continuing threat posed to India by the deployment of nuclear weapons... that we have been forced to carry out these tests."

⁶² See "Stewardship Smokescreen", Hisham Zerriffi and Arjun Markhijani, Bulletin of Atomic Scientists, September/October 1996.

⁶³ Victor Sidel, "Why Abolitionists Should Not Support the CTBT in Its Current Form" Victor Sidel, Medicine and Global Survival, October 1998. Vol. 5, Issue 3. See also accompanying article, Daryl Kimball, "Why the CTBT Is Still an Essential Step Toward Nuclear Abolition".

⁶⁴ French President Jacques Chirac highlighted this when he announced a resumption of French testing in 1995 in order to "perfect computer simulation techniques that would end the need for further (physical) testing". NY Times, 6 Sept. 1995.

⁶⁵ The Weapons of Mass Destruction Commission in Weapons of Terror, cite SIPRI and the Federation of American Scientists data and calculate 27,000 nuclear warheads.

⁶⁶ The US Doctrine for Joint Theater Nuclear Operations of 1996, for example, holds that nuclear "operations must be planned and executed to destroy or eliminate enemy WMD (weapons of mass destruction) delivery systems and supporting infrastructure before they can strike friendly forces."

⁶⁷ Sir Nicholas Lyell, UK Attorney General, Statement to the International Court of Justice, November 15, 1995.

⁶⁸ John McNeill, Senior Deputy General Counsel for the Department of Defense. Statement to the International Court of Justice, November 15, 1995.

⁶⁹ "Ban the Bomb?" The Nation, January 9/16, 1995.

⁷⁰ "An Incremental Strategy for Nuclear Disarmament: Rationale and Practical Considerations," Harald Muller, Programme for Promoting Nuclear Non-Proliferation, April, 1998.

⁷¹ "A Faustian Bargain: Why Stockpile Stewardship is Fundamentally Incompatible with the Process of Disarmament", Western States Legal Foundation, April 1998. See also "Stockpile Stewardship of Nuclear Weapons: The Deal to Subsidize Nuclear Weaponers", Facing Reality, CA 1998.

⁷² See, e.g., "Selected Accidents Involving Nuclear Weapons 1950-1993", Greenpeace, March 1996, at <http://www.greenpeace.org/~comms/nukes/ctbt/read3.html>.

⁷³ Statement by Arundhati Ghose, Ambassador of India to the UN in Geneva, to the Conference on Disarmament, February 15, 1996.

⁷⁴ Of the states possessing nuclear weapons, only China, India Pakistan and North Korea support comprehensive disarmament. All four have called for negotiations on a nuclear weapons convention.

⁷⁵ See Snaring the Sun: Opportunities to prevent nuclear weapons proliferation and advance nuclear disarmament through an abolition framework, Alyn Ware, Dr Kate Dewes and H.E. Michael Powles, Disarmament and Security Centre, February 2005. <http://www.disarmsecure.org/publications/papers/snaringsun.html>
See also International Ju-Jitsu: Using United Nations Security Council Resolution 1540 to advance nuclear disarmament, Alyn Ware, Disarmament and Security Centre, July 2004, <http://www.disarmsecure.org/publications/papers/Ju-Jitsu.html>

⁷⁶ Appeal from Hiroshima and Nagasaki - for a Total Ban on and the Elimination of Nuclear Weapons. <http://www10.plala.or.jp/antiatom/html/e/egensu/documents/hnappeal.htm>

⁷⁷ Statement by International Generals and Admirals, December 5, 1996 <http://www.gsinstitute.org/archives/000014.shtml>

⁷⁸ The Future of U.S. Nuclear Weapons Policy, Committee on International Security and Arms Control, National Academy of Sciences, National Academies Press, 1997. <http://books.nap.edu/catalog/5796.html#toc>

⁷⁹ Statement by Heads of State and Civilian Leaders Worldwide, February 2, 1998, Washington, D.C. National Press Club, http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/civil-society/cranston_statement-heads-state.htm

⁸⁰ The Morality of Nuclear Deterrence, June 1998. http://www.ccnr.org/pax_christi.html

⁸¹ "Fifteen years ago we concurred with Pope John Paul II in acknowledging that, given the context of that time, possession of these weapons as a deterrent against the use of nuclear weapons by others could be morally acceptable, but acceptable only as an interim measure and only if deterrence were combined with clear steps toward progressive disarmament... In 1998 the global context is significantly different from what it was a few years ago... We raise up our voices with those around the world in calling for an end to the reliance on nuclear deterrence and instead call upon the United States and the other nuclear weapons states to enter into a process leading to the complete elimination of these morally offensive weapons."

⁸² An Appeal to End the Nuclear Threat: Concerned Americans Speak Out. New York Times advertisement, 3 October 2000, http://www.gsinstitute.org/gsi/pubs/rsp_ad.pdf

⁸³ U.S. Mayors Ask Bush to Commit to Eliminating Nuclear Weapons, 25 June 2001. <http://www.gsinstitute.org/archives/000061.shtml#000061>

⁸⁴ World Council of Churches 9th Assembly. Minute on the Elimination of Nuclear Arms. Porto Alegre, Brazil, 14-23 Feb 2006.

- ⁸⁵ Weapons of Terror, p. 109
- ⁸⁶ Francis Sejersted, December 10, 1997. Speech at the presentation of the Nobel Peace Award to the International Campaign to Ban Landmines.
- ⁸⁷ Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects.
- ⁸⁸ Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction.
- ⁸⁹ Blaiklie, B. Speech to the Canadian Parliament November 3, 1997
- ⁹⁰ "Nuclear Weapons Convention on Track: UN Resolution, Incremental Comprehensive Approaches and the Drafting Process." INESAP Information Bulletin, December 11, 1996.
- ⁹¹ Canberra Commission, op. cit., note 3.
- ⁹² "Towards a Nuclear-Weapon-Free World: The Need for a New Agenda", op. cit., note 22.
- ⁹³ UNGA Res. 51/45 M, December 10, 1996. UNGA Res. 52/38 O, December 9, 1997. UNGA Res. 53/77 W, December 4, 1998 (See Documents section for copies of the most recent resolutions.)
- ⁹⁴ Ambassador Hasmy Agam, Permanent Representative of Malaysia to the United Nations. United Nations First Committee, October 12, 1999.
- ⁹⁵ UNGA Resolution 53/77 Y, December 4, 1998.
- ⁹⁶ R. Tauwhare, United Kingdom. Debate of the UN First Committee, October 27, 1998.
- ⁹⁷ Stansfield Turner, Caging the Nuclear Genie, Westview Press, 1997.
- ⁹⁸ India and Pakistan are resistant to joining the Non-Proliferation Treaty and the Comprehensive Test Ban Treaty, and to negotiating a Fissile Material Cut-off Treaty. However both states indicated that they would have supported the CTBT and would support FMCT if they were linked to a program for complete nuclear disarmament.
- ⁹⁹ All nuclear weapon capable states, ie those with nuclear reactors, are members of the Conference on Disarmament, which would most likely be the negotiating body for the major multilateral elements of a program for nuclear disarmament.
- ¹⁰⁰ The US Defense Department's 1994 Annual Report, for example, noted that "...US nuclear weapons and nuclear posture can play a role in deterring the acquisition of nuclear weapons by other nations."
- ¹⁰¹ Final Document of the XII Summit of the Non-Aligned Movement, Durban, Sep 1998.
- ¹⁰² 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, Vol 1, NPT/CONF.2000/28, access at disarmament.un.org/wmd/npt/finaldoc.html
- ¹⁰³ US Explanation of Vote before the vote on United Nations General Assembly resolution A/C.1/52/L.37, Nov 10, 1997.
- ¹⁰⁴ Weapons of Terror, p36.
- ¹⁰⁵ General Lee Butler, public meeting, 3 March 1999, Ottawa, Canada.
- ¹⁰⁶ Those States which had tested nuclear weapons as at Jan 1 1970. This includes China, France, Russia, the United Kingdom and the United States
- ¹⁰⁷ This currently includes NWS as well as India, Israel, Pakistan and North Korea.
- ¹⁰⁸ Including the ABM, START, INF and Moscow treaties, the Hot Line and Nuclear Accidents Agreements, and the Agreement on Notifications of Launches of Intercontinental Ballistic Missiles and Submarine Launched Missiles.
- ¹⁰⁹ "An Article VI Negotiating Forum of Five Plus One", Nuclear Disarmament: How Much Have the Five Nuclear Powers Promised in the Non-Proliferation Treaty?, Washington Council on Non-Proliferation, June 1994.
- ¹¹⁰ In November 2000, President Putin of Russia made a statement proposing that the next round of negotiations between Russia and the US in the Strategic Arms Reduction or START series of treaties, entail much deeper reductions, down to a level of 1,000 to 1,500 warheads for each side. See Patrick E. Tyler, 'Eyeing U.S. Missile Defense, Russia Wants Less Offense' New York Times 15 November 2000, <http://www.nytimes.com/2000/11/15/world/15RUSS.html?ex=1169096400&en=424982ff94fff67a&ei=5070>
- ¹¹¹ Statement by Philippines President Fidel Ramos. Manila. July 9, 1996.
- ¹¹² General considerations to be taken into account by Parties in the Review Process. Submitted by the Marshall Islands. NPT/CONF.2000/PC.I/11, 11 April 1997.
- ¹¹³ Follow-up to the Advisory Opinion of the International Court of Justice on the Legality of the Threat or Use of Nuclear Weapons: Legal, technical and political elements required for the establishment and maintenance of a nuclear weapon-free world: Working Paper submitted by Malaysia, Costa Rica, Bolivia, Democratic Republic of Timor-Leste, Nicaragua, and Yemen. 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, New York, 2-27 May 2005, <http://www.lcnp.org/disarmament/npt/2005NPTmalaysia-wp.htm>
- ¹¹⁴ "Diplomatic Judo: Using the NPT to make the nuclear weapons states negotiate the abolition of nuclear weapons", Zia Mian and M.V.Ramana, Center for Energy and Environmental Studies, Princeton University, October 1998.
- ¹¹⁴ UNGA 53/77 X, adopted December 4, 1998.
- ¹¹⁶ "Initiating work on priority disarmament and non-proliferation issues" Draft elements of an UNGA60 First Committee Resolution, Brazil, Canada, Kenya, Mexico, New Zealand and Sweden, <http://www.reachingcriticalwill.org/political/1com/1com05/docs/draftelementsinitiating.pdf>
- ¹¹⁷ Convention on prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects (1981).
- ¹¹⁸ See "A Ban against landmines? Never!" Jody Williams, in Peace is Possible, Fredrik Heffermehl (ed) International Peace Bureau, Geneva, 2000.
- ¹¹⁹ For more on the potential of an Ottawa Style process for negotiating an NWC and additional support measures, see Snaring the Sun: Opportunities to prevent nuclear weapons proliferation and advance nuclear disarmament through an abolition framework, Alyn Ware, Dr Kate Dewes and H.E. Michael Powles, Disarmament and Security Centre, February 2005. <http://www.disarmsecure.org/publications/papers/snaringsun.html>
- ¹²⁰ See Rajiv Gandhi Action Plan for a Nuclear-Weapons-Free World (Draft Convention), Mani Shankar Aiyar MP, presentation at an international parliamentary forum: From Nuclear Dangers to Cooperative Security: Parliamentarians and the Legal Imperative for Nuclear Disarmament. Liu Institute for Global Issues, University of British Columbia, Vancouver, Nov 7-9, 2003, <http://www.gsinstitute.org/pnnd/reports.html>, and A gaffe, or a historic chance? Praful Bidwai, Frontline, Volume 22 - Issue 01, Jan. 01 - 14, 2005, <http://www.flonnet.com/fl2201/stories/20050114007112400.htm>

Section 2

Model Nuclear Weapons Convention

Convention on the Prohibition of the Development, Testing, Production, Stockpiling, Transfer, Use and Threat of Use of Nuclear Weapons and on Their Elimination.

with
Comments and Critical Questions

Summary of the Model Nuclear Weapons Convention

General Obligations

The Model Nuclear Weapons Convention prohibits development, testing, production, stockpiling, transfer, use and threat of use of nuclear weapons. States possessing nuclear weapons will be required to destroy their arsenals according to a series of phases. The Convention also prohibits the production of weapons-usable fissile material and requires delivery vehicles to be destroyed or converted to make them non-nuclear capable.

Declarations

States parties to the Convention will be required to declare all nuclear weapons, nuclear material, nuclear facilities and nuclear weapons delivery vehicles they possess or control, and the locations of these.

Phases for Elimination

The Convention outlines a series of five phases for the elimination of nuclear weapons beginning with taking nuclear weapons off alert, removing weapons from deployment, removing nuclear warheads from their delivery vehicles, disabling the warheads, removing and disfiguring the “pits” and placing the fissile material under international control. In the initial phases the U.S. and Russia are required to make the deepest cuts in their nuclear arsenals.

Verification

Verification will include declarations and reports from States, routine inspections, challenge inspections, on-site sensors, satellite photography, radionuclide sampling and other remote sensors, information sharing with other organizations, and citizen reporting. Persons reporting suspected violations of the convention will be provided protection through the Convention including the right of asylum.

An International Monitoring System will be established under the Convention to gather information, and will make most of this information available through a registry. Information which may jeopardize commercial secrets or national security will be kept confidential.

National Implementation Measures

States parties are required to adopt necessary legislative measures to implement their obligations under the Convention to provide for prosecution of persons committing crimes and protection for persons reporting violations of the Convention.

States are also required to establish a national authority to be responsible for national tasks in implementation.

Rights and Obligations of Persons

The Convention applies rights and obligations to individuals and legal entities as well as States. Individuals have an obligation to report violations of the Convention and the right to protection if they do so. Procedures for the apprehension and fair trial of individuals accused of committing crimes under the treaty are provided.

Agency

An agency would be established to implement the Convention. It will be responsible for verification, ensuring compliance, and decision making, and will comprise a Conference of States Parties, an Executive Council and a Technical Secretariat.

Nuclear Material

The Convention prohibits the production of any fissionable or fusionable material which can be used directly to make a nuclear weapon, including plutonium (other than that in spent fuel) and highly enriched uranium. Low enriched uranium would be permitted for nuclear energy purposes.

Cooperation, Compliance and Dispute Settlement

Provisions are included for consultation, cooperation and fact-finding to clarify and resolve questions of interpretation with respect to compliance and other matters. A legal dispute may be referred to the International Court of Justice by mutual consent of States Parties. The Agency also is empowered to request an advisory opinion from the ICJ on a legal dispute.

The Convention provides for a series of graduated responses for non-compliance beginning with consultation and clarification, negotiation, and, if required, sanctions or recourse to the U.N. General Assembly and Security Council for action.

Relation with Other International Agreements

The Model NWC would build on existing nuclear nonproliferation and disarmament regimes and verification and compliance arrangements, including the Non-Proliferation Treaty, International Atomic Energy Agency Safeguards, Comprehensive Test Ban Treaty Organisation International Monitoring System and bilateral agreements between Russia and the United States. In some cases the NWC may add to the functions and activities of such regimes and arrangements. In other cases, the NWC would establish additional complementary arrangements.

Financing

Nuclear weapon states are obliged to cover the costs of the elimination of their nuclear arsenals.

However, an international fund will be established to assist states that may have financial difficulties in meeting their obligations.

Optional Protocol Concerning Energy Assistance

The Convention does not prohibit the use of nuclear energy for peaceful purposes. However it includes an optional protocol which would establish a program of energy assistance to promote sustainable energy resources for States parties choosing not to develop nuclear energy or to phase out existing nuclear energy programs.

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Preamble

We the people of the Earth, through the States Parties to this Convention:

Convinced that the existence of nuclear weapons poses a threat to all humanity and that their use would have catastrophic consequences for all the creatures of this Earth;

Noting that the destructive effects of nuclear weapons upon life on earth are uncontrollable in time or space;

Aware that amongst weapons of mass destruction, the abolition of which is recognized as being in the collective security interest of all people and States, nuclear weapons are unprecedented and unequalled in destructive potential;

Affirming that the inherent dignity and equal and inalienable rights of all members of the human family include the right to life, liberty, peace and the security of person;

Convinced that all countries have an obligation to make every effort to achieve the goal of eliminating nuclear weapons, the terror which they hold for humankind and the threat which they pose to life on Earth;

Recognizing that numerous regions, including Antarctica, Outer Space, Latin America and the Caribbean, the Sea Bed, the South Pacific, Southeast Asia, Africa, and Central Asia have already been established as nuclear weapon free zones, where possession, production, development, deployment, use and threat of use of nuclear weapons are forever prohibited, and desiring to extend this benefit to the entire planet for the good of all life;

Determined to eliminate the risks of environmental pollution by radioactive waste and other radioactive matter associated with nuclear weapons and to ensure that the bounty and beauty of the Earth shall remain the common heritage of all of us and our descendants in perpetuity to be enjoyed by all in peace;

Recognizing the universal need for environmentally safe, sustainable energy;

Gravely concerned that the use of nuclear weapons might be brought about not only intentionally by war or terrorism, but also through human or mechanical error or failure, and that the very existence and gravity of these threats of nuclear weapons use generates a climate of suspicion and fear which is antagonistic to the promotion of universal respect for and observance of the human rights and fundamental freedoms set forth in the Charter of the United Nations and the Universal Declaration of Human Rights;

Convinced of the serious threats posed to the environment by nuclear arsenals, the economic and social costs and waste of intellectual talent occasioned by these arsenals and the efforts required to prevent their use, the dangers inherent in the existence of the materials used to make nuclear weapons and the attendant problems of proliferation, the medically and psychologically catastrophic effects of any use of a nuclear weapon, the potential effects of mutations on the genetic pool and numerous other risks associated with nuclear weapons;

Welcoming the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction and the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, as indications of a progression toward the elimination of all weapons of mass destruction;

Recognizing that all life is sacred and that there is a moral imperative to eliminate all weapons of mass destruction;

Welcoming the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, as an indication of progress towards the prohibition and elimination of weapons which are indiscriminate and cause unnecessary suffering;

[*Welcoming* the International Convention for the Suppression of Acts of Nuclear Terrorism as an indication of progress in addressing the threat of acquisition, use or threat of use of nuclear weapons by non-State actors;]

Welcoming also the Rome Statute of the International Criminal Court, in particular the recognition of individual responsibility for crimes involved in employing weapons which cause unnecessary suffering or which are inherently indiscriminate;

Believing that the threat and use of nuclear weapons is incompatible with civilized norms, standards of morality and humanitarian law which prohibit the use of inhumane weapons and those with indiscriminate effects;

Recalling Resolution 1(I), adopted unanimously on January 24, 1946 at the First Session of the General Assembly of the United Nations, and the many subsequent resolutions of the United Nations which call for the elimination of atomic weapons;

Recalling also the Final Document of the United Nations First Special Session of the General Assembly on Disarmament 1978, which calls for the elimination of nuclear weapons;

Mindful of the solemn obligations of States made in Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons to end the nuclear arms race at an early date and achieve nuclear disarmament, and to further commitments on specific steps to achieve nuclear disarmament in the “Principles and Objectives for Nuclear Non-Proliferation and Disarmament” agreed in 1995, and the “Practical steps for the systematic and progressive efforts to implement Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons” agreed in 2000;

Convinced that the elimination of nuclear weapons is an important step towards the goal of general and complete disarmament and that the implementation of disarmament obligations would strengthen international law and peaceful relations between countries;

Welcoming the advisory opinion of the International Court of Justice of July 8, 1996, which concluded “that the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law”, and concluded unanimously that “There exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control”;

Recalling United Nations General Assembly resolutions 51/45 M, of 10 December 1996, 52/38 O of 9 December 1997, 53/77 W of 4 December 1998, 54/54 Q of 1 December 1999, 55/33 X of 20 November 2000, 56/24 S of 29 November 2001, 57/85 of 22 November 2002, 58/46 of 8 December 2003, 59/83 of 3 December 2004, 60/76 of 8 December 2005, and 61/83 of 6 December 2006 which underline the nuclear disarmament obligation affirmed by the International Court of Justice and call “upon all States to fulfill that obligation immediately by commencing multilateral negotiations ... leading to an early conclusion of a nuclear weapons convention prohibiting the development, production, testing, deployment, stockpiling, transfer, threat or use of nuclear weapons and providing for their elimination”;

Convinced that a convention prohibiting the development, testing, production, stockpiling, transfer, use and threat of use of nuclear weapons and providing for their elimination is required to abolish these weapons from the Earth;

Have agreed as follows:

I. General Obligations

A. State Obligations

1. Each State Party to this Convention undertakes never under any circumstances:
 - a. To use or threaten to use nuclear weapons;
 - b. To engage in any military or other preparations to use nuclear weapons;
 - c. To develop, test, produce, otherwise acquire, deploy, stockpile, maintain, retain, or transfer nuclear weapons except as specified under paragraph 4 of this Article;
 - d. To develop, test, produce, otherwise acquire, stockpile, retain, transfer or use proscribed nuclear material except as specified under paragraph 4 of this Article;
 - e. To develop, test, produce, otherwise acquire, deploy, stockpile, maintain, retain, or transfer nuclear weapons delivery vehicles;
 - f. To develop, test, produce, otherwise acquire, stockpile, maintain, retain, or transfer nuclear weapon components or equipment as specified in this Convention;
 - g. To fund [or conduct] nuclear weapons research, with the exception of nuclear disarmament research;
 - h. To assist, encourage, induce or permit, in any way, directly or indirectly, anyone to engage in any activity prohibited under this Convention.

2. Each State Party undertakes:
 - a. To destroy all nuclear weapons it owns or possesses, or that are located in any place under its jurisdiction or control, in accordance with the provisions of this Convention;
 - b. To destroy all nuclear weapons it abandons on the territory of another State, in accordance with the provisions of this Convention;
 - c. To submit all nuclear facilities to preventive controls;
 - d. To destroy all nuclear weapons facilities it owns or possesses, or that are located in any place under its jurisdiction or control, or to convert such facilities to weapons destruction facilities or other facilities not prohibited by this Convention;
 - e. [To disable or destroy all facilities, systems or sub-systems designed or used in the command or control of nuclear weapons, or convert such facilities, systems or sub-systems to purposes not prohibited under this Convention;]
 - f. To destroy or convert for purposes not prohibited under this Convention all nuclear weapons delivery vehicles and nuclear weapon components;
 - g. To place all special nuclear material under preventive controls as specified in this Convention.

The prohibition on funding nuclear weapons research (subparagraph 1.g) replaces the prohibition on research in the 1997 MNWC, as this would be pragmatically and ethically problematic. The bracketed language would maintain this prohibition, which some respondents consider essential.

Preventive controls entail obligations additional to safeguards and would imply new obligations on the part of non-nuclear weapon states. (See Verification Section 4.)

There is no satisfactory answer yet to the question of verification of command and control facilities.

- h. To participate in good faith in activities aimed at the promotion of transparency with respect to nuclear weapons and related technologies and the promotion of education for the purposes of detecting and preventing activities prohibited under this Convention;
 - i. To report violations of this Convention to the Agency [and to cooperate to the fullest with the Agency’s investigative, monitoring and verification functions;] [and to provide to the Agency all information requested by the Agency for the purposes of implementing this Convention, except such information as may be with-held for legitimate international or national security or trade secret concerns;]
 - j. To enact all domestic legislation necessary for the implementation of this Convention.
- 3. These obligations shall apply equally to nuclear explosive devices intended for peaceful purposes.
 - 4. These obligations shall not be interpreted to prohibit activities consistent with the application and implementation of the provisions of this Convention [including but not limited to transfer of nuclear weapons, special nuclear material, and nuclear weapons delivery vehicles for the purpose of their destruction or disposal, and nuclear disarmament research and verification thereof].

B. Obligations of Persons

- 5. The following acts are crimes for which persons shall be held responsible regardless of their position, residence, citizenship or country of incorporation:
 - a. To engage or attempt to engage in any acts listed in subparagraphs 1.a through 1.g, inclusive, of this Article;
 - b. To aid, abet, or otherwise assist, in any way, anyone to engage in any activity prohibited under this Convention.
- 6. The fact that the present Convention provides criminal responsibility for individuals does not affect the responsibility of States under international law.

Subparagraph 2.h promotes transparency and education. This is a response to the argument that nuclear weapons technology and knowledge cannot be disinvented. (See also Critical Question on Knowledge and Reversibility.)

Paragraph 4 is necessary in order to ensure implementation that is consistent with the purposes of the NWC. Some responses indicated that the bracketed language should be deleted because it leaves room for loopholes. The question of intent and the difficulty of defining technical criteria for all provisions that turn on intent surface here and elsewhere.

The definition of Nuclear Weapons State is consistent with the definition in the Non-Proliferation Treaty. The 1997 Model NWC definition of 'Nuclear Threshold State' has been replaced with "Nuclear Capable State" and includes all States outside of the NPT that have a current capability to produce nuclear weapons. States which could develop a nuclear capability in the future are not defined but rather listed in the annex on States with nuclear reactors.

"Natural person" means an individual. "Legal person" includes, for example, corporations.

Definition 4.a. is borrowed from the Treaty of Tlatelolco. Definitions 4.b,c and d update and expand this definition to cover modern weapons that use nuclear technology. Nuclear weapons are generally understood to be warheads (which have guidance systems and are delivered by missiles) or gravity bombs (delivered by aircraft).

Notes:

[..] Square brackets indicate alternative language or optional text

Within Article II {Definition}, each category begins with the definition of the categorical term. Other definitions follow in alphabetical order.

The text makes reference to a "Verification Annex" which would form an integral part of a negotiated NWC, but is not included in this Model NWC

II. Definitions

A. States and Persons

1. "Nuclear Weapons State" means a state which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967
2. "Nuclear Capable State" means [a State which has developed or has the capacity to develop nuclear weapons and which is not party to the Non-Proliferation Treaty]
3. "Person" means a natural or legal person.

B. Nuclear Weapons

4. "Nuclear Weapon" means:
 - a. Any device which is capable of releasing nuclear energy in an uncontrolled manner and which has a group of characteristics that are appropriate for use for warlike purposes;
 - b. Any nuclear explosive device;
 - c. Any radiological weapon; or
 - d. Any weapon which is designed to include a nuclear explosive device as a trigger or other component.
5. "Nuclear Weapon Component" means any constituent part of a nuclear weapon. [excluding the special nuclear material when separated from other components]
6. "Nuclear Weapons Delivery Vehicle" means any vehicle designed for or capable of delivering a nuclear weapon. Any nuclear weapons delivery vehicle that has been constructed, developed, flight-tested or deployed for weapon delivery shall be considered a nuclear weapons delivery vehicle.
7. "Plutonium Pit" means the core element of a nuclear weapon's primary or fission component.
8. "Radiological Weapon" means any weapon that disperses radioactive material or uses radioactive material as a primary material in its construction.
9. "Warhead" means the explosive part of a nuclear weapons system. Warheads consist of nuclear materials, conventional high explosives, related firing mechanisms and containment structure.

C. Nuclear Energy, Explosives, and Explosive Devices

10. "Nuclear Energy" means energy released from the nucleus of an atom either spontaneously or through interaction with other particles and/or electromagnetic radiation.
11. "Nuclear Explosion" means the release of significant amounts of nuclear energy on a time-scale faster than or comparable to chemical explosives [including micro-fission, micro-fusion or miniaturized devices of any yield].

12. “Nuclear Explosive Device” means any device capable of undergoing a nuclear explosion, irrespective of its purpose. The term includes such a weapon or device in unassembled and partly assembled forms, as well as devices or assemblies which belong to a nuclear explosive device or are a modification of such suitable for development and testing of nuclear weapons or other nuclear explosive devices, but does not include the means of transport or delivery of such a weapon or device if separable from and not an indivisible part of it.
13. “Significant Amount of Nuclear Energy” means more than the energy released by radioactive decay and spontaneous fission and may be much smaller than the maximum energy yield of the largest chemical explosions.

D. Nuclear Material

14. “Nuclear Material” means any source or fissionable or fusionable material as defined in this Convention.
15. “Exemption Quantities” mean quantities of nuclear material not prohibited under the provisions of this Convention [and preventive controls].
16. “Fissionable Material” means any isotope which may undergo either spontaneous fission or fission induced by neutrons of any energy, as well as any compound or mixture including such isotopes.
17. “Fusionable Material” means any isotope capable of undergoing fusion with the same kind of nuclide or with any other nuclide by applying sufficient conditions (pressure, temperature and inclusion time) with technical means.
18. “Highly Enriched Uranium (HEU)” means uranium in which the naturally occurring U-235 isotope (0.7% in natural uranium) is increased to 20% U-235 or above.
19. “Low Enriched Uranium (LEU)” means uranium enriched in the isotopic content of U-235 but to less than 20% of the total mass.
20. “Mixed Oxide Fuel (MOX fuel)” means nuclear reactor fuel composed of plutonium and uranium oxides.
21. [“Other Special Nuclear Material” means special nuclear material other than plutonium and uranium enriched to 20% or more U-235 or U-233.]
22. “Proscribed fissionable material” means any fissionable material that can be used for the manufacture of nuclear weapons without transmutation, chemical reprocessing or further enrichment, and includes any isotopic mixture of separated and un-irradiated plutonium, uranium enriched in the isotopes 235 to 20% or more, uranium-233.
23. “Proscribed fusionable material” means any fusionable material that can be used for the manufacture of nuclear weapons without transmutation, redoxation or further enrichment.
24. “Proscribed nuclear material” means any proscribed fissionable or any proscribed fusionable material.
25. “Significant quantity” means the approximate quantity of nuclear material in respect of which, taking into account any conversion

See Critical Question on Nuclear Energy.

The number of nuclides that fall under the definition of fissionable material may change with scientific-technical progress.

The terms , ‘proscribed’ material, are offered to cover all materials that are to be banned under the MNWC. Proscribed fissionable material does not include plutonium in spent fuel or plutonium that is irretrievably stored.

process involved, the possibility of manufacturing a nuclear explosive device cannot be excluded.

26. “Source Material” means uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope U-235, thorium, lithium beyond naturally occurring concentration, deuterium, helium-3, or any of the foregoing in the form of metal, alloy, chemical compound or concentrate.
27. “Special Fissionable Material” means fissionable material that can be used for the manufacture of nuclear weapons.
28. “Special Fusionable Material” means any fusionable material that can be used for the manufacture of nuclear weapons and includes deuterium, tritium, helium-3, and lithium-6.
29. “Special Nuclear Material” means any special fissionable or any special fusionable material.

E. Nuclear Facilities

30. “Nuclear Facility” means any facility for the research, testing, production, extraction, enrichment, processing, reprocessing, or storage of nuclear material; any facility for the production of nuclear energy; any facility for the research, development, testing, production, storage, assembly, disassembly, maintenance, modification, deployment, or delivery of nuclear weapons, or nuclear weapon components; or any facility deemed a nuclear facility by the Technical Secretariat. The term “Nuclear Facility” includes [but is not limited to] the following:
 31. “Command, Control or Communication Facility”, means [any facility designed or used for the purpose of launching, targeting, directing or detonating a nuclear weapon or its delivery vehicle, or for aiding or assisting in any of these purposes.]
 32. “Deployment Site” means the location where a nuclear weapon is or has been deployed, or a location which is equipped for the deployment of nuclear weapons.
 33. “Nuclear Enrichment Facility” means a facility capable of increasing the ratio of the isotope uranium-235 in natural uranium.
 34. “Nuclear Material Storage Facility” means a facility for the interim or long-term storage of nuclear material.
 35. “Nuclear Reactor” means any device in which a controlled, self-sustaining fission chain-reaction can be maintained or in which a controlled fission chain is maintained partly by an external source of neutrons.
 36. “Nuclear Reprocessing Facility” means a facility to separate irradiated nuclear material and fission products in whole or in part, and includes the facility’s head-end treatment section and its associated storage and analytical sections.
 37. “Nuclear Weapons Destruction Facility” means any facility for disassembly or destruction of nuclear weapons or for rendering them permanently inoperable.
 38. “Nuclear Weapons Facility” means any facility for the design, research, development, testing, production, storage, assembly,

The definition of C3 facilities may not be necessary if such facilities were no longer used for the command and control of nuclear weapons by the time of entry into force of the NWC. In any case, verification of nuclear activities at these facilities would be difficult, so trust among States would have to be strong.

It is necessary to draw a distinction between deployment sites and storage facilities not located in deployment sites, since a deployment site will have facilities for storage. This distinction could be made by requiring a certain distance between a deployment site and any storage facility.

maintenance, modification, deployment, delivery, command, or control of nuclear weapons or Schedule 1 or Schedule 2 nuclear weapon components.

39. “Nuclear Weapons Production Facility” means any nuclear facility which produces materials which have been or may be used for military purposes, including such a reactor, a plant for processing nuclear material irradiated in a reactor, a plant for separating the isotopes of nuclear material, a plant for processing or fabricating nuclear material, a plant for the construction or assembly of nuclear weapon components, or a facility or plant of such other type as may be deemed a Nuclear Weapons Production Facility by the Technical Secretariat.
40. “Nuclear Weapons Research Facility” means any facility in which nuclear weapons research, development, testing or computer simulation is conducted.
41. “Nuclear Weapons Storage Facility” means a facility for the storage of nuclear weapons but does not include such a facility located on a deployment site.
42. “Nuclear Weapons Testing Facility” means a facility or prepared site for conducting nuclear weapons testing.

As long as they exist, nuclear weapons destruction facilities would be under verification to ensure that they are not used for prohibited activities.

The definition nuclear weapons facility does not include nuclear weapons destruction facilities. Thus, all nuclear weapons facilities can be closed or decommissioned even while weapons are being destroyed. If disassembly and destruction of nuclear weapons were both to take place at nuclear weapons facilities, this definition would require refining.

F. Nuclear Activities

43. “Nuclear Activity” means:
- a. Any construction or use of a nuclear reactor or component parts thereof;
 - b. Any production, use or threat of use of a nuclear weapon;
 - c. Any research, development or testing of nuclear energy or nuclear weapons;
 - d. Any production, separation, treatment or handling of nuclear material;
 - e. Any dismantling, disabling or destruction of nuclear weapons;
 - f. Any decommissioning of nuclear reactors and power plants;
 - g. Any application of radiation and isotopes in food, agriculture, medicine, engineering, geology or other industrial processes; or
 - h. Any other activity listed below or deemed a nuclear activity by the Agency.
44. “Convert” means modify to a use not prohibited under this Convention.
45. “De-alert” means reduce the alert status of nuclear weapons by eliminating launch-on-warning or launch-under-attack alert readiness postures, e.g., by removing key trigger mechanisms, decoupling warheads from nuclear weapons delivery vehicles or other means.
46. “Deployment of a nuclear weapon” means prepare or maintain a nuclear weapon for possible use by any of the following:
- a. placing it on, in or near a delivery system;
 - b. moving it to or maintaining it at a location suitable for delivery to a target.
47. “Destroy” means, with regard to a nuclear weapon, to remove the

A nuclear weapons production facility might but would not necessarily be a complex that includes research, storage, destruction, reprocessing, or testing facilities. It would also include facilities for the production of nuclear weapon components that are non-nuclear.

Nuclear weapons storage facilities do not include such facilities if located on a deployment site because of the requirement that warheads and bombs be stored separately from their delivery vehicles.

Disposition refers to irretrievable disposal of nuclear weapons usable material. There is no known satisfactory technology for disposition yet.

The definition of nuclear disarmament research was deemed necessary to distinguish between prohibited and necessary research with respect to the NWC. This concept requires more analysis and discussion.

warhead from its delivery vehicle, dismantle and irreversibly disable the warhead and its components, and dismantle and disable or convert the delivery vehicle to non-nuclear use, in accordance with the provisions of this Convention.

48. “Disable” means:

- a. with regard to a nuclear weapon, to render the weapon unable to be detonated by such means as disengaging or removing the arming fuse and firing mechanisms;
- b. with regard to a plutonium pit, to render it unable to be used in a nuclear weapon, e.g., by disfiguring, quenching, squeezing, dilution, mixing with highly radioactive waste, immobilization and disposition, transmutation or other means;
- c. with regard to command and control systems for nuclear weapons, to render such systems incapable of initiating or directing the launch of nuclear weapons delivery vehicles;
- d. with regard to a nuclear weapons delivery vehicle, to render such vehicle unable to launch a nuclear weapon including such means as removing essential components and removing the delivery vehicle from the launch facilities.

49. “Disassemble” or “Dismantle” means:

- a. with regard to nuclear weapons, to take apart the warhead and remove the subassemblies, components, and individual parts;
- b. with regard to a nuclear weapons delivery vehicle, to separate the essential component parts, such as warheads, propulsion and guidance units.

50. “Immobilization” means the process of putting nuclear material into non-weapons usable form without irradiation, e.g., by mixing with highly radioactive isotopes and encasing into a matrix of another material in order to render separation of the nuclear material from the matrix technically difficult. Immobilization includes vitrification and encasing nuclear material in ceramic.

51. “Nuclear Disarmament Research” means research intended to further the purposes of this Convention.

52. “Nuclear Weapons Research” means experimental or theoretical work undertaken principally to acquire new knowledge going beyond publicly available information of phenomena and observable facts directed toward understanding, development, improvement, testing, production, deployment, or use of nuclear weapons.

