Canberra Commission
on the Elimination of
Nuclear Weapons

REPORT

OF THE CANBERRA COMMISSION ON THE ELIMINATION OF NUCLEAR WEAPONS

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The Canberra Commission on the Elimination of Nuclear Weapons

The Canberra Commission on the Elimination of Nuclear Weapons was established as an independent commission by the then Australian Government in November 1995 to propose practical steps towards a nuclear weapon free world including the related problem of maintaining stability and security during the transitional period and after this goal is achieved.

C O N T E N T S

Statement

The destructiveness of nuclear weapons is immense. Any use would be catastrophic.

Nuclear weapons pose an intolerable threat to all humanity and its habitat, yet tens of thousands remain in arsenals built up at an extraordinary time of deep antagonism. That time has passed, yet assertions of their utility continue.

These facts are obvious but their implications have been blurred. There is no doubt that, if the peoples of the world were more fully aware of the inherent danger of nuclear weapons and the consequences of their use, they would reject them, and not permit their continued possession or acquisition on their behalf by their governments, even for an alleged need for self-defence.

Nuclear weapons are held by a handful of states which insist that these weapons provide unique security benefits, and yet reserve uniquely to themselves the right to own them. This situation is highly discriminatory and thus unstable; it cannot be sustained. The possession of nuclear weapons by any state is a constant stimulus to other states to acquire them.

The world faces threats of nuclear proliferation and nuclear terrorism. These threats are growing. They must be removed.

For these reasons, a central reality is that nuclear weapons diminish the security of all states. Indeed, states which possess them become themselves targets of nuclear weapons.

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.

The members of the Canberra Commission call upon the United States, Russia, the United Kingdom, France and China to give the lead by committing themselves, unequivocally, to the elimination of all nuclear weapons. Such a commitment would propel the process in the most direct and imaginative way. All other governments must join this commitment and contribute to its fulfilment.

The Commission has identified a series of steps which can be taken immediately and which would thereupon make the world safer.

The Commission has also described the practical measures which can be taken to bring about the verifiable elimination of nuclear weapons and the full safeguarding of militarily usable nuclear material.

A nuclear weapon free world can be secured and maintained through political commitment, and anchored in an enduring and binding legal framework.

Executive Summary

The Canberra Commission is persuaded that immediate and determined efforts need to be made to rid the world of nuclear weapons and the threat they pose to it. The destructiveness of nuclear weapons is immense. Any use would be catastrophic.

The proposition that nuclear weapons can be retained in perpetuity and never used – accidentally or by decision – defies credibility. The only complete defence is the elimination of nuclear weapons and assurance that they will never be produced again.

The end of the bipolar confrontation has not removed the danger of nuclear catastrophe. In some respects the risk of use by accident or miscalculation has increased. Political upheaval or the weakening of state authority in a nuclear weapon state could cripple existing systems for ensuring the safe handling and control of nuclear weapons and weapons material, increasing the odds of a calamity. The same fate could befall other states or sub-state groups with a less developed nuclear weapon capability or those that seek to develop such a capability in the future.

Nuclear weapons have long been understood to be too destructive and non-discriminatory to secure discrete objectives on the battlefield. The destructiveness of nuclear weapons is so great that they have no military utility against a comparably equipped opponent, other than the belief that they deter that opponent from using nuclear weapons. Possession of nuclear weapons has not prevented wars, in various regions, which directly or indirectly involve the major powers. They were deemed unsuitable for use even when those powers suffered humiliating military setbacks.

No nuclear weapon state has been or is prepared to declare as a matter of national policy that it would respond to the use of chemical or biological weapons with nuclear weapons. The solution to these concerns lies in the strengthening and effective implementation of and universal adherence to the Chemical Weapons Convention and Biological Weapons Convention, with particular emphasis on early detection of untoward developments. The response to any violation should be a multilateral one.

Thus, the only apparent military utility that remains for nuclear weapons is in deterring their use by others. That utility implies the continued existence of nuclear weapons. It would disappear completely if nuclear weapons were eliminated.

A New Climate For Action

Nuclear weapons are held by a handful of states which insist that these weapons provide unique security benefits, and yet reserve uniquely to themselves the right to own them. This situation is highly discriminatory and thus unstable; it cannot be sustained. The possession of nuclear weapons by any state is a constant stimulus to other states to acquire them.

In the 1960s, the world looked at the prospect of dozens of nuclear weapons states, recoiled and rejected it. The result was the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) of 1968 with its promise of a world free of these weapons. The overall success of the NPT and other nuclear non-proliferation regimes has been gratifying, but it has been hard won, and is by no means guaranteed. The prospects of a renewal of horizontal proliferation have become real.

The proliferation of nuclear weapons is amongst the most immediate security challenges facing the international community. Despite the impact of the international nuclear non-proliferation regime, the disconcerting reality is that several states have made, and some continue to make, clandestine efforts to develop nuclear arsenals. The possible acquisition by terrorist groups of nuclear weapons or material is a growing threat to the international community.

The end of the Cold War has created a new climate for international action to eliminate nuclear weapons, a new opportunity. It must be exploited quickly or it will be lost.

The elimination of nuclear weapons must be a global endeavour involving all states. The process followed must ensure that no state feels, at any stage, that further nuclear disarmament is a threat to its security. To this end nuclear weapon elimination should be conducted as a series of phased verified reductions that allow states to satisfy themselves, at each stage of the process, that further movement toward elimination can be made safely and securely.

Immediate Steps

The first requirement is for the five nuclear weapon states to commit themselves unequivocally to the elimination of nuclear weapons and agree to start work immediately on the practical steps and negotiations required for its achievement. This commitment should be made at the highest political level. Non-nuclear weapon states should support the commitment by the nuclear weapon states and join in cooperative international action to implement it. This commitment would change instantly the tenor of debate, the thrust of war planning, and the timing or indeed the necessity for modernisation programs. It would transform the nuclear weapons paradigm from the indefinite management of a world fraught with the twin risks of the use of nuclear weapons and further proliferation, to one of nuclear weapons elimination. Negotiation of the commitment should begin immediately, with the aim of first steps in its implementation being taken in 1997.

The commitment by the nuclear weapon states to a nuclear weapon free world must be accompanied by a series of practical, realistic and mutually reinforcing steps. There are a number of such steps that can be taken immediately. They would significantly reduce the risk of nuclear war and thus enhance the security of all states, but particularly that of the nuclear weapon states. Their implementation would provide clear confirmation of the intent of the nuclear weapon states to further reduce the role of nuclear weapons in their security postures. The recommended steps are:

- Taking nuclear forces off alert
- Removal of warheads from delivery vehicles
- Ending deployment of non-strategic nuclear weapons
- Ending nuclear testing
- Initiating negotiations to further reduce United States and Russian nuclear arsenals
- Agreement amongst the nuclear weapon states of reciprocal no first use undertakings, and of a non-use undertaking by them in relation to the non-nuclear weapon states.

Nuclear weapon states should take all nuclear forces off alert status and so reduce dramatically the chance of an accidental or unauthorised nuclear

weapons launch. In the first instance, reductions in alert status could be adopted by the nuclear weapon states unilaterally.

The physical separation of warheads from delivery vehicles would strongly reinforce the gains achieved by taking nuclear forces off alert. This measure can be implemented to the extent that nuclear forces can be reconstituted to an alert posture only within known or agreed upon timeframes.

The nuclear weapon states should unilaterally remove all non-strategic nuclear weapons from deployed sites to a limited number of secure storage facilities on their territory.

Pending universal application of the Comprehensive Test Ban Treaty all states should observe at once the moratorium it imposes on nuclear testing.

The United States and Russia must continue to show leadership in reversing the nuclear accumulations of the Cold War. Their purpose should be to move toward nuclear force levels for all the nuclear weapon states which would reflect unambiguously the determination to eliminate these weapons when this step can be verified with adequate confidence.

The nuclear weapon states should agree and state that they would not be the first to use or threaten to use nuclear weapons against each other and that they would not use or threaten to use nuclear weapons in any conflict with a non-nuclear weapon state. Such an agreement should be brought into operation as soon as possible.

Reinforcing Steps

The following steps would build on the solid foundation of commitment, accomplishment and goodwill established through implementation of the steps recommended for immediate action:

- Action to prevent further horizontal proliferation
- Developing verification arrangements for a nuclear weapon free world
- Cessation of the production of fissile material for nuclear explosive purposes.

The problem of nuclear proliferation is inextricably linked to the continued possession of nuclear weapons by a handful of states. A world environment where proliferation is under control will facilitate the disarmament process and movement toward final elimination, and vice versa. The emergence of any new nuclear weapon state during the elimination process would seriously jeopardise the process of eliminating nuclear weapons. Action is needed to ensure effective non-proliferation controls on civil and military nuclear activities, and to press for universal acceptance of non-proliferation obligations.

Effective verification is critical to the achievement and maintenance of a nuclear weapon free world. Before 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 whether through retention or acquisition of clandestine weapons, weapons components, means of weapons production or undeclared stocks of fissile material. Formal legal undertakings should be accompanied by corresponding legal arrangements for verification. To maintain security in a post-nuclear weapon world the verification system must provide a high level of assurance as to the continued peaceful, non-explosive use of a state's nuclear activity. A political judgement will be needed on whether the levels of assurance possible from the verification regime are sufficient. All existing arms control and disarmament agreements have required political judgements of this nature because no verification system provides absolute certainty.

A key element of non-proliferation arrangements for a nuclear weapon free world will be a highly developed capacity to detect undeclared nuclear activity at both declared and undeclared sites. Progressive extension of safeguards to nuclear activity in the nuclear weapon states, the undeclared weapon states and the threshold states will be needed with the end point being universal application of safeguards in all states. Systems will be needed to verify that nuclear warheads are dismantled and destroyed, and their fissile material content safeguarded to provide maximum confidence that such material cannot be reintroduced to weapons use.

The political commitment to eliminate nuclear weapons must be matched by a willingness to make available the resources needed for nuclear disarmament including effective verification. States must also be confident

that any violations detected will be acted upon. In this context, the Security Council should continue its consideration of how it might address, consistent with specific mandates given to it and consistent with the Charter of the United Nations, violations of nuclear disarmament obligations that might be drawn to its attention. This should demonstrate that the collective security system enshrined in the Charter will operate effectively in this field.

Further United States/Russian Strategic Arms Reduction Treaties (START) and nuclear confidence building measures should establish a receptive international climate for negotiations on global reduction of nuclear arms. The United States and Russia could commence a process for bringing the United Kingdom, France and China into the nuclear disarmament process. Further early steps could be for the US and Russia to prepare the ground for verification of nuclear weapon states reductions by sharing information and expertise on START verification, on weapons dismantlement and on verification and control of fissile material from dismantled weapons. US/Russian experience on nuclear confidence building might be extended to the other nuclear weapon states and new measures developed which involve them.

The Future Environment

Concurrent with the central disarmament process, there will be a need for activity supported by all states, but particularly the nuclear weapon states, to build an environment conducive to nuclear disarmament and non-proliferation.

It will be extremely important for the pursuit of the elimination of nuclear weapons to protect fully the integrity of the Anti-Ballistic Missile Treaty.

Nuclear weapon free zones are part of the architecture that can usefully encourage and support a nuclear weapon free world. The spread of nuclear weapon free zones around the globe, with specific mechanisms to answer the security concerns of each region, can progressively codify the transition to a world free of nuclear weapons.

At the level of national action, states have the fundamental obligation, under a variety of treaties, and in moral terms, to ensure that sensitive nuclear material, equipment and technology under their jurisdiction and control do not find their way into the hands of those who would misuse them.

The Commission noted with satisfaction the response of the International Court of Justice made in July 1996 to a request from the General Assembly of the United Nations for an advisory opinion on the legality of the threat or use of nuclear weapons. The Court's statement that there existed 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 is precisely the obligation that the Commission wishes to see implemented.

The Commission considered carefully the merits of setting out a precise timeframe for the elimination of nuclear weapons, but elected not to do so. However, this does not imply that it accepts the extended timelines imposed by such current constraints as limited warhead dismantlement facilities. Those constraints could be relieved by political decisions and the allocation of resources required to advance dismantlement. In addition, another limiting factor may prove to be establishing the necessary confidence in the verification regime which would be required to take the final step to complete elimination. In this context, the Canberra Commission remains convinced of the basic importance of agreed targets and guidelines which would drive the process inexorably toward the ultimate objective of final elimination, at the earliest possible time.

Part One
The Nuclear Weapon Debate

The Nuclear Weapon Debate

The Canberra Commission is persuaded that immediate and determined efforts need to be made to rid the world of nuclear weapons and the threat they pose to it. The Commission acknowledges that the debate between those for and against the elimination of nuclear weapons is not new. Both sides claim that their positions are rational and moral. But the circumstances that created and sustained the nuclear arms race of the Cold War have all but disappeared, and an uncertain global strategic future lies ahead. This uniquely favourable moment should be seized to eliminate the class of weapons which, alone, can destroy all life on earth.

The Commission believes that to be compelling, the case for a nuclear weapon free world must be convincingly argued from two sides of the issue: why these weapons should be eliminated; and a rebuttal of the rationale most commonly cited for retaining them. Simultaneously the security concerns of the present day including, in particular, nuclear proliferation must be addressed.

The Case for a Nuclear Weapon Free World

The case for elimination of nuclear weapons is based on three major arguments:

- The destructiveness of nuclear weapons is so great they have no military utility against a comparably equipped opponent, other than the belief that they deter that opponent from using nuclear weapons. Use of the weapons against a non-nuclear weapon opponent is politically and morally indefensible.
- The indefinite deployment of the weapons carries a high risk of their ultimate use through accident or inadvertence.
- The possession of the weapons by some states stimulates other nations to acquire them, reducing the security of all.

The destructive power of nuclear weapons dwarfs that of any conventional weapon or non-nuclear weapon of mass destruction. More energy can be released in one micro-second from a single nuclear weapon than all the energy released by conventional weapons used in all wars throughout history. The

atomic bombs detonated over Hiroshima and Nagasaki in August 1945, while by today's standards of relatively low yield, in a matter of seconds erased both cities. In 1945 nuclear weapons became a new part of the international context and the world had to cope as best it could with a radically changed calculus of national and international security.

No theoretical calculation of the damage can give a true picture of the consequences of nuclear warfare. The explosion of a nuclear weapon causes damage through intense thermal radiation, a blast wave and nuclear radiation from the fireball and radioactive fallout. The effects of a major exchange of nuclear weapons, or even a more limited exchange, would not be confined to those states directly involved in a nuclear conflict. On the contrary, the consequences of nuclear war would stretch beyond the immediate destruction, and into non-belligerent states and the lives of future generations, through fallout, widespread contamination of the environment and possible genetic damage.

The survivors of a major nuclear war would face extraordinary difficulties, especially in reconstruction, and the restoration of domestic and international order. In the case of the two world wars the most powerful states were engaged in prolonged combat, but the international system survived, though at a terrible cost, and the resulting physical damage was repaired relatively quickly. A major nuclear war or exchange would make this sort of recovery immensely difficult and for some perhaps impossible.

The world has lived under the shadow of the mushroom cloud continuously since 1945, and the cumulative psychological impact has been overwhelmingly negative. The threat that the existence of nuclear weapons poses to the future of the human species and the global environment remains undiminished. It must not be ignored or forgotten by the international community.

The initial development and proliferation of nuclear weapons meant that, for the first time in history, the fate of humankind was delivered into the hands of a small group of leaders and decision makers. An unprecedented responsibility was placed on those controlling the deployment, use and maintenance of nuclear weapons. That is still the case. With the end of the Cold War, the risk that nuclear weapons might be used deliberately by a major power in a global war has lessened, but other dangers must also be

considered. Foremost among these are the risks that nuclear weapons can be detonated accidentally, used as a result of strategic miscalculation during a crisis or used in an unauthorised way by those with access to the weapons, leading to further escalation and the retaliatory use of nuclear weapons. The complexity of the command, control, communication and early warning systems associated with nuclear weapons, coupled with the speed with which nuclear weapons can be delivered, creates a broad environment for such accidental or miscalculated use.

In the 1960s, the world looked at the prospect of dozens of nuclear weapon states, recoiled and rejected it. The result was the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) of 1968 with its promise of a world free of these weapons. The overall success of the NPT and other nuclear non-proliferation regimes has been gratifying, but it has been hard won, and is by no means guaranteed. The prospects of a renewal of horizontal proliferation have become real.

In parallel with the risks associated with the nuclear arsenals in the five declared nuclear weapon states, there are the dangers of undeclared nuclear arsenals. The states concerned have neither articulated the doctrines supporting their nuclear forces, nor is anything known of the arrangements they have in place to ensure the non-use of these weapons. These states must be urged strongly to adhere to the NPT or other equivalent non-proliferation obligations as non-nuclear weapon states. Equally the acquisition of nuclear weapons or material by terrorists or other sub-national groups is a matter of grave concern.

During the Cold War, American and Soviet strategic nuclear forces were designed to cope with sudden attack, not least by keeping large portions of their forces on alert and ready to strike on the shortest notice. Although the forces were structured to be able to ride out a first nuclear strike, they also had 'launch-on-warning' or 'launch-under-attack' options, choices that would have to be exercised after no more than a few minutes of deliberation. The need for such a prompt response had grave drawbacks: information on the scale and nature of the attack might be unclear and difficult to verify in the minutes available. The recommended response might compound the disaster or, worse, the early warning systems might be wrong. False alarms have occurred, although never in the midst of a severe crisis.

The profound anxiety and uncertainties imposed on advisers and decision makers under this scenario, faced as they would be with the imminent destruction of their society and the loss of a significant fraction of their retaliatory forces, invoke a powerful predisposition toward the option to 'launch-on-warning' or 'launch-under-attack'. The acute urgency of the circumstances, and the logic of inflicting severe retaliatory damage, posed the real likelihood that a nuclear first strike of any significant size would trigger a massive response, despite the availability of an array of graduated response options. Elaborate theories of escalation control and 'intra-war bargaining' notwithstanding, the fatal flaw of strategic nuclear deterrence is that if it fails, it will do so with catastrophic consequences.

The continuing practice of maintaining nuclear weapons systems on high states of alert also increases the danger of accidental detonation, if only from the handling of nuclear weapons and their components which such postures entail. Servicing complex systems on alert 24 hours a day, year in and year out, requires elaborate planning and organisation. It demands tight discipline and continuous judgements at the margin between the requirements of safety and responsiveness. Certainly, elaborate technologies were developed to try to preclude the accidental or unauthorised launch of a delivery vehicle or the detonation of the warheads it carried. The success of these measures over five decades is a credit to those who managed and maintained the weapons systems. But accidents did occur. During the period from 1945 to 1980, about 100 accidents were reported which damaged nuclear weapons and could have caused unintended detonation. A number of serious accidents involving United States airborne alert forces prompted the termination of this practice, although plans permit its reinstatement in a period of acute crisis.