53. “Nuclear Weapons Testing” means nuclear explosions, computer simulations, hydrodynamic tests, hydronuclear tests designed to simulate behavior of nuclear materials, nuclear warheads, nuclear weapons or their components, under nuclear explosive conditions, and sub-critical testing using nuclear materials.

54. “Reprocessing” means the separation of irradiated nuclear material and fission products in whole or in part.

55. “Threat of Use of Nuclear Weapons” means any act, whether physical or verbal, including the maintenance of a previously stated policy that creates or is intended to create a perception that a nuclear weapon may or will be used.

56. “Uranium Enrichment” means the process of increasing the percentage of U-235 isotopes so that the uranium can be used as reactor fuel or in nuclear weapons.
57. “Use of Nuclear Weapons” means the detonation of a nuclear weapon.

G. Verification

58. “Verification” means a comprehensive system for ensuring the compliance with and implementation of this Convention. Verification measures include obtaining, providing, and assuring the accuracy of information on nuclear weapons, nuclear material, nuclear facilities, and nuclear weapons delivery vehicles, including information in archives, data bases, and transportation systems, through declarations, monitoring, agreements on sharing information, consultation and clarification, on-site inspections, confidence-building measures, reporting and protection, preventive controls, and any other measures deemed necessary by the Agency.
59. “Abuse of the Right of Verification” means obtaining information, or attempting to obtain information, through verification activities, for purposes not relating to the verification or implementation of and compliance with this Convention.
60. “Confidence-Building Measures” means voluntary measures by States Parties to supply information, additional to that required, to the Technical Secretariat or to other States Parties in order to develop greater confidence in compliance with the Convention. These could include bilateral or multilateral agreements on monitoring and information sharing between States Parties.
61. “Dual-access” means access to nuclear weapons, nuclear material, or nuclear facilities that requires authorization of a State Party and another State Party or the Agency.
62. “Reconstruction” means undertaking good faith scientifically sound efforts to produce or reproduce data that is not readily available regarding past production of nuclear material. Reconstruction measures include gathering and reviewing past data records, analyzing production capacity and estimating the range of quantity of nuclear material produced, and interviewing individuals with knowledge of the operation of a nuclear facility under review.
63. “Preventive Controls” mean provisions adopted by the Agency to ensure that nuclear material and nuclear facilities are not used for any military or other purpose prohibited under this Convention.
- a. The goals of preventive controls include:
 - i. Timely detection of diversion of nuclear material to allow a response before the material can be fabricated into a nuclear weapon;
 - ii. Deterring clandestine activities through the possibility of detection;
 - iii. Prevention of diversion through physical safety procedures and transfer of national access to dual-access.
 - b. Preventive controls encompass safeguards of the IAEA (including all provisions of the 93+2 Programme), EURATOM, ABACC or other bodies; agreements among States; and agreements between States and the Agency.

Dual-access agreements establish a “two-key” model of access, which may be worked out bilaterally or multilaterally among States, or between States and the Agency. No State Party would have exclusive national access to nuclear weapons, nuclear material or nuclear facilities it formally owned or possessed after Phase I. Eventually dual-access agreements would be between States and the Agency. Dual-access is distinct from national control with international monitoring, which would apply to early de-alerting measures.

Preventive controls may include the establishment of procedures for transport, treatment, storage and disposition of such materials, including the establishment of environmental guidelines on such activities.

See discussion of Preventive Controls in Section 4 of this book.

Technical means encompass national technical means (state systems of surveillance) and international technical means of the Agency.

c. Preventive controls apply to all nuclear weapons, nuclear material and nuclear facilities. The degree of restrictiveness, accountability and accessibility vary according to the risks posed by these weapons, materials or facilities to the purposes of this Convention. Preventive controls may include:

- i. Accountancy and surveillance of nuclear material in any form;
- ii. Containment of special nuclear material in any form;
- iii. Guidelines for the transport, treatment, handling, storage and disposition of nuclear material;
- iv. Environmental guidelines;
- v. Dual-access agreements for all nuclear weapons facilities and nuclear storage facilities for proscribed nuclear material.

64. “Technical Means” means the independent gathering or analysis of information which may have relevance to verification of the Convention, without physically accessing the territory being inspected.
65. “National Technical Means” (NTM) comprise nationally-owned and operated technologies and techniques used to monitor the activities of other states, including their compliance with treaty obligations. [NTM include satellites, aircraft, remote monitoring, signals intelligence (SIGINT) and open source information.]
66. “Open Skies” means a regime for the conduct of observation flights by States Parties over the territories of other States Parties.

I. Delivery Vehicles

67. “Nuclear Weapons Delivery Vehicle” means any vehicle designed for or capable of delivering a nuclear weapon. Any nuclear weapon delivery vehicle which has been constructed, developed, flight-tested or deployed for weapon delivery shall be considered a nuclear weapon delivery vehicle.
68. “Ballistic Missile” means a missile that
 - a. consists of single or multiple stage(s) whose sole means of propulsion is an internal rocket engine that is functional over all or a portion of the flight path;
 - b. follows a ballistic trajectory over the remaining unpowered portion of a flight path;and
 - c. is devoid of active aerodynamic surfaces.
69. “Air-to-Surface Ballistic Missile (ASBM)” means a ballistic missile that is installed in an aircraft or on its external mountings for the purpose of being launched from this aircraft.
70. “Ground-Launched Ballistic Missile (GLBM)” means a ground-launched ballistic missile that is a weapon-delivery vehicle.

71. “Intercontinental Ballistic Missile (ICBM)” means a land-based ballistic missile with a range in excess of 5,500 kilometers.
72. “Submarine [Sea] Launched Ballistic Missile (SLBM)” means a ballistic missile designed to be launched from a submarine or other naval vessel.
73. “Cruise Missile” means an unmanned, self-propelled weapon delivery vehicle that sustains flight through the use of aerodynamic lift over most of its flight path. Cruise Missiles include:
 - a. Air Launched Cruise Missile (ALCM);
 - b. Ground Launched Cruise Missile (GLCM);
 - c. Sea Launched Cruise Missile (SLCM).
74. “Intermediate-Range Missile” means a ballistic or cruise missile having a range capability “in excess” of 1,000 kilometers but not in excess of 5,500 kilometers;
75. “Shorter-Range Missile” means a ballistic or cruise missile having a range capability equal to or in excess of 500 kilometers but not in excess of 1,000 kilometers;
76. “Bomber” means an airplane which was initially constructed or later converted to be equipped for bombs or air-to-surface missiles.
77. “Heavy Bomber” means a bomber which satisfies either of the following criteria:
 - a. its range is greater than 8,000 kilometers; or
 - b. it is equipped for long-range nuclear ALCMs.
78. “Nuclear-Capable” in relation to delivery vehicles means able to deliver and activate a nuclear weapon.
79. “Nuclear-Capable Missile” means a missile able to deliver any payload over 300 kilometers.
80. “Nuclear-Capable Submarines” includes ballistic missile submarines, cruise missile submarines and attack submarines capable of delivery of nuclear weapons.

III. Declarations

A. Nuclear Weapons

Each State Party shall submit to the Registry, not later than [30] days after this Convention enters into force for it, the following declarations, in which it shall, in accordance with the standards and guidelines set forth in the Verification Annex:

1. Declare whether it owns or possesses or has owned or possessed any nuclear weapons, or whether there are any nuclear weapons located in any place under its jurisdiction or control;
2. Specify the precise location, aggregate quantity and detailed inventory of nuclear weapons it owns or possesses, or that are located in any place under its jurisdiction or control.
3. Report any nuclear weapons on its territory that are owned or possessed by another State or under the jurisdiction or control of another State, whether or not that State is a Party to this Convention.
4. Declare whether it has transferred or received, directly or indirectly, nuclear weapons and specify the transfer or receipt of such weapons.
5. Provide its general plan for destruction of nuclear weapons that it owns or possesses, or that are located in any place under its jurisdiction or control.

B. Nuclear Material

Each State Party shall submit to the Registry the following declarations, in which it shall, in accordance with the standards and guidelines set forth in the Verification Annex:

6. Not later than [60] days after this Convention enters into force for it, declare an inventory of all special nuclear material it owns or possesses or that is located within its jurisdiction or control, whether intended for civilian or military use.
7. Not later than [90] days after this Convention enters into force for it, declare an inventory of all other nuclear material it owns or possesses or that is located within its jurisdiction or control, whether intended for civilian or military use.
8. Not later than [120] days after this Convention enters into force for it, submit a report on the availability of data with respect to nuclear material produced in the past, including estimates regarding missing data and extent of uncertainty, and its plans for the reconstruction of such data.

C. Nuclear Facilities

Each State Party shall submit to the Registry, not later than [180] days after this Convention enters into force for it, the following declarations, in which it shall, in accordance with the standards and guidelines set forth in the Verification Annex:

9. With respect to nuclear weapons facilities:
 - a. Declare whether it has or has had any nuclear weapons facility under its ownership or possession, or that is or has been located in any place under its jurisdiction or control at any time.
 - b. Declare any nuclear weapons facility it has or has had under its ownership or possession or that is or has been located in any place

See Critical Question on Nuclear Energy in Section 3 of this book.

- under its jurisdiction or control at any time.
- c. Declare any nuclear weapons facility on its territory that another State has or has had under its ownership or possession and that is or has been located in any place under the jurisdiction or control of another State at any time.
 - d. Declare the precise location and production and storage capacities of any facility reported under subparagraphs a, b, or c above.
 - e. Declare whether it has transferred or received, directly or indirectly, any equipment for the production of nuclear weapons, and provide a detailed account thereof.
 - f. Specify actions to be taken for the closure of any facility reported under subparagraphs a, b, or c above.
 - g. Provide its general plan for conversion of any facility reported under subparagraphs a, b, or c into a nuclear weapons destruction facility.
10. With respect to other nuclear facilities, declare the precise location, nature and scope of activities of any nuclear facility under its ownership or possession, or located in any place under its jurisdiction or control. Such declaration shall include, inter alia, laboratories and test and evaluation sites as well as any other facility, site, or installation in which nuclear activities of any kind have been or are carried out, or which are suitable for carrying out such activities.

D. Delivery Vehicles

Each State Party shall submit to the Registry, not later than [210] days after this Convention enters into force for it, the following declarations, in which it shall, in accordance with the standards and guidelines set forth in the Verification Annex:

11. Declare the number and location of all nuclear-capable ballistic and cruise missiles, including all those in production, storage or under repair.
12. Declare the number and location of all nuclear-capable submarines, naval crafts, and aircraft, including all those in production, storage or under repair.

Declarations would be required for scientific research laboratories engaged in nuclear physics research and facilities with dual use potential.

IV. Phases for Implementation

A. General Requirements

1. Each phase indicates the deadline for completion of specific implementation activity. Any phase can begin at any time, and does not require the completion of previous phases before initiation.
2. Implementation activities shall be conducted in accordance with the Verification Annex.

B. Extension of Deadlines

3. If a State Party is unable to complete any of its obligations under Phase One within the deadline, it may submit a request to the Executive Council for an extension. Such a request must be made at least [four] months prior to the deadline, and no extension may exceed [six] months.
4. If a State Party is unable to complete any of its obligations under Phase Two within the deadline, it may submit a request to the Executive Council for an extension. Such a request must be made at least [six] months prior to the deadline, and no extension may exceed [one] year[s].
5. If a State Party is unable to complete any of its obligations under Phases Three, Four, or Five within the deadlines, it may submit a request to the Executive Council for an extension of the deadline. Such a request must be made at least [one] year[s] prior to the deadline for that phase, and no extension may exceed [one] year[s].

C. Reciprocity in Extensions

6. If any State Party makes a request for an extension of any deadline, any other State Party may request a similar extension within [one month] of the original State's request.

D. Phases

7. Phase One. Not later than [one year] after entry into force of this Convention:
 - a. All States Parties shall have complied with the requirements of Article III {Declarations}.
 - b. Targeting coordinates and navigational information for all nuclear weapons delivery vehicles shall be removed.
 - c. All nuclear weapons and nuclear weapons delivery vehicles shall be de-alerted and disabled.
 - d. Activities listed in Schedule 1 of the Annex on Nuclear Activities shall have ceased.
 - e. Production of nuclear weapon components and equipment listed in Schedules 1 and 2 of the Annex on Nuclear Weapons Components and Equipment shall have ceased.
 - f. All nuclear weapons testing facilities, nuclear weapons research facilities and nuclear weapons production facilities shall be designated for decommissioning and closure or for conversion.

See Section 1, "How to Achieve a Nuclear Weapons Convention" for a discussion of the phased approach.

"De-alerting include turning off power to missiles, decoupling warheads from missiles, immobilizing missile silo lids, and discontinuing launch-on-warning systems. Disabling includes removing trigger mechanisms, replacing missile cones with non-aerodynamic covers, removing SLBMs from submarines, removing warheads from delivery vehicles, and disabling launch mechanisms."

- g. Production of proscribed nuclear material shall have ceased, with the exception of exemption quantities.
- h. [Funding for] nuclear weapons research of any sort not consistent with the purposes and obligations of this Convention shall have ceased.
- i. Plans for the implementation of all obligations under this Convention shall have been submitted to the Agency.
8. Phase Two. Not later than [two] years after entry into force of this Convention:
- a. All nuclear weapons and nuclear weapons delivery vehicles shall be removed from deployment sites.
- b. All warheads shall be removed from their delivery vehicles and either placed into nuclear weapons storage facilities or dismantled.
- c. Agreements shall be negotiated to subject all nuclear weapons, nuclear material and nuclear facilities to preventive controls.
9. Phase Three. Not later than [five] years after entry into force of this Convention:
- a. All nuclear weapons shall be dismantled.
- b. All nuclear weapons shall be destroyed, except:
- i. no more than [1000] warheads in each of the stockpiles of Russia and the United States; and
- ii. no more than [100] warheads in each of the stockpiles of China, France, and the United Kingdom.
- c. All nuclear weapons delivery vehicles shall be destroyed or converted for purposes not prohibited under this Convention.
- d. All nuclear weapons facilities shall be designated for decommissioning and closure or for conversion.
10. Phase Four. Not later than [10] years after entry into force of this Convention:
- a. All nuclear weapons shall be destroyed, except:
- i. no more than [50] warheads in each of the stockpiles of Russia and the United States, and
- ii. no more than [10] warheads in each of the stockpiles of China, France, and the United Kingdom.
- b. All reactors using highly enriched uranium shall be closed or converted to low enriched uranium use.
- c. [All reactors using plutonium as fuel shall be closed or converted to reactors that do not use any special nuclear material.]
- d. All special nuclear material in any form shall be under strict, effective and exclusive preventive controls.
11. Phase Five. Not later than [15] years after entry into force of this Convention:
- a. All nuclear weapons shall be destroyed.
- b. [The powers and functions of the Agency shall be reviewed and adjusted to preserve its role in carrying out the objectives of this Convention.]

See Critical Question, Chapter 3, on Research

Phase Two would require deep cuts in the nuclear arsenals of the United States and Russia if these had not taken place by the time of entry into force of the NWC.

The phases are not equivalent to a time-bound framework. They do not indicate actual dates for completion of each obligation, but periods of time following Entry-into-force (EIF) of the convention. It may be important to add specific dates if there are some hold-out States preventing EIF but there is otherwise general support for implementation. The principal purpose for the phases is to indicate the order and coordination of key steps towards nuclear disarmament. The emphasis should not be primarily on speed of disarmament but on safety, security and irreversibility.

See Critical Question, Chapter 3, on Nuclear Energy

Determining a timeline for the final phase of moving to zero nuclear weapons could be the most problematic. A high level of confidence will be required to move from low numbers to zero unless political conditions have changed markedly to ensure that any threat of break out could be met by non-nuclear means. Some commentators have suggested that the timeline for the final phase be left open for agreement after other phases have been completed. The Model NWC however suggests a timeline be agreed, but that an extension could be requested if necessary.

Provision designed to deal with undeclared or unrecognized nuclear weapon state.

E. Special Provision

12. The Executive Council may make special provision for temporary retention of small and diminishing quantities of nuclear weapons or proscribed nuclear materials by Nuclear Capable States
13. States meeting the criteria of this Special Provision shall follow the requirements, guidelines and phases outlined in this Article. They shall not be expected to implement the provisions of this Convention in advance of other States Parties, nor shall they be exempted from the requirements of each phase.

V. Verification

A. Elements of the Verification Regime

In order to verify compliance with this Convention, a verification regime shall be established consisting of the following elements:

1. Agreements on sharing data and verification activities among States, UN organs and with existing agencies,
2. A Registry,
3. An International Monitoring System,
4. Reporting of information gathered by National Technical Means,
5. Open Skies,
6. Preventive controls,
7. Consultation and clarification,
8. On-site inspections, including challenge inspections,
9. Confidence-building measures, including additional voluntary measures,
10. Citizen and non-governmental reporting and protection,
11. Any other measures deemed necessary by the Agency.

B. Activities, Facilities, and Materials Subject to Verification

12. All obligations of States Parties and persons as defined, inter alia, in Article I {General Obligations}, Article III {Declarations} and Article IV, Section D {Phases} shall be subject to verification in accordance with the relevant provisions of this Convention and its Verification Annex.

C. Rights and Obligations With Respect to Verification

13. Verification activities shall be based on objective information, shall be limited to the subject matter of this Convention, and shall be carried out on the basis of full respect for the sovereignty of States Parties and in the least intrusive manner possible consistent with the effective and timely accomplishment of their objectives. Each State Party shall refrain from any abuse of the right of verification.
14. Each State Party undertakes in accordance with this Convention to cooperate through its National Authority established pursuant to Article VI {National Implementation Measures} of this Convention, with the Agency, with other States Parties and with other agencies as stipulated in this Convention and in separate agreements to facilitate the verification of compliance with this Convention by, inter alia:
 - a. Establishing the necessary facilities, or providing necessary modifications to existing facilities, to participate in these verification measures, and establishing the necessary communication;
 - b. Providing all relevant data obtained by technical means and by national systems that are part of the International Monitoring System as agreed among States;

See the discussion of verification in Section 4 of this book. A Verification Annex would have to be negotiated among States as an integral part of the NWC. Article V provides the general guidelines of the verification regime.

- c. Participating, as necessary, in a consultation and clarification process;
 - d. Permitting the conduct of on-site inspections;
 - e. Participating in confidence-building measures; and
 - f. To the extent possible, internationalizing elements of its National Technical Means and incorporating them into the International Monitoring System.
15. Each State Party shall have the right to take measures not contrary to the provisions of this Convention to prevent disclosure of confidential information and data not related to this Convention.
 16. Subject to paragraph 15, information obtained by the Agency through the verification regime established by this Convention shall be made available to all States Parties in accordance with the relevant provisions of this Convention.
 17. The provisions of this Convention shall not be interpreted as restricting the international exchange of data for scientific purposes not prohibited by this Convention.
 18. Each State Party undertakes to cooperate with the Agency and with other States Parties in the improvement of the verification regime and in the examination of additional monitoring technologies. Such measures shall, when agreed, be incorporated in amendments to this Convention or changes to the Annexes or, where appropriate, be reflected in the operational manuals of the Technical Secretariat.

D. Confidence-Building Measures

19. Each State Party undertakes to cooperate with the Agency and with other States Parties in implementing various measures additional to those explicitly required under this Convention in order to:
 - a. Develop greater confidence regarding compliance with the obligations under this Convention, and
 - b. Assist in the compilation of detailed information by the International Monitoring System.

E. Relation to Other Verification Arrangements

20. The Technical Secretariat may enter into cooperative verification arrangements in accordance with the provisions of Article XIV {Cooperation, Compliance and Dispute Settlement} para. 3 and the provisions of Article XVIII, Section A {Relation to Other International Agreements} para. 2.
21. Nothing in this Convention shall be interpreted as in any way limiting or detracting from the verification arrangements assumed by either State under the Treaties Between the United States of America and the Russian Federation on Reduction and Limitation of Strategic Offensive Arms and the Treaty Between the United States of America and the Russian Federation on the Elimination of Their Intermediate-Range and Shorter-Range Missiles {INF}.
22. Nothing in this Convention shall be interpreted as in any way limiting or detracting from the verification arrangements assumed by Argentina and Brazil under the Agreement on the Exclusively Peaceful Use of Nuclear Energy

Confidence-building measures are voluntary measures by States to supply information, additional to that already required, to the Agency or to other States in order to develop greater confidences in compliance with the NWC.

23. Nothing in this Convention shall be interpreted as in any way limiting or detracting from the verification arrangements, assumed by any State under the Comprehensive Nuclear Test Ban Treaty, or under safeguards agreements and additional protocol agreements with the International Atomic Energy Agency [or under the Fissile Materials Cut-Off Treaty].

F. Implementation

24. Prior to entry into force of this Convention, nothing shall preclude any signatory State from implementing, individually or in agreement with other States, the verification measures of this Convention which are applicable to them. Such measures may include public declarations as detailed in Article III {Declarations}, negotiations with other States for the purposes of verifying bilateral or multilateral reductions of nuclear weapons, and the verification of plans for the destruction of nuclear weapons, disposition of special nuclear material, and destruction or conversion of nuclear weapons facilities or nuclear weapons delivery vehicles.
25. Verification measures adopted pursuant to paragraph 23 may include the formation of a provisional authority for the purpose of overseeing verification activities, including assistance in the development of national implementation plans pursuant to Article VI {National Implementation Measures} of this Convention.

The requirements and tasks of verification would be defined by the obligations of the NWC. The verification tasks can be divided into the following three main stages:

1. Baseline information exchange and data gathering. Identify the current status of the nuclear-weapons complex with reasonable accuracy without proliferating sensitive information.
2. Disarmament: Monitor the agreed path of reducing nuclear arms and eliminating the nuclear-weapons complex within tolerable limits of uncertainty and sufficient confidence.
3. Preventing rearmament: During the transformation to and within a nuclear-weapon-free world, observe any objects and detect any activities that might indicate a nuclear-weapons capability.

Verification in all three stages would need to focus on monitoring a complex range of treaty-limited items and activities and their combination. What actually needs to be verified is the combination of required/prohibited objects and activities, according to the General Obligations of the MNWC. These include, for instance, dismantlement of nuclear weapons; disposition of nuclear material; conversion or destruction of certain nuclear facilities; monitoring the location and status of nuclear weapons, nuclear material, nuclear facilities, delivery systems, and command and control systems to insure that they are not used for research, development, testing, production, transport, deployment or use of nuclear weapons. Other activities would include storage, transfer and handling of nuclear weapons and fissile material.

The National implementation Measures include the establishment of national authorities to oversee implementation of the NWC. Domestic legal systems will have to be adapted to the obligations assumed by State Parties.

VI. National Implementation Measures

A. *Legislative Implementation*

1. Each State Party shall, in accordance with its constitutional processes, adopt the necessary legislative measures to implement its obligations under this Convention. In particular, it shall:
 - a. Extend its penal legislation to provide, in accordance with Article VII, Section A, for the trial, extradition and punishment of persons who commit crimes as defined in Article I, Section B.
 - b. Provide all necessary protection for persons who report violations of this Convention, in accordance with Article VII, Section C.
2. Each State Party shall cooperate with other States Parties in affording legal assistance toward fulfilling the obligations under paragraph 1.
3. Each State Party, in the implementation of its obligations under this Convention, shall assign the highest priority to ensuring the safety of people and to protecting the environment, and shall cooperate as appropriate with other States Parties in this regard.

B. *Relations Between the State Party and the Agency*

4. In order to fulfill its obligations under this Convention, each State Party shall designate or establish a National Authority to serve as the national focal point for effective liaison with the Agency and other States Parties. Each State Party shall notify the Agency of its National Authority at the time that this Convention enters into force for it. The responsibilities of the National Authority include:
 - a. The preparations and submission of declarations in the registry;
 - b. The enactment of new legislation or the revision of existing legislation to facilitate the enforcement of the Convention;
 - c. Preparations for receiving inspections, including, inter alia, approval of the list of inspectors, issuing of multiple entry visas for inspectors, providing aircraft clearances, and designating points of entry and exit.
5. Each State Party shall inform the Agency of the legislative and administrative measures taken to implement this Convention.
6. Each State Party undertakes to cooperate with the Agency in the exercise of all its functions and in particular to provide assistance to the Technical Secretariat. This includes cooperation in carrying out any investigation which the Agency may initiate, and to provide or support assistance with investigations of non-complying State Parties and with Parties exposed to danger as a result of violation of this Convention.
7. Each State Party shall disseminate information regarding the requirements of this Convention and shall ensure the inclusion of such information in the training of relevant personnel regarding obligations under this Convention.
8. Each State Party shall transmit relevant information gathered by its National Technical Means to the International Monitoring System.

C. Confidentiality

9. Each State Party shall treat as confidential and afford special handling to information and data that it receives in confidence from the Agency. Information subject to confidentiality shall include data used for purposes not prohibited under this Convention and state and military technology for dual use vehicles, components and computers.

D. Relation to implementation measures assumed or required under other arrangements

10. Nothing in this Convention shall be interpreted as in any way limiting or detracting from the National Implementation Measures assumed or required by States under the Comprehensive Test Ban Treaty, International Atomic Energy Agency Safeguards agreements, International Convention for the Suppression of Acts of Nuclear Terrorism, [Fissile Materials Cut-Off Treaty] and United Nations Security Council Resolution 1540.

VII. Rights and Obligations of Persons

A. Criminal Procedure

1. Any person accused of committing a crime under this Convention within the jurisdiction of a State Party of which such person is a citizen or resident shall be
 - a. tried according to the legal process of such State if found within such State, or
 - b. surrendered to the International Criminal Court if the crime alleged is within the jurisdiction of such Court and the State concerned is unable or unwilling to undertake adequate criminal procedures.
2. If found within another State Party, such person shall be
 - a. tried within such State, or
 - b. extradited to the State within the jurisdiction of which the crime is alleged to have been committed, or
 - c. surrendered to the International Criminal Court if the crime alleged is within the jurisdiction of such Court and the States concerned are unable or unwilling to undertake adequate criminal procedures.
3. Any person accused of a crime under this Convention shall be assumed to be innocent until proven guilty and have the right to a fair trial and humane treatment, as prescribed by the International Covenant on Civil and Political Rights and other conventions and agreements which have acquired the status of customary international law.

Certain prohibited acts under the NWC would be crimes for which there should be individual responsibility. This section outlines procedures for the trial of persons accused of crimes, including the rights of the accused. In addition, protection of individuals reporting crimes (societal verification) is considered a vital component of the model NWC (Section C).

B. Responsibility to Report Violations

4. Persons shall report any violations of this Convention to the Agency. This responsibility takes precedence over any obligation not to disclose information which may exist under national security laws or employment contracts.
5. [Information received by the Agency under the preceding paragraph shall be held in confidence until formal charges are lodged, except to the extent necessary for investigative purposes.]

C. Protection for Persons Providing Information

Intra-state protection

6. Any person reporting a suspected violation of this Convention, either by a person or a State, shall be guaranteed full civil and political rights including the right to liberty and security of person.
7. States Parties shall take all necessary steps to ensure that no person reporting a suspected violation of this Convention shall have any rights diminished or privileges withdrawn as a result.
8. Any individual who [in good faith] provides the Agency or a National Authority with information regarding a known or suspected violation of this Convention cannot be arrested, prosecuted or tried on account thereof.

See discussion of Societal Verification in Section 4 of this book

9. It shall be an unlawful employment practice for an employer to discriminate against any employee or applicant for employment because such person has opposed any practice as a suspected violation of this Convention, reported such violation to the Agency or a National Authority, or testified, assisted, or participated in any manner in an investigation or proceeding under this Convention.
10. Any person against whom a national decision is rendered on account of information furnished by such person to the Agency about a suspected violation of this Convention may appeal such decision to the Agency within [...] months of being notified of such decision. The decision of the Agency in the matter shall be final.

Inter-State Protection

11. Any person reporting a violation of this Convention to the Agency shall be afforded protection by the Agency and by all States Parties, including, in the case of natural persons, the right of asylum in all other States Parties if their safety or security is endangered in the State Party in which they permanently or temporarily reside.

Additional Provisions

12. [The Executive Council may decide to award monetary compensation to persons providing important information to the Agency concerning violations of this Convention.]
13. Any person who voluntarily admits to the Agency having committed a violation of this Convention, prior to the receipt by the Agency of information concerning such violation from another source, may be exempt from punishment. In deciding whether to grant such exemption, the Agency shall consider the gravity of the violation involved as well as whether its consequences have not yet occurred or can be reversed as a result of the admission made.

VIII. Agency

The model NWC proposes an implementing agency similar in structure to the Organization for the Prohibition of Chemical Weapons, although the provisions within the Technical Secretariat dealing with the Registry and the International Monitoring System do not have counterparts in the Chemical Weapons Convention.

The NWC Agency, unlike the IAEA, would not have the task of promoting nuclear energy. Its primary objectives include containment and surveillance of all materials, equipment, or facilities that could contribute to the development, production, or maintenance of nuclear weapons.

A. General Provisions

1. The States Parties to this Convention hereby establish the Agency for the Prohibition of Nuclear Weapons (hereinafter “the Agency”) to achieve the object and purpose of this Convention, to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among States Parties.
2. All States Parties to this Convention shall be members of the Agency. A State Party shall not be deprived of its membership in the Agency.
3. The seat of the Headquarters of the Agency shall be _____.
4. The organs of the Agency are the Conference of the States Parties, the Executive Council, and the Technical Secretariat. The Technical Secretariat shall oversee the Registry and the International Monitoring System.
5. The Agency shall conduct its verification activities provided for under this Convention in the least intrusive manner possible consistent with the timely and efficient accomplishment of their objectives. It shall request only the information and data necessary to fulfill its responsibilities under this Convention. It shall take every precaution to protect the confidentiality of information on civil and military activities and facilities coming to its knowledge in the implementation of this Convention.
6. In undertaking its verification activities the Agency shall consider measures to make use of advances in science and technology.
7. The costs of the Agency’s activities shall be paid by States Parties in accordance with Article XVI {Financing}. The budget of the Agency shall comprise two separate chapters, one relating to administrative and other costs, and one relating to verification costs.
8. A member of the Agency which is in arrears in the payments of its financial contribution to the Agency shall have no vote in the Agency if the amount of its arrears equals or exceeds the amount of the contribution due from it for the preceding two full years. The Conference of the States Parties may, nevertheless, permit such a member to vote if it is satisfied that the failure to pay is due to conditions beyond the control of the member.

B. The Conference of the States Parties

Composition, procedures and decision-making

9. The Conference of the States Parties (hereinafter “the Conference”) shall be composed of all members of this Agency. Each member shall have one representative in the Conference, who may be accompanied by alternates and advisors.
10. The first session of the conference shall be convened by the depositary not later than 30 days after the entry into force of this Convention.
11. The Conference shall meet in regular sessions which shall be held annually unless it decides otherwise.
12. Special sessions of the Conference shall be convened:
 - a. When decided by the Conference;

- b. When requested by the Executive Council;
- c. When requested by any member and supported by one third of the members;
- d. In accordance with paragraph 22 to undertake reviews of the operation of this Convention.

Except in the case of subparagraph (d) the special session shall be convened not later than 30 days after receipt of the request by the Director-General of the Technical Secretariat, unless specified otherwise in the request.

- 13. The Conference shall also be convened in the form of an Amendment Conference in accordance with Article XVII {Amendments}.
- 14. Sessions of the Conference shall take place at the seat of the Agency unless the Conference decides otherwise.
- 15. The Conference shall adopt its rules of procedure. At the beginning of each regular session, it shall elect its Chairperson and such other officers as may be required. They shall hold office until a new Chairperson and other officers are elected at the next regular session.
- 16. A majority of the members of the Agency shall constitute a quorum for the Conference.
- 17. Each member of the Agency shall have one vote in the Conference.
- 18. The Conference shall take decisions on questions of procedure by a simple majority of the members present and voting. Decisions on matters of substance should be taken as far as possible by consensus. If consensus is not attainable when an issue comes up for decision, the Chairperson shall defer any vote for 24 hours and during this period of deferment shall make every effort to facilitate achievement of consensus, and shall report to the Conference before the end of this period. If consensus is not possible at the end of 24 hours, the Conference shall take the decision by a two-thirds majority of members present and voting unless specified otherwise in this Convention. When the issue arises as to whether the question is one of substance or not, the question shall be treated as a matter of substance unless otherwise decided by the Conference by the majority required for decisions on matters of substance.

Powers and functions

- 19. The Conference shall be the principal organ of the Agency. It shall consider any questions, matters or issues within the scope of this Convention, including those relating to the powers and functions of the Executive Council and the Technical Secretariat. It may make recommendations and take decisions on any questions, matters or issues related to this Convention, raised by a State Party or brought to its attention by the Executive Council.
- 20. The Conference shall oversee the implementation of this Convention, and act in order to promote its object and purpose. The Conference shall review compliance with this Convention. It shall also oversee the activities of the Executive Council and the Technical Secretariat and may issue guidelines in accordance with this Convention to either of them in the exercise of their functions.
- 21. The Conference shall:
 - a. Consider and adopt at its regular sessions the report, program and budget of the Agency, submitted by the Executive Council, as well as consider other reports;

The Agency's primary objectives include containment and surveillance of all materials, equipment, or facilities that could contribute to the development, production, or maintenance of nuclear weapons. Sources of information include declarations and reports by States, systematic and challenge inspections, information from other agencies (including NGOs), publicly available resources means, and the international monitoring system.

- b. Decide on the scale of financial contributions to be paid by States Parties in accordance with paragraph 7;
 - c. Elect the members of the Executive Council;
 - d. Appoint the Director-General of the Technical Secretariat (hereinafter referred to as “the Director-General”);
 - e. Approve the rules of procedure of the Executive Council submitted by the latter;
 - f. Establish such subsidiary organs as it finds necessary for the exercise of its functions in accordance with this Convention;
 - g. Review scientific and technological developments that could affect the operation of this Convention and, in this context, direct the Director-General to establish a Scientific Advisory Board to enable him or her, in the performance of his or her functions, to render specialized advice in areas of science and technology relevant to this Convention, to the Conference, the Executive Council or States Parties. The Scientific Advisory Aboard shall be composed of independent experts appointed in accordance with terms of reference adopted by the Conference;
 - h. Take the necessary measures to ensure compliance with this Convention and to redress and remedy any situation which contravenes the provisions of this Convention, in accordance with Article XIV {Cooperation, Compliance and Dispute Settlement}.
22. The Conference shall, not later than one year after the expiration of the fifth and the tenth year after the entry into force of this Convention, and at such other times within that time period as may be decided upon, convene in special sessions to undertake reviews of the operation of this Convention. Such reviews shall take into account any relevant scientific and technological developments. At intervals of five years thereafter, unless otherwise decided upon, further sessions of the Conference shall be convened with the same objective.

C. The Executive Council

Composition, procedure and decision-making

23. The Executive Council shall consist of 44 members. Each State Party shall have the right, in accordance with the principle of rotation, to serve on the Executive Council. The members of the Executive Council shall be elected by the Conference for a term of four years. Each geographical region, as determined by Annex III, shall designate States Parties from that region for election. In order to ensure the effective functioning of this Convention, due regard being paid to equitable geographic distribution, to representation by nuclear weapons states and nuclear-capable states, and to the interests of all states to be free from the threat of nuclear devastation, the Executive Council shall be composed as follows:
- a. All Nuclear Weapons States Parties; and
 - b. Six States Parties from the Middle East and South Asia;
 - c. Seven States Parties from Latin America and the Caribbean;
 - d. Six States Parties from Eastern Europe;
 - e. Seven States Parties from Africa;

Considerations for membership in the Executive Council are nuclear status, geographic diversity, special interest or expertise in the aims of the Convention and specific concerns regarding nuclear weapons. This could include, for example, States in which nuclear weapons have been used or tested.

- f. Six States Parties from among North America and Western Europe;
 - g. Six States Parties from South East Asia, the Pacific and the Far East;
 - h. Up to two additional States Parties that have special interest or expertise in implementing the aims of this Convention to be elected if required.
24. For the first election of the Executive Council 22 members shall be elected for a term of two years, and 22 members for a term of four years.
 25. The Conference may, on its motion or upon the request of a majority of the members of the Executive Council, review the composition of the Executive Council taking into account developments related to the principles specified in paragraph 23.
 26. The Executive Council shall elaborate its rules of procedure and submit them to the Conference for approval.
 27. The Executive Council shall elect its Chairperson from among its members.
 28. The Executive Council shall meet for regular sessions. Between regular sessions it shall meet as often as may be required for the fulfillment of its powers and functions.
 29. Each member of the Executive Council shall have one vote. Unless otherwise specified in this Convention, the Executive Council shall take decisions on matters of substance by a two-thirds majority of all its members. When an issue arises as to whether the question is one of substance or not, that question shall be treated as a matter of substance unless otherwise decided by the Executive Council by the majority required for decisions on matters of substance.

Powers and Functions

30. The Executive Council shall be the executive organ of the Agency. It shall be responsible to the Conference. The Executive council shall carry out the powers and functions entrusted to it under this Convention, as well as those functions delegated to it by the Conference. In so doing, it shall act in conformity with the recommendations, decisions and guidelines of the Conference and assure their proper and continuous implementation.
31. The Executive Council shall promote the effective implementation of, and compliance with, this Convention. It shall supervise the activities of the Technical Secretariat, cooperate with the National Authority of each State Party and facilitate consultations and cooperation among States Parties at their request.
32. The Executive Council shall:
 - a. Consider and submit to the Conference the draft program and budget of the Agency;
 - b. Consider and submit to the Conference the draft report of the Agency on the implementation of this Convention, the report on the performance of its own activities and such special reports as it deems necessary or which the Conference may request;
 - c. Make arrangements for the sessions of the Conference including the preparation of the draft agenda.
33. The Executive Council may request the convening of a special session of the Conference.

34. The Executive Council shall:
 - a. Conclude agreements or arrangements with States and international organizations on behalf of the Agency, subject to prior approval by the Conference;
 - b. Approve agreements or arrangements relating to the implementation of verification activities, negotiated by the Technical Secretariat with States Parties.
35. The Executive Council shall consider any issue or matter within its competence affecting this Convention and its implementation, including concerns regarding compliance, and cases of non-compliance, and, as appropriate, inform States Parties and request compliance within a specified time.
36. If the Executive Council considers further action to be necessary, it shall take, *inter alia*, one or more of the following measures in accordance with Article XIV {Cooperation, Compliance and Dispute Settlement}:
 - a. Inform all States Parties of the issue or matter;
 - b. Bring the issue or matter to the attention of the Conference;
 - c. Make recommendations to the Conference regarding measures to redress the situation and to ensure compliance.
 - d. The Executive Council shall, in cases of particular gravity and urgency, bring the issue or matter, including relevant information and conclusions, directly to the attention of the United Nations General Assembly and the United Nations Security Council. It shall at the same time inform all States Parties of this step.

D. The Technical Secretariat

37. The Technical Secretariat shall assist the Conference and the Executive Council in the performance of their functions. The Technical Secretariat shall carry out the verification measures provided for in this Convention. It shall carry out the other functions entrusted to it under this Convention as well as those functions delegated to it by the Conference and the Executive Council.
38. With respect to the verification of and compliance with this Convention, the Technical Secretariat shall:
 - a. Maintain the Registry and other information databases in accordance with Section F below;
 - b. Maintain and coordinate the operation of the International Monitoring System;
 - c. Provide technical assistance in, and support for, the installation and operation of monitoring systems;
 - d. Assist the Executive Council in facilitating consultation and clarification among States Parties;
 - e. Receive requests for on-site inspections and process them, facilitate the Executive Council consideration of such requests, carry out the preparation for, and provide technical support during, the conduct of on-site inspections, and report to the Executive Council;
 - f. Negotiate agreements or arrangements relating to the implementation

The Technical Secretariat is responsible for verification, including the preparation and maintenance of technical manuals. The contents of these manuals are beyond the scope of this draft.

- of verification activities with States Parties, subject to approval by the Executive Council;
- g. Provide technical assistance and technical evaluation to States Parties in the implementation of the provisions of this Convention;
 - h. Assist the States Parties through their National Authorities on other issues of verification under this Convention.
39. The Technical Secretariat shall develop and maintain, subject to approval by the Executive Council, operational manuals to guide the operation of various components of the verification regime, in accordance with the Verification Annex. These manuals shall not constitute integral parts of this Convention or the Annexes, and may be changed by the Technical Secretariat subject to approval by the Executive Council. The Technical Secretariat shall promptly inform the States Parties of any changes in the operational manuals.
40. With respect to administrative matters the Technical Secretariat shall:
- a. Prepare and submit to the Executive Council the draft program and budget of the Agency;
 - b. Prepare and submit to the Executive Council the draft report of the Agency on the implementation of this Convention and such other reports as the Conference or the Executive Council may request;
 - c. Provide administrative and technical support to the Conference, the Executive Council and subsidiary organs;
 - d. Address and receive communications on behalf of the Agency to and from States Parties on matters pertaining to the implementation of this Convention;
 - e. Upon approval by the Executive Council and the Conference, submit the report of the Agency to the United Nations Secretary General.
41. All requests and notifications by States Parties to the Agency shall be transmitted through their National Authorities to the Director-General. Requests and notifications shall be in one of the official languages of the United Nations. In response the Director-General shall use the language of the transmitted request or notification.
42. The Technical Secretariat shall inform the Executive Council of any problem that has arisen with regard to the discharge of its functions, including doubts, ambiguities or uncertainties about compliance with this Convention that have come to its notice in the performance of its verification activities or through confidential or non-governmental sources and that it has been unable to resolve or clarify through its consultations with the State Party concerned.
43. The Technical Secretariat shall comprise a Director-General, who shall be its head and chief administrative officer, inspectors and such scientific, technical and other personnel as may be required.
44. The Inspectorate shall be a unit of the Technical Secretariat and shall act under the supervision of the Director-General.
45. The Director-General shall be appointed by the Conference upon the recommendation of the Executive Council for a term of four years, renewable for one further term, but not thereafter. The appointment of the Director-General shall be considered a matter of substance governed by paragraph 18.
46. The Director-General shall be responsible to the Conference and the Executive Council for the appointment of the staff and the organization and functioning of the Technical Secretariat. The paramount consideration in the employment

Additional provisions might provide for independent research done by institutions other than the current nuclear weapons research laboratories. A fund to support such research might be established.

of the staff and in the determination of the conditions of service shall be the necessity of securing the highest standards of efficiency, competence and integrity. Only citizens of States Parties shall serve as the Director-General, as inspectors or as other members of the professional and clerical staff. Due regard shall be paid to the importance of recruiting the staff on as wide a geographical basis as possible. Recruitment shall be guided by the principle that the staff shall be kept to a minimum necessary for the proper discharge of the responsibilities of the Technical Secretariat.

47. The Director-General shall be responsible for the organization and functioning of the Scientific Advisory Board referred to in paragraph 21.g The Director-General shall, in consultation with States Parties and non-governmental sources, appoint members of the Scientific Advisory Board, who shall serve in their individual capacity. The members of the Board shall be appointed on the basis of their expertise in the particular scientific fields relevant to the implementation of this Convention. The Director-General may also, as appropriate, in consultation with members of the Board, establish temporary working groups of scientific experts to provide recommendations on specific issues. In regard to the above, States Parties and non-governmental sources may submit lists of experts to the Director-General. The Scientific Advisory Board may be called upon to review nuclear or other research and determine whether it is of a nature prohibited under this Convention or of a nature that may contribute to verification of nuclear disarmament.
48. In the performance of their duties, the Director-General, the inspectors and the other members of the staff shall not seek or receive instructions from any Government or from any other source external to the Agency. They shall refrain from any action that might reflect on their positions as international officers responsible only to the Conference and the Executive Council.
49. Each State Party shall respect the exclusively international character of the responsibilities of the Director-General, the inspectors and the other members of the staff and not seek to influence them in the discharge of their responsibilities.

E. Privileges and Immunities

50. The Agency shall enjoy on the territory and in any other place under the jurisdiction or control of a State Party such legal capacity and such privileges and immunities as are appropriate for the exercise of its functions.
51. Delegates of States Parties, together with their alternates and advisers, representatives appointed to the Executive Council together with their alternates and advisers, the Director-General and the staff of the Agency shall enjoy such privileges and immunities as are necessary in the independent exercise of their functions in connection with the Agency.
52. The legal capacity, privileges, and immunities referred to in this Article shall be defined in agreements between the Agency and the States Parties as well as in an agreement between the Agency and the State in which the headquarters of the Agency is seated.
53. Notwithstanding paragraphs 50 and 51, the privileges and immunities enjoyed by the Director-General and the staff of the Technical Secretariat during the conduct of verification activities shall be those set forth in the Verification Annex.

F. Registry and Other Databases

54. The Technical Secretariat shall maintain a Registry of the following:
- a. All nuclear weapons;
 - b. All nuclear material;
 - c. All nuclear facilities;
 - d. All nuclear weapons delivery vehicles;
 - e. Any other facilities or materials as determined by the Technical Secretariat.
55. The Technical Secretariat shall obtain information from the following sources:
- a. Declarations by States in accordance with the provisions of Article III {Declarations};
 - b. Reports by States on progress in implementing their obligations under this Convention;
 - c. The International Monitoring System;
 - d. National Technical Means;
 - e. Systematic inspections;
 - f. Challenge inspections;
 - g. Other organizations with which the Agency has concluded agreements on sharing information in accordance with Article XVIII, Section A {Relation to Other International Agreements};
 - h. Other inter-governmental and non-governmental organizations that collect and submit such information;
 - i. Publicly available sources;
 - j. Any other sources which the Technical Secretariat deems appropriate.
56. The Technical Secretariat shall make available to the Registry information obtained from the above sources with the exception of information which may remain confidential because of legitimate national and international security concerns or trade secret concerns.
57. Information in the Registry shall be available to all States parties and to the public according to criteria established by separate agreements [among States].

G. International Monitoring System

58. The International Monitoring System shall comprise facilities and systems for monitoring by satellite, on-site sensors, remote sensors, radionuclide sampling, respective means of communication, aircraft and other systems developed as deemed necessary by the Agency.
59. The International Monitoring System shall be placed under the authority of the Technical Secretariat.
60. All monitoring facilities of the International Monitoring System shall be owned and operated by the States hosting or otherwise taking responsibility for them except for those systems or facilities which may be owned or operated by another agency or by the United Nations, or constructed or acquired by the Agency in accordance with paragraph 64.

The Registry would maintain a list of all nuclear warheads, delivery vehicles, facilities and material subject to verification.

The model NWC proposes the establishment of the International Monitoring System (IMS) similar to but more extensive than the International Monitoring System established by the Comprehensive Test Ban Treaty.

The main purpose of the IMS is to enable the Agency to gather information necessary for the verification of the Convention. The system would include monitoring and analysis equipment owned or controlled by the Agency. In addition, information generated by equipment owned or controlled by member States would be shared through agreements with the Agency.

Special arrangements may have to be made for facilities located on disputed territory or on the territory of indigenous nations.

61. The Technical Secretariat shall acquire equipment necessary for collating and analyzing data provided by the International Monitoring System.
62. Any State Party may, if it so decides and upon agreement with the Technical Secretariat, give a monitoring facility to the Agency.
63. The Technical Secretariat may, upon agreement of the Conference and in accordance with its funding guidelines, construct or otherwise acquire a monitoring system or facility if it determines that such a facility or system is necessary for verification of obligations of States under this Convention, and if no State is able or willing to provide such a system or facility or information from such a system or facility to the International Monitoring System.
64. Each State shall have the right to participate in the international exchange of data and to have access to all data made available to the Registry.
65. The Agency shall conclude agreements with other agencies or organizations using international monitoring systems relating to the sharing of information obtained through such systems relevant to the verification of this Convention in accordance with Article XVIII, Section A {Relation to Other International Agreements}.
66. Data obtained by the International Monitoring System not directly relevant to verification of this Convention shall be treated as confidential, except where such information is relevant to the verification of another international agreement [and there is an agreement on sharing such information between the Agency and the organization responsible for implementation of that agreement].
67. Data obtained from the International Monitoring System shall first be analyzed, processed and verified by the Technical Secretariat before being compiled as part of the Registry, in accordance with the provisions of paragraph 57.

IX. Nuclear Weapons

A. General Requirements

1. All nuclear weapons [with corresponding delivery vehicles] shall be taken off alert status, disabled, removed from deployment, declared, and destroyed in accordance with the guidelines and standards of Article III {Declarations}, Article IV {Phases for Implementation}, the Verification Annex, and the provisions set forth below:

B. Procedures for Destroying Nuclear Weapons

2. Each State Party shall take the following measures with respect to all nuclear weapons that it owns or possesses or that are under its jurisdiction or control:
 - a. All warheads shall be bar-coded, registered, and tagged for identification using secure visual tags.
 - b. All nuclear weapons shall be destroyed or moved to nuclear weapons storage facilities subject to international preventive controls. No exclusive national access to the repositories is allowed. Weapons may be removed from the nuclear weapons storage facilities only for the purposes of destruction.
 - c. All core elements from newly dismantled warheads shall be quenched or otherwise deformed and placed in storage under international preventive controls until final disposal of the proscribed nuclear material, in accordance with the guidelines and standards of Article X {Nuclear Material}.

C. Prevention of Production of Nuclear Weapons

3. All nuclear [weapons] facilities and deployment sites shall be subject to verification, including challenge inspections at any time and non-destructive detection of hidden warheads, to ensure compliance with obligations under this Convention not to develop, produce, or deploy nuclear weapons.

The procedures outlined to remove nuclear weapons from alert and deployment and to register, tag, declare and destroy such weapons need not necessarily follow in exact chronological order in exact circumstance. It may be possible in some cases, for example, to disable a warhead before removing it from its delivery vehicle. In other cases the procedure may be reversed. The manuals to be compiled by the Technical Secretariat will provide the precise details for each weapon system.

Although all nuclear material presents some proliferation-related risks, the emphasis in this article is on nuclear-weapons-usable material (special nuclear material). Efforts at reconstructing records of past production and transfers and accounting for current inventories of special nuclear material should begin as soon as possible. No distinction is made in this article between military and civilian material, as it is the material, not the source, which is of concern regarding possible diversion to nuclear weapons. In practice, however, there will be some differences in reconstructing and documenting the material from different sources. In general, civilian facilities have kept better records than military facilities since the former were subject to a greater degree of national and international monitoring and control, and safety in civilian facilities was often a higher priority than in military facilities.

Paragraph 6 would prohibit the use of MOX fuel and HEU in reactors as well as certain concepts of transmutation

X. Nuclear Material

A. Reconstruction and Documentation

1. All military and civilian nuclear material shall be documented and declared according to the guidelines and standards set forth in Article III {Declarations} and the Verification Annex.
2. Special Nuclear Material
 - a. Records of production and use of special nuclear material produced in the past shall be reconstructed to the extent possible through analysis of past records, measures of transparency including national legislation aimed at disclosure of information, interviews, and any other appropriate means.
 - b. All special nuclear material storage sites and related nuclear facilities usable for production of special nuclear material shall be subject to preventive controls, including inventory verification as set forth in the Verification Annex.

B. Control of Special Nuclear Material

3. Subject to Section C below, production and use of proscribed nuclear material is prohibited. Existing inventories of special nuclear material shall be subject to preventive controls and storage and disposal in accordance with the guidelines and standards set forth below and in separate verification agreements.
4. All treatment of nuclear material that improves its quality to the level of proscribed nuclear material or improves the accessibility of proscribed nuclear material is prohibited, including, *inter alia*, separation of plutonium from spent fuel, enrichment of uranium in U-235 beyond unavoidable civilian requirements or beyond 20%, or extraction of tritium from heavy water, with the exception of exemption quantities.
5. All existing stocks of special nuclear material shall be placed under preventive controls until a safe method of final disposal is found and approved by the Agency. All handling of proscribed nuclear material except for such handling as necessary for the purposes of this Convention shall be prohibited.
6. [Burning of special fissionable material is prohibited unless the net amount of fissionable material resulting from such burning is reduced.]
7. Facilities for the production, research and testing of special nuclear material may be converted to uses consistent with the purposes and obligations of this Convention. Conversion of such facilities may include research and development for methods of demilitarization and disposal of proscribed nuclear material, including immobilization and final disposition of plutonium.

C. Licensing Requirements

8. The Agency shall establish a licensing process for civilian use of proscribed nuclear material which is not prohibited.

D. Relation to other International Agreements

9. Nothing in this Section shall be interpreted as in any way limiting or detracting from the verification arrangements assumed by any State under safeguards agreements and additional protocol agreements with the International Atomic Energy Agency [or under the Fissile Materials Cut-Off Treaty]

Nuclear weapons production and research facilities may contain or consist of plants and equipment useful for the implementation of the Convention. For this reason, it may be more suitable to convert rather than close down some of these facilities. Under conversion, however, verification that nuclear weapons research and production have stopped could be difficult.

See Critical Questions, Chapter 3, on Research and Conversion.

XI. Nuclear Facilities

A. Nuclear Weapons Facilities

1. All nuclear weapons production facilities shall cease operations prohibited under this Convention and shall be closed or converted to purposes not prohibited under this Convention.
2. All nuclear weapons testing facilities shall cease operations and shall be permanently closed [or converted to purposes not prohibited under this Convention].
3. All nuclear weapons research facilities shall be closed or converted to research in accordance with paragraph 4.
4. Funding of research for the purposes of designing, modernizing, constructing, modifying or maintaining reliability of nuclear weapons is prohibited. Funding of research for the purpose of developing knowledge in the physics of nuclear explosions is prohibited. Funding of research in safety mechanisms for existing nuclear weapons is permitted only until all nuclear weapons are dismantled. Funding of research for the purposes of safe dismantling and destroying of nuclear weapons and for safe disposal of special nuclear material is permitted.
5. [All nuclear reprocessing facilities shall cease operations and shall be permanently closed.]
6. All nuclear facilities shall be subject to preventive controls.
7. All plans for the destruction or conversion of nuclear weapons [production, research and testing facilities and principal nuclear] facilities, submitted in accordance with Article IV {Phases for Implementation}, shall include provisions or recommendations for the placement of former employees of such facilities in positions of employment consistent with their experience and expertise and with the object and purpose of this Convention. Such positions and recommendations may include employment within a converted facility, employment for the destruction of a nuclear facility, employment for the destruction of nuclear weapons or disposition of special nuclear material, or employment within the Agency for the purposes of verification.

B. Command, Control, and Communications Facilities and Deployment Sites

8. Each State Party shall make the following changes to nuclear targeting commands and command systems in accordance with Article IV {Phases for Implementation}:
 - a. Rescind alert status on all nuclear weapons;
 - b. Remove targeting coordinates from all command and control systems; and
 - c. Remove navigational information for all nuclear armed missiles from the navigational systems.
9. Each State Party shall, in accordance with Article IV {Phases for Implementation} and the Verification Annex, destroy any facility, system or sub-system designed or used solely for the purpose of launching, targeting, directing or detonating a nuclear weapon or its delivery vehicle, or for aiding or assisting in any of these purposes.

10. Each State Party shall, in accordance with Article IV {Phases for Implementation} and the Verification Annex, and in order to prevent use for purposes prohibited under this Convention, destroy or convert any facility, system or sub-system which is used for the purpose of launching, targeting, directing or detonating a nuclear weapon or its delivery vehicle, or for aiding or assisting in any of these purposes, and which is also used for purposes not prohibited under this Convention.
11. Any facility, system or sub-system designed and used for detection of activities prohibited under this Convention is permitted.
12. All plans for the destruction or conversion of command, control, and communications facilities and deployment sites submitted in accordance with Article IV {Phases for Implementation} and the Verification Annex, shall include provisions or recommendations for the placement of former employees of such facilities in positions of employment consistent with their experience and expertise and with the object and purpose of this Convention. Such positions and recommendations may include employment within a converted facility, employment for the destruction of a nuclear facility, employment for the purpose of gathering information, including National Technical Means, and employment within the Agency for the purposes of inspection or other methods of verification.

C. Nuclear reactors, enrichment and reprocessing facilities, nuclear materials storage sites and other nuclear-fuel cycle locations outside of facilities.

13. All States shall declare the precise location, nature and scope of nuclear reactors, enrichment and reprocessing facilities, nuclear laboratories, nuclear materials storage sites and other nuclear-fuel cycle locations outside of facilities.
14. All plutonium reprocessing facilities shall cease operations and be permanently closed.
15. All States shall conclude safeguards agreements with the Agency [or International Atomic Energy Agency] to verify that nuclear facilities are operated consistent with obligations under this convention including obligations under Section X (Nuclear Material).

D. Activities at nuclear facilities

16. Activities undertaken at nuclear facilities that are listed in Schedule 1 of the Annex on Nuclear Activities shall be prohibited.
17. Activities undertaken at nuclear facilities that are listed in Schedule 2 of the Annex on Nuclear Activities are permitted unless otherwise determined by the Conference of States Parties in accordance with Articles XIV (Cooperation, Compliance and Dispute Settlement).
18. Activities undertaken at nuclear facilities that are listed in Schedule 3 of the Annex on Nuclear Activities are permitted.

Section C reflects a similar provision in the IAEA additional protocols and is designed to include all nuclear fuel-cycle locations that might be outside nuclear facilities. Some of this may be already covered by other sections of the Model NWC and thus not necessary.

The model NWC proposes the destruction of delivery vehicles designed solely for the purpose of delivering nuclear weapons. It does not prohibit dual-use delivery vehicles. However requiring dual-use delivery vehicles to be converted to non-nuclear capability would only provide limited confidence, as reconversion back to nuclear capability would not be difficult. For this reason, it is proposed there be an additional optional protocol on prohibiting certain dual-use delivery vehicles which are destabilizing irrespective of whether

XII. Nuclear Weapons Delivery Vehicles

1. All deployment, development, testing, production, or acquisition of delivery vehicles and launchers designed solely for the purpose of delivering nuclear weapons {Schedule 1} is prohibited.
2. All delivery vehicles and launchers designed solely for the purpose of delivering nuclear weapons shall be destroyed according to Article IV {Phases for Implementation} [and the Verification Annex].
3. All delivery vehicles capable of use for the delivery of nuclear weapons or non-nuclear weapons {Schedule 2} shall be destroyed according to Article IV {Phases for Implementation} or converted for purposes not prohibited under this Convention.

Schedule 1 - Nuclear Weapons Delivery Vehicles to Be Destroyed

Intercontinental Ballistic Missiles
Submarine Launched Ballistic Missiles
Heavy Bombers
Ballistic Missile Submarines
Ground Launched Cruise Missile

Schedule 2 - Delivery Vehicles to be Destroyed or Converted

Air-to-Surface Ballistic Missiles
Ground Launched Ballistic Missiles
Air Launched Cruise Missile
Sea Launched Cruise Missile
Nuclear-capable fighter bombers
Cruise Missile Submarines
Attack Submarines
Warships

[Schedule 3 - Transport Vehicles Not Designed for Nuclear Weapons to be Subject to Preventive Controls – *to be completed*]

XIII. Activities Not Prohibited Under This Convention

See Optional Protocol Concerning Energy Assistance.

1. Each State Party has the right, subject to the provisions of this Convention [and other agreements and regulations relating to nuclear material] to the research, development and use of nuclear energy for peaceful purposes.
2. Each State Party shall adopt the necessary measures to ensure that research, development and use of nuclear energy within its territory or under its control is undertaken only for purposes not prohibited under this Convention. To this end, and in order to verify that activities are in accordance with obligations under this Convention, each State Party shall subject nuclear facilities and nuclear material listed in the Annex on Nuclear Activities, Components and Equipment of this Convention, or any other activities so declared by the Agency, to control and verification measures as provided in Sections V (Verification), VI (National Implementation Measures), VIII (Agency), X (Nuclear Material), XI (Nuclear Facilities) [and the Verification Annex.]
3. Each State Party has the right to the research, development, production, acquisition and deployment of weapons-delivery systems for security purposes. This right is subject to the provisions of this Convention, other agreements and regulations relating to weapons and weapons systems, the United Nations Charter and other international law relating to the threat or use of force.
4. In the exercise of military activities not prohibited under this Convention,] each State Party shall adopt the necessary measures to ensure that [weapons and] weapons delivery systems are only developed, produced, otherwise acquired, retained, transferred, tested or deployed in a manner consistent with this Convention. To this end, and in order to verify that activities are in accordance with obligations under this Convention, each State Party shall subject weapons delivery systems including command, control, communication and production facilities to control and verification measures as provided in Section XII (Nuclear Weapons Delivery Vehicles) [and the Verification Annex].

XIV. Cooperation, Compliance and Dispute Settlement

A. Consultation, Cooperation, and Fact-finding

1. States Parties shall consult and cooperate, directly among themselves, or through the Agency or other appropriate international procedures, including procedures within the framework of the United Nations and in accordance with its Charter, on any matter which may be raised relating to the object and purpose, or the implementation of the provisions, of this Convention.
2. Each State Party undertakes to cooperate with the Agency and with other States Parties in the improvement of the verification, destruction and conversion regimes, with a view to developing specific measures to enhance the efficient, safe and cost-effective verification, destruction and conversion procedures and methods of this Convention.
3. Without prejudice to the right of any State Party to request a challenge inspection, States Parties should, whenever possible, first make every effort to clarify and resolve, through exchange of information and consultations among themselves, any matter which may cause doubt about compliance with this Convention, or which gives rise to concerns about a related matter which may be considered ambiguous. A State Party which receives a request from another State Party for clarification of any matter which the requesting State Party believes causes such a doubt or concern shall provide the requesting State Party as soon as possible, but in any case not later than [48] hours after the receipt of a request to clarify a possible threat of use of nuclear weapons or [10] days after the receipt of a request to clarify any other matter, with information sufficient to answer the doubt or concern raised along with an explanation of how the information provided resolves the matter. Nothing in this Convention shall affect the right of any two or more States Parties to arrange by mutual consent for inspections or any other procedures among themselves to clarify and resolve any matter which may cause doubt about compliance or gives rise to a concern about a related matter which may be considered ambiguous. Such arrangements shall not affect the rights and obligations of any State Party under other provisions of this Convention.

Cooperation, compliance and dispute settlement: The NWC includes provisions for consultation and fact-finding to clarify and resolve questions of interpretation with respect to compliance and other matters. These procedures would be time-crucial to essential evidence is not lost. Compliance and enforcement provisions are linked to transparency and confidence building measures among State Parties.

Procedure for requesting clarification

4. A State Party shall have the right to request the Executive Council to assist in clarifying any situation which may be considered ambiguous or which gives rise to a concern about the possible non-compliance of another State Party with this Convention. The Executive Council shall provide appropriate information in its possession relevant to such a concern.
5. A State Party shall have the right to request the Executive Council to obtain clarification from another State Party on any situation which may be considered ambiguous or which gives rise to a concern about its possible non-compliance with this Convention. In such a case, the following shall apply:
 - a. The Executive Council shall forward the request for clarification to the State Party concerned through the Director-General not later than [24] hours after its receipt;
 - b. The requested State Party shall provide the clarification to the Executive Council as soon as possible, but in any case not later than [48] hours after the receipt of a request to clarify possible threat or use

- of nuclear weapons or [10] days after the receipt of a request to clarify any other matter;
- c. The Executive Council shall take note of the clarification and forward it to the requesting State Party not later than [24] hours after its receipt;
 - d. If the requesting State Party deems the clarification to be inadequate, it shall have the right to request the Executive Council to obtain from the requested State Party further clarification
 - e. For the purpose of obtaining further clarification requested under subparagraph d, the Executive Council may call on the Director-General to establish a group of experts from the Technical Secretariat, or if appropriate staff are not available in the Technical Secretariat, from elsewhere, to examine all available information and data relevant to the situation causing the concern. The group of experts shall submit a factual report to the Executive Council on its findings;
 - f. If the requesting State Party considers the clarification obtained under subparagraphs d and e to be unsatisfactory, it shall have the right to request a special session of the Executive Council in which States Parties involved that are not members of the Executive Council shall be entitled to take part. In such a special session, the Executive Council shall consider the matter and may recommend any measure it deems appropriate to resolve the situation.
6. A State Party shall also have the right to request the Executive Council to clarify any situation which has been considered ambiguous or has given rise to a concern about its possible non-compliance with this Convention. The Executive Council shall respond by providing such assistance as appropriate.
 7. The Executive Council shall inform the States Parties about any request for clarification provided in this Article.
 8. If the doubt or concern of a State Party about a possible non-compliance has not been resolved within [60] days after the submission of the request for clarification to the Executive Council, or it believes its doubts warrant urgent consideration, notwithstanding its right to request a challenge inspection, it may request a special session of the Conference in accordance with Article VIII {Agency}. At such a special session, the Conference shall consider the matter and may recommend any measure it deems appropriate to resolve the situation.

Procedures for challenge inspections

9. Each State Party has the right to request an on-site challenge inspection of any facility or location in the territory or in any other place under the jurisdiction or control of any other State Party for the sole purpose of clarifying and resolving any questions concerning possible non-compliance with the provisions of this Convention, and to have this inspection conducted anywhere without delay by an inspection team designated by the Director-General and in accordance with the Verification Annex.
10. Each State Party is under the obligation to keep the inspection request within the scope of this Convention and to provide in the inspection request all appropriate information on the basis of which a concern has arisen regarding possible non-compliance with this Convention as specified in the Verification Annex. Each State Party shall refrain from unfounded inspection requests, care being taken to avoid abuse. The challenge inspection shall be carried out for the sole purpose of determining facts relating to the possible non-compliance.

On-site inspections and techniques would include both systematic, baseline inspections and challenge inspections (anytime-anyplace) of declared and undeclared facilities, utilizing a range of techniques, including visual inspection, record checks and non-destructive measurements (e.g., with portable x-ray and gamma-ray detectors) and could be assisted by identification techniques, such as tagging, tamper-indicating seals in nuclear power plants and “fingerprinting” of delivery systems. Perimeter portal monitoring systems would track the flow of items and materials relevant for nuclear weapons.

11. For the purpose of verifying compliance with the provisions of this Convention, each State Party shall permit the Technical Secretariat to conduct the on-site challenge inspection pursuant to paragraph 9.
12. Pursuant to a request for a challenge inspection of a facility or location, and in accordance with the procedures provided for in the Verification Annex, the inspected State Party shall have:
 - a. The right and the obligation to make every reasonable effort to demonstrate its compliance with this Convention and, to this end, to enable the inspection team to fulfill its mandate;
 - b. The obligation to provide access within the requested site for the sole purpose of establishing facts relevant to the concern regarding possible non-compliance; and
 - c. The right to take measures to protect sensitive installations, and to prevent disclosure of confidential information and data, not related to this Convention.
13. With regard to an observer, the following shall apply:
 - a. The requesting State Party may, subject to the agreement of the inspected State Party, send a representative who may be a national either of the requesting State Party or of a third State Party, to observe the conduct of the challenge inspection.
 - b. The inspected State Party shall then grant access to the observer in accordance with the Verification Annex.
 - c. The inspected State Party shall, as a rule, accept the proposed observer, but if the inspected State Party exercises a refusal, that fact shall be recorded in the final report.
14. The requesting State Party shall present an inspection request for an on-site challenge inspection to the Executive Council and at the same time to the Director-General for immediate processing.
15. The Director-General shall immediately ascertain that the inspection request meets the requirements specified the Verification Annex, and, if necessary, assist the requesting State Party in filing the inspection request accordingly. When the inspection request fulfills the requirements, preparations for the challenge inspection shall begin.
16. The Director-General shall transmit the inspection request to the inspected State Party not less than 12 hours before the planned arrival of the inspection team at the point of entry.
17. After having received the inspection request, the Executive Council shall take cognizance of the Director-General's actions on the request and shall keep the case under its consideration throughout the inspection procedure. However, its deliberations shall not delay the inspection process.
18. The Executive Council may, not later than 12 hours after having received the inspection request, decide by a three-quarter majority of all its members against carrying out the challenge inspection, if it considers the inspection request to be frivolous, abusive or clearly beyond the scope of this Convention as described in paragraph 9. Neither the requesting nor the inspected State Party shall participate in such a decision. If the Executive Council decides against the challenge inspection, preparations shall be stopped, no further action on the inspection request shall be taken, and the States Parties concerned shall be informed accordingly.

19. The Director-General shall issue an inspection mandate for the conduct of the challenge inspection. The inspection mandate shall be the inspection request referred to in paragraphs 9 and 10 put into operational terms, and shall conform with the inspection request.
20. The challenge inspection shall be conducted in accordance with the provisions of the Verification Annex. The inspection team shall be guided by the principle of conducting the challenge inspection in the least intrusive manner possible, consistent with the effective and timely accomplishment of its mission.
21. The inspected State Party shall assist the inspection team throughout the challenge inspection and facilitate its task. If the inspected State Party proposes, pursuant to the Verification Annex, arrangements to demonstrate compliance with this Convention, alternative to full and comprehensive access, it shall make every reasonable effort, through consultations with the inspection team, to reach agreement on the modalities for establishing the facts with the aim of demonstrating its compliance.
22. The final report shall contain the factual findings as well as an assessment by the inspection team of the degree and nature of access and cooperation granted for the satisfactory implementation of the challenge inspection. The Director-General shall promptly transmit the final report of the inspection team to the requesting State Party, to the inspected State Party, to the Executive Council and to all other States Parties. The Director-General shall further transmit promptly to the Executive Council the assessments of the requesting and of the inspected States Parties, as well as the views of other States Parties which may be conveyed to the Director-General for that purpose, and then provide them to all States Parties.
23. The Executive Council shall, in accordance with its powers and functions, review the final report of the inspection team as soon as it is presented, and address any concerns as to:
 - a. Whether any non-compliance has occurred;
 - b. Whether the request had been within the scope of this Convention; and
 - c. Whether the right to request a challenge inspection had been abused.
24. If the Executive Council reaches the conclusion, in keeping with its powers and functions, that further action may be necessary with regard to paragraph 23, it shall take the appropriate measures to redress the situation and to ensure compliance with this Convention, including specific recommendations to the Conference. In the case of abuse, the Executive Council shall examine whether the requesting State Party should bear any of the financial implications of the challenge inspection.
25. The requesting State Party and the inspected State Party shall have the right to participate in the review process. The Executive Council shall inform the States Parties and the next session of the Conference of the outcome of the process.
26. If the Executive Council has made specific recommendations to the Conference, the Conference shall consider action in accordance with Section B.

B. Measures to Redress a Situation and to Ensure Compliance, Including Sanctions

27. The Conference, taking into account the recommendations of the Executive Council, shall take necessary measures, as set forth in paragraphs 28, 29 and 30 to ensure compliance with this Convention and to redress and remedy any situation which contravenes the provisions of this Convention.
28. In cases where a State Party has been requested by the Conference or the Executive Council to redress a situation raising problems with regard to its compliance and fails to fulfill the request within the specified time, the Conference may, *inter alia*, decide to restrict or suspend the State Party from the exercise of its rights and privileges under this Convention until the Conference decides otherwise.
29. In cases where damage to the object and purpose of this Convention may result from non-compliance with the basic obligations of this Convention, the Conference may recommend to States Parties collective measures which are in conformity with international law. Such measures may include restrictions or suspensions of all assistance in nuclear activities outlined in Schedule 2 of the Annex on Nuclear Activities, Components and Equipment. If the State concerned continues in its failure to comply with the request, further sanctions may be imposed.
30. The Conference, or alternatively, if the case is urgent, the Executive Council, may bring the issue, including relevant information, conclusions and recommendations, to the attention of the United Nations General Assembly and the United Nations Security Council.
31. The threat or use of nuclear weapons shall be deemed to be a threat to the peace subject to the provisions of the United Nations Charter.

C. Settlement of Disputes

32. Disputes that may arise concerning the application, implementation or interpretation of this Convention shall be settled in accordance with the relevant provisions of this Convention, including Section B and in conformity with the provisions of the Charter of the United Nations.
33. When a disputes arises between two or more States Parties, or between one or more States Parties and the Agency, relating to the application, implementation or interpretation of this Convention, the parties concerned shall consult together with a view to the expeditious settlement of the dispute by negotiation, mediation, arbitration or by other peaceful means of the parties' choice, including recourse to appropriate organs of this Convention and, by mutual consent, referral to the International Court of Justice in conformity with the Statute of the Court.
34. If other peaceful means of settlement are not found, a State Party in dispute with one or more States Parties may refer the dispute to the International Court of Justice, in conformity with the Statute of the Court [and the Optional Protocol Concerning the Compulsory Settlement of Disputes]. The States Parties involved shall keep the Executive Council informed of actions being taken.
35. The Executive Council may contribute to the settlement of a dispute by whatever means it deems appropriate, including offering its good offices, calling upon the States Parties to a dispute to start the settlement process of their choice and recommending a time-limit for any agreed procedure.

See Critical Questions in Chapter 3 on Enforcement and Security.

36. The Conference shall consider questions related to disputes raised by States Parties or brought to its attention by the Executive Council. The Conference shall, as it finds necessary, establish or entrust organs with tasks related to the settlement of these disputes in conformity with Article VIII {Agency}.
37. The Conference and the Executive Council may recommend to the General Assembly of the United Nations, to request the International Court of Justice to give an advisory opinion on any legal question arising within the scope of the activities of the Agency. An agreement between the Agency and the United Nations shall be concluded for this purpose in accordance with Article VIII {Agency}.
38. This Section is without prejudice to Sections A and B.

XV. Entry Into Force

A. Conditions of Entry Into Force

1. This Convention shall enter into force [180] days after the date on which the following conditions are met:
 - a. [All] Nuclear Weapons States have deposited their instruments of ratification; and
 - b. All Nuclear Capable States have deposited their instruments of ratification; and
 - c. At least [65] States in total have deposited instruments of ratification [including all States listed in Annex IV: List of Countries with Nuclear Power Reactors] [or] [including at least [40] States from Annex V: List of Countries with Nuclear Power Reactors or Nuclear Research Reactors].
2. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Convention, it shall enter into force on the 30th day following the date of deposit of their instrument of ratification or accession.

Two-tier entry into force allows early entry into force for individual

B. State Waiver of Entry into Force Requirements

For States who waive the entry into force requirements, this Convention shall enter into force on the 30th day following the date of deposit of their instrument of ratification or accession.

Entry into force is one of the most politically difficult provisions, as was evidenced in the CTBT negotiations. It is unlikely that any of the Nuclear Weapon States will assent to the Convention unless all Nuclear Weapon States and nuclear capable States assent. On the other hand, if by the time of signing, most Nuclear Weapon States have decided that possession of nuclear weapons has no more strategic value, as they did in the case of chemical weapons, they may agree to a less restrictive entry-into-force requirement in order to advance the timetable for the elimination of nuclear weapons.