The US decision in 1991 to terminate entirely the 30 year practice of maintaining a portion of its strategic bomber force on peacetime alert further reduced the exposure of these unsheltered forces to the likelihood of accident or deliberate damage. However salutary these steps to reduce alert levels, and despite the transformation of relations between the United States and Russia, the fact remains that both of these states, and other nuclear weapon states, maintain thousands of nuclear warheads on continuous alert. This perpetuation of the most overly hostile and risky aspects of the Cold War defies logic. It needlessly prolongs an atmosphere of mistrust and the

potential for accidents. It is entirely out of keeping with the urgent interest of fully integrating Russia into the institutions and norms of a global community moving rapidly toward democratic government and free and open markets.

The end of the bipolar confrontation has by no means removed the danger of nuclear catastrophe. In some respects the risk of use by accident or miscalculation has actually increased. Political upheaval or the weakening of state authority in a nuclear weapon state could cripple existing systems for ensuring the safe handling and control of nuclear weapons and weapons material, increasing the odds of a calamity. The same fate could befall other states or sub-state groups with a less developed nuclear weapon capability or those that seek to develop such a capability in the future.

The proposition that large numbers of nuclear weapons can be retained in perpetuity and never used – accidentally or by decision – defies credibility. The fact that nuclear weapons have not been used since 1945 is a great relief but provides little comfort. The United States and the former Soviet Union came perilously close to outright nuclear war during the Cuban missile crisis. It is highly doubtful that a full accounting has been made of accidents and incidents involving nuclear weapons since their introduction over 50 years ago. And present and prospective nuclear weapon states have yet to resolve the inherent contradiction of nuclear deterrence: that forces should be postured to convey a credible capability of use, but they should not at the same time provoke countervailing reactions that lead to expanded arsenals, crisis instability and mounting consequences should deterrence fail.

Limited Military Utility

Nuclear weapons have long been understood to be too destructive and non-discriminatory to secure discrete objectives on the battlefield. They came increasingly to be regarded as weapons to be employed only in extremis, and then with the dismaying knowledge that the ensuing consequences would obviate whatever military or political objective prompted their use. As early as the 1970s, under the provisions of the Strategic Arms Limitation Treaties (SALT) and subsequently according to the obligations of the Strategic Arms Reduction Treaties (START), the United States and Russia began to constrain and reduce the capabilities and size of their strategic forces. In addition, they

began to reduce the dangers of tactical nuclear weapons. These weapons have been largely withdrawn from overseas deployment and removed from ships and sea-based aircraft to stockpiles on their own territory.

Even at the height of the Cold War, the ostensible use of tactical or battlefield nuclear weapons to prevail against a conventional attack – the 'flexible response' strategy – never satisfied the conflicting concerns of NATO allies nor was perceived as guaranteeing either a controllable nuclear exchange or ensuring an automatic link to United States strategic nuclear forces. Indeed, whether nuclear weapons were the decisive factor in or superfluous to the deterring of Warsaw Pact aggression against Western Europe has been a matter of contention for some time. What is clear, however, is that possession of nuclear weapons has not prevented wars, in various regions, which directly or indirectly involve the major powers. They were deemed unsuitable for use even when those powers suffered humiliating military setbacks (as in Korea) and, ultimately, defeat (as in Vietnam and Afghanistan).

The asserted necessity, much less the utility of nuclear weapons, of whatever yield, to deter use of such terror-inspiring devices as chemical or biological weapons, is also greatly overstated. Moreover, the advisability of such use is profoundly suspect. To the first point, the nuclear weapon states have such an overwhelming strength in military and civilian technology that a combination of defensive measures and advanced conventional forces can deter or powerfully retaliate against chemical or biological weapon threats. States with less conventional capability than the nuclear weapon states would likely find nuclear weapons highly impractical to deter attacks or threats from their neighbours, from many standpoints. But the cost of developing even a rudimentary capability would be extremely high and selecting an appropriate target for retaliation would be difficult. The consequences of nuclear retaliation are so disproportionate and uncertain as to render this option at best implausible and at worst self-defeating. The most appropriate course for dealing with chemical or biological weapon threats is for the world community, and most especially the nuclear weapon states, to press ahead with chemical and biological disarmament.

The nuclear weapon states, through negative security assurances and other multilateral commitments, have already placed sharp limits on the utility of their nuclear weapons in respect to the non-nuclear weapon states. Further,

these weapons have no feasible role in deterring terrorists or sub-state groups armed with nuclear weapons or other weapons of mass destruction. Most importantly, apart from their highly constrained military utility, the use of any type of nuclear weapon, of any yield, would irretrievably diminish, if not destroy, the vitally important threshold or firebreak between nuclear and non-nuclear weapons that has been so carefully sustained by all states since 1945. It would thereby raise the grim prospect of a world of enmities, of states armed to the teeth with nuclear weapons and of wide acceptance of the consequences of their employment.

Over the period of the Cold War, deterrence proved to be an open-ended, highly risky and very expensive strategy for dealing with the reality of nuclear weapons in a world of nation states with enduring, deep-seated animosities. Conversely, given the origins and peculiar ideological character of the East-West conflict, the extreme alienation of the principal antagonists, the vast infrastructures put in place and the sense of imminent, mortal danger on both sides, deterrence may have served to at least introduce a critical caution in superpower relationships. Whatever the final judgement may be with respect to this era of unprecedented threats and risks, in the post-Cold War environment, the argument for deterrence is largely circular. Its utility implies and indeed flows from an assumption of the continued existence of nuclear weapons, but in a world of dramatically reduced global tensions. The only military utility that remains for nuclear weapons is in deterring their use by others. That utility implies the continued existence of nuclear weapons. It would disappear if nuclear weapons were eliminated.

Reversing Nuclear Proliferation

The proliferation of nuclear weapons is amongst the most immediate security challenges facing the international community. It is a palpable threat to the security of both nuclear weapon states and non-nuclear weapon states. The inherent risks attending the possession of nuclear weapons as recounted above can only multiply should the possession of nuclear weapons expand.

There is as much cause for alarm as there is for satisfaction regarding the record to date. Despite the impact of the international nuclear non-proliferation regime, the disconcerting reality is that several states have made, and some continue to make, clandestine efforts to develop nuclear arsenals. Indeed, the world may well find itself at a crucial juncture with respect to

the future course of proliferation. Should the ranks of declared or undeclared states grow by even one beyond the present roster of known or widely presumed members, the risk of a new chain reaction of proliferation is substantial. Some argue that it is precisely because of this possibility that major powers such as the United States must retain nuclear weapons in perpetuity. Such logic turns the singular role of the major nuclear powers in the arms control arena on its head. The undeniable truth is that these powers collectively, and the United States in particular, govern the pace, possibilities and prospects for nuclear arms limitations, reductions and elimination. Should they elect to preserve their arsenals, over time other states will acquire nuclear capabilities. But, should they make an unequivocal and demonstrated commitment to shrink and ultimately eliminate their nuclear arsenals, over time they will establish a global norm for honouring this obligation.

It is false to claim that the world has traversed successfully the most dangerous phase of the nuclear era and is now on the path to modest, passively deployed nuclear forces that will deliver the asserted benefits of deterrence at much reduced risk – the so-called 'low-salience nuclear world'. Such confidence is out of keeping with the unhappy reality that even if START II is fully implemented, the United States and Russia in 2003 will still have a large stock of tactical nuclear warheads and a combined strategic nuclear arsenal of around 7000 operational warheads. Beyond even this enormous residual capability, they will likely retain a substantial reserve not accountable under the agreement. And, of course, the forces of the other three nuclear weapon states remain outside of any reduction agreement, and thus will remain unconstrained. Under these circumstances, there is no assurance whatever that a low-salience nuclear world can ever be achieved or sustained, especially as the number of actors multiplies. Nuclear forces by their mere existence will have high salience.

The possible acquisition by terrorist groups of nuclear weapons or material is a growing threat to the international community. It adds a disturbing new dimension to the more well established concern about proliferation among states. During the Cold War, the most probable targets of nuclear attack were the nuclear weapon states themselves who targeted each others' military installations and even cities. Today, the possible acquisition of nuclear weapons or material, including by terrorist and sub-state groups, has become a serious

threat to the international community. Even the most powerful country in the world, the United States, is now vulnerable to such threats.

In the absence of extremely tight controls, the development of an already significant illegal trade in fissile material – particularly from sites in the former Soviet Union – will make it easier for terrorist or sub-state groups to obtain enough nuclear material for a nuclear device. The perpetuation of a nuclear weapons culture and its supporting infrastructure, and the increasing availability of relevant expertise from scientists and technicians formerly employed in nuclear weapons establishments, will also make it feasible for terrorist or sub-state groups to assemble a workable nuclear device able to threaten large population groups. While this does not imply that illicit nuclear weapons will become widely available or the weapon of choice for terrorists, it cannot be excluded that some extreme act of terror might in the future be carried out with a nuclear device. The most recent Harvard study on the subject makes a telling point:

> It does not require a large step to get from terrorist acts like Oklahoma City and the World Trade Center to the first act of nuclear terrorism. Suppose that instead of mini-vans filled with hundreds of pounds of the crude explosives used in Oklahoma City and New York, terrorists had acquired a suitcase carrying one hundred pounds of highly enriched uranium (HEU), roughly the size of a grapefruit. Using a simple, well-known design to build a weapon from this material, terrorists could have produced a nuclear blast, equivalent to 10,000 to 20,000 tons of TNT. Under normal conditions, this would devastate a three-square-mile urban area ...[1]

In this context it cannot be excluded that one possible future source of fissile material is plutonium, in vitrified form, in former underground nuclear weapon test sites. Accordingly, these sites must be declared and safeguarded to prevent the illicit retrieval of this material.

It is unlikely that terrorist threats involving a nuclear device or material can be eliminated by state-to-state cooperation, even where a terrorist group has the backing of another state. The logic of deterrence fails when one

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1 Graham T. Allison, Owen R. Coté Jr., Richard A. Falkenrath and Steven E. Miller, *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material* (Cambridge, Massachusetts: MIT Press, 1996), p. 1 of the Introduction.

side does not have an easily identifiable or vital asset at which the other can aim. In addition, terrorists are likely to employ unconventional means of delivery for their nuclear devices, making it even more difficult for target states to predict, prevent or limit the successful use or threat of use of these devices.

The nuclear weapon states, as part of the decision taken in 1995 at the NPT Review and Extension Conference (NPTREC) to extend the NPT indefinitely, reaffirmed their commitment to Article VI of the Treaty and agreed to a specific program of action which includes the determined pursuit of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goal of elimination. The NPT rests on this promise and it must be kept. In the long run, the nuclear weapon states cannot realistically expect to dampen proliferation pressures by retaining their own, albeit modest, passively deployed forces. To deal effectively with proliferation therefore means also tackling head on the problem of nuclear disarmament and the elimination of nuclear weapons at the earliest possible time.

As to the issue of legality, the Canberra Commission notes with satisfaction that, in response to a request from the UN General Assembly for an advisory opinion on the legality of the threat or use of nuclear weapons, the International Court of Justice (ICJ), in July 1996, stated unanimously that "a threat or use of force by means of nuclear weapons that is contrary to Article 2, paragraph 4, of the UN Charter and that fails to meet all the requirements of Article 51, is unlawful", and that "a threat or use of nuclear weapons should also be compatible with the requirements of the international law applicable in armed conflict, particularly those of the principles and rules of international humanitarian law, as well as with specific obligations under treaties and other undertakings which expressly deal with nuclear weapons".[2]

By majority vote the ICJ also stated: "It follows from above-mentioned requirements that the threat or use of nuclear weapons will generally be contrary to the rules of international law applicable in armed conflict and in particular the principles and rules of humanitarian law; However, in view of the current state of international law, and of the elements of fact at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance

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2 ICJ Advisory Opinion, *Legality of the Threat or Use of Nuclear Weapons*, 8 July 1996, General List No. 95, p. 36

of self-defence, in which the very survival of a State would be at stake." Moreover, in its advisory opinion the Court unanimously stated that there existed "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".[3] It is precisely this obligation the Canberra Commission wishes to see implemented.

Security Without Nuclear Weapons

For all the reasons outlined above, the world would be a much more secure place for everyone if there were no nuclear weapons. For forty years the two superpowers made herculean efforts, at great cost, to integrate nuclear weapons into their respective national security postures - bigger warheads, smaller warheads, a greater diversity of delivery systems and launch platforms, and all manner of innovations in deterrence doctrine and declaratory postures. But nothing could alter the reality that each depended for its very existence on the rationality as well as the technical and organisational competence of its most bitter foe.

True, during the Cold War nuclear weapons may have played a role in reinforcing awareness of the futility of war between the major powers, and in helping establish a framework of confidence in the West in its own security vis-a-vis the Soviet Union and the Warsaw Pact. Some still believe that 'existential deterrence' – a general caution engendered in state behaviour by the prospect of escalation to nuclear conflict – continues to have relevance in the international system by engendering caution in state behaviour in the face of the prospect of escalation to nuclear conflict. But the world has moved beyond the Cold War. The risks of retaining nuclear arsenals in perpetuity far outweigh any possible benefit imputed to deterrence. The possession of nuclear weapons increases the possibility of a nuclear response in a crisis, encourages others to develop nuclear arsenals and provokes the rapid development of nuclear weapons by adversaries. The presence of nuclear weapons in regions of chronic tension does more to increase than alleviate the chances of misunderstanding and conflict. It increases the risk that low intensity regional conflicts could escalate into a wider nuclear confrontation.

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3 *Ibid.*

Nuclear weapons are either powerless to address or in some cases simply exacerbate the most prevalent threats to national security in today's world, including terrorism, ethnic conflicts, state disintegration, humanitarian disasters and economic crises. To help counter these security threats, states are crafting new cooperative strategies, institutions and mechanisms, both at the global and regional levels. Several states – most notably Argentina, Brazil, South Africa and Sweden – have revised their earlier assessment that a nuclear option provided a route to enhanced national security and international influence. Meanwhile, the vast majority of states have voluntarily rejected the nuclear weapon option while maintaining and enhancing their national security.

Nuclear weapons to some degree influence the security outlook of a wide range of states, not just the nuclear weapon states and other states with a nuclear weapon capability. The elimination of nuclear weapons will contribute to and facilitate important changes in the international security environment. Individual states can be reassured that their security is not undermined by the process of elimination. Practical steps to achieve a nuclear weapon free world can be agreed and verified. In sum, the safe and verifiable elimination of nuclear weapons would make a major contribution to prospects for a more secure global community in the century to come.

A New Opportunity

The end of the Cold War has created a new climate for international action to eliminate nuclear weapons, a new opportunity. It must be exploited quickly or it will be lost. There has been no better opportunity since the beginning of the nuclear age. Permanent arsenals and proliferating nuclear powers will be the fate of the world if this opportunity is ignored.

Nuclear weapons have not been used for 50 years but the risk is likely to become greater as time goes on. Nuclear weapons should not be nor should they be seen to be a natural or inevitable feature of the human society. If, on the other hand, nuclear weapons are accepted as a permanent feature of the international system, then states will inevitably develop new nuclear weapons and their associated delivery systems.

The whole global community has a direct and fundamental interest in the elimination of nuclear weapons, and the regime which manages that process

and its outcome. The key responsibility lies with the nuclear weapon states themselves and in particular with the United States and Russia. The invigoration of the elimination process will depend on decisions which they alone can make.

Rebutting the Case for Retaining Nuclear Weapons

The case for retaining nuclear weapons as instruments of national power continues to be very influential – people of great experience and authority remain unconvinced about the wisdom of elimination. Accordingly, the following rebuttal deals at some length with the arguments for retention.

"Nuclear Weapons Have Prevented and Will Continue to be Needed to Prevent War Between the Major Powers"

Perhaps the most important role claimed for nuclear weapons - beyond deterring the use of other nuclear weapons – is that they discourage recourse to war among the major powers and are thus a force for stability. The empirical evidence appears strong. The period 1870-1945 saw two world wars and several more brief, confined but full-scale clashes between major states such as France and Germany in 1870, China and Japan in 1894-95, and Japan and Russia in 1904-5. Since 1945 there has been no direct clash between the recognised major powers (although China and the Soviet Union fought a brief border war in 1969). Many therefore contend that, for better or worse, it has taken the unique sobering capacity of nuclear weapons to break the entrenched cycle of war between the world's most powerful states. This broad historical correlation between nuclear weapons and the absence of war between the major powers is seen as being decisively reinforced by the belief of some that nuclear weapons played a vital part in deterring the Soviet Union from pushing the Iron Curtain in Europe further to the West. The experience in Europe in 1945-90 in fact lies at the heart of the view that nuclear weapons have, on balance, played a positive role.

While it must be accepted the beliefs were deeply held that the Soviet Union aspired to invade and occupy Western Europe, and that nuclear weapons deterred it from doing so, the evidence for those beliefs is now unclear.

First, it is not clear that the Soviet Union, even in the company of its Warsaw Pact allies, had the capacity to do so, nor more particularly, that it believed

its national or wider political and strategic interests would be advanced by doing so. The Soviet Union, at that time, was a powerful, ruthless totalitarian state and these facts were a source of gravest concern. But, as American records from the immediate post World War II period are declassified and, even more important, as the end of the Cold War permits the first authoritative investigations into the assessments and judgements made by the Soviet leadership at the relevant times, it is clear that the view that Soviet policy rested on a systemic urge to aggression and that its actions were driven by this rather than by a concrete calculation of its capabilities and interests, is open to question.

Second, the idea that only the threat of suffering its own Hiroshimas and Nagasakis deterred the Soviet Union from invading Western Europe is contrary to the unfolding historical record. That record, rather than suggesting that the Soviet Union was uniquely different in the way it framed its interests and assessed its options to advance them, instead suggests that World War II had reaffirmed for the Soviet Union, as for other powers, that major war between them was not a rational instrument of policy and should be avoided at almost any cost. The new danger of escalation to nuclear war merely underlined this central point.

Whatever conclusions may eventually be drawn from the historical record, Europe's experience of nuclear deterrence after World War II should not be extended into a general principle. A number of relevant aspects do, however, emerge from that experience.