Drafters have opted for a somewhat restrictive entry-into-force requirement, including all Nuclear Weapon States, all nuclear capable States and a minimum number of other States, focusing primarily on those with nuclear reactors. This recognizes that all other States that could possibly develop a nuclear capability are already obligated not to develop or acquire nuclear weapons under the NPT, and are already bound by IAEA safeguards, making their early accession to this Convention less urgent.

XVI. Financing

1. The costs of the Agency's activities shall be paid by States Parties in accordance with the United Nations scale of assessment adjusted to take into account differences in membership between the United Nations and this Agency. The budget of the Agency shall comprise two separate chapters, one relating to administrative and other costs, and one relating to verification and compliance costs.
2. Each Nuclear Weapons State shall meet the costs of destruction of weapons, proscribed nuclear material and nuclear facilities under its authority. Each Nuclear Weapons State shall meet the costs of verification of nuclear facilities under its authority, except for instances of challenge inspections which are funded according to the provisions of the Verification Annex.
3. The Agency shall establish a voluntary fund to assist States Parties to comply with paragraph 2 where such compliance imposes undue financial burdens on them.

XVII. Amendments

1. Any State Party may propose amendments to this Convention. Any State Party may also propose changes, as specified in paragraph 4, to the Annexes of this Convention. Proposals for amendments shall be subject to the procedures in paragraphs 2 and 3. Proposals for changes, as specified in paragraph 4, shall be subject to the procedures in paragraph 5.
2. The text of a proposed amendment shall be submitted to the Director-General for circulation to all States Parties and to the Depositary. The proposed amendment shall be considered only by an Amendment Conference. Such an Amendment Conference shall be convened if one third or more of the States Parties notify the Director-General [not later than [60 days] after its circulation] that they support further consideration of the proposal. The Amendment Conference shall be held immediately following a regular session of the Conference unless the requesting States Parties ask for an earlier meeting. In no case shall an Amendment Conference be held less than 60 days after the circulation of the proposed amendment.
3. Amendments shall enter into force for all States Parties 20 days after deposit of the instruments of ratification or acceptance by all the States Parties referred to under subparagraph b below:
 - a. When adopted by the Amendment Conference by a positive vote of a majority of all States Parties [with no State Party casting a negative vote]; and
 - b. Ratified or accepted by all those States Parties casting a positive vote at the Amendment Conference.
4. In order to ensure the viability and the effectiveness of this Convention, provisions in the Annexes shall be subject to changes in accordance with paragraph 5, if proposed changes are related only to matters of an administrative or technical nature.
5. Proposed changes referred to in paragraph 4 shall be made in accordance with the following procedures:
 - a. The text of the proposed changes shall be transmitted together with the necessary information to the Director-General. Additional information for the evaluation of the proposal may be provided by any State Party and the Director-General. The Director-General shall promptly communicate any such proposals and information to all States Parties, the Executive Council and the Depositary;
 - b. Not later than 60 days after its receipt, the Director-General shall evaluate the proposal to determine all its possible consequences for the provisions of this Convention and its implementation and shall communicate any such information to all States Parties and the Executive Council;
 - c. The Executive Council shall examine the proposal in the light of all information available to it, including whether the proposal fulfills the requirements of paragraph 4. Not later than 90 days after its receipt, the Executive Council shall notify its recommendation, with appropriate explanations, to all States Parties for consideration. States Parties shall acknowledge receipt within 10 days.
 - d. If the Executive Council recommends to all States Parties that the proposal be adopted, it shall be considered approved if no State Party

objects to it within 90 days after receipt of the recommendation. If the Executive Council recommends that the proposal be rejected, it shall be considered rejected if no State Party objects to the rejection within 90 days after receipt of the recommendation;

- e. If a recommendation of the Executive Council does not meet with the acceptance required under subparagraph d, a decision on the proposal, including whether it fulfills the requirements of paragraph 4, shall be taken as a matter of substance by the Conference at its next session;
- f. The Director-General shall notify all States Parties and the Depositary of any decision under this paragraph;
- g. Changes approved under this procedure shall enter into force for all States Parties 180 days after the date of notification by the Director-General of their approval unless another time period is recommended by the Executive Council or decided by the Conference.

XVIII. Scope and Application of Convention

A. Relation to other International Agreements

1. Nothing in this Convention shall be interpreted as in any way limiting or detracting from the obligations assumed by any State under the United Nations Charter; the Treaty on the Non-Proliferation of Nuclear Weapons; the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water; the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean; the Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil Thereof; the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies; the South Pacific Nuclear Free Zone Treaty; the African Nuclear Free Zone Treaty; the Southeast Asia Nuclear Weapon Free Zone Treaty; the Central Asia Nuclear Weapon Free Zone Treaty; any other treaties establishing nuclear weapon free zones; the Comprehensive Nuclear Test Ban Treaty; the Treaty Between the U.S.A. and the U.S.S.R. on the Elimination of Their Intermediate-Range and Short-Range Missiles; the Treaty Between the U.S.A. and the U.S.S.R. on the Reduction and Limitation of Strategic Offensive Arms; the Treaty Between the U.S.A. and Russia on Further Reduction and Limitation of Strategic Offensive Arms; the Treaty between Russia and the United States on Strategic Offensive Reductions, the International Convention for the Suppression of Acts of Nuclear Terrorism, or under agreements with the International Atomic Energy Agency.
2. Pursuant to Article VIII {Agency}, the Agency may enter into agreements with the implementing organizations of other international agreements for the purpose of sharing information necessary or applicable to the verification tasks of each organization involved, or for any other purposes that would further the objectives of the international agreements concerned.

B. Status of the Annexes

3. The Annexes form an integral part of this Convention. Any reference to this Convention includes the Annexes.

C. Duration and Withdrawal

4. This Convention shall be of unlimited duration.
5. Withdrawal from this Convention shall not be permitted [upon ratification by all Nuclear Weapons States].

D. Reservations

6. The Articles of this Convention shall not be subject to reservations. The Annexes of this Convention shall not be subject to reservations incompatible with its object and purpose.

The model NWC provides for no withdrawal, reflecting the view that the prohibition of nuclear weapons, and the obligation to eliminate them, have entered the realm of customary international law from which there should be no exception.

XIX. Conclusion of Convention

A. Signature

1. This Convention shall be open for signature for all States before its entry into force.

B. Ratification

2. This Convention shall be subject to ratification by States Signatories according to their respective constitutional processes.

C. Accession

3. Any State which does not sign this Convention before its entry into force may accede to it at any time thereafter.

D. Depository

4. The Secretary-General of the United Nations is hereby designated as the Depository of this Convention and shall, inter alia:
 - a. Promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession and the date of the entry into force of this Convention, and of the receipt of other notices;
 - b. Transmit duly certified copies of this Convention to the Governments of all signatory and acceding States; and
 - c. Register this Convention pursuant to Article 102 of the Charter of the United Nations.

E. Authentic Texts

5. This Convention, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

Optional Protocol Concerning the Compulsory Settlement of Disputes

The States Parties to this Protocol, expressing their wish to resort to the compulsory jurisdiction of the International Court of Justice, unless some other form of settlement is provided for in the Convention or has been agreed upon by the Parties within a reasonable period, have agreed as follows:

Disputes arising out of the interpretation or application of this Convention shall lie within the compulsory jurisdiction of the International Court of Justice, and may accordingly be brought before the Court by an application by any party to the dispute being a Party to this Protocol.

Optional Protocol Concerning Energy Assistance

The States Parties to this Protocol:

Desiring to prevent any threat to the aims and objectives of this Convention from arising due to the proliferation of nuclear technology which could aid or assist in the development of nuclear weapons,

Desiring further to prevent any threat to health and the environment arising from the excessive creation of radionuclides in nuclear reactors,

Affirming the right to the development of sustainable and environmentally safe energy sources,

Have agreed as follows:

1. Not to manufacture, assemble, transfer or otherwise acquire nuclear power reactors.
2. Not to use any existing power reactor, nor the products from the use of any nuclear power reactor.
3. To close any existing nuclear power reactors within [five] years of signing this protocol.
4. To assist other Parties to this protocol in the development and use of non-nuclear, sustainable energy sources.
5. To create a voluntary fund for the purposes of implementing paragraph 4.

See Critical Questions in Chapter 3 on Nuclear Energy.

Annex I: Nuclear Activities

A. Guidelines for Schedules of Nuclear Activities

Guidelines for Schedule 1

1. The following criteria shall be taken into account in considering whether a nuclear activity shall be included in Schedule 1:
 - a) It is an activity specifically prohibited under Article I of this Convention
 - b) It is an activity the purpose of which is to aid or assist in any activity specifically prohibited under Article I of this Convention.
 - c) It is an activity which poses a grave risk to the object and purpose of this Convention by virtue of its high potential for aiding and assisting activities specifically prohibited by this Convention.
 - d) It has little or no use for purposes not prohibited under this Convention, or alternatively its use for purposes not prohibited under this Convention can be safely substituted by another activity.
2. Schedule 1 activities are prohibited.

Guidelines for Schedule 2

3. The following criteria shall be taken into account in considering whether a nuclear activity shall be included in Schedule 2:
 - a) It is an activity not specifically prohibited under Article I of this Convention
 - b) It is an activity the purpose of which is not to aid or assist in any activity specifically prohibited under Article I of this Convention.
 - c) It is an activity which poses some risk to the object and purpose of this Convention by virtue of its potential to aid and assist activities specifically prohibited by this Convention.
4. Schedule 2 activities are permitted unless otherwise determined by the Conference in accordance with Articles [Agency, Technical Secretariat] and [compliance].

Guidelines for Schedule 3

5. The following criteria shall be taken into account in considering whether a nuclear activity shall be included in Schedule 3:
 - a) It is an activity not specifically prohibited under Article I of this Convention
 - b) It is an activity the purpose of which is not to aid or assist in any activity specifically prohibited under Article I of this Convention.
 - c) It is an activity which poses no risk to the object and purpose of this Convention
6. Schedule 3 activities are permitted.

B. Schedule of Nuclear Activities

Schedule 1

- (1) Production of nuclear weapons
- (2) Use of nuclear weapons
- (3) Threat of use of nuclear weapons
- (4) Production and any use of special nuclear material
- (5) Production of metals or alloys containing plutonium or uranium
- (6) Weaponization: This covers the research, development, manufacturing and testing required to make nuclear explosive devices from special fissionable or fusionable material
- (7) Nuclear fuel fabrication using plutonium, uranium-233, uranium enriched to 20% or more in uranium-235
- (8) Import, construction or use of research and power reactors of any kind utilizing uranium enriched to 20% or more in uranium-235, uranium-233, plutonium or MOX as a fuel or any reactor designed specifically for plutonium production. This includes critical and sub-critical assemblies
- (9) Reprocessing of irradiated fuel or irradiation targets containing nuclear-weapons capable material. This includes the use of hot cells and associated equipment
- (10) Enrichment of uranium in isotope U-235 beyond 20% and any preparatory steps in this process, including the preparation and storage of UCl₄ and UF₆ enriched to more than 3% in U-235. {The preparation of UCl₄ and UF₆ from natural uranium will not be forbidden by the NWC. After enrichment it should not be stored in this form which would be appropriate feeding material for further enrichment beyond 20%.}
- (11) Production, separation, and enrichment of the isotope of plutonium-239, hydrogen, tritium and lithium-6.
- (12) Production of antiprotons, antimatter, nuclear isomers and super-heavy elements in significant quantities

Schedule 2

- (1) Import, construction, use of research and power reactors of any type using natural uranium or uranium enriched to less than 20% in uranium-235 as a fuel. This includes critical and sub-critical assemblies, but excludes reactors specifically designed for plutonium production.
- (2) Prospecting, mining or processing of ores containing uranium and/or thorium
- (3) Preparation of chemical compounds containing uranium enriched to less than 20% in uranium-235 and thorium; excluding the preparation of UCl₄ and UF₆ enriched to more than 3% in U-235.
- (4) Nuclear fuel fabrication using natural uranium or uranium enriched to less than 20% in uranium-235.
- (5) Production of particle and laser beams of all kind.
- (6) Nuclear fusion experimental devices based on inertial confinement, including diagnostics

Schedule 3

- (1) Application of radiation and isotopes in food and agriculture:
 - Soil fertility, irrigation and crop production
 - [Plant breeding and genetics]
 - Animal production and health
 - Insect and pest control
 - [Food preservation]
 - Other uses upon approval

- (2) Applications of radiation and isotopes in medicine
 - Diagnostic and therapeutic medicine including dosimetry
 - Radiotherapy by teletherapy and brachytherapy
 - Nutrition and health-related environmental studies
 - Other uses upon approval

- (3) Application of radiation and isotopes in industrial processes
 - Radiography and other non-destructive testing methods
 - Industrial process control and quality control
 - Radiotracer applications in oil, chemical and metallurgical processes
 - Development of water and mineral resources
 - Industrial radiation processing
 - Other uses upon approval

- (4) Applications in research with and production and disposal of radioactive isotopes and elementary particles
 - Conditioning and disposal of radioactive wastes
 - Nuclear fusion experimental devices based on magnetic confinement, including diagnostics
 - Production of isotopes both radioactive and stable. The production of the isotope Pu-239, titanium and lithium-6 is prohibited.
 - Import, construction and use of neutron sources, electron accelerators, particle accelerators, heavy ion accelerators
 - Research on radiation physics and chemistry and on the physical and chemical properties of isotopes except in areas relevant to activities not prohibited by or subject to authorization under this Convention

Annex II: Nuclear Weapon Components

Guidelines for Schedule 1

1. A component shall be included in Schedule 1 if it is produced solely for the purpose of incorporation into a nuclear explosive device.
2. Manufacture, transfer or stockpiling of Schedule 1 components is prohibited.

Guidelines for Schedule 2

3. The following criteria shall be taken into account in considering whether a component shall be included in Schedule 2:
 - a) The component is produced for incorporation into a nuclear explosive device
 - b) The component is also used for purposes not prohibited under this convention, but is not produced in large commercial quantities for such purposes
 - c) There exist alternative components for the purposes cited in paragraph (b).
4. Manufacture, transfer or stockpiling of Schedule 2 components is prohibited.

Guidelines for Schedule 3

5. The following criteria shall be taken into account in considering whether a component shall be included in Schedule 3:
 - a) The component is produced for incorporation into a nuclear explosive device
 - b) The component is also used for purposes not prohibited under this convention, but is not produced in large commercial quantities for such purposes
 - c) There do not exist alternative components for the purposes cited in paragraph (b).
6. Manufacture, transfer or stockpiling of Schedule 3 components is permitted only in accordance with the provisions established by the Agency.

Guidelines for Schedule 4

7. The following criteria shall be taken into account in considering whether a component shall be included in Schedule 4:
 - a) The component is produced for incorporation into a nuclear explosive device
 - b) The component is also used for purposes not prohibited under this convention, and is produced in large commercial quantities for such purposes
 - [c) There do not exist alternative components for the purposes cited in paragraph (b).]
8. Manufacture of Schedule 4 components is permitted only in accordance with the provisions established by the Agency.

Annex III: List of countries and geographical regions for the purpose of Article VII.C.23

Africa

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Tunisia, Uganda, United Republic of Tanzania, Zaire, Zambia, Zimbabwe.

Eastern Europe

Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation, Slovakia, Slovenia, the Former Yugoslav Republic of Macedonia, Ukraine, Yugoslavia.

Latin America and the Caribbean

Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

Middle East and South Asia

Afghanistan, Bahrain, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Maldives, Nepal, Oman, Pakistan, Qatar, Saudi Arabia, Sri Lanka, Syrian Arab Republic, Tajikistan, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen.

North America and Western Europe

Andorra, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Holy See, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland, United States of America.

South East Asia, the Pacific and the Far East

Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Fiji, Indonesia, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Thailand, Timor Leste, Tonga, Tuvalu, Vanuatu, Viet Nam.

Annex IV: List of Countries with Nuclear Power Reactors

ARGENTINA	INDIA	S.AFRICA
ARMENIA	IRAN	SLOVAKIA
BELGIUM	JAPAN	SLOVENIA
BRAZIL	REPUBLIC OF	SPAIN
BULGARIA	KOREA	SWEDEN
CANADA	LITHUANIA	SWITZERLAND
CHINA	MEXICO	UNITED KINGDOM
FINLAND	NETHERLANDS	UKRAINE
FRANCE	PAKISTAN	USA
GERMANY	ROMANIA	
HUNGARY	RUSSIA	

Annex V: List of Countries with nuclear power reactors and/or nuclear research reactors

ARGENTINA	GERMANY	PHILIPPINES
ARMENIA	GHANA	POLAND
AUSTRALIA	GREECE	PORTUGAL
AUSTRIA	HUNGARY	REPUBLIC OF
BANGLADESH	INDIA	KOREA
BELARUS	INDONESIA	ROMANIA
BELGIUM	IRAN	RUSSIA
BRAZIL	IRAQ	SERBIA AND
BULGARIA	ISRAEL	MONTENEGRO
CANADA	ITALY	SLOVAKIA
CHILE	JAMAICA	SLOVENIA
CHINA	JAPAN	SOUTH AFRICA
COLOMBIA	KAZAKHSTAN	SPAIN
CZECH REPUBLIC	LATVIA	SWEDEN
DPRK	LIBYA	SWITZERLAND
DEMOCRATIC	LITHUANIA	SYRIA
REPUBLIC OF	MALAYSIA	TAIWAN
CONGO	MEXICO	THAILAND
DENMARK	MOROCCO	TUNISIA
EGYPT	NETHERLANDS	TURKEY
EUROPEAN UNION*	NIGERIA	UNITED KINGDOM
FINLAND	NORWAY	UKRAINE
FRANCE	PAKISTAN	USA
GEORGIA	PERU	

Comments and Critical Questions



A D-5 Trident II missile spins out of control after being launched from the nuclear-powered strategic missile submarine USS Tennessee.
Photo: US Navy

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Enforcement

Critical Question:

Can a Nuclear Weapons Convention be enforced?

How to enforce nuclear abolition is one of the most frequently asked questions regarding the Nuclear Weapons Convention. The model NWC emphasizes compliance over enforcement. It is more effective to persuade states to comply with the Convention than it is to have to respond after a violation with enforcement measures.

However, should compliance fail, enforcement may be necessary depending on the degree of non-compliance and the threat posed. The model NWC includes some provisions for enforcement including the restriction of States' rights, suspension of assistance in nuclear activities, and other sanctions. But, ultimate authority remains - as with the Nuclear Non-Proliferation Treaty, the Chemical Weapons Convention, and the Biological Weapons Convention - with the United Nations Security Council. The model NWC includes a provision making the threat or use of nuclear weapons a threat to the peace, requiring action by the Security Council. Security Council action on non-proliferation, such as Resolution 1540, demonstrate that the Security Council could go further and mandate national implementation and enforcement measures making them compulsory for all States regardless of whether or not they have ratified the NWC. This would enhance enforcement powers of the Security Council.

Another provision makes threat or use of nuclear weapons a crime for which individuals shall be held accountable before national courts and/or the International Criminal Court.

Both the composition and the mandate of the Security Council are regularly raised in consideration of this question. This leads to concern about the current and possible future international security regimes and the concept of security itself. (See Critical Question on Security.)

It has been suggested that in addition to Security Council authority to respond to a breach, including by use of force, there should be recognition of a right of individual states to respond with force to a breach if the Security Council does not act - for example, due to a veto. However, to the extent that such a right goes beyond the present right of inherent self-defense against an armed attack under the UN Charter, it could prove destabilizing to international security arrangements generally and also serve as a disincentive for present nuclear weapon states agreeing to an NWC.

Some also suggest that the Security Council should be granted a small number of nuclear weapons to be able to threaten or use in response to nuclear breakout. Most of the MNWC drafters oppose this idea on the grounds that 1) there are adequate non-nuclear means for responding to breakout, 2) the retention by any entity of nuclear weapons would justify the deterrent posture, and could lead to retention by certain states of their own nuclear weapons as a counter-balance to those of the Security Council, and 3) it is difficult to see how any threat or use of nuclear weapons, whether by a state or the Security Council, could conform with international rules of humanitarian law.

Experience with the NPT indicates that for most states in the world, enforcement will not be an issue. Almost all non-nuclear weapon states parties to the NPT — the vast majority of states in the world — have complied with their obligation under that treaty not to acquire nuclear weapons. Cases of actual or possible violation illustrate that while an effective international response can be difficult and problematic, it nonetheless is possible. In the case of Iraq's WMD programs, the measures imposed by the UN Security Council in 1991 were successful in achieving their dismantling and destruction including of their fledgling nuclear weapons programs.

Responses to the question of enforcement overwhelmingly favor reliance on incentives for compliance rather than threat force, or sanctions.

The North Korean situation is somewhat different in that they exercised their right to withdraw from the NPT prior to openly embarking on a nuclear weapons program. Subsequent developments indicate that a negotiated approach involving security assurances and economic incentives can facilitate compliance with nuclear disarmament objectives.

Moreover, in a nuclear-weapon free world, the international response to a breach of the NWC by small or mid-sized powers would almost certainly be more effective than under the NPT. Among other reasons, current nuclear weapon states would no longer have their own nuclear threat, and would have very strong incentives to ensure that no other state acquires that capability.

Violation of the NWC by a major military power, including those states that are now both nuclear-armed and permanent members of the Security Council with a veto, obviously would pose serious problems for a nuclear weapon free regime. Certain reforms, such as restricting the power of the veto or providing that the General Assembly could act in the absence of Security Council action, may be useful in addressing that possibility. But, in the near-term, the stability of a nuclear weapon free regime may depend on the assessment by major powers that it is in their security interests, and on the normative force of the prohibition of acquiring nuclear weapons that would grow as the regime was institutionalized and endured. These are significant factors. Moreover, the development of a nuclear weapon free regime will itself change the security situation. In the longer term, owing in part to the NWC, global collective security arrangements may develop that are capable of effectively responding to any state breaching the NWC.



Illustration: Laurence Clark.
Courtesy of the Alexander Turnbull Library,
Wellington, New Zealand.

Comment: Treaties are not enough

Present-day political culture derives from a long history of “might is right.” This means that militarily and economically strong countries can make or break agreements at their will, and enforce them on the weak with equal arbitrariness. For instance, nuclear weapons states have signed the NPT, which requires an early end to the nuclear arms race. Yet after three decades, all five continue to modernize their arsenals. Other than China, none have even accepted the World Court’s unanimous advisory opinion that Article VI requires the achievement of nuclear disarmament in all its aspects. Nuclear apartheid can continue even after it has been declared to be illegal.

The CTBT provides a similar lesson. Though Article I bans all nuclear explosions, including peaceful nuclear explosions, nuclear weapons states (and some others) interpret it as allowing nuclear fusion explosions in laboratories. This interpretation of the CTBT will allow the modernization of present arsenals, as well as the development of entirely new types of nuclear weapons, notably pure fusion weapons.

Some of the most difficult nuclear disarmament issues relate to the minimization of the risk of (i) a breakout of the treaty and (ii) retaliation with nuclear weapons in case breakout results in the use of nuclear weapons. To address these concerns, any nuclear weapons convention must contain features that go well beyond the complete verified dismantlement of nuclear weapons and related infrastructure, since both of these can be re-constituted. Unlike many existing treaties, such as the NPT and CTBT that permit withdrawal (usually at short notice and no specified penalty), the NWC must completely prohibit withdrawal under any circumstances. Activities violating the treaty should be punishable under the Nuremberg code. This would allow the individuals making the decisions to be held accountable under international law. Further, the role of the World Court clearly needs to be strengthened so that it can effectively deal with violations by any state, including present-day nuclear weapon states.

Such features, which are essential to enduring nuclear disarmament, cannot be successfully incorporated into a NWC unless there are profound changes in the present political, military, moral, and economic framework of which nuclear weapons are just one part. For instance, current military and political deterrence doctrine legitimizes the killing by states of children in an adversary country in retaliation for a nuclear attack even though such an idea is generally regarded as immoral and illegal at individual or non-state party levels. Unless such retaliation by a state is rejected by the majority of the people of nuclear weapons states as immoral, there is little chance that a nuclear weapons convention with the necessary features can be negotiated. The resistance of the United States to the International Criminal Court is a case in point.

Finally, huge nuclear weapons budgets have created powerful vested interests that a treaty alone cannot overcome. Even the decision to bomb Hiroshima was made with an eye to justifying World War II nuclear weapon budgets and hence to post-war allocations of funds. As another example, the CTBT gave birth to “stockpile stewardship” programs that have increased the flow of money into nuclear weapons maintenance modification, design, and laboratory testing. A full conversion of nuclear establishments from their Cold War functions to management of weapons-usable materials and nuclear wastes as well as to clean-up of vast areas that have been contaminated is an essential part of the disarmament process. Such a restructuring of functions will reduce the economic incentives for continued maintenance of nuclear weapons capacities and help reduce the risk of a breakout from a nuclear weapons convention.

-Arjun Makhijani, Institute for Energy and Environmental Research

Security

Critical Question:

Will a Nuclear Weapons Convention mean a different international security system?

Some governments consider the threat of nuclear weapons to be a vital component of their security. This posture will have to change before they agree to eliminate these weapons, and this change will help create a different security system, with greater reliance on non-violent conflict resolution, demilitarization and international law.

Existing international security mechanisms may be strengthened and new ones created in the process, but these are not necessary prerequisites to developing a plan for the elimination of nuclear weapons. Such security systems already exist, albeit in undeveloped or underused form. The NWC cannot prescribe the elements of an alternative security system. Rather, as it evolves, the NWC should incorporate and reinforce developments towards demilitarization and less reliance on force as a method of responding to conflicts and achieving security.

Security is related to the question of enforcement because the latter will be the Achilles' heel of any regime that relies primarily on threat or use of force for security and defense. Collective security doctrines further complicate the power balance and have the potential to aggravate perceptions of threat.

For most of the world, security increasingly refers not to the military capacity to defend territory, but to the capacity to provide for human needs in a sustainable way. Such 'human' security is threatened by the detrimental environmental and economic impact of nuclear weapons and by the political threats which are perpetuated by nuclear policies and which prevent the global cooperation required to meet human security needs.

Despite this reality, the security policies of some States continue to rely on military might in the form of policies of mass destruction, first use of nuclear weapons, and overwhelming offensive capacity. If this approach continues, it will lead to development of new weapons and increasingly sophisticated methods of warfare. These could include pure fusion weapons, weapons that defy the conventional-nuclear distinction, unforeseen means of mass destruction, militarization of space, and information technology warfare. Possible ways to reduce reliance on policies of security through military might include avoiding military "solutions" to human problems, and democratizing the security debate.

Whatever international security regime emerges, the NWC should emphasize compliance over enforcement. Compliance must be more attractive than non-compliance. The question then becomes how to design incentives. The NPT offered assistance in nuclear energy to non-nuclear weapons states. The NWC should offer assistance in alternative energy possibilities, in recognition of the proliferation risks and verification difficulties associated with nuclear energy. Other forms of development or humanitarian assistance related to nuclear disarmament and its risks could also provide incentive.

A recurrent question is how to reduce the existing incentives to develop nuclear weapons and increase the repercussions enough to dissuade pursuit of the nuclear option. If a nuclear free regime were accepted, non-compliance would be universally condemned and likely result in ostracism and other negative consequences to the violating State in such areas as trade, aid, cooperative endeavors and political influence. This is the reverse of the current situation where the possession or possible development of nuclear weapons generates international power and attention.

"We have guided missiles and misguided men."
-Martin Luther King Jr.

It is important to recognize, however, that for a great majority of states, nuclear weapons are already perceived as not necessary for their peace and security, even in the current international order. The national security of one state, and the collective security of a group of states cannot, by definition, be separated from larger regional and international security issues. One group's self defense policies are often seen as aggression by others, and in today's political environment, this means arms races and escalating militarism.

“Security” as the rationale for developing arsenals of nuclear weapons is not compatible with security in the sense of common survival. Pursuit of security through militarism — “hard” or State security — undermines “soft” or “human” security concerns such as health, development and sustainability. “Hard” security pursuit diverts resources away from social needs. “Hard” security has also been claimed as the domain of governments and military experts, and decisions are often made secretly or otherwise undemocratically, even though these decisions affect everyone. A wiser and fairer approach, therefore, is to link security with survival at every level — global, regional, national and local.

Comment: Security

A Nuclear Weapons Convention will be negotiated among parties that understand they are better off without nuclear weapons than with them. In reality, an international security regime which relies on the threat or use of greater force by a few states is self-defeating, promotes lawless proliferation of nuclear weapons and other weapons and tactics of mass destruction, and causes grave harms and threats to the health and existence of all human beings, including all states and our common ecosystems. An agreement reached in the ratification of a NWC establishes systematic and transparent processes that fulfill real determination to eliminate nuclear weapons. Such an unequivocal determination to eliminate nuclear weapons faces the fact that nuclear deterrence has proved a dead-end and delusional basis for security for any state and for the community of states. The vast majority of states who recognize the current universal legal obligation to negotiate in good-faith a treaty for nuclear disarmament in all its aspects can and should now begin formal negotiations of the NWC.

-Anabel Dwyer Lawyers' Committee on Nuclear Policy

Breakout

Critical Question: How can the NWC prevent breakout?

There is no magic formula to prevent a State breaking out from a Nuclear Weapons Convention and pursuing a nuclear weapons capability. The key to breakout is irreversibility of the disarmament process. A concerted effort to eliminate not only nuclear weapons but the infrastructure behind them will require sequenced measures--perhaps incrementally reversible but cumulatively irreversible--aimed at building confidence and leading to a world in which developing nuclear weapons will mean starting from scratch. Such a program will become increasingly difficult to conceal as elements of the nuclear weapons industry are destroyed, converted or allowed to erode.

The potential for a state to break out of the NWC and pursue a nuclear weapons program will exist as long as there is the nuclear material, including that produced by use of nuclear energy. The likelihood will decrease, however, as progress is made on nuclear disarmament and reliance on nuclear weapons is stigmatized. Concern over breakout, though valid, should not prevent progress on nuclear disarmament. The real risk of breakout inherent in a nuclear disarmament regime must be measured not against a perfect nuclear weapons free world--where breakout is impossible--but against the world we live in today, where pursuit of nuclear weapons programs is a potential temptation to some states and even non-state actors. The question becomes whether we are safer from intentional, accidental or unauthorized use of nuclear weapons in today's "non-proliferation" regime or in a future regime directed toward complete nuclear disarmament.

The Model NWC includes a number of technical, legal, political and institutional measures that would make any possible development of nuclear weapons following breakout that much more difficult and detrimental to State interests (see Critical question on Enforcement). These include preventive controls on nuclear materials and facilities, application of individual responsibility, and sanctions. Thus, while breakout is a concern, it would not pose the same risk of nuclear weapons production and threat as currently exists if a State breaks out from the NPT.

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Comment: Breakout

If the key to breakout is the irreversibility of the disarmament process, it is essential that the NWC be unequivocal in this regard. This will require a major departure from the approach taken in the NPT and the CTBT, which relies upon statements of intent not backed by measurable objectives. This has allowed the nuclear weapon states, thus far, to circumvent meaningful compliance with the historical intent of these treaties.

While the Preamble to the CTBT claims that "the cessation of all nuclear weapon test explosions and all other nuclear explosions, by constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of nuclear weapons, constitutes an effective measure of nuclear disarmament..." the Treaty fails to define a nuclear test. In fact, the nuclear weapon states, separately and in cooperation with each other, are using the CTBT as a justification for undertaking major new programs to replace underground nuclear test explosions through advanced technological means. The October 1998 White House "National Security Strategy For a New Century" asserts that the U.S. must continue to maintain, for "deterrence" purposes, a "robust triad of strategic forces,"

and states further: “We must also ensure the continued viability of the infrastructure that supports U.S. nuclear forces and weapons. The Stockpile Stewardship Program will guarantee the safety and reliability of our nuclear weapons under the Comprehensive Test Ban Treaty.”[1]

Such programs also represent the antithesis of the NPT Article VI obligation to “pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race and an early date and to nuclear disarmament,” which was reaffirmed by the nuclear weapon states in the Principles and Objectives for Nuclear Non-Proliferation and Disarmament adopted with the NPT extension decision in May 1995. This obligation was reinforced by the International Court of Justice in July 1996, which unanimously held that “there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control.” In fact, expanded laboratory-based experimental programs in the nuclear weapon states fundamentally are intended to ensure that nuclear disarmament does not occur as a consequence of the CTBT. Moreover, new nuclear weapons designs, modifications and improvements directly contravene the “cessation of the nuclear arms race” Article VI requirement and the April 1995 Declaration by France, Russia, the United Kingdom and the United States in connection with the NPT that “the nuclear arms race has ceased.” [2] In addition, the close interconnections between research, design and testing of thermonuclear weapons and other forms of advanced weapons research have the potential to ignite entirely new arms races. The potential development of pure fusion weapons, using inertial confinement fusion and other Stockpile Stewardship technologies, exemplifies this inherent danger.

If the NWC is to minimize the potential for breakout, the closure and monitoring of the nuclear weapons infrastructure in all nuclear weapons states must begin early in the process of disarmament. Nuclear weapons research, testing, and component production should be halted while reductions are in progress, not after, with nuclear weapons production and research facilities subject to intrusive verification regimes at the earliest possible time. Fissile materials accounting, already a challenging task, is rendered more so by the continued fabrication and testing of weapons components in classified facilities. Early cessation of both research and production activities also makes evasion of emerging verification regimes and covert production of components or manufacturing equipment particularly suited to a hidden long-term nuclear weapons capability more difficult. The continued pursuit of increased nuclear weapons knowledge by one state – including everything from systematization of fissile materials understanding to more rapid, flexible, and easily scaled production techniques — will be matched to a greater or lesser degree by others. The longer such activity continues prior to achievement of an abolition regime, the greater and more widespread the technical capability for breakout is likely to be.

-Jacqueline Cabasso and Andrew Lichterman, Western States Legal Foundation

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U1A complex, an underground laboratory of tunnels built 960 feet beneath the ground, designed to conduct subcritical high explosive experiments to test nuclear weapons material. Photo: US Department of Energy.

"[Deterrence] evolved from an increasingly convoluted morass of unwarranted assumptions, unprovable assertions and logical contradictions. By the end of the first decade of the Cold War, it had effectively served to suspend rational thinking about the ultimate aim of national security: to ensure the survival of the nation."

- General Lee Butler
February 2, 1998

Deterrence

Critical Question: What is the future of nuclear deterrence?

Nuclear deterrence has served as a central component of the security posture of nuclear weapon states and their allies since WWII. Essentially a psychological process, deterrence relates to influencing the rational calculation of threat probability by an aggressor, who would be assured unacceptable damage and is therefore deterred from initiating attack. Nuclear deterrence is a contested concept. The principles of nuclear deterrence are not objective truths, but rather theoretical concepts. However, many believe that it has protected these states from attack and has prevented a third world war from occurring. Such beliefs are difficult to prove or disprove. All of the Nuclear States have been involved in wars, and indeed have lost wars despite their nuclear arsenals. It may also have been other factors that prevented attack on the nuclear weapon states. Countless other nations that do not have nuclear weapons or alliances with nuclear weapon states have not been attacked either.

Doubts about the effectiveness of nuclear deterrence doctrines were multiplying before 11 September 2001 because the geopolitical circumstances that had shaped the Cold War balance between secrecy and democracy no longer existed. The events of 11 September 2001 spawned a new use of force doctrine outlined in the 2002 US Nuclear Posture Review and National Security Strategy, calling for military action to prevent rogue states from acquiring nuclear weapons and other weapons of mass destruction, a doctrine that reflects a loss of confidence in the utility of nuclear deterrence.

With respect to non-State actors, especially terrorist organizations, deterrence is clearly inadequate. Nuclear weapons could only be used against states sponsoring terrorism with the danger that they might provoke the very danger they were designed to avoid. France has recently announced that it would deploy nuclear weapons against states supporting terrorism.

General Lee Butler, retired Commander-in-Chief of United States Strategic Command has said that, "Deterrence is a dialogue of the blind with the deaf. Deterrence invokes death on a scale rivaling the power of the creator... It [nuclear deterrence] was our shield and by extension our sword. The nuclear priesthood extolled its virtues and bowed to its demands. Allies yielded grudgingly to its dictates even while decrying its risks and costs. We brandished it at our enemies and presumed they embraced its suicidal corollary of mutually assured destruction. We ignored, discounted or dismissed its flaws and cling still to the belief that deterrence is valid in a world whose security architecture has been wholly transformed." [1]

Nuclear deterrence advocates claim that nuclear weapons should be retained as an "insurance policy," in case diplomacy or other forms of war prevention fail. However, this approach has fatal flaws because nuclear deterrence itself can and has failed:

- **By design:** Deterrence relies on a "credible" threat of use in order to deter an attacker. In a conflict situation, antagonists may decide that the point has been reached that they have to launch a nuclear attack or lose the deterrent value of their weapons. A crisis may also be created by the very weapons themselves, as in the Cuban Missile Crisis. "Counter-proliferation" policies identifying a role of nuclear weapons in countering a chemical or biological attack have widened the range of settings in which "credibility" could drive nuclear use. {See below}

- **By accident:** Nuclear forces remain on alert in a launch-on-warning posture in order to maintain "survivability" of weapons should an attack occur (i.e., "use 'em or lose 'em"). In times of tension, a mistake in early warning information could lead to an

inadvertent nuclear “response”.