It was in Europe that the strategic utility of nuclear weapons was most thoroughly explored and their limitations most clearly displayed. The first authoritative endeavour in the United States to accommodate nuclear weapons in a national security strategy – the policy memorandum NSC-68 of 1950 – recommended that the United States make the fullest use of its advantage in atomic weaponry. In the NATO context, facing very strong Soviet conventional forces, the decision was taken to enlist nuclear weapons as a substitute for conventional forces. Declaratory statements stressed that, if attacked, NATO intended to respond promptly with nuclear weapons "by means and at places of our own choosing". This strategy, known as 'massive retaliation', was the beginning of a determined search to extract utility from nuclear weapons as a balance against superior conventional forces, namely deterring major aggression against any member of the Atlantic alliance.

This policy of extended nuclear deterrence, as it came to be known, proved to be a most demanding one. It is noteworthy that doubts about the credibility of nuclear threats were apparent from the outset: NSC-68 also recommended that the post-war rundown of conventional forces be reversed to create the largest possible firebreak between conventional war and nuclear war. The United States and its allies had as a common interest a threat to resort to nuclear weapons that was, if not utterly credible, at least not blatantly incredible. But the United States, for all the sincerity of its political undertakings, had a compelling interest in not being drawn automatically into full-scale intercontinental nuclear war as a result of any instance of aggression against its European allies.

The European allies, seeking the strongest possible deterrent to war, spoke publicly as though they wanted to see a direct linkage between Soviet conventional attack and a response by US strategic nuclear forces. Privately, however, many Europeans thought otherwise. And in the 1970s and 1980s scepticism about the military utility of nuclear weapons began to be expressed publicly by former service leaders and officials on both sides of the Atlantic:

- In 1978 General Johannes Steinhoff, the former Luftwaffe Chief of Staff, wrote: "I am in favour of retaining nuclear weapons as potential tools, but not permitting them to become battlefield weapons. I am not opposed to the strategic employment of these weapons; however, I am firmly opposed to their tactical use on our soil."[4]
- By 1982, some retired Chiefs of the British Defence Staff, including Lord Louis Mountbatten, reportedly expressed their belief that initiating the use of nuclear weapons, in accordance with NATO policy, would lead to disaster. Field Marshal Lord Carver, Chief of the Defence Staff from 1973 to 1976 and a member of the Canberra Commission, wrote in the London *Sunday Times*:

  > At the theatre or tactical level any nuclear exchange, however limited it might be, is bound to leave NATO worse off in comparison to the Warsaw Pact, in terms both of military and civilian casualties and destruction...The only exception would be if the Soviet Union were to respond to NATO's use of nuclear

4 Hans Gunther Brauch, "The Enhanced Radiation Warhead : A West German Perspective," *Arms Control Today*, (June 1978), p.3.

weapons either with a much more limited response or none at all. To initiate use of nuclear weapons on that assumption seems to me to be criminally irresponsible.[5]

- Henry Kissinger, President Nixon's National Security Adviser and Secretary of State, speaking in Brussels in 1979, made quite clear he believed the United States would never initiate a nuclear strike against the Soviet Union to protect its allies, no matter what the provocation. "Our European allies," he said, "should not keep asking us to multiply strategic assurances that we cannot possibly mean or, if we do mean, we should not execute because if we execute we risk the destruction of civilisation."[6]
- Admiral Noel Gayler, former commander in chief of US air, ground and sea forces in the Pacific, remarked in 1981: "There is no sensible military use of any of our nuclear forces. The only reasonable use is to deter our opponent from using his nuclear forces."[7]
- Melvin Laird, President Nixon's first Secretary of Defense, was reported in April 1982 as saying: "A worldwide zero nuclear option with adequate verification should now be our goal....These weapons...are useless for military purposes."[8]
- In 1983, Robert S. McNamara, former US Secretary of Defense, and another member of the Canberra Commission, wrote that in the early 1960s he had recommended, first to President Kennedy and then to President Johnson, that they should never, under any circumstance, initiate the use of nuclear weapons. He believed they accepted his recommendations.
- Former West German Chancellor Helmut Schmidt stated in a 1987 BBC interview: "Flexible response is nonsense. Not out of date, but nonsense.....The Western idea, which was created in the 1950s, that we should be willing to use nuclear weapons first, in order to make up for our so-called conventional deficiency, has never convinced me."[9]

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5 Solly Zuckerman, *Nuclear Illusions and Reality* (New York: Viking, 1982), p.70; *Sunday Times* (London), February 21, 1982.

6 Henry Kissinger, "NATO Defense and the Soviet Threat," *Survival*, (November-December 1979), p. 266.

7 *The Congressional Record (US)*, 1 July, 1981.

8 *The Washington Post,* 12 April, 1982.

9 BBC Radio interview with Stuart Simon, 16 July, 1987.

The history of extended deterrence – which included the progressive acquisition by the Soviet Union of a comparably large and diversified nuclear arsenal – is an anguished one. For Europe the concern was sometimes that developments in Soviet nuclear capabilities had weakened Washington's commitment to its defence, or else that Washington might convince itself that any conflict could be confined to Europe and for that reason be rather more adventurous than Europeans might wish. Concern mounted in the early 1960s when the United States, confronted with a rapidly developing Soviet nuclear force both strategic and tactical, proposed to abandon 'massive retaliation' in favour of a more cautious and nuanced strategy – 'flexible response' – which pushed the nuclear threshold up behind a new resolve to strengthen NATO's conventional defence capabilities. Flexible response and extended deterrence both came under challenge in the late 1970s when the Soviet Union deployed new generations of surface-to-surface ballistic missiles (notably the SS-20) and was thus seen to be acquiring the ability to wage strategic nuclear war against Western Europe with a weapon that was sub-strategic in the superpower context. Some believed that to negate or respond to the use or threat of use of these weapons the United States would have had to leapfrog from its tactical nuclear weapons in Europe to its US-based strategic nuclear forces. There was thought to be a missing rung in the ladder of escalation which was seen as further 'de-coupling' the United States from the defence of Europe, that is, putting at risk the direct linkage between aggression against NATO and the threat of US strategic nuclear strikes against the Soviet Union. The British and French nuclear forces were deemed, as always, to be essentially irrelevant to this gap in the escalatory ladder. The solution adopted by NATO was to deploy new American missiles capable of posing from European soil the same risk to Soviet targets that the SS-20 posed to Western Europe, and accompany this with an offer to negotiate mutual reductions in this class of weapon.

In all of this there was little discussion, even in broad terms, of how the strategic weapons in the United States and the broad array of tactical nuclear weapons in Europe would actually be used. Deterrence, after all, requires that threats be credible to the opponent: this, in turn, requires evidence that using nuclear weapons could produce outcomes preferable to non-use. But it has proven impossible to conceive of 'war plans' for the use of nuclear forces against a comparably equipped foe which did not leave the initiator worse off as a result of the action. Discussion of this problem was muted for two main reasons.

First, the extraordinary destructiveness even of tactical nuclear weapons in the relatively confined spaces of northern Europe came graphically to the fore. Occasional references deriving from exercises, based on favourable assumptions such as the constrained use of tactical nuclear weapons against military targets, invariably involved casualty figures which provoked public alarm. Adding to the alarm of casualty figures in the millions was nervousness relating to the decision to cross the nuclear threshold as a crisis unfolded, including the prospect that authority to release nuclear weapons might be delegated down the chain of command.

The second constraint on discussion is perhaps even more important. As the Soviet nuclear arsenal grew and diversified – broadly matching that of the United States in terms of flexibility, survivability and destructiveness – the crucial feature of flexible response, namely the presumption of a more credible capacity to threaten to move up the escalatory ladder, became untenable. In effect NATO was trying to build a credible deterrent based on an incredible action.

A degree of 'existential deterrence' existed. But the prospect of the damage which would surely have been incurred in a conventional war must have weighed heavily in the minds of leaders on both sides. Notwithstanding doctrine and declaratory positions, the absolute imperative for the United States and its NATO partners was considered to be the non-use of nuclear weapons.

The foregoing is a brief account of the attempts by the West, and essentially the United States, to exploit nuclear weapons to enhance security. This bias is appropriate because the United States was unique in overtly tasking its nuclear forces to do more than deter nuclear attack against itself. The Soviet Union, of course, also took nuclear weapons very seriously and invested heavily in them. Although there is no evidence that NATO ever entertained the possibility of dislodging the Soviet Union from Central Europe by force, the Soviet Union undoubtedly felt that its nuclear forces deterred, particularly perhaps at times of popular uprisings (1953, 1956 and 1968) when it would have appeared that NATO was under considerable pressure to intervene.

"Nuclear Weapons Protect the Credibility of Security Assurances to Allies"

It is argued that the credibility of security assurances extended to third parties requires the continued existence of nuclear weapons. Extended deterrence

was formulated in the first instance to address circumstances in Western Europe, as a means of transposing United States power and negating the proximity and ready reinforcement capability of the Soviet Union's larger conventional forces. The gravity of the United States' political commitment to defend its allies in Europe and also in Asia and the Pacific lay in its declared preparedness to expose its own territory to nuclear attack. One consideration, never formally declared but not disguised with any vigour, was to dampen incentives in Germany and Japan to become nuclear weapon states themselves.

Extended deterrence has always encompassed tensions. On the one hand, the United States has had to balance the credibility of its security commitments to allies against its natural instinct to build firebreaks between those commitments and nuclear attack against its own home territory. On the other, allies who craved that commitment have also dreaded becoming a superpower nuclear battleground. More importantly, the circumstances in Europe which originally gave rise to extended deterrence no longer obtain. Partly through the Conventional Forces in Europe Treaty (CFE), but more emphatically as a result of the break-up of the Soviet Union and the dramatic diminution in the military capability of its constituent parts, including Russia, the prospect of an overwhelming conventional threat against US allies on the periphery of the former Soviet Union has simply vanished. Nor is there any prospect of a new threat arising comparable in magnitude to that posed by the Soviet Union in the past now that Russian forces have been withdrawn from Germany and the rest of Central Europe.

The Canberra Commission does not propose that any nuclear weapon state should eliminate its nuclear forces unilaterally. Moreover, extended deterrence assurances in the form of collective defence arrangements will remain as part of stable security arrangements. Extended nuclear deterrence, however, cannot be used as a justification for maintaining nuclear arsenals in perpetuity, and the security and non-proliferation function of extended nuclear deterrence in any case will no longer apply in a nuclear weapon free world. Allies of the United States have lent their strong support to the NPT's stated objective of nuclear disarmament. Their interest in collective security arrangements based on conventional forces is sure to continue after nuclear weapons have been eliminated.

"Nuclear Weapons Deter the Use of Other Weapons of Mass Destruction"

Weapons of mass destruction embrace chemical and biological as well as nuclear weapons. The claim is still sometimes made that nuclear weapons are an effective deterrent against them all and constitute the only guarantee of national security against threats posed by such weapons.

All the nuclear weapon states have formulated negative security assurances, statements that set out the circumstances in which they would not use nuclear weapons. The United States declared in 1982 that it would "not use nuclear weapons against any non-nuclear weapon state ... except in the case of an attack on the United States, its territories or armed forces, or its allies, by such a state allied to or associated with a nuclear weapon state in carrying out or sustaining the attack". The clear inference that can be drawn from this statement – which, together with that of the United Kingdom, is the most conditional negative assurance offered by a nuclear weapon state – is that a non-aligned non-nuclear weapon state acting on its own but using biological weapons or chemical weapons against the United States should not fear retaliation with nuclear weapons. In other words, the US and the other nuclear weapon states signalled through these security assurances that the only circumstances in which it would be appropriate to use or threaten to use nuclear weapons was when nuclear weapons were present, directly or indirectly, on the opposing side.

The United States has not failed to capitalise on the fact that it has nuclear weapons and that a non-nuclear adversary might doubt its ordinances of self-denial. In 1990 the United States did not discourage Iraq from the view that it might be subject to nuclear retaliation if it used chemical weapons to protect its occupation of Kuwait. Iraq's Foreign Minister subsequently asserted that the nuclear capability of the coalition forces cast a shadow over the means the regime determined it could sensibly employ to resist eviction from Kuwait. But the United States had means other than veiled nuclear retaliation to deter Iraq from using weapons of mass destruction – for example, the prospect of Iraq's utter devastation through massive conventional bombings or changing the main objective of the war from liberating Kuwait to toppling the Iraqi Government. Furthermore, the United States would have been aware that, if Iraq had raised the stakes and used chemical weapons, the consequences of nuclear retaliation by the United States might have been even more far reaching than the threat it was seeking to deter.

No nuclear weapon state has been or is prepared to declare as a matter of national policy that it would respond to the use of biological or chemical weapons with nuclear weapons. Whatever incidental contribution they might consider nuclear weapons to make in deterring the use of biological and chemical weapons (and it is not difficult to find high-level statements short of formal policy declarations seeking to establish this connection), the nuclear weapon states have not specifically included this in rationales for the maintenance of nuclear forces. They have evidently also taken full account of the fact that use of nuclear weapons in response to use or threat of use of other weapons of mass destruction would cross an important psychological as well as military threshold, making the management of future conflicts even more uncertain. The remarkable advances in the capabilities of conventional armaments, both already achieved and in prospect, can be expected on the whole to confirm this self-imposed limitation on the utility of nuclear weapons.

An increasing number of states have in recent years come to be concerned at the threat of chemical and biological weapons. The issue has become enmeshed with policy responses to proposals for nuclear weapon free zones. The 1996 Treaty of Pelindaba provided an opportunity for nuclear weapon states to reaffirm to African states the assurances they have previously given. As argued in the case for the elimination of nuclear weapons, the solution to these concerns lies in the strengthening and effective implementation of and universal adherence to the Chemical Weapons Convention and the Biological Weapons Convention, with particular emphasis on early detection of untoward developments. The response to any violation should be a multilateral one.

"Nuclear Weapons Confer Political Status and Influence"

It is said of nuclear weapons, with some justification, that their possession delivers important benefits in the form of status, influence and autonomy in world affairs. All of these are strong motives for states as well as individuals. Pressures to retain or acquire nuclear weapons for these reasons must be taken seriously. Yet the growth in influence of several non-nuclear weapon states tends to refute this proposition.

The example most frequently cited of the correlation between nuclear weapons and status is the fact that the five permanent members of the United

Nations Security Council, the only members with the power of veto, are also the nuclear weapon states. None of the five, however, secured this status because of nuclear weapons. Not even the United States was a confirmed nuclear power when the Charter of the United Nations was signed on 26 June 1945. And today, it is beyond doubt that any expansion of the permanent membership of the Security Council will not be on the basis of preserving the nexus between such membership and the possession of nuclear weapons.

The view that nuclear weapons deliver status and influence to their owners is due in part to the fact that nuclear weapons were in the early aftermath of World War II the supreme embodiment of economic strength and technological excellence. As the world slipped deeper into Cold War, and Washington and Moscow gathered ever more of the reins of global management into their hands, the United Kingdom, France and then China saw themselves as potential targets of superpower arsenals. Subsequently they were attracted also to nuclear capability as a means to secure a place at the top table. Nuclear weapons undeniably helped sustain the significant international standing of both the United Kingdom and France, who, importantly, both took the decision to acquire them when nuclear weapons were still fresh and novel. Equally, however, their alliance with and importance to the United States during the Cold War almost certainly contributed far more to their continued prominence in world affairs.

In retrospect, the United Kingdom and France in particular may question whether their decision to secure a nuclear weapon capability has been worthwhile. Very large economic costs, both direct and cumulative, are inevitably involved and these need to be set against any possible enhanced independence in foreign and defence policy. The direct costs of developing atomic and thermonuclear weapons and an array of specialised delivery vehicles, providing an elaborate security apparatus for warheads and their delivery systems, and keeping all of these up to date are themselves formidable. Moreover the entire complex must be operated continuously at extreme standards of excellence.

Nuclear weapons cannot exclusively be relied on for defence, especially if potential adversaries also have them. So the cost of the nuclear forces, including their continued modernisation, must essentially be added to

conventional means of defence. In the cases of the United Kingdom, France and China, the need to support extensive nuclear programs has taken resources and skilled personnel away from conventional forces. The diversion to military purposes of a disproportionately large share of a country's research and development capability is a significant factor in explaining differences in the rate of economic growth that states can sustain over the medium and longer term. In part it explains the pronounced shifts that have occurred over the post-war period in the relative economic weight of the major states, and how Japan and Germany, in particular, have improved their position markedly relative to all the nuclear weapon states. The pressures to refine and update delivery systems have eased although missiles, aircraft and ballistic missile submarines will require expensive maintenance and replacement from time to time. On the other hand the outlook for the medium and longer term is less optimistic. In the absence of a commitment to eliminate nuclear weapons more countries are likely to acquire them, prompting costly competition for at least a qualitative edge. And even a modest increase in the membership of the nuclear club must sharply diminish whatever benefits these weapons are felt to deliver in terms of status.

"Nuclear Weapons Provide Effective Defence at Lower Cost"

It is sometimes argued that nuclear weapons are cost-effective and make possible a more economical defence posture. This view was briefly entertained in the early years of the nuclear era when the United States had a nuclear monopoly or a huge preponderance in deliverable nuclear weapons and when there was a temptation to discount the horror of Hiroshima and Nagasaki and regard nuclear weapons as an important but basically evolutionary development – just a bigger bomb.

While the US/NATO strategy of 'massive retaliation' was an echo of this view, it is important to note that the United States simultaneously decided to reverse the drastic demobilisation that occurred after World War II and to maintain indefinitely large standing conventional forces. The Korean War strongly reinforced this policy position. Much the same happened in the other nuclear weapon states. It was quickly recognised that the circumstances in which nuclear weapons could beneficially be employed were extremely narrow if, indeed, they existed at all. Rather than nuclear weapons being regarded as a substitute for conventional forces, the overwhelmingly

dominant line of reasoning has been to maintain the strongest practicable conventional capabilities and thereby maximise the firebreak between conventional war, should it break out, and nuclear war.

No accurate data exists on the recurring or cumulative cost of the nuclear posture for any of the nuclear weapon states, though without doubt a realistic full costing would yield staggering figures. Such a costing would embrace the production of fissile material; the fabrication of nuclear weapons; environmental clean-up; testing; the design, development, production and operation of delivery systems; the command, control and communications architecture; and the panoply of early warning systems.

All the nuclear weapon states continuously face difficult decisions on nuclear/conventional trade-offs at the margin. But such trade-offs are governed primarily by the need to keep total military expenditure within acceptable bounds. There has been essentially no realistic possibility of achieving savings through assigning to nuclear weapons missions and functions previously performed by conventional forces. If anything, the reverse is true. Recent experience suggests that modern conventional capabilities can reliably perform tasks that were considered earlier to require nuclear weapons. Even here the issue is not cost-effectiveness but the fact that such conventional capabilities constitute a realistic deterrent. In contrast to nuclear weapons, they can be used.

"Nuclear Weapons Deter and if Necessary Can Defeat Large Scale Conventional Aggression by Regional Powers"

The view is held that in a prospective multipolar world with a significant diffusion of economic, technological and military power, nuclear weapons could prove valuable in deterring and if necessary defeating large scale conventional aggression by regional powers, perhaps occurring in more than one theatre at the same time. This presupposes that a nuclear weapon state would find it morally and politically acceptable to use nuclear weapons against a non-nuclear foe.

This contention is unrealistic. Even in the most favourable circumstances, where there has been no prospect of retaliation, political, moral and military inhibitions have excluded the use of nuclear weapons. Twice during the Korean War, when US forces were in desperate straits and when North Korea

and China had no nuclear capability and the Soviet Union only a relatively small one, the US President recoiled from the moral and political costs of resorting to nuclear weapons. When French forces were besieged at Dien Bien Phu in 1954, serious consideration was given in the United States to providing assistance through use of low-yield nuclear weapons. But in these and other instances, including in the later American involvement in Vietnam, self-deterrence proved as effective as mutual deterrence.

The nuclear weapon states have concluded that it is in their interests to formulate negative security assurances that formally proclaim the inadmissibility of the use or threat of use of nuclear weapons in circumstances where the aggressor is not a nuclear weapon state and is not being actively supported by a nuclear weapon state.

It is also plain that any attempt to unshackle nuclear weapons through contemplating a role for them in conventional regional conflicts would be short-sighted in the extreme. This would inevitably and significantly intensify proliferation pressures.

"Deep-Seated Regional Disputes Will Always Frustrate Universal Agreement on the Elimination of Nuclear Weapons"

It is sometimes contended that even if the nuclear weapon states saw net advantage in the complete elimination of nuclear weapons, the necessary universal commitment to this goal would be frustrated by the states involved in the most intractable regional disputes. The two key examples given are the disputes between Israel and the Arab states, and between India and Pakistan. But, without question, the overt nuclearisation of these disputes would complicate them further and make any genuine reconciliation vastly more difficult. The states concerned would be locked into very expensive and dangerous nuclear deterrent relationships, with the familiar incessant pressures to increase and diversify the nuclear arsenals. The actual use of nuclear weapons – whether by design or by accident – would exacerbate these disputes beyond measure and make more likely the direct involvement of the major powers.

It is clearly in the interests of the nuclear weapon states, and substantially within their capacity and that of the international community, to address the concerns of the few states who may believe that a nuclear capability is

indispensable to their security. Strengthening conflict mediation procedures and providing additional security assurances will be in the interests of both nuclear and non-nuclear weapon states.

The striking development, post-Cold War, of increasing global interdependence has led most states to appreciate the potential of seeking security in cooperation with rather than in confrontation against their neighbours. Though cautiously in some cases, many states are now exploring the potential for dialogue, transparency and other trust and confidence building measures with their neighbours as a more reliable and effective means of providing for their security than confrontation or deterrence. Furthermore, the commitment to the goal of a nuclear weapon free world should reinforce the determination of states to strengthen collective and cooperative means of addressing their security concerns.

"The Elimination of Nuclear Weapons is Unverifiable : Cheating and Breakout Will Occur"

The elimination of nuclear weapons will not be possible without the development of adequate verification. A political judgement will be needed on whether the levels of assurance possible from the verification regime are sufficient. All existing arms control and disarmament agreements have required political judgements of this nature because no verification system provides absolute certainty. This situation has not prevented the international community acting in the area of nuclear and other weapons of mass destruction first with the NPT and the International Atomic Energy Agency (IAEA) safeguards system, then the CWC and the Comprehensive Test Ban Treaty (CTBT).

The nature of nuclear weapons, the secrecy that has surrounded their development and uncertainties about total amounts of nuclear material produced for weapons, will make it very difficult, or in the view of some impossible, to be confident that states which have operated large scale military nuclear programs have made full declarations of their holdings of nuclear weapons and fissile material. The possession by a state of a number of nuclear weapons and the means to deliver them in an otherwise nuclear weapon free world would present the state concerned with a powerful coercive instrument. While such a development is considered a significant risk it is hard to envisage the nuclear weapon states totally eliminating their

arsenals. Confidence in the verification arrangements will have to apply to the nuclear programs of the declared nuclear weapon states and the undeclared and threshold nuclear weapon states. Verification arrangements are also discussed in Part Two and in more detail in Annex A.

Nuclear disarmament will be achieved in stages, and the decision point on whether verification is adequate for complete elimination is unlikely to be reached for some time. The potential uncertainty about whether a verification regime can be developed to provide sufficient confidence for final elimination should not be allowed to divert attention from the benefits of making an early start on practical steps toward a nuclear weapon free world. Development and implementation of the verification arrangements needed for each step toward elimination will provide immediate benefit through reducing the dangers posed by nuclear weapons and the threat of nuclear proliferation including nuclear terrorism. If it were to take a long time for the verification system to deliver the levels of confidence needed for total elimination, a world of small residual arsenals would, in the meantime, be a safer place than at present although the dangers of nuclear proliferation and a renewed arms race would remain. Movement to this penultimate stage of nuclear disarmament would establish circumstances in which states could conclude, with increasing conviction over time, that nuclear weapons are not relevant to their security, thereby eliminating any remaining incentive to cheat.

It should be recognised that a verification regime is composed of both its material and technical features, which should be of the highest order attainable, and the common political and legal commitments which support it. This creates the climate of confidence essential to any verification regime. An inclusive approach to verification can increase levels of assurance. In the case of verification for a nuclear weapon free world, technical verification can be supplemented by measures such as transparency in nuclear activity, relevant national intelligence information passed to verification bodies, an enhanced role for individuals in verification and application of effective export controls.

A number of factors can be identified which will act in favour of development of adequate verification arrangements for a nuclear weapon free world. First, because the nuclear weapon scientific industrial complex is a tightly

regulated governmental enterprise, there is an increased probability that extensive records of nuclear weapons and weapons fissile material production will be available. This is not to diminish the magnitude of the task of verifying the completeness of states' declarations of holdings of weapons and weapons nuclear material, and records can of course be destroyed or falsified.

A second consideration is the nearly thirty years of experience accumulated in verifying compliance with the NPT. The IAEA safeguards system offers a proven and evolving system for delivering a high degree of assurance that safeguarded nuclear material remains in peaceful use. Action necessary to improve the IAEA's capacity to detect undeclared nuclear activity is being taken and the Agency has expertise in verifying declarations of previously unsafeguarded nuclear programs, including its work in Iraq, the DPRK (North Korea) and South Africa after that country renounced nuclear weapons.

Third, there is the experience of the SALT, START, INF, CFE and CWC agreements that individually and collectively demonstrate the powerful influence that political will can exert over what is desirable and possible in terms of verification. In the 1980s, the arms control agenda was transformed by the negotiation, in particular, of the INF (Intermediate-range Nuclear Forces) and the CFE agreements. Prior to these treaties, the scope of arms control was, with the major exception of IAEA safeguards inspections, basically limited to arrangements that could be verified by so-called 'national technical means' – that is, by the information that each side could extract without the cooperation of the other. Once it had been determined politically that both sides really wanted the outcomes in question, the realm of verification expanded beyond recognition to include on-site inspections and voluntary transparency and cooperative measures. In a similar vein the verification regime supporting the CWC broke significant new ground in response to the scale and complexity of the challenge, the harnessing of new technologies for verification purposes and the forging of a partnership, worldwide, between governments and the chemical industry. These agreements show that verification capabilities can grow to support the objective when that objective is determined unequivocally to be in the political and security interests of all concerned.

The temptation should be resisted to demand a perfect verification regime and total assurance of effective collective action against any cheating state

(in effect, a world government) as the only circumstance in which it would make sense to eliminate nuclear weapons. Inevitably, some risk will have to be accepted if the wider benefits of a nuclear weapon free world are to be realised. Some argue that, in a nuclear weapon free world, any state that cheats successfully and emerges with a meaningful nuclear force – warheads and credible delivery systems – would derive tremendous advantage. This seems intuitively obvious but it should be examined. The history of the nuclear era to date indicates that the threat of use of nuclear force is in practice extremely difficult to translate into political gains. This would be at least as true in the world that had succeeded in crossing the threshold to zero nuclear weapons. Furthermore, in an era in which the accuracy, penetrating power and destructive force of conventional weapons are increasing rapidly and economic interdependence is growing, the development of an illegal nuclear force would, in all probability, be self-defeating.

It is important to be clear on what constitutes a 'meaningful nuclear force' and on what force might be secretly acquired. Much would depend on the sort of country that did the cheating and the scale of the geopolitical threat that it could subsequently pose before its nuclear capability was countered and negated. The risk of a single state emerging with a meaningful nuclear force is perhaps greatest in the case of a nuclear power or threshold state that succeeded in hiding away a portion of its arsenal while otherwise appearing to participate in the elimination process. This is a clear challenge for the accounting and verification regime. If states with a known nuclear weapon capability fail to create high and unblemished levels of reciprocal confidence in the course of the preparatory process, this will inevitably prejudice the elimination process.

It is already practically impossible for a government to develop nuclear weapons without at least arousing strong suspicions. The instruments and procedures that would come into effect as part of the process of eliminating nuclear weapons can be expected to increase confidence in this regard very substantially. Any state that generated doubts about its commitment to nuclear disarmament or had done so in the past would be subject to particularly close scrutiny. The credibility of the new verification regime should not rest wholly on detection of just one bomb: it should rather be based on the ability to provide due warning that someone was preparing a meaningful nuclear force.

Major powers with very substantial conventional forces do not require nuclear weapons to deal with threats from small states which might acquire some nuclear weapons capability. The advanced conventional weapons of the major powers would be enough to discourage or retaliate against any small state which threatens to use nuclear weapons.

In the light of these considerations, the rational requirement is to evaluate comparative risks. In considering the desirability of moving to a nuclear weapon free world, some compare its hazards not with yesterday's massive nuclear forces on hair-trigger alert holding apart nervous and deeply antagonistic states but with the prospect of relatively modest arsenals possessed only by a few states experienced in their management. But, as already argued, it is much more likely that the nuclear club will expand and the nuclear arms race re-ignite. A more telling comparison is therefore the risk of a failure of deterrence in an environment of thousands of warheads on reliable delivery vehicles, against the risks associated with whatever nuclear force a cheating state could assemble before it was exposed. It is beyond question that, of those two, the former is the vastly greater risk.

Conclusion

The world community has had 50 years of experience with nuclear weapons. In this period much of its effort, including of those members of the community which have owned nuclear weapons, has been directed towards protecting itself from their destructive power. Vertical proliferation – the urge of nuclear weapon states to add to and perfect their arsenals – has been a major cause of the problem of living with nuclear weapons. Horizontal proliferation – the urge of other states to acquire this perceived means of enhancing their security – has also been and remains of great concern.

It has been argued that nuclear weapons have reinforced caution in the conduct of relationships between the major powers. But their existence carries the inherent risk of their use, which would inevitably have catastrophic results. The only complete defence against such catastrophe is the elimination of nuclear weapons and the assurance that they will never be produced again. Inertia and complacency should not be permitted to prevent the international community from reaching this goal.

Part Two
Steps to Eliminate Nuclear Weapons

Steps to Eliminate Nuclear Weapons

The elimination of nuclear weapons must be a global endeavour involving all states. The impetus and driving force however must come from the nuclear weapon states and particularly the United States and Russia. A decisive signal from these longstanding nuclear powers that the risks associated with nuclear weapons far outweigh the presumed benefits would be of historic importance. Indeed, such a definitive commitment to a nuclear weapon free world would accelerate a course of events set in motion well before the Cold War ended.

Movement toward a nuclear weapon free world has begun. That movement rests fundamentally on the Anti-Ballistic Missile Treaty and was significantly advanced with the ratification of the Intermediate-range Nuclear Forces Treaty. The INF was unprecedented in that it was the first negotiated treaty to actually reduce nuclear weapons. More to the point of this report, it was also the first agreement to eliminate an entire class of nuclear weapons. In more recent years the United States and Russia have agreed to deep cuts to their nuclear arsenals which today in total approximate 40,000 to 50,000 warheads. The START I and START II agreements require a two thirds reduction in US and Russian strategic nuclear arsenals from pre-START levels of approximately 10,000 deployed strategic warheads each to 3000-3500 by 2003.

Both the United Kingdom and France have unilaterally reduced their nuclear postures by measures including withdrawal from deployment and elimination of elements of their nuclear forces. Tactical nuclear weaponry has been mostly withdrawn from deployment and removed from ships and sea-based aircraft. China has reiterated its support of the goal of the elimination of nuclear weapons, and its declaration of no first use of nuclear weapons. The experience the United States and Russia have accumulated through decades of negotiating and implementing nuclear arms control agreements will prove invaluable both as a basis for further bilateral reductions and as a store of knowledge that can be drawn upon by the other nuclear weapon states.

The first requirement for movement towards a nuclear weapon free world is for the five nuclear weapon states to commit themselves unequivocally to

proceed with all deliberate speed to a world without nuclear weapons – not as an objective for the far distant future, but as an objective which deserves action from the time the commitment is given. A commitment of this kind would transform the whole process.

The process followed must ensure that no state feels, at any stage, that further nuclear disarmament is a threat to its security. To this end nuclear weapon elimination should be conducted as a series of phased, verified reductions that allow states to satisfy themselves, at each stage of the process, that further movement toward elimination can be made safely and securely. Political commitment and allocation of adequate resources will be needed to overcome technical constraints such as the current slow rate of weapons dismantlement – around 2000 per year each by the United States and Russia.

The rate of present dismantlement should not be the factor which determines the rate of elimination. The important condition is to have agreed procedures for establishing new targets, which drive the process forward to the ultimate objective of total elimination.

While the nuclear weapon states have a special responsibility, all states must contribute to development of and support for an environment favourable to nuclear weapons elimination, including an end to nuclear testing and prevention of further horizontal nuclear proliferation.

The Commission reaffirms its strong conviction that immediate and consequential steps are possible. These would both convey a powerful signal of commitment to elimination by the nuclear weapon states, and enhance global security by widening the firebreak between the onset of a crisis engaging a nuclear weapon state and the risk of a deliberate or inadvertent nuclear detonation.

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.

Nuclear Weapon State Commitment to a Nuclear Weapon Free World

The nuclear weapon states should commit themselves unequivocally to the elimination of nuclear weapons and agree to start work immediately on the practical steps and negotiations required for its achievement. This commitment should be made at the highest political level.

Non-nuclear weapon states should support the commitment by the nuclear weapon states and join in cooperative international action to implement it.

Such a commitment would constitute a concrete expression of the intention of the nuclear weapon states to implement the 'Principles and Objectives for Nuclear Non-Proliferation and Disarmament' agreed at the 1995 Review and Extension Conference of the Treaty on the Non-Proliferation of Nuclear Weapons (NPTREC). It would receive the enthusiastic support of an overwhelming majority of states.

High level political commitment has proven time and again to be the crucial condition for the resolution of seemingly intractable situations and reconciling embittered foes. A declaration by the nuclear weapon states, in clear and unambiguous terms, would have a dramatic impact on the way the world thinks about nuclear weapons. It would change instantly the tenor of debate, the thrust of war planning, and the timing or indeed the necessity for modernisation programs. It would transform the nuclear weapons paradigm from the indefinite management of a world fraught with the twin risks of the use of nuclear weapons and further proliferation, to one of nuclear weapons elimination.

Finally, much as the end of the Cold War greatly accelerated the broad agenda of arms control, a commitment now to eliminate nuclear weapons would generate the necessary political momentum and give a new coherence to the entire spectrum of non-proliferation, disarmament and arms limitation efforts currently being pursued at global and regional levels.

The Commission recommends that negotiation of the nuclear weapon states' commitment to a nuclear weapon free world should begin immediately, with the aim of first steps in its implementation being taken in 1997.

Additional Immediate Steps

The commitment by the nuclear weapon states to a nuclear weapon free world must be accompanied by a series of practical, realistic and mutually reinforcing steps.

There are a number of such steps that can be taken immediately. They would significantly reduce the risk of nuclear war and thus enhance the security of all states, but particularly that of the nuclear weapon states. Their implementation would provide clear confirmation of the intent of the nuclear weapon states to further reduce the role of nuclear weapons in their security postures. These steps would also signal that the nuclear weapon states were unequivocally of the view that continued possession of nuclear weapons was incommensurate with the risks they pose.

The recommended steps are:

- Taking nuclear forces off alert
- Removal of warheads from delivery vehicles
- Ending deployment of non-strategic nuclear weapons
- Ending nuclear testing
- Initiating negotiations to further reduce US and Russian nuclear arsenals
- Agreement among the nuclear weapon states of reciprocal no first use undertakings, and of a non-use undertaking by them in relation to the non-nuclear weapon states.

Taking Nuclear Forces Off Alert

The continuing practice of maintaining nuclear-tipped missiles on alert, whether on land-based or sea-based platforms, is a highly regrettable perpetuation of Cold War attitudes and assumptions. It needlessly sustains the risk of hair-trigger postures. It retards the critical process of normalising United States-Russian relations. It sends the unmistakable and, from an arms control perspective, severely damaging message that nuclear weapons serve a vital security role. It is entirely inappropriate to the extraordinary transformation in the international security environment achieved at such staggering cost. Taking these missiles off alert is a natural counterpart to the stand-down of bombers from nuclear alert which was implemented in late 1991.

Terminating nuclear alert would reduce dramatically the chance of an accidental or unauthorised nuclear weapons launch. It would have a most positive influence on the political climate among the nuclear weapon states and help set the stage for intensified cooperation. Taking nuclear forces off alert could be verified by national technical means and nuclear weapon state inspection arrangements. In the first instance, reductions in alert status could be adopted by the nuclear weapon states unilaterally.

Removal of Warheads from Delivery Vehicles

The physical separation of warheads from delivery vehicles would strongly reinforce the gains achieved by taking nuclear forces off alert. This measure can be implemented to the extent that nuclear forces can be reconstituted to an alert posture only within known or agreed upon timeframes, much as is the case with bomber forces today. Adequate response to nuclear threats would remain certain, but the risk of large scale preemptive or surprise nuclear attack and the imperative for instantaneous retaliation would be obviated. Further, the barriers against inadvertent or accidental use would be greatly strengthened. The range of verification procedures which are already in place between the United States and Russia could likely be applied as the basis of a regime to ensure that no state would have a meaningful advantage in terms of the ability to reassemble its nuclear force for a first strike capability.