It also needs to be asked: Is nuclear deterrence really deterrence? The possession of nuclear weapons can make the possessing country a nuclear target rather than immune to nuclear attack. The nuclear deterrent may in fact be a nuclear magnet.

Current nuclear deterrence doctrine has additional problems:

The adherence to it by some States leads to nuclear proliferation, as other States imitate this policy. The argument that a nuclear deterrent is required to defend against unknown future threats suggests that all states would be wise to possess nuclear weapons.

- It creates constant pressure to improve nuclear arsenals.
- It places the whole world at risk, not only the nuclear weapons states, and is thus a violation of the sovereign rights and humanitarian rights of the world’s nations and peoples.
- It creates and perpetuates an unstable, hostile attitude between nuclear possessor States, and inhibits cooperation in promoting true security.

Finally one must ask what deterrence does to us as a society. Gandhi noted after the bombing of Hiroshima and Nagasaki, “We have yet to see what it does to the soul of the destroying nation.” Does threatening to incinerate millions of people and destroy the environment desensitize us and make us more ready to inflict harm in other areas? Does it create a form of hopelessness about the human condition and an acceptance of the belief that ultimately we must threaten to destroy in order to achieve our desires? Has this posture been a contributor to the horrific increase in social violence and despair in this century? If so, rejection of deterrence will indeed assist humanity in its quest for the development of a more humane international society.

The United States has given conflicting signals about both preemptive and retaliatory use of nuclear weapons against non-nuclear weapons, including chemical or biological weapons. According to the Air Force “Nuclear Operations,”

“If US objectives are more limited, a counterforce strategy of employment might be more appropriate. This refers to the use of weapons against the enemy’s immediate war-fighting capability. While there will certainly be long-term effects from the use of a nuclear device against any target, counterforce strategy focuses on the more immediate operational effect. Nuclear weapons might be used to destroy enemy WMD before they can be used, or they may be used against enemy conventional forces if other means to stop them have proven ineffective. This can reduce the threat to the United States and its forces and could, through the destruction of enemy forces, bring an end to the conflict.”[2]

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The warhead on the Trident II missile is slated for re-design.
Photo: US Navy

Terrorism

Critical Question:

How could a nuclear weapons convention deal with the growing threat of terrorists acquiring and possibly using nuclear weapons?

Nuclear weapons are weapons of terror, and any use or threat of nuclear weapons constitutes terrorism, whether by governments or non-state groups, regardless of how it is rationalized. However, this section will deal with the issue of nuclear weapons acquisition and threat of use by non-State terrorists.

Terrorism involving nuclear weapons or radioactive materials could take a wide variety of forms. Terrorists could steal, buy or otherwise acquire a ready-made nuclear weapon or take over a nuclear-armed submarine, plane or base. They could also acquire fissile material and fabricate a crude nuclear bomb. This is a real danger: the global stockpile of highly enriched uranium (HEU) and plutonium currently amounts to 2300 tons, enough for more than 200,000 nuclear weapons. [1] These materials exist in hundreds of buildings in more than 40 countries, under security arrangements ranging ‘from excellent to appalling.’ The IAEA Illicit Trafficking Database has documented more than 650 instances of intercepted smuggling of radioactive materials over the past decade; 18 cases of stolen plutonium or HEU have been confirmed. IAEA Director General ElBaradei estimated in March 2006 that regarding protection of nuclear material, “...perhaps 50 per cent of the work has been completed.” [2]

A Nuclear Weapons Convention would build on existing measures to deal with nuclear terrorism at national and international levels.

States Parties to the International Convention for the Suppression of Acts of Nuclear Terrorism (“Nuclear Terrorism Convention”), for example, are obliged to develop appropriate legal frameworks criminalizing nuclear terrorism-related offenses, investigate alleged offenses, and, as appropriate, arrest, prosecute, or extradite offenders. It also calls for international cooperation with nuclear terrorism investigations and prosecutions, through information-sharing, extradition and the transfer of detainees to assist with foreign investigations and prosecutions.

The Nuclear Terrorism Convention however is limited to States Parties. In order to ensure action is taken globally, the UN Security Council adopted Resolution 1540 [3] requiring all States to take measures to prevent nuclear terrorism, focusing particularly on prohibiting non-State actors from acquiring or using nuclear weapons and on further measures to control nuclear materials and prevent proliferation. The resolution requires States to adopt and implement measures to a) prevent non-State actors from acquiring or using nuclear, chemical or biological weapons, and b) control nuclear, chemical and biological weapons and related materials in order to prevent proliferation. The resolution arose in response to security concerns from a number of States, including the United States, arising from the possibility of the proliferation of nuclear weapons and other weapons of mass destruction to States and non-State actors. Participation in the universal reporting process has been rather positive, despite its novelty and complexity. If the negotiation and adoption of UNSC 1540 had many possible points of origin, the underlying motivation also varied by state, triggered by events in 2003-4, such as information on efforts by Al Qaeda to acquire WMD, described as a “religious duty” in comments attributed to bin Laden. [4]

UNSC 1540, however, circumvents the question of state responsibility for proliferation of WMD by focusing on access by non-state actors to NBC weapons and defining non-state actor for the purpose of the resolution as: “individual or entity, not acting under the lawful authority of any State in conducting activities which come within the scope of this resolution.” It is thus unclear whether the provision could have been used in relation to the nuclear black market of AQ Khan, which appears to have been integrally bound up with the Pakistani state, where lines of state authority were deliberately blurred to provide plausible deniability.

In its report to the 1540 Committee, New Zealand emphasized that “all weapons of mass destruction should be eliminated” and that measures should be taken to prevent “any entity

- whether State or non-State actor - from attempting to develop, acquire, manufacture, possess, transport, transfer or use WMD and their means of delivery.” New Zealand noted that, “This is reflected in the prohibitions under New Zealand law which make it an offence to aid or abet any person in developing WMD. This prohibition also applies extra-territorially to agents or servants of the Crown outside the New Zealand nuclear free zone.”

Implementation requirements of a NWC would include criminal measures for both non-State and State actors engaged in nuclear weapons related activities, similar to those already adopted by New Zealand. However, NWC requirements would go further by extending extra-territorial application to all citizens and incorporating universal jurisdiction, i.e. it would be illegal for anyone anywhere in the world to engage in nuclear weapons activities and any State could prosecute them.

Some terrorist groups now have access to professional scientific and technical skills, large sums of money, international networks, modern communications, and a burgeoning supply of recruits. Aum Shinrikyo and al Qaeda are the two most capable and well-financed terrorists groups that have thus far known to have pursued nuclear weapons. An IPPNW report “Crude Nuclear Weapons: Proliferation and the Terrorist Threat,” concluded that, “unless radical steps are taken urgently, it will not be a question of whether terrorists can acquire or build a nuclear device, but when.”

Non-State organizations would not be parties to a Nuclear Weapons Convention and would thus not be party to the verification regime agreed to by states parties. In addition, non-State organizations may have less restraint on threatening to use or on using nuclear weapons should they acquire them. This leads some commentators to question whether a nuclear weapons convention could prevent nuclear terrorism. If not, should a small number of nuclear weapons be retained to respond to nuclear terrorism?

To respond to the second question — A terrorist organization is unlikely to be deterred by a State with nuclear weapons, because: a) It would be difficult for the State to find a target to retaliate against or threaten such retaliation against. Unlike a State, a terrorist organization does not usually have a territory or large military facilities against which to target a weapon of mass destruction. b) Terrorists are most often prompted by a psychology of “heroic” response to perceived aggression including the acceptance of personal death in the battle. A threat of nuclear weapons against them would likely increase their perception of the “evil” of the state they are fighting against, and give them justification for responding in kind. Rather than deterring them from using nuclear weapons it would likely stimulate them to.

A nuclear weapons convention, on the other hand, would make it much more difficult for a terrorist organization to acquire or build a nuclear weapon. Once all nuclear weapons are eliminated, terrorists would not be able to steal a bomb. And once all nuclear materials and facilities are placed under safeguards it would be difficult for terrorists to acquire bomb making materials and technical assistance. The verification systems established under a nuclear weapons convention would make it easier to discover a potential terrorist threat from diversion of fissile material or technical expertise in time to prevent the building of a bomb.

In addition, a nuclear weapons convention would reduce or remove the political power of nuclear weapons for a terrorist organization. Terrorists commit terrorist acts either to retaliate against perceived aggression, or to generate support for their cause through maximizing publicity. Once nuclear weapons have been prohibited, there could be no perceived aggression requiring a nuclear response, and any threat or use of such a weapon would be condemned universally and eliminate support for a terrorist’s cause.

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Health and Environment

Health and Environmental Consequences of the Production, Testing and Use of Nuclear Weapons



Some of the injured and dying the day after the bomb was dropped on Nagasaki. Photo: Yosuke Yamabata

The world has yet to come to terms with the medical consequences of the nuclear weapons era more than 60 years after the atomic bombings of Hiroshima and Nagasaki at the end of World War II. Nuclear weapons, when exploded over population centers, cause not only immediate death and suffering on a massive scale, but every part of the production process—from mining uranium ore to developing and testing the weapons, and storing the inevitable radioactive waste materials—has brought with it health consequences, especially high rates of cancer, that have never been fully acknowledged by governments and industry. This is even before the weapons are used. Survivors of the Hiroshima and Nagasaki bombings suffer increased rates of illness to this day, and the full effects on future generations, including possible genetic effects, are not yet known. The health and environmental consequences of long-lived high-level nuclear waste adds further to the price paid by current and future generations for the policies of a handful of nations.

There are significant difficulties involved in assessing the health effects of nuclear weapons production, testing, and use. The widespread dispersal of ionising radiation in the environment during many of the steps involved even in manufacturing and testing a nuclear weapon make it difficult

to quantify with certainty the doses received by affected populations. In addition, cancers induced by radiation exposure often take decades to develop, and cannot be distinguished in any way from cancers due to other causes.

We do know, however, that there is no safe dose of radiation exposure. Even a very small dose carries a risk of harm. This was confirmed by the 2005 report of the Committee on Biological Effects of Ionizing Radiation (BEIR) of the US National Academy of Sciences, which stated, “The smallest dose has the potential to cause a small increase in risk to humans.” There is no threshold below which radiation is safe. [1]

In 1984 the United Nations Human Rights Committee noted that “It is evident that the designing, testing, manufacture, possession and deployment of nuclear weapons are among the greatest threats to the right to life which confront mankind today,” and concluded that “The production, testing, possession, deployment and use of nuclear weapons should be prohibited and recognized as crimes against humanity.”[2]

Use of nuclear weapons

On August 6, 1945, a nuclear weapon with an explosive force equivalent to that of about 15 kilotons (thousand tons) of TNT was detonated above the city of Hiroshima. Three days later, another nuclear weapon was detonated over the city of Nagasaki. Each of these bombs caused the deaths over the next few days of almost 100,000 people and the deaths over succeeding months of tens of thousands of others. [3]

John Hersey describes the consequences of the Hiroshima bomb and the role played by a physician of Hiroshima:

The lot of the majority of physicians of Hiroshima — with their offices and hospital destroyed, their equipment scattered, their own bodies incapacitated in varying degrees — explained why so many citizens who were hurt went untended and why so many who might have lived, died. Of the one hundred and fifty doctors in the city, sixty-five were already dead and most of the rest were wounded. In the biggest hospital, that of the Red Cross, only six doctors were able to function, and only ten nurses. The sole uninjured doctor on the Red Cross Hospital staff was Dr. Sasaki....

Dr. Sasaki worked without method, taking those who were nearest him first, and he noticed soon that the corridor seemed to be getting more and more crowded. Mixed with the abrasions and lacerations which most people in the hospital had suffered, he began to find dreadful burns. He realized then that casualties were pouring in from outdoors. There were so many that he began to pass up the lightly wounded; he decided that all he could hope to do was to stop people from bleeding to death. Before long, patients lay and crouched on the floors of the wards and the laboratories and all the other rooms, and in the corridors, and on the stairs, and in the front hall, and under the portecochere, and on the stone front steps, and in the driveway and courtyard, and for blocks each way in the streets outside. Wounded people supported maimed people; disfigured families leaned together, many people were vomiting...

The people in the suffocating crowd inside the hospital wept and cried for Dr. Sasaki, and the less seriously wounded came and pulled at his sleeve and begged him to go to the aid of the worse wounded. Tugged here and there in his stocking feet, bewildered by the numbers, staggered by so much raw flesh, Dr. Sasaki lost all sense of profession and stopped working as a skilful surgeon and a sympathetic man; he became an automaton, mechanically wiping, daubing, winding, wiping, daubing, winding.... [4]

In addition to the effects of blast injuries and burns, many of Dr. Sasaki's patients soon developed the features of acute radiation sickness: severe gastrointestinal problems, uncontrolled bleeding, hair loss, and extreme susceptibility to infection. [5]

Dr Sasaki was among the very first medical witnesses to the utter devastation inflicted by mankind's newest and most terrible weapon. Within several years, however, even the atomic bomb was surpassed in its capacity to destroy. During the 1950s, new types of nuclear weapons were developed and tested first by the United States and then the Soviet Union. Based on nuclear fusion in addition to the initial fission reaction, these new "thermonuclear" or "hydrogen" bombs had a destructive force equal to 1,000 times the force of the bombs detonated over Hiroshima and Nagasaki.

In 1961, a group of Boston physicians analyzed the potential medical consequences of the use of these new weapons. An entire issue of the prestigious *New England Journal of Medicine* was dedicated to articles on "The Medical Consequences of Thermonuclear War." Analyzing an attack on the US postulated in 1959 by the Joint Congressional Committee on Atomic Energy, a new group called Physicians for Social Responsibility (PSR) documented in detail the health effects of nuclear explosions. If such an explosion were to occur over Boston, the authors wrote, severe traumatic injuries and massive burns, combined with life-threatening radiation exposure, would kill 1,300,000 people on the first day alone, with another 1,250,000 injured. There would be widespread destruction of health care facilities, and approximately 1,000,000 of



This child from Nagasaki suffered third degree burns that exposed the bone.
Photo: Yasuo Tomishige

More significant is the fact that most deployed nuclear weapons are not the low yield tactical weapons, but high yield strategic weapons, most of which are 10-100 times more powerful than the bombs used on Hiroshima and Nagasaki.

those injured would die. The authors concluded that effective responses by health professionals after a thermonuclear weapon explosion would be impossible or futile, and that civil defense efforts offered little benefit. They, and the then-editor of the *New England Journal of Medicine*, argued that the prevention of use of nuclear weapons was an urgent task for health professionals [6,7,8]

The World Health Organization in 1986 summarized the nature and effects of nuclear weapons in the following terms: “Quantitatively nuclear weapons are vastly more powerful than conventional weapons. The explosive power of all the nuclear arsenals is now about 5,000 times greater than that of all the explosives used in the Second World War.” [9]

Nuclear weapons are qualitatively different from conventional weapons. In addition to the deaths and injuries caused by the effects of blast and heat, nuclear weapons produce radioactive isotopes (fallout) that may be transported by winds great distances from the site of the explosion. Moreover, fallout may be an obstacle to rescue operations and effective care of injured survivors. [10]

In 1993, the World Health Assembly reaffirmed that “no health service in the world can alleviate in any significant way a situation resulting from the use of even one single nuclear weapon.” [11]

In its 1996 advisory opinion on the legal status of nuclear weapons, the International Court of Justice (ICJ) noted, “The destructive power of nuclear weapons cannot be contained in either space or time. They have the potential to destroy all civilization and the entire ecosystem of the planet.” [12]

The US and the UK argued before the ICJ that the use of precisely targeted, lower-yield nuclear weapons would not have the same effects as those described in the WHO studies. The Court did not accept this argument. Even the lowest yield of nuclear weapons in the current arsenals, about 1 kiloton, would still produce large quantities of radiation. More significant is the fact that most deployed nuclear weapons are not low-yield tactical weapons, but high-yield strategic weapons, most of which are 10 to 100 times more powerful than the bombs used on Hiroshima and Nagasaki.

An understanding of the massive levels of death and irremediable suffering that would result from an explosion of even a single nuclear warhead near a populated area compels a simple conclusion: no such explosion must ever happen again.

Consequences of Nuclear Weapons Tests

Of all the activities in the nuclear weapons cycle, nuclear testing has been the most destructive of human health and the environment. The US, the former Soviet Union, China, France, India, Pakistan, and the UK have collectively conducted more than 2,000 nuclear explosions for testing purposes, approximately 500 above ground or under water and the rest underground.

Lijon Eknilang, of the Marshall Islands, recounted her experiences of nuclear testing as follows. “I was eight years old at the time of the Bravo test on Bikini in 1954. I woke up with a bright light in my eyes. There was a huge brilliant light that consumed the sky. Soon after we heard a big loud noise and the earth started to sway and sink...A little later...it began to ‘snow’ in Rongelap. We had heard about snow from the missionaries, but this was the first time we saw white particles fall from the sky. We kids were playing in the powder, but later everyone was sick and we couldn’t do anything.... My own health has suffered as a result of radiation poisoning. I cannot have children. I have had seven miscarriages. One was severely deformed — it had only one eye. Many of my friends keep quiet about the strange births they had. They gave



Despite a de facto moratorium on testing, France began preparations to resume testing at Moruroa in 1995. This child in Rarotonga joined more than 1,500 people (one-quarter of the population) in protest. France was forced to stop testing by the global outcry, which included a boycott of French products
Photo: Greenpeace/Morgan

birth, not to children as we like to think of them, but to things we could only describe as “octopuses”, “apples”, “turtles” and other things in our experience. The most common have been “jellyfish” babies. These babies are born with no bones in their bodies and with transparent skin. We can see their brains and hearts beating. There are no legs, no arms, no head, no nothing.”[13]

The story of Lijon Eknilang is just one of the many in the test sites and adjacent areas in the Marshall Islands, Te Ao Maohi (French occupied Polynesia), Maralinga, Nevada, Kazakhstan, Lop Nor, Novaya Zemlya, Kiribati, Pokhran and elsewhere. “Radioactive Heaven and Earth”, a study that was published by International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research in 1991, estimated that global fallout from nuclear testing will lead to more than two million cancer fatalities alone, in addition to other health and environmental effects.[14]

Government reporting on health effects of nuclear weapons testing has often been inaccurate, incomplete, or non-existent. The US government, for example, neglected to conduct systematic studies of the effects of radioactive iodine-131 from atmospheric tests between 1945 and 1962, until it was mandated to do so by the US Congress in 1982. The studies were not released for another 15 years, and even then the problem was downplayed.

The US National Cancer Institute (NCI), which reported the findings, estimated that fallout of radioactive iodine (I-131) from nuclear weapons tests had caused 10,000 to 75,000 cases of thyroid cancer. [15] These high figures are cause for considerable concern. But critics noted that the real figures are probably much higher. NCI provided no basis for its thyroid cancer risk estimates and appeared to have ignored evidence from Chernobyl, where thyroid cancer rates have been approximately 10 times higher than expected from conventional calculations based on extrapolation from exposures at Hiroshima and Nagasaki. North Dakota health department analysts estimated that I-131 in fallout may have increased the rate of thyroid cancer in that state alone by 5 to 10 percent. [16,17]

The American Public Health Association noted that if disclosures of the releases had been made public at the times they occurred, implementation of federal protective action guidelines — including removal of soil, destruction of milk and dairy cows, destruction of contaminated human and animal food, and public education about protective measures — would have been required. No public warnings were issued (although the Eastman Kodak corporation was warned in advance of some of the tests, to protect its film stocks). [18]

While the effects of radioactive iodine exposure can generally be treated with considerable success, the NCI study did not focus on other radioactive elements produced by nuclear testing, including strontium, caesium, plutonium, and carbon, the health effects of which are much more difficult to treat.

Governments of the other nuclear weapon states have been similarly reluctant to reveal the full extent of the health and environmental problems from nuclear testing. Thus, non-governmental organizations (NGOs) have attempted to fill the gap.



Radiation Day at Chelyabinsk Ecology School, 1992. May 19 is Radiation Day at the Chelyabinsk Ecology School in Russia, sited on a dead river at the edge of the city's metallurgical district. Each year on this day students practice safety routines designed to protect them from a sudden release of radiation from the Chelyabinsk-65 complex 160 kilometers to the north.

Photo: Robert Del Tredici



Troops at Operation Buster, Nevada Test site, US, November 1951.

Photo: Defense Nuclear Agency



Among the most highly exposed groups of downwinders are those who live near Semipalatinsk nuclear weapons test site in Kazakhstan.
Photo: Yuri Kuidin.

During the late 1950s and early 1960s NGOs in the United States collected the deciduous teeth of children, and demonstrated the replacement of calcium in the teeth with radioactive strontium-90. The publicity given to these findings by PSR and other groups was an important factor in the negotiation in 1963 of the Partial Test Ban Treaty, which banned nuclear tests in the atmosphere, in space, and under the oceans. [19]

The Soviet Academy of Medical Sciences determined in 1989 that residents of Semipalatinsk, near the main USSR nuclear test site in Kazakhstan, had experienced excess cancers, genetic diseases, and child deaths because of radiation exposure from pre-1963 atmospheric tests. This helped stimulate the formation of the “Nevada-Semipalatinsk” movement, which led to the closure of the test site in 1991. [20]

The conclusion of the Comprehensive Test Ban Treaty in 1996 signalled a potential end to the era of nuclear testing. However this Treaty has not yet come into effect and a resumption of testing remains a possibility. In any event, the legacy of nuclear testing will remain for centuries as the radiation from the tests, whether dispersed throughout the atmosphere or concentrated in the underground test sites, will continue to threaten human health.



Worker at the Rocky Flats Plant examining a plutonium button inside a glove box designed to protect workers from radiation.
Photo: Department of Energy

Consequences of Nuclear Weapons Production

Radioactive pollution contaminates every site where nuclear weapons have been developed. The two nations that produced the vast majority of the world’s nuclear weapons, the US and the former Soviet Union, are the most heavily affected.

There are more than 4,500 contaminated Department of Energy sites in the United States. Production facilities for nuclear weapons, such as those at Feed Materials Production Center (OH), Hanford Reservation (WA), Los Alamos (NM), Rocky Flats (CO), Oak Ridge (TN), and Savannah River (SC) are heavily polluted. Epidemiologic surveys have demonstrated elevated levels of cancer in surrounding communities. The Department of Energy knowingly polluted its nuclear weapons production facilities and the areas surrounding them without warning either its workers or those living in the endangered areas around the plants. Furthermore, the impact of this pollution has been disproportionately concentrated in areas in which poor people and people of colour live.

Dispersion of these pollutants is an ongoing process. For example, waste storage tanks at Hanford containing millions of gallons of highly toxic processing chemicals and radionuclides are reaching groundwater and flowing towards the Columbia River seven miles away. Spent nuclear fuel at this same facility is at risk of spontaneous combustion due to uranium hydrides. Such a fire would spread deadly radionuclides across the agricultural belt of the northwestern United States. [21]

Production sites in the former Soviet Union are even more heavily contaminated. These include Chelyabinsk 65 (“Ozyorsk”) in the Urals, with radioactive wastes dumped into the Techa River and Lake Karachay; Dimistrovgrad; Tomsk; and Krasnoyarsk. Russian authorities have now admitted injecting approximately a billion curies of radioactive substances underground at both Tomsk and Krasnoyarsk. While the US has dispersed an estimated three million curies of radioactivity into the

environment from nuclear weapons production, the comparable figure in the former Soviet Union is 1.7 billion curies. [22]

Conclusion

Nuclear weapons have been developed, produced, tested, and deployed by a handful of nations, largely in secret, with disregard for human health and environmental well being. The effects, even without further explosions of nuclear weapons, include deaths estimated to number in the millions, and permanent radioactive pollution of our land, sea, and air. As nuclear arms production and the mining, fuel processing, and manufacturing infrastructure to support it gathers momentum in India, Pakistan, and possibly other countries that take their cue from the US and the other nuclear weapon states, the damage to health and the environment will be compounded rather than mitigated. If these weapons are eventually used again, as they will be if they are not abolished, we will not only have failed to learn the lessons of Hiroshima and Nagasaki, we will have consigned the rest of the world to their fate. A nuclear weapons convention, as described in this book, is therefore not only a political prescription but also a medical prescription for averting that catastrophe.

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De-Alerting

The Legal and Moral Case for De-Alerting Nuclear Weapons and Removing Launch-on-Warning

The Model NWC calls for a phased programme of disarmament commencing with measures such as de-alerting of all existing nuclear weapons. It would however be helpful in reducing nuclear dangers and in building confidence between negotiating parties if some initial measures such as de-alerting were undertaken by parties prior to conclusion of the NWC. In fact, there is a legal and moral case for the immediate de-alerting of nuclear weapons and removing the launch-on-warning policy.

The US and Russia continue to deploy approximately 3000 nuclear weapons on a high level of readiness for use [1] and on launch-on-warning (LOW) operational procedures.[2] Such policy and practice constitute a real and immediate threat to use nuclear weapons. The Commission on Weapons of Mass Destruction (Blix Commission) notes that “since the flight time of US and Russian land-based missiles is between 25 and 30 minutes – significantly less for sea-based missiles – such nuclear postures risk causing nuclear exchanges by accident, technical malfunction or strategic miscalculation. [3]

Despite calls for reducing the operational readiness of nuclear weapons, the US and Russia maintain that high alert status [4] and LOW are necessary.

The US argues that a high level of readiness to use nuclear force acts as a deterrent to potential aggressor States. However, they also argue that during times when an adversary is preparing for war, visibly increasing the readiness to use nuclear force acts as a warning to the adversary and assists deterrence. [5] If this is true, then during peacetime a lower level of readiness to use should be maintained in order that there are additional steps of readiness to progress to without having to move to actual use. Maintaining a high level of use leaves no such room for manoeuvre. Robert McNamara, former US Secretary of Defense, has noted that the high alert status has left the NWS vulnerable to nuclear war by accident or miscalculation. “*During the Cuban Missile Crisis we had thirteen days to muddle our way and avert nuclear war. Today we would only have thirteen minutes.*” [6]

The policy makes the potential use of nuclear weapons by miscalculation that much more likely. While no-one may want nuclear war, military decision makers may launch an attack first if they know the other side has weapons on alert and is considering an attack themselves. This is particularly true if they believe that their nuclear forces could disable the nuclear forces of the adversary before the adversary had the opportunity to launch

The ICJ affirmed that the threat or use of nuclear weapons must comply with the requirements of international law applicable in armed conflict and with Articles 2 (4) and 51 of the UN Charter. These laws prohibit the threat or use of weapons unless an armed attack has occurred against a State and until the Security Council has taken measures to deal with this attack.

The deployment of nuclear weapons on delivery vehicles ready to be used within minutes or hours, at a time when there has been no attack or imminent threat of attack, thus constitutes an illegal threat of use of such weapons. C.G. Weeramantry, former



US Strategic Air Command Headquarters at Offutt Air Force Base, Nebraska, USA.
Photo: US Air Force.

Vice-President of the ICJ, has noted (with regard to naval nuclear weapons) that:

Assuming that nuclear weapons are deployed on naval vessels on alert status, they constitute a threat of use. The ICJ's opinion was that the threat or use of nuclear weapons would be generally contrary to international law, and in particular the humanitarian laws of warfare. The only situation in which the ICJ was inconclusive on absolute illegality was the extreme circumstance of self-defence when the very survival of a State is at stake. Considering the conclusion of general illegality, the burden of proof that a specific situation of threat or use is not proscribed by this rests on the threatening or using state. There is no proof offered by the deploying states that there is currently a threat to the very survival of a state which would require a threat or use of nuclear weapons.[7]

The US and Russia claim that LOW is necessary in order to protect against the possibility of a first strike by the other side which might destroy the bulk of their nuclear forces thus leaving them defenceless and unable to retaliate. During wartime launch-on-warning could possibly be justified in response to a threat of imminent nuclear attack as long as the response is designed not as retaliation but in order to prevent further attack, and is consistent with other principles of international humanitarian law previously discussed.

During peacetime however, launch-on-warning makes nuclear weapons use by accident or intent much more likely. The policy leaves little time to check accuracy of information regarding possible nuclear attacks before a retaliatory launch is authorised. A nuclear war could be started accidentally by faulty information of an incoming attack triggering a launch-on-warning response. In January 1995, for example, Russian early warning systems detected a missile heading towards Moscow. Russian leaders were alerted that it may be a nuclear tipped submarine launched nuclear missile. The “nuclear suitcase” which is used to give commands for a retaliatory strike, was “opened” in preparation for activation. It took eight minutes to conclude that the missile was not a nuclear missile – less than four minutes before the deadline for ordering a nuclear response. [8]

LOW also establishes a response procedure that might not be appropriate. If there is an actual nuclear attack, it could be one of a range of scenarios including a mistaken launch, a stolen nuclear weapon fired by a non-State group, a limited demonstration attack, or a massive attack. Launch-on-warning provides very little time to determine the exact nature of the attack, whether a nuclear response is the most appropriate, or what scale of response would be appropriate. Military strategy often assumes a worst-case scenario in order to provide maximum protection for ones-self. The assumption of a worst-case scenario in a nuclear strike could lead to a full-scale response which could be out of all proportion to the actual attack.

Finally, launch-on-warning and maintaining nuclear forces on high alert status constitute a highly confrontational posture which jeopardises efforts to reduce political tensions between countries, to solve longstanding conflicts and to move towards disarmament and cooperative threat reduction.

Philips and Starr have proposed that the US and Russia could rescind LOW and adopt instead a policy of RELOAD (Retaliatory Launch Only After Detonation). They argue that “ Such a policy ‘is compatible with the current posture of nuclear deterrence, and that the military on both sides would be glad to accept it in order to reduce the risk inherent in LoW.” [9]

The Blix Commission says that the most urgent task is to eliminate the launch-on-warning posture, and suggests some bilateral verification measures including the participation of inspectors from both countries in military exercises of their strategic forces or even a permanent presence of liaison officers at their strategic command posts.

The Blix Commission also recommends that Russia and the United States should agree on reciprocal steps to take their nuclear weapons off hair-trigger alert and should create a joint commission to facilitate this goal. They should implement a controlled parallel decrease in operational readiness of a large part of their strategic forces, through: reducing the number of strategic submarines at sea and lowering their technical readiness to launch while in port; storing nuclear bombs and air-launched cruise missiles separately from relevant air fields; storing separately nose cones and/or warheads of most intercontinental ballistic missiles or taking other technical measures to reduce their readiness. [10]

De-alerting as part of a transition to abolition would begin to move the Nuclear Weapon States out of the state of immorality inherent in the possession of nuclear weapons and provide a more positive political environment for negotiating a NWC. It would contribute to ending what Lee Butler, former commander of US strategic nuclear forces, called the “spectacle of democratic societies clinging to the proposition that threats to the lives of tens of millions of people can be reconciled with the underlying tenets of our political philosophy”.

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CleanUp, Disposition and Safe Disarmament



Barrels of transuranic waste in temporary storage at the E. Area Burial Grounds, Savannah River Site, South Carolina, US. This waste is contaminated with plutonium. More than 300,000 such barrels from nuclear weapons production are buried or stored around the country. Photo: Department of Energy

The implementation of a nuclear weapons convention would require dismantling thousands of nuclear missiles and disposing massive quantities of nuclear materials. In addition, many facilities involved in the production of nuclear weapons are severely contaminated. Experience to date indicates that more attention, research, and funding are necessary for safe nuclear disarmament, disposition, and cleanup.

Not only does the production, testing, storage and use of nuclear weapons lead to environmental and health damage, (See Critical Question on Health and Environment), but the process of dismantling the weapons also carries major risks. These risks include: accidents to or hijacking of the nuclear weapons during their transport to the site of dismantling; the hazards to the workers during the process of dismantling the weapons; and health and environmental damage associated with the removed components, including their transport, storage, and destruction.

In 1989, a committee of the U.S. Senate expressed concern that the Department of Defense had devoted too little money and effort to finding ways to comply with nuclear arms reductions in “an environmentally benign manner.” For example, pursuant to the Intermediate-Range Nuclear Forces (INF) Treaty, hundreds of Pershing missiles were burned in the open air or exploded on a test stand at the Pueblo Army Depot in Colorado. These procedures can release clouds of toxic hydrochloric acid when the missiles’ solid fuel combines with moisture. (See *Defending the Environment*, 1989).

Virtually all the experience with the disassembly and destruction of nuclear weapons in the United States has been gained over the past decade at the Pantex nuclear weapons facility, located about 17 miles northeast of Amarillo, Texas. It is operated for the U.S. Department of Energy by a contractor, the Mason & Hanger-Silas Mason Co., and is the U.S. primary assembly and disassembly plant for nuclear weapons. Prior to 1989 the Department of Energy had considered Pantex to be a relatively clean and safe facility. Since 1989 Pantex has been repeatedly criticized for its safety and health problems. These problems have included: radiation accidents in 1989 and 1990 resulting in workers being exposed to tritium and depleted uranium; inadequate staffing, training and procedures designed to protect workers and the environment from radiation; and violations in the general worker safety program.

Comment: Disposition

Unlike enriched uranium, plutonium poses special problems when one decides to “get rid of it.” Enriched uranium can simply be diluted to low enriched uranium and fabricated into fuel for nuclear power plants. Plutonium cannot be “diluted” – both “reactor grade” plutonium, the material produced in an average nuclear power plants and “weapons grade,” material produced in special reactors for the use in sophisticated nuclear weapons can be used in nuclear weapons. With isotopes that have half-lives of 86 – 380,000 years, it will take 860 to 3.8 million years for the material to completely decay.

The problem is further exacerbated by the fact that there are no acceptable methods to eliminate plutonium. Shooting it into the sun or at the least into outer space

would be expensive and risky – a Challenger-type disaster with a plutonium payload could potentially harm many people. Diluting plutonium in the oceans is politically unfeasible and may be scientifically unfeasible, too. Destroying it in underground nuclear explosions would be hazardous and environmentally unsound, not to mention a violation of the CTBT. The only other option is to transmute or transform it into other isotopes in a nuclear reactor or accelerator. The only problem is that the technology for such a process is only theoretical at the moment, and would take at least 25-50 years to fully develop. Furthermore, transmutation would require the construction of new nuclear reactors, which may be problematic in some countries (like the United States). Fortunately, there are ways to minimize access to plutonium by burying underground in a geologic repository, by putting it into a deep borehole, 2-6 km in depth, or by burying it in deep sea muds. One can further reduce access by immobilizing plutonium in a glass form or in a ceramic matrix prior to burial. Or, one can “burn” the plutonium as mixed oxide fuel (MOX fuel) in nuclear reactors and transport the spent MOX fuel to a geologic repository. Finally, instead of minimizing access, plutonium could be stored above-ground indefinitely with tight security, but this option presupposes continued political stability and a continued commitment to the NWC.

Only the United States and Russia have considered the question of plutonium disposition so far. Both countries have agreed to declare 50 metric tons of plutonium each as excess to military needs. The United States has adopted a “dual-track” method for dispositioning plutonium: immobilizing it in a ceramic matrix and burning it as MOX fuel in commercial reactors. Both the immobilized plutonium and the spent MOX fuel would then be put into a mined geologic repository. Russia is very attached to plutonium as a fuel form and would like to burn all of it as either MOX fuel or directly in breeder reactors. At the moment, it has only one breeder reactor (one is under construction). Russia has made no formal declarations of its intentions, in contrast to the United States.

Because there are no straightforward solutions to plutonium disposition, it would be difficult for the NWC to require the use of specific technologies for plutonium disposition, especially as the technology to disposition plutonium may improve in the future. Consequently, the NWC may be best off only requiring general conditions, such as physical protection standards. At the moment, no global standards exist for the physical protection of fissile materials like plutonium. For example, some countries (like the United States) require guards protecting plutonium to be armed, whereas other countries (like Japan) do not arm the guards protecting plutonium stockpiles. Consequently, it could be useful for the NWC to have a clause on physical protection for all fissile materials.

-Allison Macfarlane, Belfer Center for Science and International Affairs Kennedy School of Government, Harvard University

Related to the question of disarmament and cleanup is the problem of disposition of weapons usable material, particularly plutonium. No satisfactory solution has been found to date. Among the proposed options are the following:

- 1 Monitored and secured storage of plutonium for an indefinite period while a solution is sought,
- 2 Fabrication of plutonium into mixed oxide (MOX) fuel to be used in commercial power reactors (see discussion below),
- 3 Fissioning of plutonium in an accelerator or a nuclear reactor,
- 4 Deep geologic disposal or sub-seabed disposal of plutonium
- 5 Launch of plutonium into the sun
- 6 Destruction of nuclear warheads in an underground nuclear explosion.



Contaminated rubble and soil from the demolition of a uranium processing facility and debris from a munitions factory and chemical plant have been dumped in Weldon Spring Raffinate Pit 4 in Missouri. Photo: US department of Energy.