Ending Deployment of Non-Strategic Nuclear Weapons

The nuclear weapon states should unilaterally remove all non-strategic nuclear weapons from deployed sites to a limited number of secure storage facilities on their territory. This would be a logical follow-on to the 1991 unilateral declarations of the United States and the Soviet Union, whereby each pledged to remove all non-strategic nuclear weapons from ships and submarines and store them on shore. As regards NATO, with the dissolution of the Warsaw Pact and all that has followed in its wake, the nuclear threat long felt by the alliance has evaporated. United States tactical nuclear weapons deployed in Western Europe serve no security purpose. To the contrary, they send a subtle but unmistakable message that Russia is still not to be trusted, thus feeding the fears that NATO harbours aggressive designs against it. These nuclear weapons can be returned to US territory

and stored so that, much like strategic forces removed from alert, they can not be readily redeployed.

Ending Nuclear Testing

The Comprehensive Test Ban Treaty will be a major impediment to the development of new generations of nuclear weapons by the nuclear weapon states. It will perform an equally vital non-proliferation function by inhibiting nuclear weapons development by potential new nuclear weapon states, including the undeclared nuclear weapon states and nuclear threshold states. Most important, the CTBT obligation permanently to cease or forgo nuclear testing sets the psychological stage for moving toward elimination of nuclear weapons. Pending universal application of the CTBT, all states should observe at once the moratorium it imposes on nuclear testing.

Further US/Russian Bilateral Reductions

The nuclear arms race was driven by competition between the United States and the former Soviet Union. The United States and Russia must continue to show leadership in reversing the nuclear accumulations of the Cold War. Their purpose should be to move toward nuclear force levels for all the nuclear weapon states which would reflect unambiguously the determination to eliminate these weapons when this step can be verified with adequate confidence.

The immediate steps discussed above deal with the manner in which residual nuclear forces are deployed that diminish to the greatest possible extent both the risk of inadvertent or accidental use and the adverse political signals transmitted by poised nuclear forces. With respect to the size of arsenals, there are two notional targets. First, the United States and Russia should, in consultation with the other nuclear weapon states, establish the relative force levels that would allow all five nuclear weapon states to proceed in concert with reductions beyond that point. Second, the five nuclear weapon states should agree on the minimum residual forces to be retained until the stage had been set for complete elimination.

The Commission considers it inappropriate to try and forecast the stages involved in reaching these targets. Clearly, there will have to be at least one further reduction agreement on the part of the United States and Russia. It should be noted in this context that the entry into force of the START II

agreement is in some doubt because Russia may be required to invest in new nuclear weapon systems in order to reach parity. To obviate this undesirable development, and to facilitate the ratification of START II, lower ceilings could be promptly negotiated in a START III agreement. President Yeltsin has already proposed the figure of 2000 (compared with the 3000 – 3500 the agreement currently specifies) but lower levels should be considered to hasten the achievement of force levels that would bring all the nuclear weapon states into the process.

Similarly, the Commission considers it presumptuous to try and specify from its present vantage point the minimum residual forces that the nuclear weapon states would regard as the appropriate final way-station pending complete elimination. It would observe, however, that the considerations that the nuclear weapon states would bring to bear in determining this level would be profoundly different from those that have shaped these negotiations to this point.

While of signal importance, the existing START agreements do not require that withdrawn warheads be disassembled and destroyed. Hence actual stockpiles of warheads in the United States and Russia post-START II are likely to be much higher than the figures set by the agreement. Nor do the START agreements address disposition of the fissile material content of warheads removed from deployment. This material represents the core element of a 'virtual arsenal' existing outside the START framework, and which would be available to the United States and Russia if ever a political decision were taken to reassemble dismantled warheads.

This concern was mitigated in part by agreements reached at the 10 May 1995 US/Russian summit to develop procedures for ensuring that excess nuclear warheads are dismantled and the reduction process made irreversible. The 1996 Moscow Nuclear Safety and Security Summit also underscored a need to identify appropriate strategies for the management of fissile material designated as no longer required for defence purposes. The summit undertook to convene by the end of 1996 an international meeting of experts to examine available options and identify possible development of international cooperation in the implementation of national strategies. The knowledge gained from implementation of these undertakings should prove valuable for development of systems for verification of warhead dismantlement and fissile material control. The Commission considers arrangements for the control and

verification of the dismantlement to be essential for the stability and sustainability of the process of reducing nuclear weapons.

The security benefits of the START agreements and their value as a staging point to wider nuclear disarmament would be increased if START III or a separate agreement required the verified dismantlement of warheads withdrawn under past and future US/Russian bilateral reduction agreements, tactical warheads withdrawn unilaterally and reserve warheads. This would establish warhead numbers (strategic and tactical, active and in reserve) as the basic unit of account in US/Russian reductions and provide a common basis for considering relative force levels when nuclear disarmament moves beyond the bilateral phase.

Agreements on No First Use and on Non-Use of Nuclear Weapons

In the post-Cold War world the only conceivable residual role of nuclear weapons is to pose a threat of retaliation against nuclear aggression. It follows that a joint no-first use undertaking would be at no strategic cost to the nuclear weapon states. Indeed as a significant confidence building measure it would in fact enhance their security.

As one of the immediate steps, the nuclear weapon states should agree and state that they would not be the first to use or threaten to use nuclear weapons against each other and that they would not use or threaten to use nuclear weapons in any conflict with a non-nuclear weapon state. The Commission considers that such an agreement should be brought into operation as soon as possible.

Reinforcing Steps

The recommended nuclear weapon states' political statement of commitment and other 'Immediate Steps' would firmly orient the defence and bureaucratic establishments of all nuclear weapon states to the goal of elimination and to the development of a practical program of nuclear disarmament. The following steps would build on the solid foundation of commitment, accomplishment and goodwill established through implementation of the steps recommended for immediate action:

- Action to prevent further horizontal proliferation
- Developing verification arrangements for a nuclear weapon free world

- Cessation of the production of fissile material for nuclear explosive purposes.

Action to Prevent Further Horizontal Proliferation

The problem of nuclear proliferation is inextricably linked to the continued possession of nuclear weapons by a handful of states. As long as any state has nuclear weapons, there will be others, state or sub-state actors, who will seek to acquire them. Other national security reasons also motivate states to acquire nuclear weapons. The task of preventing further proliferation becomes even more urgent as existing nuclear arsenals are being eliminated. A world environment where proliferation is under control will facilitate the disarmament process and movement toward final elimination and vice versa. The emergence of any new nuclear weapon state during the elimination process would seriously jeopardise the process of eliminating nuclear weapons. It would not, of course, rule out forever the possibility of elimination, although it would probably retard it.

Action is therefore needed to ensure effective non-proliferation controls on civil and military nuclear activities, and to press for universal acceptance of non-proliferation obligations.

At the level of national action, states have the fundamental obligation, under a variety of treaties and in moral terms, to ensure that sensitive nuclear material, equipment and technology under their jurisdiction and control do not find their way into the hands of those who would misuse them. A breakdown in national nuclear controls could lead to nuclear material coming into the possession of would-be proliferator states or sub-state groups, including terrorists. States must have competent systems of nuclear materials accountancy to keep track of nuclear material. Nuclear establishments and the transport of nuclear material need appropriate physical protection and states need to have effective procedures to control what leaves their territory, know where it is going and for what purpose. All member states of the International Atomic Energy Agency and the future Comprehensive Test Ban Treaty Organisation should ensure that they meet in full their financial obligations so these bodies can properly perform their functions.

The Treaty on the Non-Proliferation of Nuclear Weapons remains the cornerstone of the international nuclear non-proliferation regime. It is the

legal and political means by which almost all states give effect to their decisions to renounce nuclear weapons. Because of the near universality of the non-proliferation regime those states operating significant nuclear programs without comprehensive safeguards stand exposed to the international community as being of possible proliferation concern. Application of IAEA NPT or equivalent fullscope safeguards in non-nuclear weapon states promotes national, regional and global security and stability by providing a high level of assurance that nuclear material remains in peaceful, non-explosive use.

A small number of states continue to refuse to join the NPT or accept equivalent non-proliferation commitments. Bringing these states into the non-proliferation regime through acceptance of internationally verifiable, legally binding non-proliferation obligations will be an essential step in the process of eliminating nuclear weapons. The NPT Review and Extension Conference identified universal adherence to the NPT as an urgent priority and called upon all states not yet party to the treaty to accede to it at the earliest date, particularly those states that operate unsafeguarded nuclear facilities. This process would be enhanced by the unequivocal commitment of the nuclear weapon states to the elimination of nuclear weapons and concrete movement towards that goal.

Proliferation pressures in South Asia, the Middle East and the Korean peninsula may prejudice the prospects for eliminating nuclear weapons. Determined efforts, particularly on the part of the states in these regions and the nuclear weapon states, are urgently needed to address the long-standing differences that fuel proliferation in these regions. Just as the nuclear weapon states need to be convinced that giving up nuclear weapons will not harm their security so too will the undeclared weapon states and threshold states need to be convinced that ending their nuclear ambiguity will not damage their interests.

Past experience points to a variety of ways in which such situations can be resolved. Unilateral action is possible, as in the case of South Africa's unilateral dismantlement of its nuclear weapons. In this case, close attention was needed by the IAEA to ensure completeness of initial inventories preparatory to the application of fullscope safeguards to South Africa's remaining nuclear activities.

Bilateral negotiations can also be successful as in the case of Argentina and Brazil. After decades of nuclear competition and uncertainty about the direction of their nuclear programs these states took joint action. Both now accept comprehensive IAEA safeguards and have established a bilateral nuclear inspection agency, the Argentina-Brazil Accounting and Control Commission. Both have ratified the Treaty of Tlatelolco and Argentina has joined the NPT. Of particular note is that safeguards are applied bilaterally and by the IAEA. Each state thereby has direct access to information about the other's nuclear program, providing high transparency and confidence.

A combination of bilateral and multilateral approaches is also possible. The Denuclearisation Declaration between the ROK and the DPRK coupled with the US-DPRK Agreed Framework and the Korean Peninsula Energy Development Organisation (KEDO) is an example of how dialogue, encouragement, assistance, some security guarantees (in this case negative nuclear security assurances) and give and take on both sides can help to wind back nuclear weapon ambitions on the part of an insecure state.

In situations of regional tension – such as India and Pakistan in South Asia and Israel and its neighbours – the security needs of all parties involved have to be identified, acknowledged and addressed systematically to find solutions. Action should be taken as a matter of urgency, and if necessary discretely, to prevent a regional dispute acquiring a nuclear dimension. This points to a multilateral approach involving relevant regional and possibly neighbouring powers. Bilateral or regional involvement could be employed as a means of providing additional assurance and confidence building above and beyond international inspections. The overall security environment, including conventional armaments and other weapons of mass destruction, would be highly relevant to a negotiated solution. There could be a role in this regard for assistance and assurances from outside powers, particularly the nuclear weapon states, covering such matters as security assistance, positive and negative nuclear security assurances, assurances about access to imported technologies and agreed restraint in arms exports to the region.

Developing Verification Arrangements for a Nuclear Weapon Free World

Effective verification is critical to the achievement and maintenance of a nuclear weapon free world. Before 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 whether through retention or acquisition of clandestine weapons, weapon components, means of weapons production or undeclared stocks of fissile material. Formal legal undertakings should be accompanied by corresponding legal arrangements for verification. To maintain security in a post-nuclear weapon world the verification system must provide a high level of assurance as to the continued peaceful, non-explosive use of a state's civil nuclear activity.

To be adequate, the verification regime must provide a high probability that cheating of proliferation significance would be detected promptly. This is essential to provide confidence that nuclear weapons have been eliminated and to discourage potential violators.

A political judgement will be needed on whether the level of assurance possible from the verification regime is sufficient. All existing arms control and disarmament agreements have required judgements of this nature because no verification system can provide absolute certainty. The likelihood that the verification regime for a nuclear weapon free world will involve a small probability that attempted breakout might go undetected does not alter the fact that a nuclear weapon free world would be, fundamentally, a safer place. Development and implementation of the verification arrangements needed for each step toward elimination will provide immediate benefit through reducing the dangers posed by nuclear weapons and the threat of nuclear proliferation including nuclear terrorism.

Verification is likely to involve bilateral US/Russian measures, verification among the nuclear weapon states and multilateral verification during various stages of the dismantlement and elimination of nuclear weapons. Bilateral or regional involvement in inspections on nuclear facilities and in monitoring the dismantlement of any nuclear weapons could be employed as a means of providing additional assurance and confidence building above and beyond international inspections particularly during the early stages of disarmament while states develop confidence that multilateral verification is operating effectively. The verification regime will take many years to develop. To ensure that movement toward a nuclear weapon free world is not held up by lack of adequate verification, higher priority should be given to the development of the verification techniques that will be needed.

The following are some of the main components of a possible verification regime. These and other verification issues are discussed further in Annex A.

- Effective, cost-efficient non-proliferation controls on the civil nuclear industry in all states
- Detection of undeclared nuclear activity
- Ceasing production of fissile material for nuclear weapons
- Nuclear warheads dismantlement and elimination
- Disposition of warhead uranium and plutonium
- Controls on nuclear weapons components other than nuclear material
- Dismantlement of nuclear weapons infrastructure.

A key element of non-proliferation arrangements for a nuclear weapon free world will be a highly developed capacity to detect undeclared nuclear activity at both declared and undeclared sites.

Progressive extension of safeguards to nuclear activity in the nuclear weapon states, the undeclared weapon states and the threshold states will be needed with the end point being universal application of safeguards in all states. Few facilities in the nuclear weapon states are safeguarded at present and a number of other states operate unsafeguarded nuclear facilities. The first stage of extending safeguards in these states is likely to be verification of facilities and material covered by a convention to end fissile material production for weapons.

Systems will be needed to verify that nuclear warheads are dismantled and destroyed and their fissile material content safeguarded to provide maximum confidence that such material cannot be reintroduced to weapons use. Controls on important components of nuclear weapons other than fissile material such as tritium and non-nuclear components will need to be considered. To ensure that a nuclear force of strategic significance cannot be reconstituted quickly a staged process for verified destruction of the nuclear weapons infrastructure is likely to be considered necessary.

Even allowing for future developments it seems unlikely that technical verification alone can provide the levels of assurance needed for the elimination of nuclear weapons. Supplementing technical verification by other measures such as transparency in nuclear activity, relevant information obtained by national technical means and passed to verification bodies, exchange of information between verification bodies and application of effective export controls can increase the levels of assurance from technical measures. Societal verification or citizen's reporting may prove to be an additional means of supporting the verification system for a nuclear weapon free world.

The political commitment to eliminate nuclear weapons must be matched by a willingness to make available the resources needed for nuclear disarmament including effective verification. The amounts involved are likely to be considerable, especially for the dismantlement of weapons and disposition of their fissile material content, but very much less than developing, maintaining and upgrading nuclear arsenals. In addition, the costs of the verification system should be weighed against the substantial contribution to global, regional and national security that effective verification of a nuclear weapon free world would make. Consideration should be given to creating an international fund for this purpose.

As the verification regime is developed it will be necessary to ensure that institutional arrangements are appropriate. Some probable institutional elements such as the IAEA and the CTBT verification organisation are existing or soon will be. Other institutional requirements should be considered as the disarmament process develops. Elaboration of technical aspects of verification should be initiated without delay within the framework of the Conference on Disarmament.

States must also be confident that any violations detected will be acted upon. In this context, the Security Council should continue its consideration of how it might address, consistent with specific mandates given to it and consistent with the Charter of the United Nations, violations of nuclear disarmament obligations which might be drawn to its attention. This should demonstrate that the collective security system enshrined in the Charter will operate effectively in this field.

Cessation of the Production of Fissile Material for Nuclear Explosive Purposes

Ending the production of fissile material for nuclear weapons or other nuclear explosive devices (cut-off) would require the dismantlement or placement under international safeguards of all enrichment and reprocessing plants in the nuclear weapon states and in undeclared weapon states and threshold states. A cut-off convention would contribute to nuclear disarmament by capping the amount of nuclear material available for nuclear weapons use and by extending safeguards coverage over currently unsafeguarded sensitive nuclear facilities. The Conference on Disarmament has agreed a mandate for negotiation of a production cut-off convention and the negotiations should proceed as a matter of urgency.

Final Steps

Final steps towards elimination will require a negotiating process involving all nuclear weapon states and any remaining undeclared weapons states and threshold states. The detail of how this might be achieved will principally be a matter for the states involved at the time, but some general comments can be offered. Steps suggested are:

Other Nuclear Weapon States Joining the Process

Further START agreements and nuclear confidence building measures should establish a receptive international climate for negotiations on global reduction of nuclear arms. Following the achievement by the United States and Russia of appropriate force levels, the next step might be to reduce the levels of all nuclear weapon states to 100 warheads each. The United Kingdom, France and China have given undertakings that they will join nuclear arms reductions when the arsenals of the United States and Russia are reduced sufficiently. These undertakings would need to be given concrete form and acted upon.

Preparations for negotiations involving all nuclear weapon states need not await the achievement by the United States and Russia of the appropriate force levels. The United States and Russia could commence a process for bringing the United Kingdom, France and China into the nuclear disarmament process. For example, early exploration of a comprehensive

exchange of information on each state's nuclear arsenal and stocks of fissile material will be needed to establish baseline data for nuclear weapon state negotiations. Further early steps could be for the United States and Russia to prepare the ground for verification of nuclear weapon state reductions including by sharing information and expertise on START verification, on weapons dismantlement and on verification and control of fissile material from dismantled weapons. US/Russian experience on nuclear confidence building should be extended to the other nuclear weapon states, and new measures developed which involve them.

With respect to reductions involving all nuclear weapon states, as their arsenals are substantially reduced, the levels of warheads or warheads components thought to be held by any remaining undeclared nuclear weapon states and threshold states will become a more serious concern. It is therefore essential that states with a presumed nuclear weapons potential take early action and enter into international legal constraints as they will have to resolve their ambiguous nuclear status before the nuclear weapon states will finally move to zero nuclear weapons. As part of the process, it will be necessary for these states to acknowledge the progress made toward nuclear disarmament and to demonstrate their own intentions in this regard including through cessation of production of fissile material until production facilities are subject to international monitoring.

During the early part of nuclear weapon state reductions there are likely to be asymmetries in the arsenals which would reflect the different starting points of the participants. Progressive reductions in these asymmetries could be expected, leaving all nuclear weapon states with similar residual stocks of weapons as they approach the elimination stage.

For nuclear disarmament to be genuine and stable it should not be easily or unevenly reversible. There must be confidence that any attempt by a state to reverse disarmament would be a drawn out, highly visible, resource-intensive exercise. As nuclear disarmament extends beyond US/Russian bilateral reductions, so too must arrangements to provide a high degree of assurance that it would not be reversible. These arrangements include verified dismantlement and destruction of warheads and ending fissile material production for weapons purposes.

Getting to Zero

Each successive phase toward elimination of nuclear weapons will provide a guide to possible legal arrangements for a nuclear weapon free world. These measures could include further US/Russian bilateral agreements, a Comprehensive Test Ban Treaty, a cut-off convention and any no-first-use treaty that may have been negotiated. Further new treaties will be needed at the global or regional level and existing instruments may have to be modified or replaced.

Separate but mutually reinforcing instruments could be one way to give legal effect to nuclear disarmament. As nuclear disarmament nears the elimination stage, consideration should be given to whether the legal obligations to sustain a nuclear weapon free world would be best given effect by the incremental approach of a number of separate instruments or through a comprehensive approach which would combine all relevant instruments into a single legal instrument – a nuclear weapons convention. A comprehensive treaty would be a fresh start, removed from acrimonious debate, such as that over the NPT. It may also be possible to include in a new treaty provisions which would minimise any danger to the NPT such as a requirement that the new treaty would enter into force only after it had been ratified by all states party to the NPT. These questions and other legal considerations are discussed in further detail at Annex B.

In any reflection on the legal regime required as a basic part of the architecture for a nuclear weapon free world, it is fundamental to recognise that the legal regime supports but cannot itself bring about such a world. The prospective components of the nuclear weapon free world legal regime will play an important role in the political negotiations through which a nuclear weapon free world will be established. But it is these political negotiations and the determination to make them effective which are central to the elimination of nuclear weapons.

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.

Building the Environment for a Nuclear Weapon Free World

A world ready to eliminate nuclear weapons would be very different from today's world. The absence of nuclear weapons and related activity would become an internationally accepted norm, obviously including in all five declared nuclear weapon states. National arguments that nuclear weapons are needed because others have them would not apply. States' commitment to a nuclear weapon free future would be codified in international legal documents. Nuclear weapons would by then have to be seen as having no part to play in assuring any state's national sovereignty and independence. The world would have to live in the knowledge that cheating could spark the return of a nuclear armed world and the threat of a nuclear war, but the basic changes which would have occurred would buttress, substantially, the technical barriers against breakout and collective interest in maintaining them.

Concurrent with the central disarmament process, there will be a need for activity supported by all states, but particularly the nuclear weapon states, to build an environment conducive to nuclear disarmament and non-proliferation. Progress in each track will influence the other. It is essential that the international nuclear and security agenda should move forward on a broad front in ways supportive of nuclear disarmament so that the process does not lose momentum.

Ballistic Missiles

Aside from warheads, missile delivery systems are of the greatest concern in seeking to ensure that a meaningful nuclear force cannot be reconstituted quickly. Reductions in strategic nuclear missile numbers should therefore track reductions in warhead numbers closely. The START agreement provisions for verified destruction of launchers and platforms are a possible model for strategic nuclear ballistic missile reductions involving the nuclear weapon states. Missile capabilities in the Middle East, South Asia and on the Korean peninsula also need to be addressed.

The Anti-Ballistic Missile Treaty concluded in 1972 by the United States and the Soviet Union recognised the potential for strategic missile defence systems to fuel the offensive arms race as both sides sought to counter the

other's defensive systems. By limiting strategic missile defence sites to one per side the ABM Treaty removed a strong incentive to increase offensive forces and paved the way for the START I and II reductions.

Proliferation of missiles and their use in conflicts such as the Gulf War have intensified interest, particularly in the United States, in missile defence systems. While Cold War missile defence proposals centred on strategic ballistic missiles, the present focus is on defences against shorter range theatre missiles. In practice it is likely to become increasingly difficult to draw a clear line between systems to defend against strategic ballistic missiles and those which defend against sub-strategic and particularly theatre ballistic missiles. The deployment of some ballistic missile defence systems during the transition to a nuclear weapon free world could threaten seriously the continuation of the process, particularly as technology capabilities in this field vary significantly.

It will be extremely important for the pursuit of the elimination of nuclear weapons to protect fully the integrity of the ABM Treaty. A global treaty controlling longer range ballistic missiles would provide a universal means of addressing the dangers to international security posed by ballistic missiles; it would also avoid the potential destabilising effect of ballistic missile defence systems. It would increase the confidence of nuclear weapon states that nuclear disarmament will not damage their security, and it would improve the security environment in a number of regions by eliminating destabilising missile arms races. Pending development of such a regime, confidence building measures such as a multilateral ballistic missile launch notification agreement and a ballistic missile flight test ban could be explored.

Nuclear Weapon Free Zones

Nuclear weapon free zones are part of the architecture that can usefully encourage and support a nuclear weapon free world. The spread of such zones around the globe, with specific mechanisms to answer the security concerns of each region, can progressively codify the transition to a world free of nuclear weapons.

Nuclear weapon free zones are an effective means of addressing regional nuclear tensions in a cooperative way and provide ongoing assurance that nuclear activity in a region is confined to peaceful purposes. Their potential

contribution to global and regional peace and security was reaffirmed at NPTREC which encouraged development of nuclear weapon free zones, especially in regions of tension such as the Middle East, as a matter of priority. There are also proposals for the establishment of such zones in South Asia, in Central Europe and from the Black Sea to the Baltic Sea.

The cooperation of the nuclear weapon states is necessary for the maximum effectiveness of nuclear weapon free zones. To increase the likelihood that nuclear weapon states will become party to nuclear weapon free zones they should be consulted early in the negotiation process. Equally, because of the contribution nuclear weapon free zones can make to disarmament and non-proliferation, the nuclear weapon states should support them including through signing nuclear weapon state protocols.

About half of the earth's surface is already covered by nuclear weapon free zones, comprising the Latin American and the Caribbean countries (Treaty of Tlatelolco), the South Pacific (Treaty of Rarotonga), the ASEAN countries (Southeast Asian Nuclear Weapon Free Zone) and African countries (the Treaty of Pelindaba). Once the ASEAN and African agreements come into force, most of the southern hemisphere (and some parts of the northern hemisphere) will be covered by nuclear weapon free zones. The Canberra Commission encourages development of linkages between all existing and prospective southern hemisphere nuclear weapon free zones to create a southern hemisphere free of nuclear weapons.

Nuclear Trade and Export Controls

All states have an obligation to ensure that their nuclear trade does not contribute, wittingly or unwittingly, to nuclear weapons proliferation by either states or sub-state groups. Meeting this obligation is assisted by a common understanding of what items are sensitive in the nuclear proliferation process and has resulted in development of internationally agreed standards for nuclear exports. Such standards support the non-proliferation regime and foster legitimate trade and cooperation in the peaceful uses of nuclear energy by contributing to the climate of confidence essential for international nuclear cooperation.

The importance of nuclear export controls is acknowledged in the NPTREC 'Principles and Objectives for Nuclear Non-Proliferation and Disarmament'.

These state that new supply arrangements should require acceptance of fullscope safeguards 'as a necessary precondition', thereby clearly specifying the fullscope safeguards supply standard as the accepted global norm for nuclear supply.

States looking to develop nuclear weapons also need delivery systems, and a close correlation exists between nuclear weapons proliferation and missile proliferation. More broadly, states seeking to develop weapons of mass destruction may try to develop several categories of weapons simultaneously. Effective export controls on items that could contribute to development of non-nuclear weapons of mass destruction are therefore important to establishing and sustaining an international climate favourable to the elimination of nuclear weapons.

It is essential that export control regimes are transparent in their operation and do not impede legitimate trade and technology transfer.

Eliminating Other Weapons of Mass Destruction

The Commission does not accept the view that nuclear weapons need to be retained to serve as a deterrent against other types of weapons of mass destruction, particularly chemical and biological weapons. Implementation of effective measures to eliminate both types of weapons would significantly enhance global security and provide more conducive circumstances for the elimination of nuclear weapons. While there have been longstanding efforts to prohibit both chemical and biological weapons, these efforts have not yet reached the stage where the international community can be confident that the menace of such weapons has been finally removed.

One hundred and sixty countries have signed the Chemical Weapons Convention since it was opened for signature in Paris in January 1993. The CWC will enter into force 180 days after the 65th country has ratified the convention. The CWC promises to be an effective instrument for controlling chemical weapons but will face a variety of challenges when it becomes operational. A key issue will be universality – a number of important countries in the Middle East and in other regions of tension have not yet signed the convention. The two largest possessors of chemical weapons, the US and Russia, have yet to ratify. It will be vital that the CWC achieve comprehensive participation if its promise is to be realised. Signatories

which have not yet ratified the CWC should give high priority to ratification, and non-signatories, particularly in regions of tension, should join this new regime as soon as possible.

The 1925 Geneva Protocol sought to ban use of biological weapons, but a more comprehensive ban was established in the Biological Weapons Convention, which came into operation in 1975. The BWC has been hampered by the lack of formal provisions and machinery to verify compliance, a major deficiency which has been underlined by suggestions that a number of countries have maintained programs to develop such weapons despite the convention's provisions. Negotiations to develop a legally binding instrument to reinforce the BWC, which is expected to contain verification provisions, were commenced only in 1995. These negotiations will need to come to an early conclusion to preserve the BWC's value in maintaining a global norm against biological weapons. Assisted by the rapid advance in biotechnology, these weapons, more so than chemical weapons, have the potential to cause damage on a widespread, strategic scale and could become the new scourge for the next century if current arms control efforts are not successful.

Timing Considerations

The Commission considered carefully the merits of setting out a precise timeframe for the elimination of nuclear weapons, but elected not to do so. However, this does not imply that it accepts the extended timelines imposed by such current constraints as limited warhead dismantlement facilities. Those constraints could obviously be relieved by political decisions and the allocation of resources required to advance dismantlement. Another limiting factor may prove to be establishing the necessary confidence in the verification regime which would be required to take the final step to complete elimination. In this context the Canberra Commission remains convinced of the basic importance of agreed targets and guidelines which would drive the process inexorably toward the ultimate objective of final elimination, at the earliest possible time.

Annexes

Annex A

Verification

The elimination of nuclear weapons will not be possible without the development of adequate verification. A political judgement will be needed on whether the levels of assurance possible from the verification regime are sufficient. All existing arms control and disarmament agreements have required political judgements of this nature because no verification system provides absolute certainty. This situation has not prevented the international community acting in the area of nuclear and other weapons of mass destruction first with the Treaty on the Non-Proliferation of Nuclear Weapons and the International Atomic Energy Agency safeguards system, then the Chemical Weapons Convention and the Comprehensive Test Ban Treaty. Nor has it prevented negotiation and implementation of bilateral nuclear arms control agreements including the Intermediate-range Nuclear Forces Treaty which eliminated an entire class of nuclear weapons.

The nature of nuclear weapons, the secrecy that has surrounded their development and uncertainties about total amounts of nuclear material produced for weapons will make it very difficult, or in the view of some impossible, to be confident that states which have operated large scale military nuclear programs have made full declarations of their holdings of nuclear weapons and fissile material.

This potential uncertainty should not deter reductions to small residual arsenals. At that point the verification system can be re-evaluated and the benefits and risks of further reductions compared. Development and implementation of the verification arrangements needed for each step toward elimination will provide immediate benefit through reducing the dangers posed by nuclear weapons and the threat of nuclear proliferation including nuclear terrorism. And a world of small residual arsenals would still be a safer place than the present world although the dangers of nuclear proliferation and a renewed arms race would remain.

Because no verification system can be perfect it is inevitable that some risk will have to be accepted if the wider benefits of a nuclear weapon free world are to be realised. The international community will need to determine the level of risk acceptable. This decision will be influenced by a range of factors,

particularly the global circumstances applying when the elimination stage is reached. That the verification system for a nuclear weapon free world will involve a small probability that attempted breakout might go undetected does not alter the fact a nuclear weapon free world would be, fundamentally, a safer place, as Part One of this report makes clear. Furthermore, in an era in which the accuracy, penetrating power, and destructive force of conventional weapons are increasing rapidly, and economic interdependence is growing, the development of an illegal nuclear force would, in all probability, be self-defeating. It is nevertheless essential that there be a wide and politically acceptable level of confidence in the verification system. For this to be achieved the results of verification activities will need to be transparent to the international community both at the level of states and at the public level.

It should be recognised that a verification regime is composed of both its material and technical features, which should be of the highest order attainable, and the common political and legal commitments which support it. This creates the climate of confidence essential to any successful verification regime. Further, an inclusive approach to verification can increase levels of assurance. In the case of verification for a nuclear weapon free world, technical verification can be supplemented by measures such as transparency in nuclear activity, relevant national intelligence information passed to verification bodies, an enhanced role for individuals in verification and application of effective export controls.

A number of factors will assist development of adequate verification arrangements for a nuclear weapon free world. First, the nuclear weapon scientific/industrial complex is a tightly regulated governmental enterprise, so extensive records of nuclear weapons and weapons fissile material production should be available. Second, nearly 30 years of experience has been accumulated in verifying compliance with the NPT, and IAEA safeguards offer a proven and evolving system for delivering a high degree of assurance that safeguarded nuclear material remains in peaceful use. And, third, there is the experience of the SALT, START, INF, CFE and CWC agreements which individually and collectively demonstrate the powerful influence that political will can exert over what is desirable and possible in terms of verification.

The nuclear disarmament process will be progressive with new verification arrangements required at various stages. Because of the importance of adequate verification it is likely that progress with verification will dictate the timetable for the last stages of disarmament. Verification is likely to involve bilateral US/Russian measures, the nuclear weapon states and the IAEA at various stages of the dismantlement and elimination of nuclear weapons. The undeclared nuclear weapon states and threshold states will have to be involved in nuclear disarmament. Verification measures appropriate to these states' nuclear status at that time will have to be applied. Bilateral or regional involvement could be employed as a means of providing additional assurance and confidence building above and beyond international inspections.

This annex concentrates on measures which may make up a verification regime to provide assurance that states are complying with nuclear disarmament obligations. In addition, it is of crucial importance that there be very high physical security against diversion or theft of nuclear weapons, fissile material (whether of military or civil origin) and nuclear weapon non-nuclear components and materials. A breakdown in physical security could result in nuclear weapons, nuclear material or components coming into the possession of would-be proliferator states or sub-state groups, including terrorists which would jeopardise the disarmament process. Nuclear disarmament will at various stages of the process involve monitored storage of weapons and weapons components including fissile material. It is imperative that the highest standards of physical security be applied to such items and material. Consideration of how this can best be achieved should form part of the nuclear disarmament process.

Developmental work on verification arrangements should begin soon to ensure that movement toward a nuclear weapon free world is not delayed by lack of adequate verification.

The political commitment to eliminate nuclear weapons must be matched by a willingness to make available the resources needed for nuclear disarmament, including for effective verification. The amounts involved are likely to be considerable, especially for the dismantlement of weapons and disposition of their fissile material content, but very much less than developing, maintaining and upgrading nuclear arsenals.

This annex does not seek to be a definitive plan for the verification arrangements for a nuclear weapon free world. Its purpose is to identify some of the issues which will need to be addressed and to offer some comments on these issues. Questions of the mechanisms for applying the verification arrangements are mostly left open as it will be for the countries concerned and the international community as a whole to define these as the process unfolds.

Verification Tasks

The disarmament process will be progressive with new verification arrangements required at various stages. Few facilities in the nuclear weapon states are safeguarded at present and a number of other states operate unsafeguarded fissile material production facilities. The first stage of extending safeguards in these states is likely to be verification of facilities and material covered by a convention to end fissile material production for weapons. Systems will be needed to verify that nuclear warheads are dismantled and destroyed and that their fissile material content cannot be reintroduced to weapons use. To ensure that a nuclear force of strategic significance cannot be reconstituted quickly, a staged process for verified destruction of the nuclear weapons infrastructure is likely to be considered necessary. An intrusive inspection regime and new techniques will be needed to ensure a high probability that significant undeclared nuclear activity would be detected. Development of verification arrangements for each step toward a nuclear weapon free world will, in addition, be of immediate benefit to the existing non-proliferation regime.

Verifying the 'completeness' of declared stocks of warheads and fissile material will be a crucial and difficult operation. The IAEA has expertise in verifying declarations of previously unsafeguarded nuclear programs including its work in Iraq, the DPRK and South Africa after that country renounced nuclear weapons. The extent to which this is transferable to the very large military programs of the nuclear weapon states is to be established.

Another problem for a verification regime lies in the physical characteristics of current nuclear weapons and the fissile materials that are used in the core of the weapon. Many weapons are small, readily transported and readily concealed. The fissile material cores are smaller and thus even more easily concealed. While radiation emitted from these cores can be detected at close

range, it is not clear that they would always be detected if in properly shielded storage facilities, even through environmental sampling. However, nuclear weapons in storage deteriorate with time and the ongoing maintenance needed for a secret cache of weapons would carry a risk of exposure or detection.

If a nuclear weapon free world is to be credible and stable, it clearly will have to place prohibitions on much more than just weapons. Irreversibility of nuclear disarmament will also require verified elimination or conversion to exclusively civil use of the facilities used to develop and construct nuclear weapons and dedicated nuclear delivery vehicles. In the transitional period some of the facilities used to develop and construct weapons are likely to be needed to dismantle them, so the nuclear weapon states will need to keep a part of their plant operational until the very last items in the residual stockpiles are disassembled.

Confidence to move to the final elimination phase would be enhanced if by that time all delivery vehicles built primarily for nuclear weapons are eliminated, leaving only the residual arsenals of bombs or warheads in monitored storage. It is therefore important that verified elimination of such delivery vehicles occurs in tandem with elimination of nuclear warheads. Means could be devised to make the removal of any weapons from monitored storage and their installation on improvised delivery vehicles as difficult and time-consuming as possible.

Other components which play an important role in nuclear weapons such as tritium should also be subject to a verification regime. Non-nuclear components of a weapon may also need to be taken into account. These are a collection of diverse materials: plastics, metals, chemical high-explosives and also extremely sophisticated electronics and various other items all organised inside the weapon to produce the optimum explosive output from the fissile material. These non-nuclear parts are in some cases made in or near the final assembly facility, but others come from far away, from specialised workshops or enterprises most of whose output may be civilian.