Comment: Disposition

Disposition is a misnomer. We cannot “dispose” of plutonium, which remains lethally toxic for 250,000 years. The latest plan to handle nuclear materials generated by nuclear power is the Bush Administration’s Global Nuclear Energy Partnership (GNEP) to replace the MOX project. [1] GNEP is a disastrous scheme to promote nuclear power around the world while “controlling” the outbreak of additional nuclear weapons states by maintaining custody of the bomb materials produced by nuclear reactors and recycling it in fast breeder reactors. The US has been approaching established nuclear weapons states and their friends with advanced civilian nuclear technology such as France, Japan, Russia, UK, China and India with a plan to provide toxic nuclear “fuel services” to developing countries which includes transporting fresh nuclear fuel to the four corners of the earth and then importing foreign “spent” fuel back to the US and shipping it by rail and truck, to selected US sites across the continent, to be reprocessed to make nuclear reactor fuel and shipped out again. GNEP would break a 30 year taboo, established by President Carter, on reprocessing civilian nuclear waste, which separates the used irradiated fuel produced by nuclear power plants into bomb-ready plutonium and uranium.

We would be putting our security at enormous risk, raising the chances exponentially for theft and nuclear weapons proliferation by increasing substantially the amount of bomb ready nuclear materials and putting it in transit all over the world. There is no guarantee that we could provide nuclear materials to a developing country for “peaceful” purposes, and that the receiving country wouldn’t decide some day, like North Korea did, to break its agreements and weaponize its plutonium.

GNEP creates additional toxic waste which would lie around for eons with no guarantee that it will not seep into our groundwater, aquifers and rivers, causing increases in cancers, birth defects, and mutations, as has been demonstrated at every other nuclear site on the planet. Reprocessing is the most polluting part of the nuclear fuel cycle. Like the MOX scheme, the nuclear industry is arguing that GNEP would make the material safe from terrorists. The best, cheapest, and quickest way to secure the material from theft is to put it behind gates with guns and guards while a new generation of scientists, untainted by the inadequate thinking of the current weapons designers, is provided adequate resources to re-visit the disposition problem anew.

The late Ted Taylor, a former nuclear weapons designer at Los Alamos, who quit his job after a crisis of conscience to work for nuclear abolition, maintained that we could disable all the nuclear weapons in our massive arsenal in a matter of weeks without resorting to the costly, complex, and environmentally harmful processes with hi-tech facilities recommended by the weapons scientists to dismantle the bombs over an agonizingly long period of time. When questioned as to how that could be done he said, “Put them in molasses! That would gunk up the works and prevent them from going off.” Frank von Hippel, President Clinton’s former science advisor, and Co-Chair of the International Panel on Fissile Materials affirmed that, indeed, we could just gum up the works of a nuclear bomb with some kind of sticky substance and render it inoperable in no time.

With adequate resources and new thinking, we may discover new properties of nuclear materials, which will enable us to render them inert over a shorter period of time than the current 250,000-year toxic lifespan of plutonium. In the meantime, nuclear waste should be stored as near to the site where it is generated as can be safely managed, in above ground monitored storage, until a new generation of scientists, untainted by weapons-work and ecological unconsciousness, has addressed the disposition conundrum, with adequate resources, fresh thinking, and a commitment to solutions that will not further pollute the earth. Just as the Hebrew children wandered in the desert for forty years so that no one born into slavery would enter the Promised Land, no one who ever worked at the weapons labs should be part of the solution for nuclear materials disposition.

-Alice Slater Nuclear Age Peace Foundation, New York

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Nuclear Energy

Critical Question:

How should the NWC handle the nuclear fuel cycle?

Nuclear Energy

Unlike the NPT, the Model NWC discourages the use of nuclear energy, recognizing that the continued reliance on nuclear power and its potential expansion pose a challenge to verification of a nuclear-weapons-free world. Recent high-profile cases, including the crises over the nuclear programs in Iran and the North Korea, have brought the risks associated with the proliferation of nuclear fuel-cycle technology to the forefront of the international agenda.

Article IV of the NPT refers to an “inalienable right” of non-nuclear-weapon states to develop nuclear energy for peaceful purposes. A possible problem for the confident achievement and sustainability of a world free of nuclear weapons, this current norm allows for states to build up the capacity and infrastructure—through ostensibly civilian energy and research programs—to produce nuclear weapons within a brief time period. However, any right must be exercised in conformity with international law, as is illustrated by the NPT itself, which makes the exercise of the Article IV right contingent on the obligation not to manufacture nuclear weapons. More broadly, the Article IV right is subject to limits based upon the environmental and security rights of other States and the global community. Further, while states surely are entitled to develop energy sources as part of the sovereign right of development, that right is subject to restrictions – including on particular energy sources – in the common interest. Accordingly, the qualification of the NPT right to peaceful nuclear energy as “inalienable” should be understood in the context of the NPT bargain, and not as a claim that it is a fundamental aspect of sovereignty. It therefore may be limited or extinguished over time by subsequent developments and agreements, as has the NPT Article V promise of access to the “benefits” of peaceful nuclear explosions – a provision which catered for the possibility of digging canals and mining operations with nuclear explosive devices, but which has subsequently become understood as too environmentally damaging and has been prohibited in the Comprehensive Test Ban Treaty.

The question of the relationship of nuclear power to the achievement of a nuclear-weapons free world remains crucial. Appreciation of the extreme environmental risks of nuclear energy, as demonstrated by the Chernobyl disaster, have been partially offset by a push to reduce reliance on fossil fuels creating a new demand for nuclear energy, with a Massachusetts Institute of Technology (MIT) study predicting a three-fold expansion in nuclear energy by 2050. Should these predictions be accurate, the need for nuclear fuel-cycle services will expand as well. With some adjustment, the very same facilities and equipment used to produce low-enriched uranium fuel for power reactors can produce high-enriched uranium suitable for use in a nuclear weapon. The separation and reprocessing of plutonium from spent reactor fuel as mixed-oxide fuel is a potentially greater proliferation challenge, as all separated plutonium is directly usable in nuclear weapons. All existing commercial nuclear power reactors produce plutonium as a by-product. The spread of these technologies increases the risk that such facilities might be misused and nuclear material diverted to use in weapons or into the hands of terrorists, or that the knowledge gained from operating such facilities might be employed in a clandestine nuclear bomb program. The spread of nuclear technology also increases the risk of terrorist attack on reactors and their spent fuel stores.

Verification of nuclear non-proliferation objectives historically has been limited in order to maintain the balance between rights and obligations of NPT states parties. NPT Safeguards, administered by the International Atomic Energy Agency (IAEA),

are restricted to verifying that no nuclear material in each non-weapon state has been diverted to weapons. The IAEA only has the authority to comprehensively verify the presence or absence of undeclared nuclear activities or materials in a state if it has accepted the voluntary Additional Protocol. Enforcement is hindered by the treaty's institutional deficits: the lack of a standing secretariat for the NPT and the infrequent meetings of states parties. The UN Security Council has increasingly filled the enforcement gap left by the lack of compliance mechanisms, but under a traditional view its authority is limited to cases that it has found to constitute a threat to international peace, rather than functioning as a reliable enforcer of global treaty regimes.

These concerns over the limits of the NPT safeguards regime led a 2003 MIT team, examining issues related to the expansion of nuclear power, to question the wisdom of any scenario envisioning the growth of nuclear energy. Undoubtedly, the only truly proliferation-proof solution would be the global phase-out of nuclear power. The Model NWC does not mandate such a global phase-out, but does provide some encouragement for it through an additional protocol on nuclear energy phase-out. This could be assisted by the establishment of an International Sustainable Energy Agency, which would provide assistance to States in developing environmentally sound energy technologies and phasing out nuclear energy.

A variety of proposals exist to mitigate the risks posed by the proliferation of sensitive nuclear technology and they should be explored and possibly implemented in parallel with negotiation of a NWC or prior to its conclusion. The Model NWC itself provides additional restrictions and controls on nuclear technology including a prohibition on plutonium reprocessing and on enrichment of uranium beyond 20% U-235 - an enrichment level sufficient for most nuclear reactors but insufficient for nuclear weapons. This would require the phase-out of breeder reactors and reactors using highly enriched uranium.

Beyond this, the continued existence of nationally based nuclear fuel-cycle facilities might pose an insuperable obstacle to the verifiability of a nuclear-weapons-free world. Thus, the IAEA has been studying the possibility of international control of fuel-cycle in order to prevent any State from possessing the national capability to produce material for nuclear weapons.

While there is a definite link between nuclear energy and nuclear weapons, progress towards nuclear disarmament should not be prevented due to continuing reliance by some States on nuclear energy. Thus the Model NWC attempts a balanced approach, permitting nuclear energy while at the same time strengthening controls over nuclear technology, and encouraging the phase-out of nuclear energy. Opinions vary on whether the Model NWC is too permissive or too restrictive in this respect, but such variance should not prevent progress on either negotiations for the NWC or strengthening nuclear energy controls.

Comment: Nuclear Energy

I agree that there should be much more thorough and open debate on nuclear energy. I would add that it should be international, with inputs from people who are citizens of a wide variety of countries with regard to their past and current nuclear activities. These should include announced or unannounced possession of nuclear weapons (including Israel); the nearly 50 countries that have nuclear power plants and/or research/test reactors with thermal power outputs greater than about 1 megawatt; and any other countries that are openly seriously considering use of nuclear energy for peaceful or military purposes. I would also include the dozen or so countries within which work is proceeding on R&D on inertial or magnetic confinement fusion power systems.

It has been my conviction for decades that solar energy is, by far, the best alternative, anywhere in the world, for meeting all human energy needs. I therefore keep pressing for completely open, urgent international development and demonstration of solar powered total energy systems to displace the present and widely projected dependence on fossil and nuclear fuels worldwide. I expect the environmental and economic benefits of such a global effort to become evident to everyone within less than a decade.

– Theodore B. Taylor, former nuclear weapons designer, Los Alamos National Laboratory.



“It has been my conviction for decades that solar energy is, by far, the best alternative, anywhere in the world, for meeting all human energy needs.”
 - Theodore B. Taylor
 Photo: Petr Nad

Comment: Nuclear Energy

The fundamental problem with banning nuclear weapons but allowing nuclear power is that they have the same energy source: the fission of uranium and plutonium isotopes. To use uranium in a nuclear weapon, it must first be enriched in the isotope U-235. At the same time, most of the nuclear power plants in the world also require enriched uranium, though not enriched to the degree used in nuclear weapons. To create plutonium for use in nuclear weapons, uranium-based fuel must be “burned” in a nuclear power reactor. In 1974, India showed the world that diversion of nuclear material for a “peaceful” nuclear explosion was indeed possible.

On the other hand, nuclear power may be needed in the 21st century to replace energy from fossil fuel power plants that emit greenhouse gases. Nuclear power is seen by a number of Asian countries, themselves either fossil-fuel-poor or loathe to expand dirty coal-burning plants, as a reliable energy source to fulfill the increasing electricity demands of their rapidly growing populations. Finally, who are western countries, having enjoyed the “luxury” of energy benefits from nuclear power, to inform developing Asian countries that they cannot have nuclear power?

Currently, the IAEA verifies that non-nuclear weapon states signatories to the NPT do not divert nuclear materials from energy to weapons purposes. With the exception of Iraq, the IAEA has done its job successfully. There will be no way to ensure completely that an individual country, especially a former nuclear weapons nation, will not break out of the NWC. Unless the NWC nullifies the NPT, there will be no reason to have a parallel organization to the IAEA. Nations, however, may wish to “update” or “recreate” the IAEA, and perhaps doing so under the auspices of an NWC is the path to follow.

There are two processes in nuclear materials handling for nuclear energy and nuclear weapons that are, in my mind, the most vulnerable to diversion activities: reprocessing of spent fuel and enrichment of uranium. The latter, as noted, is necessary for fuel fabrication in most light water type reactors, the most common reactor design. Only CANDU (Canadian deuterium-uranium) reactors use natural uranium, but they have their own proliferation problems. Fuel requires only 3-4% enrichment, whereas nuclear weapons require at least 20% enrichment. Therefore, careful monitoring of the enrichment process is necessary. As it stands now, only a few facilities worldwide can enrich uranium, though, each country that uses nuclear power would rather not be dependent on another for the main component of its fuel. Nonetheless, there may be some way to control the uranium enrichment market, but I’m not certain the NWC should do so.

Reprocessing of spent nuclear fuel is perhaps more worrying than enrichment in terms of proliferation. It easily can create a plutonium economy, and plutonium, no matter whether it is “weapons grade” or “reactor grade” can be used in nuclear weapons. Currently, only Russia, France, Britain, Japan, and Germany reprocess their spent fuel. India has plans to, and has reprocessed some material already for use in nuclear weapons. Germany recently announced that it plans to phase out reprocessing. Such a move may be the death knell for reprocessing plants in Britain and France, which rely heavily on Germany’s business. Japan is finally coming to the realization that reprocessing is a very expensive method for producing electricity. At today’s prices, uranium is so cheap that it does not make economic sense to use anything but uranium-based fuel. The dream of breeder reactors, which France, Japan and Russia clung to, is fading in France and Japan, but Russia continues to cling to the idea. The only country currently enthusiastic about plutonium as a good nuclear fuel is Russia, which has no money to reprocess spent fuel, build new reactors, or even run the ones they have very efficiently. So, commercial reprocessing may die a slow death. The NWC may want to restrict reprocessing activities, but again, doing so may cause it to lose signatories (Russia, in particular). It may be better for concerned countries to encourage those that reprocess to stop, and for the NWC to avoid this question and the question of nuclear energy.

- Allison Macfarlane (See Comment on Disposition for affiliation)



Plutonium generated in power reactors can be used to make nuclear weapons. This photograph is of a nuclear missile in its silo. *Photo: John Wollwerth*

Comment: Nuclear Energy

The problem of nuclear energy is complicated by the fact that almost all plutonium can be used to make nuclear weapon. For a time, many in the nuclear industry believed that the plutonium generated in power reactors could not be used for weapons. However, it is now understood that virtually any combination of plutonium isotopes can be used to make a nuclear weapon, using a design as simple as that of the Nagasaki bomb.

At present, there are roughly 500 tonnes of separated plutonium in the world, enough for over 100,000 nuclear weapons. About 250 tonnes of this plutonium has been separated from civilian spent nuclear power-reactor fuel, mostly in France, Russia and the UK. The stock of civilian separated plutonium is growing and will soon be significantly larger than the amount of weapon plutonium. It is all weapon-usable.

As of December 2005, there is over 800 tonnes of plutonium contained in spent fuel -- 700 tonnes in non-weapons states, and over 100 tonnes in the nuclear weapons states. This will grow each year as fresh spent fuel is generated from the production of nuclear electricity. There is an urgent need to address the problem of this growing stock of separated and unseparated civil plutonium.

-Zia Mian (Program on Science and Global Security, Princeton University)

Comment: Nuclear Energy

Despite massive public relations expenditures by the nuclear industry to convince the world that nuclear power is needed to mitigate the effects of global warming, that contention is unsupportable. Nuclear power is the slowest and costliest way to reduce CO2 emissions. Financing nuclear power would divert scarce resources from investments in renewable energy and energy efficiency. The enormous costs for nuclear power per unit of carbon emissions reduced compared to oil and coal, would worsen climate change by buying less carbon-free energy per dollar, compared to sun and wind. Nor is nuclear power carbon free. It is not only dependent upon fossil fuels for the production of uranium fuel, decommissioning and the disposition of wastes generated; it is also dependent upon a grid that is powered by other sources of energy, typically coal. And nuclear power is not reliable in extreme weather conditions. Every reactor needs back up power to prevent a meltdown. Recent incidents of intense heat, drought, blizzards, and hurricanes contributed to electric grid failures. In the summer of 2004, France had to shut down a number of reactors during the extreme heat wave.

It's time to replace Article IV of the Non-Proliferation Treaty with an International Sustainable Energy Agency. The nuclear crisis has resulted from the spread of "peaceful" nuclear technology together with the nuclear weapons states failure to disarm their arsenals. IAEA Director, Mohammed ElBaradei stated, "We just cannot continue business as usual so that every country can build its own factories for separating plutonium or enriching uranium. Then we are really talking about 30, 40 countries sitting on the fence with a nuclear weapons capability that could be converted into a nuclear weapon in a matter of months."

However, the proposals to try to *control* civilian nuclear fuel production, suggested by El Baradei and the Blix Commission are doomed to fail. It is unjust for certain favored nations to make their own nuclear fuel, without world condemnation, such as Brazil and Japan, while others, such as Iran and North Korea, are threatened for doing so. We must supercede the "inalienable right" to peaceful nuclear technology by establishing an International Sustainable Energy Agency (ISEA), funded by the more than \$250 billion in annual subsidies to nuclear and fossil fuel. Civil Society has produced a model statute for the Agency. www.abolition2000.org. Just as the CTB rendered the NPT's Article V guaranteed right to "peaceful nuclear explosions" inoperative, the establishment of ISEA would make the inalienable right to peaceful nuclear technology inoperative as well. Setting up ISEA, with a moratorium on new reactors and fuel production, phasing out nuclear power with safe, sustainable energy, should be an integral part of the negotiations for a Nuclear Weapons Convention.

- Alice Slater Nuclear Age Peace Foundation, New York Convenor, Abolition 2000 Working Group for Sustainable Energy

Knowledge and Reversibility

Critical Question:

Can the Nuclear Weapons Convention put the nuclear “genie” back in the bottle?

A recurring argument in the debate over elimination of nuclear weapons is that the “nuclear genie is out of the bottle”, inferring that nuclear physics cannot be unlearned. Because of this, it has been argued, there is no point in pursuing the elimination of nuclear weapons. True, nuclear weapons knowledge cannot be unlearned. In fact, it would be foolish to base any non-proliferation regime on the assumption that knowledge is lacking. But current proliferation risks are not merely a result of the discovery of the splitting of the atom. They are also the end product of long-standing policies to exploit this discovery for military purposes. Making nuclear disarmament irreversible will therefore involve a gradual dismantling of the entire nuclear weapons infrastructure, beginning with greater, not lesser, awareness of the potential risks posed by scientific discoveries.

The MNWC actually stresses the importance of keeping up the public availability of nuclear weapons and disarmament related knowledge in order to facilitate societal verification and conversion. However, it is virtually impossible to reconstruct a complicated technical device from its blueprints without referring to the implicit knowledge of the very experts who designed and constructed it. Therefore, nuclear weapons can be “disinvented” to some degree simply by retirement of the experienced weapon designers and by destruction of data storage media that contain most of the technical information relevant for nuclear weapons. A suggested approach is to eliminate all nuclear weapons related classified information, i.e., to destroy all design information and to declassify whatever is not destroyed.

On a more negative note, laboratory testing and computer simulation would further knowledge of nuclear weapons. The improved simulation technology is highly incompatible with the goal of a nuclear weapons free world. At the end of an era of comparatively primitive trial and error, a scientific revolution is now being initiated. With it, the theoretical understanding of nuclear weapons is supposed to be deepened. In addition new scientists and testers are being primed for systematic conservation of the knowledge relevant for nuclear weapons. If these developments continue, it will become more difficult in the future to “disinvent” sophisticated designs of nuclear weapons.

“Absent action, the knowledge and skills base unique to nuclear weapons will be atrophy.”
- *The Stockpile Stewardship and Management Program, US DOE, Office of Defense Program, May 1995.*

Comment: Knowledge

This is an extremely complex subject. Present and past knowledge of a wide variety of technical concepts has evolved from basic principles of design and analysis that are no longer secret. This knowledge has spread dramatically during the past decade or so. Much that is considered secret by governments of announced or unannounced Nuclear Weapon States is not in others. I therefore tend not to be hopeful that control of information is likely to be very effective in curbing the proliferation of nuclear weapon concepts in countries with either rudimentary or advanced understanding of the relevant design principles. The proliferation of actual nuclear weapon arsenals now and in the short-term future are, I believe, therefore best controlled by verified physical control of the key materials needed for making nuclear weapons. These key materials are now plutonium, highly enriched uranium, and tritium.

This type of international control of nuclear weapons may no longer be applicable if present efforts to develop pure fusion explosive weapons succeed. This possibility, the likelihood of which is strongly debated by experts, cannot be openly assessed because some of the key considerations remain secret.

- Ted Taylor (See Comment on Nuclear Energy for affiliation)

Comment: Knowledge

Many who advocate retention of substantial nuclear weapons facilities and arsenals for the foreseeable future rest their case in large part on two claims. Abolition of nuclear weapons is seen as impossible because the knowledge needed to make nuclear weapons cannot be “disinvented”. At the same time, many of the same people argue that we must keep and constantly modernize a huge complex of nuclear weapons research and testing facilities, because the knowledge needed to maintain an adequate deterrent is so fragile that it requires enormous effort to retain it.

The argument that retention of a nuclear arsenal is essential once the knowledge needed to make nuclear weapons is widespread has many flaws. Perhaps most important is that it implicitly compares a world without declared nuclear arsenals to a perfect, risk free world, in which there is no possibility of either breakout by a nuclear weapons state or proliferant or covert retention of small arsenals. The proper ground for comparison is the world we now inhabit, one bristling with nuclear weapons, some in decaying military structures, with a nonproliferation regime in tatters and new nuclear and ballistic missile races underway in South Asia. It is only in this context that the discussion of “reversibility” can be more than another abstract technical debate. The argument that large, active nuclear weapons establishments are necessary to sustain an acceptable deterrent rests on assumptions about the role of nuclear weapons which still receive far too little attention in arms control debates. Deterrence for several nuclear weapons states means far more than deterring an adversary’s nuclear weapons use. Rather, nuclear weapons are seen by the dominant factions in those states as an integral part of military policies which deem necessary and rightful the capacity to apply overwhelming force in response to a wide range of perceived threats, including threats to military forces deployed far beyond national boundaries. Only in this context does the constant refinement of large and diverse nuclear arsenals become understandable.

The assertion that constant increases in nuclear weapons knowledge are essential because nuclear weapons knowledge cannot be eliminated increasingly becomes a self-fulfilling prophecy. As the nuclear weapons states develop more sophisticated means to simulate nuclear weapons phenomena, and as techniques of nuclear weapons production also are developed to improve their flexibility and capacity to move quickly from design to production, the proliferation of nuclear weapons knowledge is bound to increase, and the technical barriers to reconstitution of a nuclear arsenal will tend to diminish. The technical capabilities which are touted as necessary to counter proliferation and use of weapons of mass destruction have the potential to make nuclear weapons proliferation more likely, and abolition of nuclear weapons more difficult to achieve.

Jonathan Katz, a member of a 1994 JASON panel which evaluated the U.S. nuclear weapons “stewardship” program, advocated an alternative “curatorship” approach in which new experimental facilities like the NIF “are not built, experiments are not conducted, and design and development skills are allowed to atrophy. Only those

skills required to remanufacture weapons according to their original specifications are preserved.” Stewardship would add little to confidence in the nuclear weapons stockpile, Katz argued, while posing proliferation risks due to the knowledge which could diffuse from nuclear weapons “stewardship” programs, particularly those involving inertial confinement fusion:

“....NIF would bring together weapons scientists with scientists who are doing unclassified work on inertial fusion. They would rub elbows, share facilities, collaborate on unclassified experiments, and communicate their interests and concerns to each other. Information and understanding would diffuse from the classified to the unclassified world, even without any technical violations of security....

Weapons work is so advanced in the United States that the NIF would not advance it; but NIF could be of tremendous use to nations where nuclear weapons work is less advanced. The lowering of the barriers to proliferation of both fission and fusion weapons that NIF would bring is surely not in the national interest....

As nuclear weapons grow older, it is inevitable that confidence in their performance will erode. But stewardship cannot remedy that. The source of confidence in the nuclear stockpile is the original testing program, combined with the faithful remanufacture of weapons components to original specifications. Curatorship is sufficient to make this degree of confidence possible, and stewardship can do no better....

Curatorship makes more sense than stewardship. It is cheaper, more proliferation resistant, and it is plainly more suitable for a world in which a nuclear arms race no longer exists.”

We are entering a time in which full-scale nuclear arms races are beginning once more. Today, they are principally races among new nuclear weapons states, manifesting the deterioration of the nonproliferation regime, attributable in large measure to the failure of the nuclear weapons states to make significant progress towards nuclear disarmament in a decade of unprecedented opportunity. The complexity of the multilateral nuclear confrontation is growing as sophisticated nuclear weapons capabilities continue to spread, each new turn making the technical and political tasks of achieving abolition of nuclear weapons more difficult.

In the end, the road to abolition requires political, not technical, inventiveness. Every round of technological innovation in the nuclear weapons sphere has proliferated, only making the world more dangerous and the path to abolition more complicated. The problem of “reversibility” in an abolition regime is an abstract theological debate in a world where the powerful are turning their backs on disarmament and returning to the rule of force in international affairs. Elimination of nuclear weapons will require profound political change within the nuclear weapons states, leaps of faith and building of confidence on all sides, and an international security regime that is truly multilateral. The “reversibility” of nuclear abolition, and the degree of risk it represents, cannot be discussed meaningfully until we are at least stumbling towards abolition rather than marching towards war.

- Jacqueline Cabasso and Andrew Lichterman Western States Legal Foundation. See comments on Research and Breakout.



National Ignition Facility (NIF) under construction at Lawrence Livermore National Laboratory in California would pursue research on fusion reactions for a whole new generation of weapons. Photo: Brian Quintard, Lawrence Livermore National Laboratory

The proper ground for comparison is the world we now inhabit, one bristling with nuclear weapons, some in decaying military structures, with a non-proliferation regime in tatters and new nuclear and ballistic missile races underway in South Asia.

Conversion

Critical Question: How should the Nuclear Weapons Convention handle conversion?

"I have to cast my lot with those who age after age, with no extraordinary power, reconstitute the world.

- Adrienne Rich, Poet

Current nuclear weapons programs have generated a constituency of corporations and workers that benefit economically from the nuclear weapons budget and is thus resistant to nuclear disarmament. Conversion refers to the least disruptive transformation of nuclear weapons facilities and supporting industries to non-weapons purposes. Conversion models envisage the potential for productive roles for nuclear weapons corporations and workers. The education, skills, and training necessary for large-scale nuclear disarmament, from research and development to implementation, are one answer to the "jobs" argument, often used to defend the nuclear weapons industry.

There is, however, disagreement as to the most appropriate type of work for weapons designers, whether as part of the disarmament process or in a completely separate field (e.g., medicine). On the one hand, the knowledge, skills and technology necessary for verifiable nuclear disarmament are today in the hands of the nuclear weapons establishment. Thus conversion of this infrastructure seems the most efficient way to preserve jobs and redirect expertise. On the other hand, opponents argue, the mentality of the nuclear weapons infrastructure would prevent it from being truly able to participate in a nuclear disarmament regime.

The viability of conversion would seem to turn on the ability of a disarmament culture to permeate the nuclear weapons infrastructure and the scientific educational and training institutions that feed into it. Research and development priorities, with the emphasis on military ambition, have limited the options available to scientists, and participation in weapons research, in turn, has shaped the political outlook of the scientific establishment.

It is not possible to predict with certainty whether scientific research and education institutions can be transformed from a weaponization mentality to a disarmament mentality. The feasibility of such a transformation will depend greatly on the larger cultural context in which scientists are educated, trained and politicized. If nuclear weapons are stigmatized rather than glorified in political discourse and popular movies, they will also be less appealing as objects of scientific pursuit than they are today.

The success of conversion will likely rely on a mix of coercion and incentives at both national and international levels, many of which could be implemented prior to the NWC entering into force, and which could in fact assist in removing institutional blocks in NWS to their ratification of the NWC. One such example would be divestment in corporations involved in nuclear weapons contracts – a measure already undertaken by the Norwegian Pension Fund. Incentives could include retraining for workers and government contracts for corporations converting to nuclear disarmament, clean-up or verification tasks.

Even without transformation to a nuclear disarmament regime, research is desperately needed for cleanup of the radioactive and other hazardous waste produced by 50 years of a nuclear arms race. For nuclear disarmament to progress, research is also needed in the area of plutonium disposition and verification technology. Assuming that a good faith reordering of research and development priorities is possible, conversion of the nuclear weapons complex would seem to be the most efficient way to develop a nuclear disarmament regime.

Conversion, if it is possible, would likely take more than one generation and it would depend on changes in policy and popular culture. It also depends on whether nuclear disarmament research can be made as economically enticing and intellectually exciting as nuclear weapons research has been for many. (See Critical Question on Research.)

Comment: Conversion

What would happen to nuclear weapons laboratories in a world where nuclear weapons had been abolished by international treaty? Presumably the weapons laboratories, together with universities and NGOs, would play an important role in studying how to disarm in a stable and verifiable way, how to dismantle nuclear weapons cleanly and efficiently, and how to dispose of the material in the weapons safely. But, if we believe that a world without nuclear weapons is possible to achieve, what should the weapons laboratories do once such a world has been achieved?

It is fashionable on the left to say that, if they are no longer needed, weapons laboratories should be “converted” to other purposes. I have to confess that this puzzles me. We did not “convert” the typewriter industry when computers were invented; we let it shrivel and

(nearly) die. In our society, which tends to trust the invisible hand of the infinitely wise free market to allocate economic resources, it’s generally assumed that, once an industry’s product is no longer needed, it’s best to lay off the people making products we no longer use and let them find new jobs in industries whose products we want. Why should a nuclear weapons laboratory be any different? And why should the alternative, central planning by the government, work any better in the U.S. than it did in the Soviet Union?

The problem with “converting” the weapons laboratories is that it’s like asking an elephant to be a giraffe. If you wanted a new clean car engine or environmental remediation technologies, you wouldn’t ask Microsoft to do it because they have no experience in the field; so why would you ask a nuclear weapons laboratory?

Having said this, I would not close the weapons laboratories outright. They are large, complex organizations with many subcultures, of which the weapons subculture is only one — albeit the largest and most important one. Still, the Livermore Laboratory, for example, has a biomedical division, it has an atmospheric sciences division, it has people working on new computer chip technologies, new automobile engines and so on. Such programs could become the nucleus for a smaller, different kind of laboratory if the laboratory was no longer dominated by managers who worked their way up through the weapons programs.

But what of the weapons scientists? Many of these have given the best years of their lives to their country and, if their curriculum vitae are classified and their skills narrow and esoteric, it will not be easy for them to find new jobs, especially if they are middle aged. Besides, if they are fired en masse, the politicians representing their districts will fight to save their jobs. Thus I would suggest a kind of GI Bill for weapons scientists. I would lay them off with very generous severance payments that they could use to start their own businesses, go back to college, play the stock market etc. This would compensate the weapons scientists for their sacrifice, keep federal money flowing into the local economy for a while, and it would, in the long run, be cheaper than keeping the weapons labs at their present size

-Hugh Gusterson, Professor of Cultural Studies and Sociology at George Mason University.

Comment: Conversion

The U.S. nuclear weapons laboratories constitute a politically powerful, self-perpetuating, multi-billion dollar industry. Almost mystically rooted in their origins as developers of the first atomic and hydrogen bombs, their power is amplified by the lack of recognized independent nuclear weapons expertise and their monopoly on access to decision makers. The link between control over nuclear weapons-relevant information and influence over nuclear weapons policy has been formally institutionalized by the “certification” process, an element of the “Stockpile Stewardship” program, in which the weapons laboratories annually “certify” the “safety” and “reliability” of the nuclear arsenal. As one of the Clinton Administration’s prerequisites for acquiescence to the CTBT, the certification process provides an opportunity for the weapons laboratories to call for resumption of underground testing if they are not given what they consider adequate alternative resources to “certify” the stockpile — a temptation which may grow in appeal if nuclear weapons begin to lose their central place in U.S. national security dogma. The concentration of arms control and nonproliferation policy and technology work at the weapons laboratories has further consolidated their influence over nuclear weapons policy.

Monitoring and verification technologies also employ a facilities and skills base, which is centered largely at the weapons laboratories. The difficulties of sorting out what is truly needed for monitoring and verification of the nuclear disarmament process alone from attempts to continue weapons development are substantial. Combined with an extensive counter-proliferation program in which nuclear weapons play a central role and an ambitious nuclear weapons “stewardship” program, which will entail new generations of multi-use high energy density, hydrodynamic testing, and computing capabilities, they may be insurmountable.

Conversion will require radical and profound changes at the highest levels in national security and foreign policies, coupled with the lifting of secrecy and a greatly increased level of public participation in decision-making at the local/community level. These developments will necessarily be accompanied by a major realignment of powerful economic interests.

- Jacqueline Cabasso and Andrew Lichterman, Western States Legal Foundation
(See Comments on Breakout and Knowledge.)

Comment: Conversion

We have observed the response of the US nuclear weapons labs to the end of the Cold War and the moratorium on nuclear testing. First they came up with AGEX, (Above Ground Experiments) and then they sold the Congress on the “stockpile stewardship” program which enabled weapons workers to design new nuclear weapons in computer simulated cyberspace with the addition of so called “sub-critical” nuclear tests. These tests, while shattering plutonium in underground tunnels 1,000 feet below the desert floor at the Nevada test site, do not cause a chain reaction, and so the weapons labs argue that they do not “count” as nuclear tests and are permitted under a “Comprehensive” Test Ban Treaty, which they have opposed in the halls of Congress, arguing that someday they may want to do full scale tests again. Stockpile Stewardship has now spawned the Reliable Replacement Warhead, at a cost of nearly \$9 billion a year, where our best and brightest at the weapons labs are now arguing that we should replace the entire nuclear arsenal with a new set of hydrogen bombs, that will last forever, even though experts have concluded that “most plutonium pits have a credible lifetime of at least 100 years.” [1] The oldest pits, or plutonium bomb cores, currently in the US arsenal are still less than 50 years old.

The culture of the weapons labs makes them a very poor bet for conversion. It would be foolish and naive, given our experience to date, to assume any "good faith reordering of research and development priorities" by the labs. Thus, conversion would not be the most efficient way to achieve a nuclear disarmament regime and should not be addressed in a Nuclear Weapons Convention. It would be far more efficient to send all the weapons designers and their teams to medical school, or muster them out with full pay until retirement, using the \$9 billion per year now budgeted for new weapons work at the labs. We would still have enough funds left over to cover the desert with solar panels and wouldn't be plagued by new loopholes and twisted interpretations of our commitment to disarmament by the current weapons establishment

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-Alice Slater (See Comment on Disposition) Nuclear Age Peace Foundation, New York

Comment: Conversion

Conversion does not minimize disruption of the entities being converted, it refers instead to transforming military industries into civilian industries in a manner in which the benefits outweigh the costs. And disarmament tasks are not conversion; they simply substitute a disarmament program for a weapons program. This is exactly what the stockpile stewardship claims to be, and over 50% of the budget of that program is currently being spent on research and development of new weapons. Conversion should concentrate on people, not facilities. Unfortunately, attempts to challenge scientists and engineers at the labs are mainly associated with new weapons design and testing.

The only measures of viability for conversion are market-based. One cannot assume a good faith reordering of research and development priorities if the weapon labs control the research funds. Only the market, not another government project, can guarantee a reordering of research funds.

Research isn't desperately needed for cleanup of nuclear waste. DOE has research units scattered around the complex. What is needed is a commitment to pursue cleanup. "Innovative" research from the labs has centered on breeder reactors, MOX burning and other methods of disposition that create more, not less, waste. Similarly, research in plutonium disposition and verification technologies is ongoing around the US. Again, viable methods have been by-passed so we can engage in MOX burning.

-William Weida, Economics Department, Colorado College

Research

Critical Question:

How should the NWC handle research related to nuclear weapons?

The question of research has triggered some of the most reactive responses to the model NWC. Any suggestion of state or international control over scientific work is inherently disturbing, not only to scientists. There is intense disagreement about whether certain types of nuclear physics research should be limited or prohibited, and what prohibitions would even be possible.

An approach to research that relies primarily on prohibition of certain activities or knowledge will meet resistance and its effectiveness will depend greatly on enforcement rather than compliance. Today's vast accumulated knowledge about the weapons applications of nuclear physics is not a direct and inevitable consequence of the splitting of the atom. It is the result of deliberate research and development priorities based on considered policy, which has led to an availability of weapons related work and lack of meaningful alternatives. The social and political manifestations of dependence on military power and nuclear capability for security also play a role. Scientists do not make choices in a cultural vacuum.

Defining what constitutes nuclear weapons research is a difficult threshold question. Whether an area of research is in conflict with the purposes of the NWC depends largely on intent and will remain unclear and controversial as long as any nuclear weapons are being maintained. In today's world, such controversy is inevitable because a policy of maintaining a nuclear arsenal allows for a "grey" area regarding the intent of research related to nuclear weapons. An example of this is the debate in the United States over what constitutes design of new weapons, as opposed to modification of existing weapons types or additional safety features. These types of debates will dissipate under a regime committed to the elimination of nuclear weapons. Grey areas will decrease even further once weapons are actually eliminated and no research is necessary for their interim maintenance and storage.

Research essential to nuclear weapons, if it is to be restricted, may need to be handled differently from research that may support or enhance a nuclear capability but primarily has other purposes. Again, intent plays a critical role here, as almost any area of scientific research can lend itself to military applications. The answer to this dilemma is to cultivate a culture of scientific responsibility rather than approach science and scientists with suspicion. Scientists should learn about proliferation risks and develop the tools to recognize potential diversion of scientific discovery to aggressive purposes. (See Critical Question on Nuclear Weapons Knowledge and Reversibility.)

Prohibiting nuclear weapons research does not necessarily create pragmatic or ethical problems. Where there is no policy of nuclear weapons dependence, as in Africa, a prohibition on research or the seeking, receiving, assisting or encouraging of research is generally acceptable. This is evidenced in the Treaty on an African Nuclear Weapon Free Zone (Treaty of Pelindaba), which prohibits States from conducting research, seeking or receiving assistance in research, or assisting or encouraging research on "any nuclear explosive device by any means anywhere" (Art. 3). However, where there is a long history of nuclear weapons research, a direct prohibition may



Los Alamos National Laboratory, one of the three major labs responsible for creating and manufacturing the US nuclear stockpile. Photo: Department of Energy.

be controversial or impossible until nuclear weapons are completely destroyed. For this reason the model NWC suggests a prohibition on funding as an alternative to a direct prohibition on research. It is also simpler to determine and define the purpose of funding than it is to determine the potential uses of specific research.

The United States Stockpile Stewardship and Management Program has as one of its goals attracting young scientists to keep the knowledge necessary for a nuclear capability alive. (See Critical Question on Conversion.) Scholarships, fellowship, education and training programs, and intellectually stimulating research opportunities feed today's nuclear capability in the United States and elsewhere. In fact, the current disrepair in the former Soviet Union's nuclear complex is directly related to the collapse of the economic and educational systems that supported the vast nuclear weapons structure. (See Critical Question on Economic Aspects.)

Research is desperately needed for safe, secure, irreversible and verifiable nuclear disarmament. Most of the knowledge, skills and mechanisms essential to safely reversing nuclear armament are today in the hands of the scientific and technical staff of the nuclear weapons complex and supporting agencies, such as the International Atomic Energy Agency. Thus the most efficient and least disruptive way to further nuclear disarmament research would be to transform the weapons related institutions and redirect the skills of their staff. Many supporters of nuclear abolition, however, question whether the institutions that have produced today's nuclear arsenals are capable of change. There is concern that any NWC provisions that allow or encourage nuclear disarmament research would function as loopholes allowing maintenance of a nuclear weapons capability. (See Critical Question on Conversion.)

Comment: Research

I don't believe that you can ban research in the purest sense of the term. How can you tell scientists to stop thinking about an issue — especially when the issue (nuclear weapons physics) is so closely tied in to other areas of academic physics? And how would you verify such a ban? The only thing you can verifiably ban are certain large experiments — such as nuclear tests or laser fusion shots. These take immense amounts of money, complex social organization and political will to orchestrate and can be banned by treaty if there is a will to do so. Computer simulations of nuclear tests are in a different category, and I don't see any realistic way to ban them.

If there were a NWC, I would expect the decline of nuclear weapons research to be a very gradual affair — with some continuation of basic research initially as the political price for such a convention. Presumably if there were such a convention, it would at first be accompanied by the survival of a fairly substantial group of stewards maintained as a hedge against a new arms race. The stewards would rightly say that they wouldn't be very good at being stewards unless they were allowed to do some sort of basic research into their field — short of making new weapons. But over time the existence of such a group would be seen as an extravagance and bright people would not be very interested in joining such a dead-end profession provided there was no resumption of the nuclear arms race internationally. It would help if there were no further production of fissile material, of course. Furthermore, as the group of scientists who had participated in nuclear tests died off, it would become harder to transmit nuanced nuclear weapons knowledge to a new generation of scientists. The knowledge and research that survived would seem, like alchemy, of increasingly questionable value.

- Hugh Gusterson, Professor of Cultural Studies and Sociology at George Mason University.

Comment: Research

“Stockpile Stewardship” is a nuclear weapons research and testing program of Cold War proportions that will keep nuclear weapons in the arsenal, in the budget, and in the career paths of scientists well into the next century. Under the pretense of maintaining the “safety” and “reliability” of the nuclear weapons stockpile, Stockpile Stewardship is intended to preserve the capacity to maintain, test, modify, design and produce nuclear weapons, with or without underground testing. Some of the key Stockpile Stewardship technologies have been developed as “dual-use” scientific facilities that can be used for both high-energy physics research and bomb science. Prime examples are the multi-billion dollar, stadium-sized National Ignition Facility, a laser fusion installation presently under construction at the Lawrence Livermore National Laboratory in California, and the virtually identical “Projet Megajoule,” under construction in France, which have the potential, in combination with other ongoing experimental research, to lead to the development of pure fusion weapons. Most Stockpile Stewardship facilities have little to do with maintaining either the safety or reliability (itself a highly debatable proposition) of existing weapons as they await disablement and dismantlement on the path to elimination. Rather, they are intended to serve as training grounds for the next generation of nuclear weapons designers as well as the tools of the trade.

It is often stated that we can’t or shouldn’t prohibit certain types of research. However, we don’t have to pay people to design weapons of mass destruction. What’s needed is an engineering-based “stewardship” approach to ensure the safe and secure containment of nuclear weapons, their components and materials, under international supervision, as nuclear weapons are phased out and eliminated. We support a prohibition on funding for nuclear weapons research, as suggested in the model NWC.

- Jacqueline Cabasso and Andrew Lichterman, Western States Legal

Comment: Research

The weapons labs should be shut down after a treaty is signed. There should be an international prohibition on government funding of research for nuclear weapons design, development, testing and production. Such a provision would be a totally appropriate international control on government-funded research for the future of the planet. Research should be permitted on verification and materials disposition, and the language of the treaty should be specifically limited solely to those two areas of research. While the verification research may require the use of older experienced weapons lab personnel, their contribution to solutions on the disposition of materials such as plutonium has been worse than nothing at all. Their latest new ideas for GNEP and the Reliable Replacement Warhead, are a recipe for proliferation, giving other countries an incentive to get nuclear weapons of their own and to develop homegrown “peaceful” nuclear technology while creating extraordinary planetary hazards as hundreds of thousands of tons of lethal material are shipped around the world — by plane, ship, train, and truck — to be burnt up in civilian reactors which will cause even more deadly environmental contamination.

-Alice Slater, Nuclear Age Peace Foundation, New York

(See Comments on Disposition and Conversion)

Economic Aspects

Critical question.

Will nuclear weapon states, particularly Russia, be able to afford to eliminate their nuclear weapons?

The full cost for the total dismantlement and destruction of nuclear weapons and disposal of fissile material is impossible to determine at this point in time, and depends on a number of policy decisions regarding, among other things, the speed of destruction, the types and complexity of verification systems adopted and the method of fissile material disposal.

Experience from the START I and INF Treaties indicates that costs will be extremely high. Projected U.S. costs for dismantlement and verification under these treaties is approximately \$31 billion. [1] However, this does not include cleanup costs, which could reach a staggering \$365 billion. Russian costs are likely to be comparable, if they are to enact cleanup operations commensurate with the requirements.

Russia is already experiencing difficulties in meeting the costs of current programs of dismantlement and disposition, threatening the continuation of such programs. In response the US has provided \$1.5 billion to help in dismantlement, and has agreed to spend \$8 billion - \$12 billion to purchase Highly Enriched Uranium from the dismantled bombs. However this may bring some economic return to the U.S. as it will be used in nuclear power facilities.

While the nuclear weapons States are responsible for the costs of eliminating the weapons they have created, the Model Nuclear Weapons Convention provides for the establishment of a voluntary fund to assist States who might otherwise be unable to fulfill their disarmament obligations.

As large as the disarmament costs may be, the alternative of maintaining nuclear weapons would be even more costly, as it merely delays the disarmament costs into the future, and adds extra costs to maintain the weapons. The US is currently spending \$30 billion annually on nuclear weapons programs, and has spent over \$5.5 trillion since 1940. [2] These programs continue to add to the future costs of weapon destruction and clean-up. In purely dollar terms, it will thus be more economic to move from the current nuclear weapons maintenance and modernization program to a nuclear disarmament program.

Proponents of nuclear weapons research and development (R&D) often cite economic benefits of such research, arguing that such R&D generate technological “spin-offs” which have led to economic advancement. [3] For example, NAVSTAR satellites, originally developed to provide pinpoint accuracy for ballistic missiles, are now finding widespread commercial use in automobile electronic atlases and hand-held directional finders. However, the extent of civilian benefits from nuclear weapons spending is necessarily restricted due to the secrecy of much research and the specific orientation to military purpose. [4] If a comparable amount of public money were spent in civilian research and development, the returns would most likely be much greater.

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Comment: Economic Aspects

Russian cleanup costs will certainly be larger than ours because of the lax environmental standards followed in Russia. Our cleanup costs may be as much as \$1 trillion - comes from a DOE estimate that omitted many costs. The cheapest short-run alternative for the Russians is not to clean up at all — and the cheapest course of action is may be to retain most of their nuclear weapons. The Russians probably spent an amount similar to the US to develop and deploy nuclear weapons. A French researcher recently claimed that the French spent \$1.5 trillion on their entire effort to develop and deploy nuclear arms.

Spinoffs are always more expensive to develop than if the product/item had been developed directly. As a result, they always represent an economic loss compared to more efficient methods of development.

The real economic issue that is not addressed here is the 'future cost' of all the weapon work we are now doing. The essay on economics tends to view nukes and their waste as past events that need to be corrected. While this is true, the production of both weapons and waste continues unabated. And the costs continue to mount.

- William Weida (See Comment on Conversion)

Update to comments on *Breakout, Knowledge, Conversion and Research* by Jacqueline Cabasso and Andrew Lichterman, Western States Legal Foundation, for the 2007 edition

When we wrote our comments on *Breakout, Knowledge, Conversion and Research* in 1998, the window of opportunity for meaningful progress towards nuclear disarmament that had appeared with the end of the Cold War was still open. In these comments, which are reprinted here without changes, we warned that programs then underway by the nuclear weapon states to maintain and upgrade their nuclear weapons research and production infrastructures would create insurmountable obstacles to nuclear nonproliferation and disarmament and invariably lead to new arms races. Today, in the world's leading nuclear weapon state, we are seeing that the deal obtained by the U.S. nuclear weapons establishment-- modernization of its nuclear weapons complex in exchange for the cessation of full scale underground tests-- is bearing fruit in the form of plans for a new generation of hydrogen bombs. Moreover, these new weapons of mass destruction play a central role in that nation's official national security policy.

In August 1995, citing the promise made in connection with indefinite extension of the nuclear Non-Proliferation Treaty earlier that year, U.S. President Bill Clinton announced his support for a Comprehensive Test Ban Treaty by 1996, in order to "reduce the danger posed by nuclear weapons proliferation." He also announced the U.S. intent, "as part of our national security strategy," to "retain strategic nuclear forces. . . In this regard," he stated, "I consider the maintenance of a safe and reliable nuclear stockpile to be a supreme national interest of the United States." Clinton strongly endorsed the nuclear weapons labs' "Science Based Stockpile Stewardship" program as a means of maintaining the U.S. "nuclear deterrent" without nuclear testing, and he appealed to Congress for bipartisan support for the program "*over the next decade and beyond.*" [1] Congress provided that support and just over ten years later, in April 2006, the National Nuclear Security Administration (NNSA) of the Department of Energy (DOE) rolled out its plans for Complex 2030, the new name for its evolving nuclear weapons research and production infrastructure.

The DOE proudly traces its lineage to the Manhattan Project and the race to develop an atomic bomb during World War II. [2] The DOE's Livermore Lab in California was founded in 1952 to compete with its Los Alamos Lab in New Mexico - the original home of the Manhattan Project - to develop a hydrogen bomb, orders of magnitude more powerful than the U.S. atomic bombs that destroyed Hiroshima and Nagasaki in 1945. Today, the Livermore and Los Alamos National Laboratories - *the direct descendants of the Manhattan Project* - are engaged in a new arms race with each other to design the next generation of hydrogen bombs, euphemistically called "Reliable Replacement Warheads" (RRWs).

After a lengthy design competition, the Livermore Lab has recently been given the green light to proceed with development of a replacement for the 100-kiloton W76 warhead [3] (some 1,600 of which are currently deployed on Trident II D-5 submarine-launched ballistic missiles). The Nuclear Weapons Council, a joint Department of Defense (DoD)-DOE agency, has directed the NNSA to begin another design competition for a second RRW. The first RRW is due for production in 2012; the production goal for the second warhead is 2014. [4] A DoD document outlining the future of the nuclear stockpile, forecasts that the U.S. will "develop warheads for next-generation delivery systems" between 2010 and 2020. The "long term vision" stated in the "Stockpile Transformation" chart includes "possible new DoD platforms and delivery systems" along with "2-4 types of RRWs". [5]

In April 2006 testimony to Congress, the Deputy Director for Defense Programs at the NNSA bragged: "Progress on RRW has been remarkable. Last year, the DoD and

DOE jointly initiated an RRW competition in which two independent design teams from our nuclear weapons laboratories—LLNL and LANL both in partnership with Sandia and the production complex—are exploring RRW options. A competition of this sort has not taken place in over 20 years, and *the process is providing a unique opportunity to train the next generation of nuclear weapons designers and engineers.* Both teams are confident that their designs will meet established requirements and be certifiable and producible without nuclear testing.” [6]

This testimony was proffered in support of the NNSA’s “Complex 2030” plan for the future of the nuclear weapons complex. Under this proposal, “NNSA’s future path is to establish a smaller, more efficient Nuclear Weapons Complex that is able to respond to changing national and global security challenges.” [7] The RRW Program is identified as a principal element of Complex 2030, “to ensure the long-term reliability and safety of the nuclear weapons stockpile and enable a more responsive supporting infrastructure while reducing the possibility that the United States would ever need to return to underground testing.” [8] While the NNSA claims that “RRW is not a new weapon providing new or different military capabilities and/or missions,” [9] then-NNSA chief Linton Brooks was very clear that this possibility remains on the table.

“In 2030, our Responsive Infrastructure can also produce weapons with different or modified military requirements as required. The weapons design community that was revitalized by the RRW program can adapt an existing weapon within 18 months and design, develop and begin production of the new design within 3-4 years of a decision to enter engineering development... goals that were established in 2004. Thus, if Congress and the President direct, we can respond quickly to changing military requirements.” [10]

Brooks spelled out the purpose of the “responsive infrastructure:” “The current nuclear weapons complex was built in the 1950s and 60s for the Cold War. Unless this infrastructure is improved, we will not be suited for 21st century challenges. As outlined in the 2001 *Nuclear Posture Review*, we are moving towards a nuclear deterrent that is smaller, more capable and better able to respond to changing needs. Our *Complex 2030* plan... puts NNSA on a path to achieve this necessary national security goal.... In short, I see a future world where a smaller, safer, more secure and more reliable stockpile is backed up by a robust industrial and design capability to better respond to changing technical, geopolitical or military needs.” [11]

This work is already in progress under the existing Stockpile Stewardship program. “Life Extension Programs,” to render the U.S. nuclear arsenal reliable for decades to come have been completed for the W80 Cruise Missile and are underway for the B61 bomb and the W76 SLBM (Sea Launched Ballistic Missile). [12] While considering options for a new large-scale factory for warhead components, the U.S. is establishing significant “interim” capacity to make bomb parts at its existing facilities. [13]

According to the NNSA, “Once it is demonstrated that replacement warheads can be produced on a timescale in which geopolitical threats could emerge, or the nuclear weapons complex can respond in a timely way to technical problems in the stockpile, further reductions can be made in reducing on-deployed warheads.” [14] *This approach renders the disarmament objective implicit in further reductions meaningless.*

An official government study on plutonium aging, released in November 2006, created a flurry of national media attention. The study, conducted by nuclear scientists at the Livermore and Los Alamos Labs and reviewed by an outside panel of nuclear weapons experts known as the JASONS, concluded that plutonium pits degrade at a much slower rate than was previously believed. The study found that plutonium in the U.S. nuclear arsenal remains viable for as long as 100 years, more than twice as long as had been thought. Some critics of Complex 2030 seized on the report, claiming it “proved” that new pits and warheads are “completely unnecessary” because the existing warheads will last for a century. [15] But the Democratic Congressional

Representative whose district includes the Livermore Lab welcomed the study, claiming that plutonium aging is a “side matter” that will not influence the RRW decision, which she characterized as “an opportunity to rejuvenate the complex” and attract the “smartest scientists in the world” to the weapons labs. [16] Indeed, the NNSA issued a press release two days later, reaffirming its commitment to the RRW program as the best strategy for “*sustaining the nation’s nuclear weapons stockpile for the long-term without underground nuclear testing.*” [17]

In a famous line from the movie, “Field of Dreams,” the protagonist declares, “If you build it, they will come.” He was talking about a baseball field and the sports fans it would attract. In the same way, as we’re clearly seeing, *if you build a new nuclear weapons infrastructure, it will produce new nuclear weapons.* As events have continued to unfold in the post Cold War era, we believe it has been conclusively demonstrated that, as we said nearly ten years ago, *the closure and monitoring of the nuclear weapons infrastructure in all nuclear weapons states must begin early in the process of disarmament. Nuclear weapons research, testing, and component production should be halted while reductions are in progress, not after, with nuclear weapons production and research facilities subject to intrusive verification regimes at the earliest possible time.*

Some argue that Complex 2030 is merely a “make work” program for scientists and engineers, or that the nuclear weapons we already have are not “useable.” But consider the following passage from an August 2006 DoD planning document:

“Within Global Strike, US nuclear forces contribute uniquely and fundamentally to deterrence—through their ability to threaten to impose costs and deny benefits to an adversary in an exceedingly rapid and devastating manner. *Nuclear weapons provide the President with the ultimate means to terminate conflict promptly on terms favorable to the US....* Nuclear weapons threaten destruction of an adversary’s most highly valued assets, including adversary WMD capabilities, critical industries, key resources, and means of political organization and control (including the adversary leadership itself). This includes destruction of targets otherwise invulnerable to conventional attack, e.g., hard and deeply buried facilities, “location uncertainty” targets, etc. Nuclear weapons reduce adversary decision-makers’ confidence in their ability to control wartime escalation.” [18]

We believe that maintenance of a nuclear arsenal for another hundred years, whether in the form of existing or “new” weapons, by the only country that has so far used nuclear weapons, is “unreasonable,” unacceptable, and unlawful. It is long past time for us to break out of the confines of clever technical arguments against the “need” for replacement warheads, and instead to demand the *only* reasonable alternative, nuclear abolition. The United States, in compliance with its obligation under the NPT, should commit to the elimination of nuclear weapons *no later than 2030*, by initiating negotiations leading to conclusion of a verifiable treaty, under strict and effective international control.

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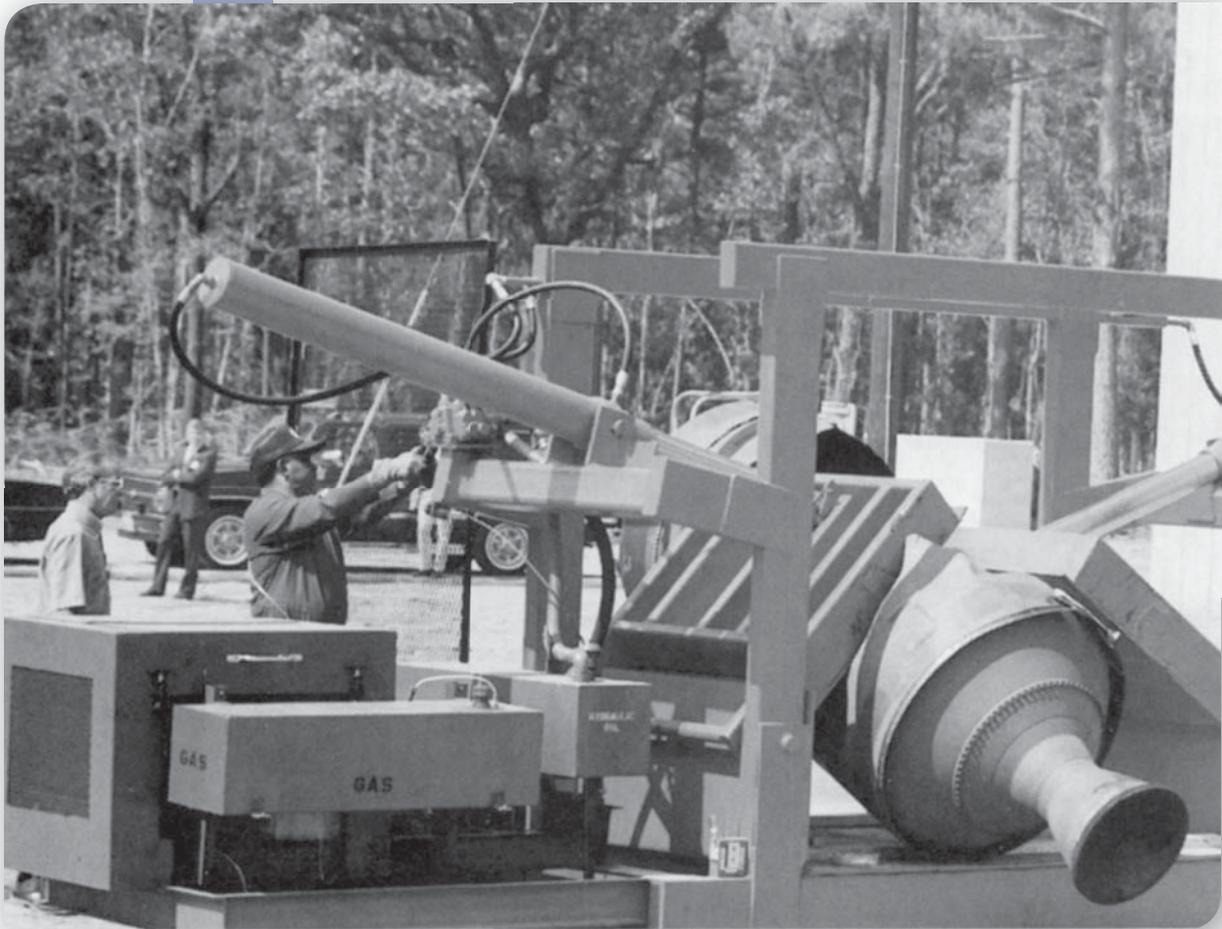
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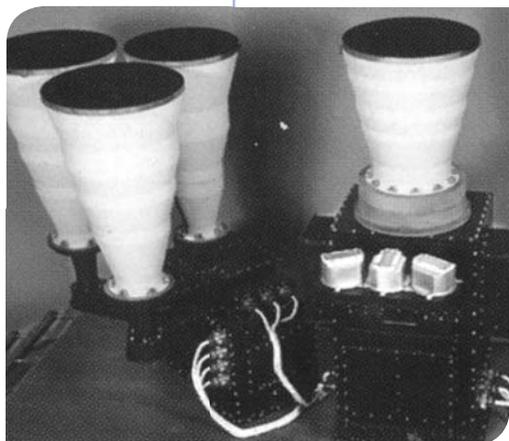
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Verification



Part of a Pershing II missile being destroyed.
Under the 1987 INF Treaty, more than 200 of these
missiles were retired and destroyed.
Photo: US Army.

1. Principles and Demands of Verification



Nuclear burst detection satellite sensor system.
Photo: Cooperative Monitoring Centre

A Nuclear Weapons Convention will only be effective if it can be adequately verified, both in political and technical terms.¹ Verification is the process of establishing whether States parties are complying with their obligations under an arms control or disarmament agreement. Verification has several functions:

“First, it allows the parties to assess an agreement’s state of implementation. By establishing how each party is fulfilling its obligations, verification gives a good indication about the functioning of the agreement. Second, it discourages non-compliance with agreement provisions. Because parties know that breaches of obligations carry the risk of detection, they should be less inclined to attempt to renege secretly on their commitments. Third, verification can give timely warning of violation(s) of agreement conditions. In case of non-compliance, verification can reveal transgressions before these have a chance to turn alarming. Finally, by checking that obligations are indeed being honoured, verification helps generate confidence that the agreement and its verification mechanism are functioning as intended, thereby fostering trust and confidence between the parties.”²

These four verification tasks - assessing implementation, discouraging non-compliance, timely warning, building confidence - are of particular relevance with regard to a potential Nuclear Weapons Convention. States parties need to implement the agreed process towards elimination and non-acquisition of nuclear weapons and allow other States to assess the effectiveness of this process. Since a few nuclear weapons can make a significant difference, violations of the obligations must be detected as early as possible and with high likelihood to discourage any State party from non-compliance due to unacceptable risks from responses of the international community. While punishment may only be applied in exceptional cases, verification of an NWC requires and contributes to an unprecedented degree of confidence and cooperation, which in itself is a value that discourages benefits from acquisition of nuclear weapons.

The Model NWC strives to prevent the construction of nuclear weapons and puts the technical barrier for diverting nuclear-weapon-usable material as high as possible, aiming at the detection and prevention of the illegal acquisition of nuclear weapons through production or removal of nuclear material from existing stocks. Verification of an NWC would monitor a wide range of nuclear-weapons objects (nuclear warheads and components, nuclear materials, equipment, facilities, delivery systems, command and control) and nuclear-weapons activities (research, development, testing, production, acquisition, deployment, stockpiling, maintenance, transfer, use, threat of use, destruction, disposal, and conversion) and their combination. These include, in particular, dismantlement of nuclear weapons; disposal of nuclear material; conversion or destruction of certain nuclear facilities; monitoring the location and status of nuclear weapons, nuclear material, nuclear facilities, delivery systems, and command and control systems to ensure that they are not used for research, development, testing, production, transport, deployment or use of nuclear weapons. Other prohibited activities would include storage, transfer and handling of nuclear weapons and fissile material. Some of these activities are easy to monitor (such as nuclear explosions), others require considerable detection efforts (such as finding hidden warheads).

Verification policies of the NWC should be designed to assure early detection and interpretation of information necessary for preventing prohibited activities or permitting timely responses to nuclear weapons development, involving a range of issues³

Perspectives on Nuclear Disarmament Verification

The 1996 Canberra Commission noted, “(b)efore states agree to eliminate nuclear weapons they will require a high level of confidence that verification arrangements would detect promptly any attempt to cheat the disarmament process.” (Executive Summary) According to the 1998 CISAC report of the U.S. National Academy of Sciences complete nuclear disarmament will, “require continued evolution of the international system toward collective action, transparency, and the rule of law; a comprehensive system of verification, which itself will require an unprecedented degree of cooperation and transparency; and safeguards to protect against the possibility of cheating or rapid breakout.” On the other hand, “even the most effective verification system that can be envisioned would not produce complete confidence that a small number of nuclear weapons had not been hidden or fabricated in secret. More fundamentally, the knowledge of how to build nuclear weapons cannot be erased from the human mind. Even if every nuclear warhead were destroyed, the current nuclear weapons states, and a growing number of other technologically advanced states, would be able to build nuclear weapons within a few months or few years of a national decision to do so.”⁴

The stakes are high: “The verification and compliance regime for a nuclear-weapon-free world will need to be more effective than any disarmament arrangement hitherto envisaged. One hundred per cent verification of compliance with any international arms agreement is highly improbable. In the case of nuclear disarmament, however, the security stakes will be so high that states will not agree to disarm and disavow future acquisition of nuclear weapons unless verification reduces to a minimum the risk of non-compliance.”⁵

However, these fundamental restrictions do not generally exclude verifiability of comprehensive disarmament, as Steve Fetter points out: “Although no verification regime could provide absolute assurance that former nuclear-weapon states had not hidden a small number of nuclear weapons or enough nuclear material to build a small stockpile, verification could be good enough to reduce remaining uncertainties to a level that might be tolerable in a more transparent and trusting international environment. And although the possibility of rapid break-out will be ever present in modern industrial society, verification could provide the steady reassurance that would be necessary to dissipate residual fears of cheating.”⁶

This indicates the link between the verifiability of the NWC and its security environment. Accordingly, the Weapons of Mass Destruction Commission notes in its 2006 report:⁷ “One state’s non-compliance with its obligations under a treaty on arms control or disarmament may fundamentally and negatively affect the security of others. A bilateral treaty may simply be abrogated. In a global context, this may lead to collective reactions. Conversely, continued compliance with such treaty obligations impacts positively on security. In both cases, credible verification to establish compliance or non-compliance is of major importance.”

A viable regime should assure states at the very outset that participation provides a better guarantee of security than maintaining the nuclear option. A guiding principle should be the search for a regime sufficiently restrictive to ensure the highest level of confidence in compliance, but also sufficiently permissive to allow states to join without jeopardizing their legitimate security interests and commercial activities

Requirements and Guiding Principles

To discuss the possible options and means for the verification of an NWC, it is useful to refer to some established general principles of adequate verification:

1. International law and its verification should enhance international security and

stability and avoid the risks of an unrestrained situation that could lead to arms races or war;

2. Verification is a comprehensive iterative process, with political, legal, diplomatic, economic, technical and military dimensions, for judging compliance with international law, containing the risk of cheating and increasing time for adequate response;
3. The verification process balances between those provisions that are to be verified (which degree of verification is tolerable) and those activities that can be verified (which degree of verification is feasible);
4. The demands, requirements and costs of verification are to be adapted to the relevance of specific treaty provisions and the associated risk of cheating, comparing the benefits and costs of additional verification measures;
5. Because existing verification means are not perfect, the residual risk needs to be reduced to tolerable levels by adequate responses, offsetting eventual military threats by and advantages for non-compliance.

Thus, the verifiability of a treaty is not an absolute issue, but a matter of degree depending on political assumptions and requirements as well as the available resources and capabilities for verification, which are not only technical. Most crucial is the question of “tolerable” degrees of verifiability and their associated residual risks.

For the early Reagan Administration, for instance, nothing short of 100 percent certainty that the Soviets were not cheating was tolerable. Since this was an impossible standard to achieve with limited verification efforts, the requirement prevented progress on disarmament. With Gorbachev, however, confidence and trust increased between the superpowers, and finally even Reagan accepted much lower verification standards in order to conclude the INF and START treaties. More verification was seen as too costly, and the residual risks were accepted because the potential security implications were perceived as manageable. It is remarkable to compare this with the [...] turn under the Bush Administration, which refused any verification provisions under the Moscow Treaty with Russia, failing to assert its demand for verification. Therefore, the nuclear disarmament process of the Strategic Offensive Reductions Treaty SORT remains undefined and does not build an infrastructure to implement and measure its success.

Between friendly nations, usually lower standards of verification are tolerable because the incentive for and probability of cheating are perceived as negligible. As long as there is a gap between verification demands and capabilities, either the capabilities must be improved, depending on the available means and resources, or the political requirements must be reduced to achieve the desired security gains by the treaty within the given resource limits. Thus, the verification process assesses the difference between the desired situation and the actual situation, and tracks the agreed path connecting both.

If the actual path diverts from the agreed path more than is tolerable, then the verification system should provide a timely alarm. Thus the following questions are to be considered for the verification process:

- Which agreed states, items and activities should be achieved, limited or prohibited during given periods with confidence and certainty (what are the requirements/tasks of verification)?
- Which verification means could be applied to monitor actual states and activities (what are the means of verification)?
- Can an intolerable deviation from agreed states, items and activities be detected in time with reasonable verification efforts (what are the benefits, costs and risks of verification)?

The requirements and tasks of verification are defined by the provisions of the NWC, specified by the definitions, and the agreed timeframe of their realization. The tasks of verifying these obligations can be divided into the following three main stages:

1. **Baseline information exchange and data gathering:** Identify the current status of the nuclear-weapons complex with reasonable accuracy without proliferating sensitive information.
2. **Disarmament:** Monitor the agreed path of reducing nuclear arms and eliminating the nuclear-weapons complex within tolerable limits of uncertainty and sufficient confidence.
3. **Prevent rearmament:** During the transformation to a nuclear-weapon-free world, and after it has been achieved, observe any objects and detect any activities that might indicate a nuclear-weapons capability.

The NWC needs to foresee a number of provisions that help to create the necessary confidence that the elimination of nuclear weapons is complete and will not be reversed. Verification of the following obligations is crucial:⁸

1. No nuclear weapons or relevant nuclear materials may be held back and hidden in the current nuclear weapons states. The existing arsenals of nuclear weapons need to be disarmed completely. No single nuclear warhead and no significant quantity of nuclear-weapons-usable material may be retained. The process also needs to avoid a hidden inertia of the whole nuclear weapons production system.

Verifying the dismantlement and destruction of remaining declared weapons, production and maintenance facilities is the easiest task of the verification system.⁹ The locations are known and the state of the facilities can be checked by on-site inspections. From the outset, member states would give a detailed inventory of their remaining weapons and weapons-grade fissionable materials. Affixed with a unique tamper-proof tag and seal, these would be stored in sealed containers and stored at secure locations, well away from potential delivery systems. Warhead pits would be removed to internationally monitored storage facilities to await final disposition.¹⁰

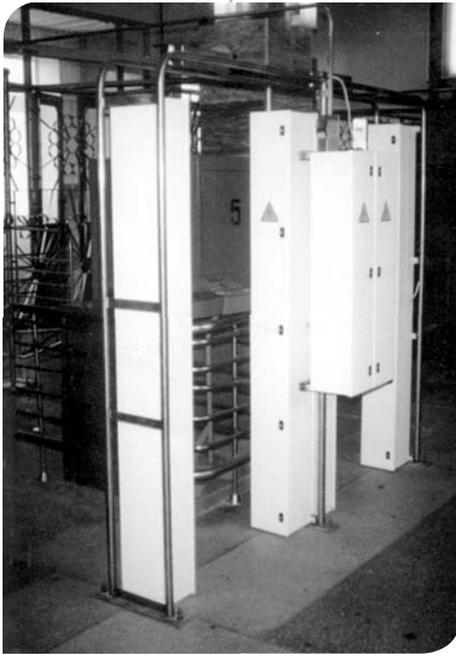
2. Nuclear weapons need to be “disinvented” to the degree achievable.

The whole infrastructure of the now existing nuclear weapons complex has to be dismantled. No research for or testing of nuclear weapons should be conducted. The knowledge of nuclear weapons experts should not be intentionally maintained, in particular the important specialized personal knowledge directly related to the design of weapons. Through these means, the threshold against reinvention of nuclear weapons can be significantly increased. Dual-use science and technology which is perceived as too important for civilian purposes to be banned needs to be controlled.

3. A break-out of the ban to develop or manufacture nuclear weapons needs to be prevented and detected. In any country that conducts nuclear power or nuclear research programs, the diversion of nuclear materials for nuclear weapon purposes needs to be prohibited and any related activity needs to be detected in time. Nuclear-weapon-usable materials should neither be produced for weapon purposes nor removed from existing stocks. Step-by-step, existing stocks have to be reduced down to zero. While old facilities are subject to monitoring and inspection, new production may occur at remote locations and at new, specially designed underground facilities that may be rather small and easy to hide. The risks of these activities can be reduced and the costs increased by a combination of remote monitoring from air and space, environmental sampling, and on-site inspections without a complete guarantee to detect such violations.

4. No intention to acquire nuclear weapons should remain or have a reason to reemerge. The international security system needs to provide clear evidence that nuclear weapons are inherently negative, and create incentives that make the possession of nuclear weapons undesirable.

It is essential that compliance with these obligations can be sufficiently verified and universally and indefinitely enforced. Verification can significantly reduce the likelihood of breakout through a combination of deterrence and enhanced warning, but cannot completely assure that a small clandestine nuclear arsenal or hidden cache of plutonium will be discovered.



Pedestrian portal monitors at the Siberian Group of Chemical Enterprises Enrichment Plant. Photo: Department of Energy

Iterative Verification Process

Verification is not a static one-time activity of monitoring that applies the above-mentioned means, but a dynamic, iterative process with four distinct phases of declaration, monitoring, inspection and enforcement being repeated successively and in parallel:

1. Declaration and registration provide the necessary information of the initial situation as a starting point for verification to allow comparison with future changes, either agreed or prohibited. All treaty-limited items are tagged, identified and registered, using advanced identification techniques (fingerprinting) without revealing sensitive design information.

2. Monitoring aims at detecting prohibited objects or activities. Continuous monitoring requires information gathering over periods of time. Remote sensors on satellites and aircraft provide monitoring of large areas to detect larger objects, in particular transport vehicles and buildings. The problem is to identify treaty-limited items among the vast number of existing civilian and military objects. However, regular cartographic mapping provides a basis [...] to detect irregularities/inconsistencies between official mapping information and actual remote sensing data.

3. Inspection: As soon as a suspicion of a treaty violation is raised, the inspection mechanism is applied to check whether it is justified or not. During visits to facilities, the inspectors could request all the necessary detailed information from the inspected party, including the opening of rooms, access to computer codes and interviews with personnel and neighbors. In addition, a wide range of non-destructive on-site monitoring devices at entrance/exit ports or along the perimeter of critical facilities (portal/perimeter controls) could be applied to understand the structure and function of equipment. Cooperation and consultation within the international agency could help in gaining and proving the information.

4. Negotiation, prevention and enforcement: If sufficient information has been gathered to indicate a treaty violation, negotiation and enforcement mechanisms could apply. The first step would be to demand that the suspected violator ends the prohibited activities or enters the destruction and conversion of prohibited objects. If the object or activity of concern is to be excluded from nuclear weapons use, additional preventive control measures are applied. If the suspected violator refuses any of these measures, a negotiation process is started, during which the motivations of the violator and the possible coordinated actions of the international community are explained. It would be important to leave the violator the option of a face-saving exit as early as possible. Ideally, enforcement measures should be preventive and minimally intrusive.