Measures must be taken to preclude leakage of sensitive information during the dismantlement process. Practical options for doing this include requiring states which own nuclear weapons to dismantle them within a containment boundary with monitored inputs and outputs. It may also be possible for

international inspectors to estimate, with sufficient accuracy, the fissile material content of the stored fissile material 'pits' from dismantled nuclear warheads without revealing sensitive information. This will depend on a judgement of what constitutes sufficient accuracy and what would be reasonable assumptions about the measures that might be used to defeat such verification.

In the transition to a nuclear weapon free world it will be important to find the right balance between bilateral (US/Russia), plurilateral (nuclear weapon states) and appropriate international inspection of nuclear material made excess to military requirements. Bilateral and plurilateral inspections may be less transparent in the assurance they offer to the non-nuclear weapon states than international inspections. But bilateral or plurilateral inspections may be considered preferable for the verification of material in sensitive forms. The transparency issue could be addressed by the nuclear weapon states perhaps as part of increased accountability at NPT meetings. In areas of regional nuclear tension, bilateral or regional involvement in inspections on nuclear facilities and in monitoring the dismantlement of any nuclear weapons could be employed as a means of providing additional assurance and confidence building above and beyond international inspections.

Components of a Verification Regime

For any verification system the basic requirement is to establish what is to be prohibited or controlled. The verification regime for a nuclear weapon free world would need to bring under safeguards fissile material currently contained in weapons and military stockpiles, and to provide the most credible assurance that all such material has been accounted for; to provide a very high level of assurance that no weapons or stocks of fissile material have been concealed during the disarmament process; to ensure that all nuclear weapons facilities have been dismantled or converted to peaceful use; and to verify destruction of strategic delivery vehicles developed primarily for nuclear purposes.

Current, prospective and future treaties could provide the legal authority for application of the verification regime.

The IAEA has wide experience in application of safeguards to provide high assurance that nuclear material remains in peaceful non-explosive use.

Subject to strengthening of its safeguards system the IAEA would seem the logical body to verify non-proliferation undertakings in a nuclear weapon free world. The development of concepts for CTBT verification is well advanced. Bilateral US/Russian agreements such as START and INF are a model for a verification regime for elimination of nuclear delivery vehicles. The other main elements of the verification regime, especially verification of the elimination of nuclear warheads, are less well developed and should be afforded greater priority to ensure that progress toward elimination of nuclear weapons is not held up by delays in developing and proving the verification system necessary.

Non-Proliferation Undertakings

Verification of non-proliferation undertakings en route to a nuclear weapon free world and after this is achieved will require a highly developed capacity to detect undeclared nuclear activities at both declared and undeclared sites.

Iraq demonstrated that a state with sufficient determination and resources may be able to establish a self-contained clandestine military nuclear program. This prompted a reappraisal of IAEA safeguards as it was clear there was a need to improve the safeguards system's capacity to detect undeclared nuclear activity. As a result the IAEA and its member states have worked to strengthen the effectiveness and improve the efficiency of the safeguards system. Since 1993 this effort has focused on a comprehensive program known as '93+2'. The 93+2 program is aimed at enhancing the legal and technical capability of the IAEA safeguards system with respect to its ability to detect undeclared nuclear activities. The 1995 NPT Review and Extension Conference also gave strong political support to strengthening IAEA safeguards including explicit support for the 93+2 objectives. And at the Moscow Nuclear Safety and Security Summit in April 1996 the participating countries (US, Russia, UK, France, Germany, Japan, Canada and Italy) agreed as well to work vigorously to strengthen IAEA safeguards.

The elements of the 93+2 program of most obvious application to verification of a nuclear weapon free world are increased IAEA access to information, expanded access for IAEA inspectors and use of environmental sampling. Regarding the first of the 93+2 elements, the need for maximum transparency about a state's nuclear program is fundamental. In a nuclear weapon free world transparency will be essential, especially for those states which formerly

had a nuclear weapons capacity. As nuclear disarmament proceeds, doubts are bound to arise about some states' commitment to a nuclear weapon free world including whether full declarations of fissile material production have been made, whether nuclear weapons have been hidden or are being developed clandestinely and so on. Information provided by a state about its nuclear program, such as its plans for future nuclear fuel cycle activities or its fuel cycle research and development activities, together with other safeguards information such as fissile material production records, can contribute to determining whether such doubts have foundation. The state's declarations would be systematically evaluated in the light of all the other information available to the IAEA about a state's nuclear activities, and any questions or inconsistencies would be followed up.

To provide the levels of non-proliferation assurance needed in a nuclear weapon free world IAEA inspectors will need to have access to any location in a state, at very short notice or no notice and with no right of refusal. The expanded managed access arrangements being negotiated as part of the 93+2 program are a starting point in the development of access arrangements which will be needed in a nuclear weapon free world. The application of a program such as 93+2 would be central not only to effective non-proliferation arrangements but also to the ultimate development of effective verification arrangements for a nuclear weapon free world. Acceptance of the more demanding access rights will be facilitated by the universality of the nuclear weapon free world verification regime.

New technologies proposed as part of the 93+2 program have the potential to contribute significantly in this area. Of particular promise is use of environmental sampling which through air, water and soil sampling can detect characteristic radionuclide and chemical emissions from a broad array of nuclear and other industrial activities. Environmental sampling is thereby able to provide important information about the presence or absence of specific nuclear activities. Such information will be vital for verification of a nuclear weapon free world. To maximise the contribution of environmental sampling the IAEA must have the right of access to any location.

As the world moves toward a nuclear weapon free world the differences in application of safeguards in the nuclear weapon states and non-nuclear weapon states will have to diminish with the end point being universal

application of the same safeguards in all countries. Verifying all nuclear weapon state facilities, including former nuclear test sites, will cause the costs of the safeguards system to rise sharply because most of the nuclear weapon states have extensive civil nuclear power programs of which only a few facilities are currently safeguarded. Improvements in safeguards procedures which have been demonstrated in the earlier phases of nuclear disarmament may allow development of alternative and more cost-effective safeguards approaches. Such approaches may moderate the increase in resources needed, for example improvements in the IAEA's capacity to detect undeclared nuclear activity may allow reduction or elimination of routine inspections at reactors.

Sharing of information between the IAEA, the chemical weapons verification regime, the prospective Comprehensive Test Ban Treaty Organisation and the biological weapons verification regime (when developed) should be explored as a means of strengthening the weapons of mass destruction non-proliferation regime. For similar reasons the weapons of mass destruction verification regimes need a flow of information on international trade in relevant sensitive items. States and individuals should also do all they can to maximise the information base of the international bodies about possible clandestine nuclear activity, including the provision of information obtained from national export licensing systems and other national technical means. Care would be needed in sharing proliferation relevant information not to breach the conditions of confidentiality under which states supply information on their own activities to verification agencies.

Verifying a Production Cut-Off

The process of developing verification for elimination of nuclear weapons will be aided by progressive controls on nuclear activity in the nuclear weapon states, the undeclared weapon states and threshold states. A cut-off convention would be the first step toward extending the safeguards applied in non-nuclear weapon states to these states, including establishing a legal basis for IAEA inspections to verify compliance with the convention. Because it would effectively cap the amount of nuclear weapon raw material, a cut-off agreement is essential to ensure the irreversibility of nuclear reductions. As with the CTBT, a cut-off convention would be open to universal adherence by all states so that these agreements can draw the states presumed to have a nuclear weapons capacity into the nuclear disarmament process.

The extent of verification required by a cut-off convention will be determined largely by its scope, which is not yet resolved. The main options are a wide scope agreement which would apply to all nuclear facilities involved in fissile material production, processing or use as well as existing stocks of fissile material and future production, or an agreement concentrating on the sensitive fissile material production facilities, i.e enrichment and reprocessing plants, and the product from these plants.

Cut-off verification will require at least application of IAEA safeguards at all enrichment plants capable of producing highly enriched uranium, all plutonium separation (reprocessing) plants, all highly enriched uranium and mixed oxide fuel fabrication plants and research reactors and critical assemblies using large quantities of highly enriched uranium or plutonium in the states joining the treaty. There might also be safeguarding of reactors and other nuclear facilities, but the elements noted above are generally accepted as the most effective and efficient ways of ensuring any fissile material produced is under safeguards that would bar its use in weapons.

The unilateral nuclear weapon states' action to end production of fissile material for weapons suggests that a cut-off agreement limited to production can be achieved within a reasonable timeframe. This approach would also moderate the increase in the IAEA's resources needed to enable it, as appropriate, to verify a cut-off convention as a verification regime concentrated on production facilities and their products would suffice. In contrast a wide scope agreement covering all facilities and all fissile material would require application of fullscope type safeguards similar to those currently applied in the non-nuclear weapon states.

Acceptance of a commitment to cease production of fissile material should not imply that existing stockpiles are to exist in perpetuity. Arrangements should be found to have stocks verified and safeguarded as early as possible in the disarmament process.

This limited verification, confined to safeguarding of enrichment and reprocessing facilities, highly enriched uranium and separated plutonium, is technically adequate, assuming that there are no clandestine, undeclared enrichment or reprocessing plants. Such an assumption will be supported by the increased capabilities of the IAEA safeguards regime for the detection of clandestine facilities.

Measures to build confidence that all activity has been declared should be developed concurrently with negotiation of a cut-off convention and might include declarations by all states of all their nuclear activities, military as well as civil, possibly with ongoing reporting on all activities, monitoring for environmental signatures indicating possible undeclared activities, application of remote surveillance techniques and access arrangements to enable the IAEA to investigate possible undeclared enrichment or reprocessing activity.

Safeguarding of enrichment and reprocessing facilities is complex, and considerable time will be needed to develop IAEA safeguards. To prepare the ground for verification of a cut-off convention the NWS should begin cooperative work with the IAEA on developing safeguards approaches for their facilities to be covered under cut-off.

Verifying Nuclear Warheads Dismantlement and Elimination

Existing nuclear arms reduction treaties provide for destruction of missiles and other delivery systems but do not address elimination and destruction of nuclear warheads. This situation is reflected in the state of nuclear arms control verification. Methods for monitoring the destruction of strategic and shorter range missiles and strategic bombers are well established and have been used to verify destruction of heavy missile launchers (silos and submarine launch tubes) and heavy bombers under the SALT and START treaties, and intermediate-range missiles under the INF treaty. In the case of nuclear warheads, methods for verifying their dismantlement have been worked out on a general level but no comprehensive verification regime is in place.

The United States and Russia have taken some preliminary steps to ensure warheads are dismantled and the process made irreversible but these two states are yet to agree on specific technologies and procedures which could be employed. Higher priority should be given to bilateral and multilateral development of the techniques needed to verify nuclear warhead elimination. Bilateral procedures should in due course be shared with the other three nuclear weapon states, perhaps with agreed modifications, as they prepare to join the disarmament process.

The first step toward a verification system for the elimination of nuclear weapons will be for the nuclear weapon states to declare their holdings of nuclear warheads and weapons grade material. In the first instance this

could involve a US/Russian exchange as part of preparations for further bilateral reductions.

A possible model is the nuclear stockpile data exchange under discussion between the United States and Russia. A data exchange of this type could initially provide information on numbers of nuclear stockpile weapons added, retired, dismantled and remaining in service, broken down by categories. Information on total masses of military plutonium and highly enriched uranium again broken down by categories should also be provided. Subsequent to a US/Russian exchange of stockpile data, whether public or not, the other nuclear weapon states could make similar declarations as preparation for joining the nuclear disarmament process. As reductions proceed the initial data exchange should be expanded to provide a comprehensive picture of a state's military nuclear activity. The undeclared nuclear weapon states and threshold states will also have to end their nuclear ambiguity and to provide data on their programs to establish a basis for their involvement in nuclear disarmament.

Confidence building would be served by openness about weapons stockpiles. It is essential that states move promptly toward full disclosure of production and stocks of nuclear warheads and unsafeguarded fissile material.

One problem that must be addressed is the poor quality of accounting procedures applied during the early years of fissile material production. For example the United States recently admitted to a measurement error problem resulting in an inventory difference or material unaccounted for of 2.8 tonnes of weapons grade plutonium. A difference of this magnitude in the civil plutonium cycle would be cause for great concern. In the military cycle measurement uncertainties could be used to disguise retention of stocks of nuclear weapons material.

The United States and Russia are already cooperating on measures to improve accountancy and control of weapons material. All states producing unsafeguarded fissile material must ensure they are in a position to establish the most credible baseline data possible for their fissile material production. Techniques such as study of enrichment plant records and tails assays should be employed to reduce to the minimum any uncertainties about past production of fissile material.

The more information that can be exchanged regarding the specific locations, amounts, and forms of materials, the greater the potential synergistic benefit in terms of developing a full picture of fissile material production. This process should be applied to each phase of the life cycle of military fissile materials: production and separation of the materials; fabrication of fissile material weapons components; assembly, deployment, retirement, and disassembly of nuclear weapons; and storage and eventual disposition of fissile materials. These measures would be mutually reinforcing, building confidence that the information exchanged was accurate and that the goals of the regime were being met.

A sufficiently inclusive approach would make it difficult to falsify the broad range of information exchanged in a consistent way. Nevertheless, because of the large amounts of fissile material involved, a small measurement uncertainty would represent sufficient material for many nuclear weapons. Resulting doubts that some nuclear material and/or nuclear bombs may have been hidden may delay final elimination of nuclear weapons but should not prevent movement toward this objective.

When information on warhead numbers and types has been established a next step would be to seal warhead containers and indelibly tag them using suitable verification techniques such as bar codes, tamper indicating seals, metal surface 'fingerprints', measurement of mass, dimensions and chemical composition of warheads and active and passive radiation detectors. With some of these techniques there is a danger that warhead design information could be revealed. Approaches in their application are available, however, which should preserve the security of design information, for example through lowering the resolution of radiation detectors.

Inventoried warheads awaiting dismantlement should be inspected periodically to ensure that warhead disposition corresponds with information in the stockpile data exchange and to identify weapons entering a dismantlement facility. Use of tagging techniques should ensure that fake warheads cannot be substituted for weapons awaiting dismantlement and the real warheads diverted.

It would be inadvisable to attempt to apply IAEA inspections at the dismantlement process unless verification techniques are available which protect sensitive information. Alternatives which would allow monitoring of

dismantlement without revealing design information are available, such as application to the dismantlement facility of the containment principle whereby a boundary would be established around the dismantlement facility. Actual dismantlement would be carried out by citizens of the state owning the weapons. All portals with access through this boundary would be monitored visually and using techniques outlined above to ensure there was no passage of unauthorised items into or out of the facility. The main inputs would be the tagged warheads. The main outputs would be accurately measured quantities of highly enriched uranium and plutonium in forms which do not reveal design information and which can be made subject to IAEA safeguards. Non-nuclear components would be destroyed within the containment boundary by the state owning the weapons.

Another option for protecting sensitive information could be to ensure that inspectors monitoring the dismantlement process come from countries with a similar level of weapons program to the weapons being dismantled.

The two main fissile materials, highly enriched uranium and plutonium, are at the heart of every weapon. In any phased elimination arrangement, both should be safeguarded downstream from the point where weapons are dismantled to their eventual disposal. In the interests of speed, monitoring of storage could initially be conducted by the nuclear weapon states but the IAEA should be brought into the process rapidly. In the case of plutonium stored as 'pits' the US National Academy of Sciences (NAS) report[1] on management and disposition of excess weapons plutonium concluded that adequate safeguards could be provided without compromising sensitive weapons design information by declassifying the mass of plutonium in the pits, and allowing IAEA monitors to assay the sealed containers holding the pits without observing the components' dimensions. While this procedure needs to be scrutinised in the light of reasonable assumptions about what a state might do to attempt to defeat such verifications, as a concept it is worthy of further investigation.

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1 US National Academy of Sciences (NAS): Committee on International Security and Arms Control, NAS, *Management and Disposition of Excess Weapons Plutonium*, (National Academy Press, January 1994); Reactor Options Panel, Committee on International Security and Arms Control, NAS, *Management and Disposition of Excess Weapons Plutonium: Reactor-Related Options*, (National Academy Press, July 1995) referred to in *Management of Surplus Nuclear Explosive Materials*, background paper prepared for the Canberra Commission by Professor John P. Holdren which was drawn on in preparation of this annex.

Although intermediate storage is an inevitable step preceding all longer-term disposition options, such storage should be minimised. Maintaining vast stocks of excess material in a readily weapons usable form over the long term would send negative political signals for non-proliferation and for the elimination of nuclear weapons. It should also be noted that the security against the risks of diversion and theft is entirely dependent on the durability of the political arrangements under which storage is conducted. One of the key criteria by which disposition options should be judged is the speed with which they can be accomplished, and thus how rapidly they curtail these risks of storage.

Disposition of Warhead Uranium and Plutonium

Verification arrangements will be needed for monitoring the long term disposition of fissile material removed from warheads. The NAS report referred to above recommends that the United States and Russia pursue long term disposition options that:

- Minimise the time during which this material is stored in forms readily usable for nuclear weapons
- Preserve material safeguards and security during the disposition process, seeking to maintain the same high standards of security and accounting applied to stored nuclear weapons (which the NAS report termed the 'stored weapons standard')
- Result in a form from which the uranium would be as difficult to recover for weapons use as ordinary commercial low enriched uranium, and the plutonium would be as difficult to recover for weapons use as the larger and growing quantity of plutonium in commercial spent fuel (which the NAS report termed the 'spent fuel standard')
- Meet high standards of protection for public and worker health and the environment.

In the case of highly enriched uranium, achieving these goals is technically straightforward. Highly enriched uranium can be blended with other forms of uranium to produce proliferation resistant low enriched uranium for commercial fuel. The United States has agreed to purchase 500 tonnes of excess Russian highly enriched uranium, blended to low enriched uranium,

over 20 years. The United States is planning to undertake a similar blending process for most of its own stockpile of excess highly enriched uranium.

Speeding up the rate of blending down of highly enriched uranium would have the advantage of reducing the time during which this material remained in weapons usable form. Even if the commercial market cannot absorb the material more rapidly, or sufficient facilities for blending the material more rapidly to a commercial quality product cannot be made available, it would be highly desirable to blend the material rapidly to an intermediate level below 20 percent enrichment, or even below 10 percent so that it was no longer usable in weapons.