In the past, the iteration process has been incomplete. Neither remote monitoring and challenge inspections nor prevention and enforcement were adequate or possible under the safeguards system of the International Atomic Energy Agency (IAEA); the global spread of nuclear energy has made diversion for military purposes too easy. This explains the limited effectiveness of safeguards (see more in the following sections). Monitoring without inspection or enforcement can raise suspicions but not prove or prevent them. Therefore, more emphasis should be given to integrated mechanisms realizing all four tasks.

2. Political Mechanisms of Verification: Building on Existing Regimes

Political verification of an NWC will have organizational and societal requirements. Organizational means of verification include state, regional and international bodies as well as national legislation and bi- or multi-lateral arrangements. Societal verification means large-scale governmental and non-governmental participation in the implementation of an NWC. Such participation would be sought through affirmative obligations to report non-compliance and provide guarantees of protection for suppliers of information.

Each of the following examples has relevance to the functions and the forms of authority necessary for nuclear disarmament:¹¹

1. CWC: The Chemical Weapons Convention establishes a comprehensive framework for elimination of an entire class of weapons to be implemented through the Organisation for the Prohibition of Chemical Weapons (OPCW). It proposes, among other measures, a system for on-site inspections unprecedented in its intrusiveness. How successful this system is considered to be in promoting compliance and confidence will be instructive in considering the degree and type of intrusiveness to build into an NWC.

2. CTBT: The verification provisions of the CTBT suggest a system for gathering and processing information. The International Monitoring System under the supervision of the Technical Secretariat includes facilities for seismological, radionuclide, hydro-acoustic and infrasound monitoring. The Technical Secretariat is to store and process information through its International Data Centre on behalf of States Parties. Application of this model to an NWC would require, for example, review of the provisions for data receipt and initiation of requests for data to adjust for the security and transparency considerations particular to the nuclear weapons infrastructure.

3. INF/START: The Strategic Arms Reduction Treaties (START) and Intermediate-range Nuclear Forces (INF) treaties provide positive examples of bilateral verification procedures for nuclear disarmament. They shed light on the role of confidence-building and the ability to adjust for confidentiality concerns. The verification provisions of these treaties apply to delivery vehicles rather than warheads. New guidelines for verification of warhead dismantlement, removal of warheads from deployment and de-alerting would be necessary as next steps. A salient question in this context is the expansion of bilateral to multilateral procedures. This process must balance considerations of security, transparency, and confidentiality.¹² Several studies have explored the verification of deep reductions in nuclear arsenals and the special requirements of elimination of nuclear weapons. One proposal for a “verification scheme for deep cuts” would begin bilaterally, incorporating the other nuclear weapon states (NWS) through transparency and confidence-building measures, leading to proportional or gradual reductions down to very low levels, in order to lay the foundation for eliminating nuclear weapons.¹³

4. IAEA: In order to detect illegal activities, the NPT foresees nuclear safeguards on special nuclear materials to verify compliance. The IAEA safeguards regime is the primary model for accountancy, containment and surveillance of nuclear material. The officially declared intention of these safeguards is not to prevent diversion of such materials. The IAEA insists on not having a police function but only the role of inspection. The purpose of nuclear safeguards is the timely detection of diversion after it has happened. The detection should be made early enough to allow for political reactions aimed at stopping the proliferating country before a bomb is manufactured from the diverted material. However, the dual function of the IAEA—timely detection

of diversion and promotion of “peaceful” uses—makes its direct application to a disarmament regime problematic. Because of unavoidable measurement uncertainties, loss of material within facilities and lax practice, the IAEA safeguards material-accounting system cannot with confidence detect the diversion of weapons size quantities of nuclear material sufficient for the manufacture of dozens of weapons (the limits became obvious in the case of Iraq). The task of differentiating between military and civilian applications of nuclear material--widely though not unanimously recognized as a primary source of IAEA shortcomings--will become more difficult if reliance on nuclear energy increases. Some of the changes proposed in the IAEA 93+2 Programme and Additional Protocol reflect strategies and policies aimed at improving the conditions for safeguarding.¹⁴

Effectiveness of Nuclear Safeguards

Safeguards in Nuclear Weapons States (NWS) are virtually non-existent, and the IAEA does not have the mandate it needs to effectively prevent proliferation. Current timely detection goals are faulty, and do not take into consideration the enhanced nature of the technical means to turn fissile materials speedily into weapons. The fact that the nuclear weapon states are only subject to selective voluntary scrutiny has made it easier for them to share nuclear materials and designs; several have been guilty of this practice. IAEA safeguards are currently not extended to apply fully to mined uranium ores, refined uranium oxides, uranium hexafluoride and uranium conversion facilities, prior to the stages of enrichment or fuel fabrication.^{14a}

One severe criticism of the current nuclear safeguards system is that it cannot even achieve the limited goal of detection. At any large bulk handling facility, large amounts of material unaccounted for (MUF) will inevitably occur. This problem is exemplified drastically with the publication of the US plutonium inventory for the first 50 years of its nuclear program.¹⁵ While there is a current stockpile of about 100 tons of plutonium, the amount of not less than 2.8 tons of plutonium is unaccounted for. This is enough material for hundreds or even a thousand nuclear weapons. This raises a big concern; Will we ever have the chance to gain enough confidence that no nuclear-weapons-usable material is diverted by any country that possesses large amounts of such materials?

Another severe criticism of nuclear safeguards is that clandestine nuclear weapons programs are very difficult to detect. The experiences with clandestine nuclear weapons programs in Iraq and other countries call for very strong and efficient verification as long as nuclear installations with significant amounts of nuclear-weapons-usable materials exist. The 93+2 Programme of the IAEA resulted in a number of improvements that strengthen the effectiveness and improve the efficiency of the nuclear safeguards system. However, the MUF-problem is not even tackled by these measures and there will still remain deficiencies with other detection problems.

The question of capabilities and limits of technical verification depends on the degree of political demands. The main purposes of nuclear safeguards on special nuclear materials are timely detection of and deterrence against diversions of significant quantities of these materials, i.e. they are not designed to prevent diversion of such materials, but to deter from diversion by the risk of detection. Diversion remains a technical possibility. With respect to a nuclear-weapon-free world such a political goal may change. The demand may be posed that compliance with treaty obligations is not only verified with a high probability of detection but also rendered impossible especially through a strict reduction of the availability and accessibility of nuclear-weapon-usable materials.

The experience of the IAEA in verifying South Africa's nuclear inventory and the termination of its weapons program is significant for developing and evaluating the framework for verification of complete nuclear disarmament within the NWC.

By comparing calculations with physical inventory measurements, apparent discrepancies indicated that an amount of enriched uranium-235 was unaccounted for. Though extensive examinations were able to significantly reduce the magnitude of these apparent discrepancies, the IAEA had to conclude that the assessment of the completeness of South Africa's inventory of nuclear materials was not free from uncertainty. Nevertheless, the international community was satisfied with the result of the investigations, which led to the conclusion that there were no indications that the initial inventory was incomplete or that the nuclear weapon program was not completely terminated. This positive conclusion is only possible because of the openness for transparency and the cooperation of the South African authorities with respect to access to information and past and future locations that allowed for further IAEA investigation.

The experiences with clandestine nuclear weapons programs in Iraq and other countries call for very strong and efficient verification as long as nuclear installations using, producing or storing significant amounts of nuclear-weapons-usable materials exist. Activities to strengthen the current regime include the following:¹⁶

1. Despite the improvements of the 93+2 programme, which strengthen the effectiveness and improve the efficiency of the nuclear safeguards system, there are still deficiencies. In 1997, the IAEA introduced the *Model Additional Safeguards Protocol*¹⁷ with expanded safeguards authorities and activities. Not much has been achieved so far in providing the IAEA with technical means to detect clandestine activities from a distance. Satellite imagery is used mainly for investigations on known facilities¹⁸ and is not capable of providing a proof for clandestine plutonium production; environmental sampling is restricted to the locations that are routinely visited by inspectors anyway. Adopting and fully implementing the Additional Protocol increases the verification powers of the IAEA and expands transparency and verifiability for the whole civilian nuclear fuel cycle. It allows the IAEA to redirect saved verification resources towards states of greater concern.

2. UN Security Council resolution 1540 of April 2004 has made it mandatory for all states, including the three non-NPT parties, India, Israel and Pakistan, to adopt national implementation measures for all types of weapons of mass destruction to prevent non-state actors from acquiring or proliferating such weapons, either on its territory or elsewhere.

3. The Trilateral Agreement, negotiated 1996 to 2002 between Russia, the US and the IAEA, seeks to involve the Agency in verifying disposal of excess fissionable material and could give it a role in a multilateral global nuclear disarmament process. The agreement's implementation has been hampered by the fact that no material has been offered by the US and Russia for the purpose; there is disagreement over the period and costs of IAEA monitoring.

4. The IAEA Board of Governors has established a Special Committee on Safeguards and Verification to examine further improvements, but it has moved slowly. For instance, the examination of environmental and other samples from Iran has not been as speedy as it might have been. More funding is required to conduct research in advanced nuclear verification techniques.

A breakthrough was expected since the mid-1990s on a fissile cut-off agreement, which has been prevented by the stalemate in the Conference on Disarmament in Geneva.¹⁹ Further progress is urgently needed as nuclear weapons development does not stand still. Laboratory testing, laser enrichment and computer simulation reduce the possibilities of driving back the knowledge about nuclear weapons development. With improved simulation technology, highly undesirable developments are possible that obstruct the goal of a nuclear weapons free world. At the end of an era of comparably primitive trial and error, a scientific revolution is now being initiated, which is supposed to deepen the theoretical understanding of nuclear weapons. Rather than deliberate and systematic conservation of knowledge about nuclear weapons, transition

to a nuclear-weapon-free-world would require retiring nuclear weapons scientists and testers to not transfer their expertise to future generations. Otherwise, it will be more difficult to “disinvent” sophisticated designs of nuclear weapons.

In a nuclear-weapon-free world not all use of nuclear materials may be banned. To prevent the diversion of nuclear materials for weapons development through the whole nuclear fuel cycle, from uranium mining and milling to disposition, nuclear safeguards would be needed. These would cover all nuclear materials in reactors, stockpiles or extracted from dismantled weapons, including those of the nuclear weapon states, to ensure that all sources of new fissionable material are accounted for. Consequently, the safeguards system would cover a considerably higher amount of material and a larger number of facilities than today. Completely banning weapons-usable materials would significantly facilitate the verification task. Allowing the use of HEU in naval propulsion would require special safeguards arrangements. Other ways in which safeguards would have to be further strengthened include increasing the intrusiveness of inspections, lowering the quantities and increasing the types of nuclear materials requiring declaration and inspection, and boosting the intelligence and data-handling capacities of the international verification organisation.²⁰

A critical issue is the “significant quantity” of weapons-usable material required for nuclear weapons production. To provide greater assurance, the current standard (8 kg of plutonium, 25kg of HEU) would have to be lowered and other nuclear materials identified as weapons-usable to be included. 3-4 kilograms of weapons grade plutonium is commonly used for a nuclear warhead and, depending on the sophistication of weapons design, even significantly smaller quantities may suffice. Another issue is to lower the current standard for ‘timely detection’ from months to weeks which would better address the risk of rapid diversion from former nuclear weapon states.²¹

3. Means and Procedures for NWC Verification

Initially states rely predominantly on their national technical means (NTM) of verification and monitoring capabilities, including satellite monitoring, information gathering and espionage. In the process of moving towards a nuclear-weapon-free world a strong multilateral system of data collection and analysis capabilities needs to be established that complements or replaces national capabilities. All measures combined will reduce the risks and increase the costs of illicit activities to an actual or potential violator even though they may not completely guarantee the detection of such violations.

While the Model NWC bases many of its verification procedures on those employed in other treaties, new approaches are required. Remote and wide-area monitoring is a vital element of the verification regime as soon as the relevant production facilities are shut down and dismantled, especially if only a few sites remain to be inspected and efforts are more concentrated on detecting clandestine facilities and activities. Technical verification means and processes have been continuously improving. Remote sensing from aircraft and satellites provides high-resolution images over large areas in short time. On-site inspections have to search for hidden warheads and related materials and to verify the shut-down of declared facilities. Challenge inspections are necessary to search for clandestine activities. To survey sensitive installations and activities, inspection authorities can make use of new cost-effective techniques without frequent intrusive visits. The inspections in Iraq stimulated the introduction of new methods such as environmental monitoring to detect releases around nuclear-related facilities and ground-penetrating radar.²² For example, atmospheric concentrations of krypton-85 can be used to get indications for clandestine plutonium separation from some distance.²³ Authentication and fingerprinting techniques are based on the measurement of radiation emissions and other characteristic signatures.²⁴

To assure that the main obligations are adequately monitored and violations detected within tolerable limits of deviation, a variety of verification means and procedures can be applied, as listed in the following box. Some technical possibilities are principally available; others require additional research and development.

To address the technical challenges in verifying nuclear dismantlement, research, development and cooperation needs to be intensified on innovative techniques to monitor declared and detect undeclared weapons, facilities and materials. Most of the research in this area has been done in the US and the UK who have shared information on the results.²⁵ In particular, the Atomic Weapons Establishment at Aldermaston has concluded a five-year program to study the dismantling of their Chevaline warheads to identify potential methodologies for a future nuclear disarmament verification regime. In 2005 the US National Academy of Sciences' Committee on International Security and Arms Control (CISAC) published a comprehensive assessment of methods for monitoring nuclear weapons and nuclear explosive materials in a disarming world. The Committee concluded:²⁶ "Current and foreseeable technological capabilities exist to support verification at declared sites, based on transparency and monitoring, for declared stocks of all categories of nuclear weapons—strategic and nonstrategic, deployed and nondeployed—as well as for the nuclear-explosive components and materials that are their essential ingredients."

An effective NWC requires specific verification mechanisms that can discover clandestine nuclear-weapons-related activities with sufficient certainty, thereby increasing transparency and confidence in the whole nuclear disarmament process. In order to verify compliance with the NWC, a verification regime would be established with all the verification means and procedures explicitly needed to assure the verification of the NWC. The Model NWC seeks to lay out a verification regime to assure states that participating in this regime provides a better guarantee of security than maintaining the nuclear option.

Verification Means and Procedures

1. Monitoring technologies

- Remote sensors in the visible, infra-red or radar spectra, based on satellites, aircraft or on ground-based systems
- Signal and electronic reconnaissance
- Seismological, radionuclide, hydroacoustic and infrasound monitoring
- On-site sensors for non-destructive measurement, e.g. for portal perimeter monitoring: measurement of weight, length, acoustics, light (UV, infrared, visible), electrical and magnetic fields; passive radiation measurement, active radiation (x-ray, gamma ray, beta particles, protons, neutrons)

2. Cooperative procedures for information exchange, inspections and safety controls

- Nuclear archaeology and forensics
- Initial declarations and data exchange
- Identification and item counting of objects (tagging, fingerprinting, registration)
- Confidence-building measures
- Joint overflights (Open Skies)
- Accountancy, control and surveillance
- Safety Controls at nuclear facilities
- Baseline and routine inspections
- Challenge inspections of suspected facilities (anytime-anywhere)
- Personal observation of destruction and suspected activities

3. Institutional verification

- International Agency for Verification
- Cooperative fact finding on compliance
- Consultation
- Dispute settlement

4. Societal verification

- Open sources, scientific knowledge
- Espionage
- Citizen reporting and protection, whistle-blowing

The box opposite gives four categories of different readiness of verification technologies and provides a few examples for each of these categories. From this, it becomes apparent that most verification technologies required or proposed by the Model NWC are already implemented in existing treaties within the nuclear disarmament and non-proliferation regime. Some others are established in other international regimes and can be adopted for an NWC. In addition, there are further technological means which are already developed or demonstrated, but which are not yet implemented in any international control regime. Only very few verification technologies which may be helpful or necessary to verify an NWC are not yet developed or proven to work sufficiently. However, it has to be noted that most technologies have inherent deficiencies and need to be evaluated on a critical basis. That a variety of technical means for the verification of an NWC already exist does not imply that these means are covering satisfactorily all verification demands.

Availability of Verification Technologies²⁷

1. Technologies which are already implemented in existing treaties within the nuclear disarmament and verification regime

- Nuclear material accountancy, limited by Materials Unaccounted For (NPT)
- Containment and surveillance of nuclear materials (NPT)
- Identification and item counting of objects by tagging, fingerprinting, registration (NPT and others)
- Personal observation of suspected activities and destruction (NPT, INF, START)
- Remote sensors in the visible spectrum based on satellites (INF, START)
- On-site sensors for non-destructive characterisation of containers and transport vessels, e.g. for portal perimeter monitoring; measurement of weight, length (INF, START)
- Seismological, radionuclide, hydro-acoustic and infrasound monitoring (CTBT)
- Challenge inspections of suspected facilities without any restrictions, i.e. anytime and anywhere, limited by political acceptability and costs (UNSCOM)

2. Technical approaches which are established in other international regimes and can be adopted for the NWC

- Preventive controls at nuclear facilities (Convention on Physical Protection)
- Joint overflights with remote sensors in the visible spectrum (Open Skies)
- Managed access (CWC)

3. Technical means which are already developed or demonstrated, but not yet implemented in any international control regime

- Accounting, surveillance and containment of nuclear warheads, limited by access
- Verification of dismantling of nuclear warheads, limited by the interest to protect sensitive design information
- Remote sensors in the infra-red or radar spectra based on satellites, aircraft or on the ground
- Passive radiation measurement, active irradiation using x-ray, gamma ray, beta particles, protons or neutrons, limited by free mean path depending on shielding of nuclear radiation (e.g. Black Sea experiment for the detection of hidden warheads)

4. Technological options which need further research, development or demonstration of their capabilities and limits, before they can be adopted for the NWC

- Wide area radionuclide monitoring to detect uranium enrichment or plutonium separation (e.g. krypton-85)
- Nuclear archaeology to reconstruct the working history of production reactors

4. Elements of NWC Verification

Some of the potential verification elements of the NWC are discussed in the following.

Registry and International Monitoring System

The Registry would maintain a list of all nuclear warheads, delivery vehicles, facilities, and materials subject to verification. The International Monitoring System enables the Agency to gather information necessary for the verification of the NWC and would comprise facilities and systems for monitoring by satellite, fixed on-site sensors, remote sensors, radionuclide sampling, means of communication and other systems. Information generated by equipment owned or controlled by member States would be shared through agreements with the Agency. Required are agreements on sharing data and verification activities with existing agencies, including those responsible for implementation of other treaties regarding nuclear disarmament. Methods of nuclear archaeology are important to reconstruct the past production history by investigating traces which are characteristic for the relevant past activities at production facilities and by doing model calculations.²⁸

On-site inspections and techniques

A challenge inspection system will be important to conduct on-site inspections, which may require an even more intrusive system than that of the Organization for the Prohibition of Chemical Weapons (OPCW) under the 1993 Chemical Weapons Convention (CWC). This would include both systematic, baseline inspections and challenge inspections (anytime-anyplace) of declared and undeclared facilities, utilizing a range of techniques, including visual inspection, record checks and non-destructive measurement (e.g., with portable x-ray and gamma-ray detectors). This could be assisted by identification techniques, such as tagging, tamper-indicating seals in nuclear power plants and “fingerprinting” of delivery systems. Perimeter portal monitoring systems would track the flow of items and materials relevant for nuclear weapons.

Preventive controls and nuclear energy²⁸

Due to unavoidable measurement uncertainties, loss of material within facilities and lax practice. As mentioned before, [...] IAEA safeguards material-accounting system cannot with confidence detect the diversion of weapons size quantities of nuclear material sufficient for the manufacture of dozens of weapons, either by illegally producing nuclear materials, or by illegally removing nuclear material from existing stocks. The Model NWC strives to prevent the construction of nuclear weapons and puts the technical barrier for diverting nuclear-weapon-usable material as high as possible. Effective prevention would not be possible as long as weapons-usable nuclear material is available and can be diverted for use in nuclear weapons at any time. The above-mentioned problem of MUF leads to the conclusion that not only prevention but also the verification of the NWC would be very much facilitated by a significant reduction of the accessibility of nuclear-weapons-usable materials and production technology.

Therefore, the Model NWC demands the reduction of inventories as well as the reproducibility of nuclear-weapon-usable materials to the lowest possible level³⁰ and proposes preventive controls on nuclear-weapons-usable material to guard against breakout of the ban to manufacture nuclear weapons. Preventive controls are

broader than IAEA safeguards, which are primarily intended to deter diversion of nuclear materials through detection of such diversion once it has taken place. The measures proposed in the Model NWC would concentrate on prevention of diversion through physical protection and restricted physical access to special nuclear material (containment and surveillance), increasing the risk and the cost for cheating and minimizing the risk for the international community. Preventive controls may include the establishment of procedures for transport, treatment, storage and disposition of such materials. By banning the technologies for production of direct use nuclear materials such as the reprocessing of spent fuel for separation of plutonium and by imposing other appropriate provisions the available quantities of nuclear-weapons-usable materials are minimised. The inventories of these materials should be eliminated under international control as far as possible or converted into a physical form that minimizes access.

Recognizing the importance of declaring and monitoring all such material, the verification provisions allow for accountancy to begin even before entry into force of the Convention. In addition to the requirement that all special nuclear material be placed under strict, effective and exclusive international control, the NWC proposes to deal with long-term disposition of the fissile material through an optional protocol that would recognize disposition as an urgent problem and devote significant resources to the search for a permanent solution. Preventive controls will be international, eliminating national access to be eliminated to the extent possible. Nuclear weapons-usable materials in the civilian sector need to be included into preventive controls. An important step towards more effectiveness is the 93+2 safeguards agreement signed by IAEA members in May 1997. It includes expanded declarations, extended possibilities of inspection and techniques for environmental monitoring.³¹

In theory the highest barrier against breakout would be realised in a world without nuclear energy, which would exclude the infrastructure to produce nuclear weapons materials and would effectively foreclose any path towards the bomb. The NWC does not prohibit peaceful uses of nuclear energy, but it offers an optional protocol on energy assistance for States that choose not to develop or use nuclear energy. However, it should be pointed out that the abolition of nuclear weapons could be accomplished, though less easily, even without abolishing nuclear energy. The second best approach is to restrict the use of those nuclear technologies that have the highest relevance for nuclear proliferation and in addition to make the remaining special nuclear materials as inaccessible as possible for any country. Nonetheless, while the NWC verification measures will improve the existing safeguards system, they will face the same challenges in a world where reactors make bomb fuel.

Organizational verification and the implementing Agency

To implement the NWC and oversee the nuclear disarmament process, the Model NWC proposes an International Agency similar but not identical in structure to the OPCW. Its primary objectives include containment and surveillance of all materials, equipment, or facilities that could contribute to the development, production, or maintenance of nuclear weapons. The Agency would encompass and expand on some of the tasks currently within the mandate of the IAEA, which would be altered to focus entirely on verifying global disarmament, ceasing to facilitate the nuclear industry. The Agency in the Model NWC would have the following structure:

- The principal organ of the Agency would be a **Conference of all States Parties**, which would meet annually, and for special sessions as necessary;
- An **Executive Council** would be a standing body, to be elected by the Conference for a certain period. The EC would oversee implementation and operation of the Convention and would be responsible for day-to-day

decision-making on the operation of the treaty. It would also have the power to demand clarification from any state party and recommend action in the case of non-compliance. Membership would rotate, with attention to equitable regional distribution and representation by nuclear weapon and nuclear-capable states;

- A **Technical Secretariat**, headed by a Director-General, would carry out the tasks of implementation and verification through various mechanisms, including a Registry and an International Monitoring System. Sources for such information include declarations and reports by States, systematic and challenge inspections, information from other agencies (including NGOs), publicly available sources, national technical means, and the international monitoring system.

An important component of the institutional process would be the reform of the UN Security Council, which needs to represent nuclear and non-nuclear great powers to delegitimise nuclear weapons and devise an effective and fair compliance system.

Transparency, education and confidence- building

The Model NWC makes transparency and education obligatory, in response to the argument that nuclear weapons technology and knowledge cannot be uninvented. The idea is to promote scientific responsibility and greater awareness of the link between nuclear science and weapons development. Scientists can and should be trained to identify and warn others of potentially prohibited activities. Confidence building measures (CBMs) and supplying additional information on a voluntary basis increases confidence in compliance with the Convention. CBMs could include bilateral agreements on reciprocal monitoring and information sharing between States. Consultation, cooperation and fact-finding should help to clarify and resolve questions of interpretation with respect to compliance and other matters. These procedures would be time-critical to ensure that essential evidence is not lost. Compliance and enforcement provisions are linked to transparency and confidence-building measures among States Parties. Dispute settlement provisions include negotiation, mediation and referral to regional agencies or to the International Court of Justice (ICJ). The Executive Council or Conference would also have the authority to refer unresolved disputes to the ICJ for an advisory opinion and to the General Assembly or Security Council.

All NWS need to contribute to improving the mutual nuclear transparency process.³² This is a difficult task, partly because of concerns about confidentiality, partly because of inherent uncertainties and poor bookkeeping from the beginning of the nuclear era. Openness about past production of fissionable materials will be particularly challenging, since it will be virtually impossible for any nuclear weapon state to give a complete and accurate account.³³ The documentation of past production (nuclear archaeology) must begin now, while discrepancies are not strategically significant and potentially destabilising. The sooner transparency can be achieved in relation to numbers, types and deployments of nuclear weapons, delivery systems and holdings of special nuclear materials, the earlier and deeper can confidence be established. Activities could include exchange visits and cooperative monitoring ventures between the nuclear weapon possessors.

Societal verification

Beside technical instruments, human information sources are increasingly relevant for arms control verification. In addition to the governmental tasks in verification, new possibilities of societal verification are created under the Model NWC which provide citizens of all states with the right and the obligation to indicate suspected nuclear weapons activities.³⁴ Cheap and ready access to information and communication

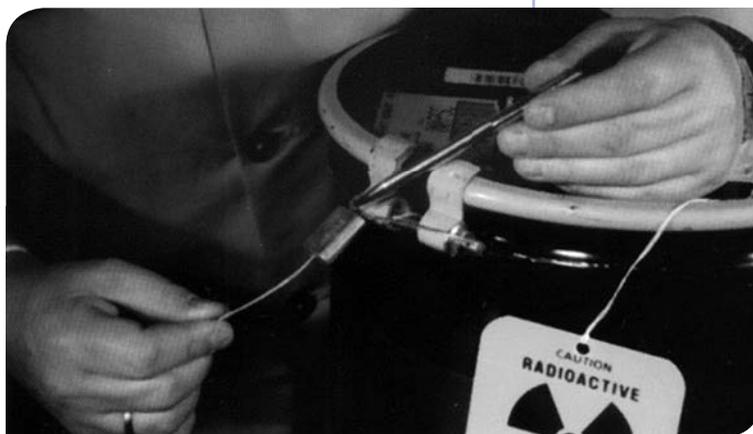
technologies increases the possibilities for NGOs to participate in verification activities. Civil society, including non-governmental organisations (NGOs), professional bodies and individuals (such as academics, scientists and engineers), are involved in monitoring the activities of governments and if necessary can ‘blow the whistle’.³⁵ Instructive cases are Mordechai Vanunu on the Israeli nuclear arsenal, Kamal Hussein on Iraq’s biological weapons program and various Russian defectors and whistle-blowers.

Societal verification would substantially extend the basis of information and add to the complexity of violating the treaty. It would also be a contribution to the protection and creation of democratic rights in all parts of the world. Organised societal verification is more feasible in open societies, but even in closed societies it would be difficult to prevent defectors from leaking critical information. Questions about the role and function of societal verification are particularly relevant to the future direction of nuclear research and development. The model NWC incorporates the concept of societal verification through individual rights and obligations, including citizen reporting and protection for whistle-blowers. According to Joseph Rotblat,

*“The main form of societal verification is by inducing the citizens of the countries signing the treaty to report to an appropriate international authority any information about attempted violation going on in their countries. For this system of verification to be effective it is vital that all such reporting becomes the right and the civic duty of the citizen.”*³⁶

Societal verification requires transparency and education. Scientists and nuclear industry workers should be alerted to the potential links between nuclear science and nuclear proliferation. This responsibility could be developed through training to identify activities that are, or border on, prohibited activities. Supplying additional information on a voluntary basis increases confidence in compliance. By definition, this approach is not the “Big Brother” model of suspicion and surveillance where citizens watch each other and the state watches all citizens, as some have suggested. Rather, societal verification aims for openness and trust in scientific and industrial endeavors. Indeed, secrecy and mistrust undermine the openness and free flow of ideas necessary for good science and its productive application.

In addition to the governmental tasks of verification, societal verification would substantially extend the basis of information and would be a contribution to the protection and creation of democratic rights in all parts of the world. NGOs could play an important role in this process. No state that secretly strives for nuclear weapons can be sure that persons involved in clandestine activities would not transmit their knowledge for a reward to the international community which then could take appropriate reactions.



A device that indicates tampering with a nuclear material container.
Photo: Department of Energy

5. Security Context and Challenges of NWC Verification

A precursor of a verification system for nuclear disarmament will be the US and Russian experience of verifying deep cuts, building on their [...] extensive bilateral experience in verifying the INF and the START [...] treaties. Valuable lessons have already been learned from existing regimes. On-site inspections can be managed in a way that does not reveal security or commercial proprietary information and some of the concerns disappear with progressing implementation and experience.³⁷ Verification and transparency measures can learn from the cooperative threat reduction programs between Russia and the US to safely dismantle the former Soviet nuclear complex and control the fissionable material from dismantled nuclear weapons.³⁸ Former nuclear scientists and facilities are employed in the disarmament process to prevent them from spreading their knowledge. This would also minimize the risk that personnel involved in verifying nuclear disarmament would acquire additional knowledge of nuclear weapons and thus contribute, inadvertently or deliberately, to proliferation.

The 2005 National Academies of Science (NAS) report has identified several issues that are critical for the monitoring of nuclear weapons and nuclear explosive materials (NEM):³⁹

- There are some tensions between sharing information about nuclear weapon and NEM stockpiles and maintaining the security of these stockpiles, but cooperative use of technologies can substantially alleviate these tensions;
- The characteristics of NEM and nuclear weapons place some fundamental limits on the capabilities of any system of monitoring and transparency to provide assurance of compliance. Accordingly, a degree of uncertainty is inescapable;
- The biggest challenge to cooperation-based verification would arise if countries give the appearance of cooperation while covertly retaining undeclared stockpiles of nuclear weapons or NEM and/or undertaking clandestine production programs;
- Important transparency measures do not necessarily require formal treaties but could be undertaken on the basis of informal understandings or unilateral initiatives, e.g. as part of broader confidence-building efforts;
- There are both liabilities and benefits of incorporating, in the long run, nuclear transparency and monitoring into formal agreements to address complexity and sustain measures over time;
- The synergistic effect of the discussed approaches in a cooperative environment, coupled with robust NTM capabilities, would substantially reduce current uncertainties over time.

The report also makes clear that in view of the sheer size and age of the Russian stockpile (where current uncertainties are equivalent of several thousand weapons), “*Russia probably could conceal undeclared stocks of several hundred weapons*”. For other countries with much smaller programs, absolute uncertainties would be much less, leading to the possibility that “*these countries could conceal undeclared stocks equivalent to one or two dozen weapons in the case of China, and at most one or two weapons in the cases of Israel, India, and Pakistan.*” However, “*confidence that declarations were accurate and complete, and that covert stockpiles or production facilities did not exist, would be increased by the successful operation of a monitoring program over a period of years in an environment of increased transparency and cooperation.*”

The security impact of breakout scenarios would depend on the particular circumstances, including the state of readiness and deliverability of weapons; the existence of defenses; the relative military strength of the violator; and the international

community's willingness to respond (Findlay 2003). Illicit nuclear weapons produced, "would be untested, could not be deployed until the last minute, could probably not be delivered by conventional means, and overt training for use would have been impossible." Of course, such a scenario is not only possible in a nuclear-weapon-free world, but also more likely in today's nuclear-armed world, and it may be or may not be deterred by the existence of other nuclear weapons. An actor (whether governmental or non-governmental) threatening to use such a weapon would provoke others to rebuild a nuclear device or arsenal, thus losing the temporary advantage.

This highlights the fact that verifiability of a NWC depends on political assumptions and requirements as well as on the available resources and capabilities for verification, which are not only technical. A bargaining process is necessary between political demands and technical capabilities. If political demands increase, the technical solution may become more expensive. If technical or economic limits for introducing advanced or improved verification means are reached, political demands are either cut back or need to be satisfied by non-technical measures. For example more intrusive measures of physical protection and control can be introduced which go beyond verification of compliance with treaty obligations.

Although there may never be a foolproof multilateral verification system for total nuclear disarmament, the limits of technical verification must not lead to the pessimistic view, that a nuclear-weapon-free world and an irreversible path towards that goal is not adequately verifiable. Instead, the political consequence of this merely technically induced evaluation is to find strategies to increase the barrier against a first or renewed access to nuclear weapons. Given their limits, verification of an NWC would not only rely on technical measures. A number of means and procedures can be applied to detect clandestine objects and activities and clarify critical questions. How well these elements can be integrated into a coherent and effective verification system for a Nuclear Weapons Convention requires further examination.

As Trevor Findlay (2006) points out, "complete nuclear disarmament implies not just a significant evolution in verification, but an evolution of the international system. States will have to change their attitudes towards the limits of sovereignty, the rule of international law and governance of the international system, particularly in regard to enforcement, if nuclear disarmament is ever to be negotiated. Indeed, the attainment of a nuclear weapon free world is so dependent on such changes that we will only be able to judge fully and accurately its verifiability as we become seriously engaged in moving towards that goal."

Endnotes to Section 4

¹ This section builds on the following original sources which were expanded and updated: Merav Datan, Jürgen Scheffran, Principles and Means for Verification of a Nuclear Weapons Convention, INESAP Information Bulletin No. 14, November 1997; Martin B. Kalinowski, Beyond Technical Verification: Integrated Prevention and Detection of Diversion of Special Nuclear material in the Nuclear Weapons Convention, INESAP Information Bulletin No. 14, November 1997; Merav Datan, Verification Requirements for a Nuclear Weapons Convention, Paper presented at the 9th International Summer Symposium on Science and World Affairs, Cornell University, July 1997; Jürgen Scheffran, Content and Verification of a Nuclear Weapons Convention, in: Joseph Rotblat (Ed.), Remember Your Humanity, Singapore: World Scientific, 1999, 318-334; Martin B. Kalinowski, Wolfgang Liebert, Jürgen Scheffran, Beyond technical verification. Transparency, verification, and preventive control for the Nuclear Weapons Convention, in: Martin B. Kalinowski (ed.), Global Elimination of Nuclear Weapons, Baden-Baden: Nomos, 2000, 61-68.

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⁷ *Weapons of Terror: Freeing the World of Nuclear, Biological and Chemical Arms, Weapon of Mass Destruction Commission*, Stockholm, 2006.

⁸ Kalinowski, Liebert, Scheffran 2000.

⁹ Findlay 2003.

¹⁰ Tom Milne, Henrietta Wilson, *Verifying the transition from low levels of nuclear weapons to a nuclear weapon-free world*, VERTIC Research Report, no. 2, June 1999, p. 17 ff.

¹¹ Merav Datan, *Verification Requirements for Nuclear Weapons Convention*, Paper presented at 8th International Summer Symposium on Science and World Affairs, Cornell University, July 1997.

¹² For a full discussion of proposed immediate nuclear disarmament measures and accompanying verification measures, see generally: *Nuclear De-alerting: Taking a Step Back*, UNIDIR Newsletter No. 38; Bruce Blair, *Global Zero Alert for Nuclear Forces*, Brookings Institution, 1995; Chris Paine, Tom Cochran and Robert Norris, *Practical Interim Steps Toward Nuclear Weapons Elimination and a Fissile Material Control Regime for Nuclear Weapon States*, Canberra Commission Background Papers; Matthew Bunn, 'Pit-Stuffing': How to Disable Thousands of Warheads and Easily Verify Their Dismantlement, *Federation of American Scientists Public Interest Report*, Vol. 51, No. 2, March/April 1998; Owen Greene, *Multilateralising the Nuclear Disarmament Process*, INESAP Information Bulletin No. 14, November 1997.

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¹⁸ See Gotthard Stein, *Detection of Clandestine Nuclear Weapons Usable Materials Production with Satellite Imagery*, INESAP Information Bulletin, No. 27, December 2006, pp. 23-26.

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²² J. Whichello, D. Parise, N. Khlebnikov, *IAEA Project on Novel Techniques*, INESAP Information Bulletin, No. 27, December 2006, pp. 27-30.

²³ See Martin B. Kalinowski, Heiner Daerr, Markus Kohler, *Measurements of Krypton-85 to Detect Clandestine Plutonium Production*; Martin B. Kalinowski, Johann Feichter, Ole Ross, *Atmospheric Krypton-85 transport modeling for verification purposes*; Daek Youn, Donald J. Wuebbles, Martin B. Kalinowski, *Global Modeling of Atmospheric Krypton-85 Concentrations*; all published in: INESAP Information Bulletin, No. 27, December 2006.

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²⁶ Committee on International Security and Arms Control of the National Academy of Sciences, *Monitoring Nuclear Weapons and Nuclear-Explosive Materials: An Assessment of Methods and Capabilities*, Washington DC, 2005, p.12.

²⁷ Source: Kalinowski, Liebert, Scheffran 2000.

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