Plutonium raises more difficult issues. Because, at least in principle, all mixtures of plutonium isotopes could be used to make a nuclear explosive device, plutonium cannot be blended to a highly proliferation resistant form in the same way that highly enriched uranium can. The NAS study identified two leading candidate approaches for reducing the accessibility of weapons plutonium to a level corresponding to the 'spent fuel standard'. They are:

- The current reactor/spent fuel option, which would use light-water reactors or Canadian deuterium-uranium reactors of currently operating types or evolutionary adaptations of them, employing mixed-oxide fuel in a once-through mode, to embed the weapons plutonium in spent fuel similar to the larger quantity of such fuel that will exist in any case from ordinary nuclear electricity generation
- The vitrification with wastes option, which would immobilise the weapons plutonium together with intensely radioactive fission products in heavy glass logs of the type planned for use in the immobilisation of military high level radioactive wastes.

All options should be evaluated carefully to determine which offers the best solution for long term disposition of former weapons plutonium, including any new possibilities that emerge as nuclear disarmament proceeds.

The security risks of plutonium in spent fuel are not zero, and this is so whether the plutonium is of military or civilian origin. So while it is very worthwhile to provide for weapons plutonium, as rapidly as possible, the same chemical and radiological barriers to diversion and theft for weapons use as exist for reactor grade plutonium in spent fuel, it is also important

that safeguards and protections applied to all spent fuel are adequate in relation to the residual security risks posed by such material.

Work should be accelerated on development of techniques for IAEA safeguarding of former weapons use fissile material. The nuclear weapon states should work closely with the IAEA to develop methods which provide the high level of assurance needed without compromising sensitive information.

Civil Fissile Material

In principle, plutonium of any isotopic composition (apart from plutonium containing 80 percent or more of the isotope Pu-238) can be used in nuclear explosive devices, and for IAEA safeguards purposes all plutonium (other than Pu-238) is regarded as a 'direct use material' that can be used in the manufacture of nuclear explosives. Because of the short time needed to convert direct use material into components for a nuclear explosive device it has been suggested that verification of a nuclear weapon free world would be simplified if plutonium recycle did not occur. Use of plutonium in civil power programs is not proscribed by the NPT, however, and a number of countries have formed the view that they have no alternative to plutonium use in their civil fuel cycle if they are to meet their electricity supply needs. Such states have invested large sums in civil plutonium use.

Plutonium is produced as a natural consequence of the irradiation of U-238. The production of plutonium in a conventional reactor is therefore unavoidable. In practice, plutonium for nuclear weapons purposes is produced in dedicated reactors where burn-up levels, hence Pu-240 and Pu-238 content, can be minimised and there is no doubt that plutonium at a suitably low burn-up level is extremely attractive for nuclear weapons purposes, and that 'reactor grade' plutonium is less so. History shows that reactor grade plutonium has not been a material of choice for weapons use.

Nevertheless, plutonium use in the civil fuel cycle raises a number of issues including the requirement that strict controls be applied through application of safeguards, physical protection and rigorous national accountancy and control. Because of the sensitivity of this material, any stockpiling of plutonium by a non-nuclear weapon state beyond legitimate energy needs would be of security and proliferation concern and could result in doubts about the viability of a nuclear weapon free world.

It is essential that the control regime for civil plutonium use continue to deliver high levels of confidence that such material remains in exclusively peaceful use. States using civil plutonium also have a duty to ensure that by doing so they are not creating regional or wider tensions. This obligation is especially cogent regarding assurances that they are not stockpiling fissile material in excess of normal civil operational requirements for nuclear energy requirements. One means of doing this would be for such states to increase transparency regarding their management and use of fissile material by publishing details of their projected fissile material needs and fissile material holdings. Once a comprehensive, voluntary arrangement is operating steps could be taken to develop a treaty requiring all states to declare and account for their stocks of fissile material.

A correct balance must be struck by the international community between the interests of states using weapons grade or direct use material for civil purposes and the wider general interest in ensuring that use of such material does not result in proliferation pressures or frustrate achievement of a nuclear weapon free world.

One possibility may be to draw a distinction between plutonium of different isotopic grades and to use this distinction both for safeguards purposes and for a proscription on the separation of plutonium of an isotopic composition which makes it attractive for weapons use. If combined with a prohibition on production of uranium at or near weapons grade and the cut-off convention (which would apply only to fissile material produced for explosive use), this would stop production of all nuclear material at or near weapons grade. This would constitute an important confidence building measure in support of the nuclear non-proliferation regime and the elimination of nuclear weapons. Weapons grade nuclear materials have very limited use in civil nuclear activities and therefore a prohibition on their production should not cause practical difficulties with any ongoing legitimate civil (or military) requirement for such materials being met from existing stocks.

Were a state to be producing significant quantities of separated plutonium at or near weapons grade, the application of safeguards measures, though technically sound, would not provide the requisite degree of assurance about the future intent of the state concerned. The best way of building confidence is to avoid production of material of this kind. Where reprocessing of low

burn-up material is proposed, arrangements could be put in place to ensure such material is reprocessed in stream with high burn-up material, such as normal spent fuel, so that the resultant product will have a sufficiently high proportion of the higher plutonium isotopes.

The clearest example of potential large scale incidence of low burn-up plutonium is the blanket material from fast breeder reactors. Plutonium in fast breeder blankets is the equivalent of very low burn-up, its isotopic composition being similar to weapons grade (or even 'super grade', i.e around 3 percent Pu-240). Since production of blanket material is the major reason for operating fast breeders (i.e to obtain plutonium for recycle), obviously it is not practicable to proscribe the production of such plutonium in irradiated blanket material. It is possible however to avoid the production of low burn-up plutonium as a separated product, by ensuring that irradiated material containing any such plutonium will only be reprocessed in stream with high burn-up material (e.g. fast breeder core fuel, or light water reactor fuel).

It is an unfortunate consequence of the current practice of not differentiating between plutonium grades for safeguards purposes that special attention is not directed to plutonium having the isotopic characteristics of greatest proliferation concern. Where irradiated fuel containing low burn-up plutonium is stored in spent fuel ponds, there is a strong case for subjecting it to particular safeguards attention to provide extra assurance of non-diversion.

A possible risk of drawing a distinction between the various grades of plutonium is that it could result in pressure to consider whether controls on reactor grade plutonium should be reduced. A further consideration is that enhanced controls on low burn-up plutonium would probably increase the costs of safeguarding plutonium from weapons dismantlement. In circumstances where safeguards resources are under great pressure, it would be necessary to determine whether using such resources to increase controls on low burn-up plutonium would be the most cost-effective option in terms of benefit to the non-proliferation regime. Therefore there would be merit in investigating various categories of plutonium in terms of applicable safeguards measures and resulting verification costs.

As to a prohibition on production of uranium at or near weapons grade, apart from minor quantities for laboratory use the only civil requirement for

highly enriched uranium (at or above 20 percent U-235) is in certain research reactors and critical assemblies. In recent years there has been a concerted program of converting research reactors from highly enriched uranium to low enriched uranium fuel, and very few still operate on highly enriched uranium. Fewer still operate on highly enriched uranium fuel of weapons grade, the recent decision by Germany to proceed with a new reactor using such fuel being a controversial example. To the extent that use of highly enriched uranium cannot be avoided in advanced scientific research, obtaining this material from the very extensive stocks held by the nuclear weapon states will help run down those stocks and obviate any further production. Highly enriched uranium is also used by some of the nuclear weapon states in marine propulsion reactors for both surface ships and submarines. States using highly enriched uranium for this purpose have adequate stocks and do not require further production.

A prohibition on production of all nuclear material at or near weapons grade may prove a practical step of considerable value in support of the eventual elimination of nuclear weapons and could be included in the proposed cut-off convention or a complementary international agreement.

As nuclear disarmament gathers pace the amount of fissile material to be brought under IAEA safeguards will increase dramatically. This material will be made up of plutonium and highly enriched uranium components from dismantled weapons and fissile material inventories not stored in weapon component form. As a guide, the United States currently has about 84 tonnes of weapons grade plutonium and about 500 tonnes of weapons use highly enriched uranium. Russian stocks are at least equal and could be higher. It is essential that former weapons fissile material be afforded the highest standards of accounting and control and physical protection to ensure that it does not contribute to concerns about cheating or leakage to other actors.

As agreed at the Moscow Nuclear Safety and Security Summit, fissile material removed from weapons should be made subject to IAEA safeguards as soon as practicable. This will have to be done in a way that ensures that sensitive information relating to weapons design is protected. The options for doing this are either to convert the material to forms which do not reveal weapons information when accounted for by traditional IAEA safeguards measurement techniques, or to develop new techniques to account for the

material in component form without revealing sensitive information. Both of these methods for protecting weapons design information appear technically feasible but require further development.

Tritium

Tritium, a radioactive isotope of hydrogen, is an essential ingredient of most modern nuclear weapons, both for initiation of the fission reaction and for enhancing or boosting that reaction. It is subject to rapid radioactive decay – its half-life is 12.3 years – so there is no doubt that an appropriate control regime could play a major part in the elimination of nuclear weapons. While pure fission nuclear weapons can be made without tritium, there would be profound design consequences, e.g. they would have to be physically larger for the same yield, hence less easily deliverable.

Tritium has a number of non-nuclear uses, and Canada, the major civil producer, has established a regime of peaceful use assurances and bilateral accounting for tritium supply. This might form the basis for an international tritium control regime although it is expected that verification arrangements would also be required.

The nuclear weapon states are unlikely to accept inclusion of tritium in the proposed cut-off convention because of the changes to force structures this would require and consequent effect on deterrence. Nonetheless, such controls will be an important part of the disarmament process and associated verification arrangements and it would be surprising if the nuclear weapon states did not come to recognise that it is in their own interests for an appropriate regime to be established in due course. A practical step would be for the nuclear weapon states and other states to commence a detailed study of how such a regime might operate, and what would be acceptable to the nuclear weapon states and to the international community at large.

Funding

It is essential that the international community recognise that laying the foundation for a nuclear weapon free world will require additional resources. At the US/Russian bilateral level this will include funding verification measures for bilateral monitoring of the early stages of disarmament such as warhead dismantlement and initial monitoring of fissile material removed from warheads. This process would probably be extended to the other nuclear

weapon states when they join the disarmament process with accompanying resource requirements. Resources will also be needed for the multilateral safeguards system in particular to strengthen the IAEA's capacity to detect undeclared nuclear activity and to apply safeguards at nuclear weapon state fissile material production facilities under a cut-off convention.

The IAEA's safeguards budget is approximately US $75 million per year and provides a considerable security benefit for a modest outlay. IAEA safeguards are under great pressure because of the need to apply safeguards at an increasing number of facilities. The demands nuclear disarmament will make of the Agency will add to this pressure. While the 93+2 program is intended to improve the efficiency as well as effectiveness of IAEA safeguards, it is inconceivable that existing levels of funds could be stretched to include the coming demands on Agency safeguards.

The political commitment to eliminate nuclear weapons must be matched by a willingness to make available the resources needed for nuclear disarmament including for effective verification. The amounts involved are likely to be considerable, especially for dismantlement of weapons and disposition of their fissile material content, but very much less than developing, maintaining and upgrading nuclear arsenals. The costs of verification also need to be weighed against the substantial contribution to global, regional and national security effective verification of a nuclear weapon free world would make.

Infrastructure Dismantlement

Part of the penultimate stage before final elimination of nuclear weapons should be the sequential destruction of nuclear weapons facilities. The object of this infrastructure dismantlement would be to discourage any breakout by making it a drawn-out, highly visible, large-scale, costly process.

The infrastructure dismantlement phase would begin with disclosure by the nuclear weapon states and any remaining undeclared weapon states and threshold states of their infrastructure for the production and assembly of the various elements of weapons. They would also need to agree to international monitoring to verify that weapons production has halted and that the capacity to resume production has been essentially eliminated. This would require agreements on infrastructure declarations, monitoring and dismantlement processes. Reductions in stockpiles of warheads would continue.

At this stage the nuclear weapon states and any remaining states presumed to have a nuclear weapons capacity should compile annotated charts tracing each critical element of their weapons back out into the economy through the fabricator up to whatever level technical specialists may designate. At this stage of nuclear weapons elimination there can be no valid reason not to make full disclosure of this supply net and then to eliminate those critical elements whose retention could shorten the time and cost of resuming weapon production.

There may be a need to allow the retention of some facilities on a care and maintenance basis for a period of time to provide reassurance to the nuclear weapon states until their confidence in the process has increased sufficiently to allow them to complete the task. Any cheating at this stage would require clandestine infrastructure which would need to be supplied with fissile material and the verification arrangements for a cut-off convention should be able to detect any clandestine activities at this stage in the process of disarmament.

More should not be expected of infrastructure dismantlement than it can deliver. In the period immediately following elimination any former nuclear weapon state could rapidly reconstitute a few bombs using plutonium recovered from spent fuel, assuming it was prepared to abrogate the relevant treaties and the international community did not act to stop it.

By the time the elimination phase of nuclear disarmament is reached the nuclear weapon states and the undeclared weapon states and threshold states will have halted production of weapon material, accepted safeguards on their facilities for enrichment and for plutonium separation and on material flows from those facilities and dismantled the infrastructure for the production of weapons. Ensuring the maximum degree of transparency during these processes is of central importance.

The Elimination Phase

As the nuclear powers go into their final countdown, there may be resistance to rapid elimination should the nuclear weapon states want a pause of some years to assure themselves (and others) that this elimination of bomb-building capabilities was both genuine and stable. A penultimate step to elimination might be the reduction of nuclear forces to very small residual levels – possibly but not necessarily equal – that would be retained until it is clear

that a viable support regime for a nuclear weapon free world is in place. The small residual weapon stocks would be reassuring to the nuclear weapon states though not to many others, since it would mean that the world of mutual deterrence had not yet vanished. These residual forces would then be eliminated simultaneously.

Such a stalemate would be less likely if the strengthened safeguards system currently being developed by the IAEA is instituted quickly and further developed over the course of the nuclear disarmament process. In addition, successful operation of verification during the steps toward disarmament on such sensitive tasks as eliminating weapon assembly facilities and reducing weapon stockpiles would enhance confidence that the very last stage was indeed going to be executed in strict compliance with treaty commitments.

Verification in a Nuclear Weapon Free World

The most plausible breakout scenario would be for one of the nuclear weapon states, or one of the states thought to have a nuclear capacity, to conceal a few weapons and/or fissile material from the disarmament process. Even with a highly intrusive verification regime, detection of a well shielded weapons/fissile material cache would be difficult with today's technology. But the elimination of nuclear weapons is likely to take some decades so prospects for technical detection of breakout should not be measured against today's technology. It is reasonable to expect substantial increases in the capacity of the technical verification system will flow from the experience gained in verifying the move to a nuclear weapon free world.

Apart from international verification activities of the IAEA and related bodies, the cooperation of all states would be essential as an additional layer of deterrence to any government that might consider concealing fissile material. Any state which through national technical means becomes aware of potential violations of verification regimes should bring this to the attention the appropriate verification authority.

Societal verification, or citizen's reporting, may prove to be an additional means of supporting the verification system for a nuclear weapon free world. Considerable doubts have been raised about societal verification's potential to contribute to verification of a nuclear weapon free world. In today's world

or one close to it this scepticism appears to have foundation. Where the sceptics may be wrong is in extrapolating today's world indefinitely into the future. Change is inevitably coming, including in international interdependence, in developments in global communications and within societies. The right of individuals to bring violations of international obligations to the public notice is becoming increasingly recognised. A number of these changes may make societal verification an increasingly meaningful adjunct to more traditional verification methods.

Societal verification, like national intelligence activities, will operate uncertainly and unpredictably. Other governments cannot be confident that a whistle blower will quickly discover any particular violation and act on it. But a government contemplating cheating could never be confident that no whistle blower or agent would ever learn of its misdeed and act on that knowledge. Thus societal verification may prove a useful additional deterrent to any government that might consider an action such as concealing fissile material.

The possible role of societal verification would be enhanced if personal responsibility became an established norm in the area of weapons of mass destruction, i.e if it were accepted that production and use of weapons of mass destruction constituted a personal crime under international law by the individuals involved as well as by the state. In these circumstances there would be a strong incentive for individuals not to participate in or support state weapons of mass destruction programs and an incentive for whistle blowing particularly by persons who might otherwise be seen as being implicated in an illegal activity.

A second source of breakout concern is that states may seek to establish a clandestine nuclear fuel cycle and weapons program. The 93+2 program for strengthening IAEA safeguards is a sound foundation for development of technical arrangements to provide a high degree of probability that undeclared nuclear activity would be detected. As with the concealment scenario, to increase the probability of detection, information from technical verification should be supplemented by a range of other sources including intelligence information, export control regimes and societal verification.

Annex B

Legal Arrangements for the Elimination of Nuclear Weapons

Disarmament undertakings need to be established as legal as well as political and normative obligations if they are to provide the confidence needed for the achievement of a nuclear weapon free world and the basis for the necessary verification arrangements, and particularly for their permanent maintenance. There are a variety of legal arrangements in which the legal obligations could be embodied.

Legal Options

There are a number of legal instruments in place and in prospect which embody legal obligations relevant to arrangements for the elimination of nuclear weapons. Amendments could be made to existing instruments or protocols added to cover additional obligations. Alternatively a new treaty could be negotiated. Non-treaty measures could also assist the disarmament process and transition to a nuclear weapon free world. This annex canvasses the options available.

Treaty Measures

Amendments

The method of amending a multilateral treaty depends on the terms of the treaty. Where no provision is made for amendment, the residual rules set out in the Vienna Convention on the Law of Treaties apply.

Unless a multilateral treaty provides otherwise, amendments to it bind only those parties which become party to the amending instrument. Where not every party to a multilateral treaty adheres to an instrument amending the treaty, a two-tiered system arises in which two different sets of states are bound by two different sets of obligations. First, the unamended treaty governs relations between a state party to the unamended treaty and a state party to the treaty as amended. It also governs relations between two states party to the unamended treaty. Second, the treaty in its amended form governs relations between two states party to the treaty as amended.

As a practical matter, it is difficult to prevent such a two-tiered outcome from persisting for a protracted period even where all parties to the original treaty intend to ratify the amending instrument. This is because delays are inevitable as each state party complies with domestic requirements for treaty action before ratifying the amending instrument. In a situation where some parties to the treaty were unwilling to ratify the amending instrument because they disagreed with the substance of the amendments, the two tiers of obligation would continue indefinitely.

The effect of two co-existing tiers of obligation varies with the nature of the treaty. Most treaty obligations in the field of disarmament are not premised on a strictly reciprocal basis. In the case of the Treaty on the Non-Proliferation of Nuclear Weapons, for example, each party's obligations are of an over-arching and largely negative – that is, refraining – nature. In one sense, those obligations benefit states not party to the NPT as much as states party, although they are not enforceable by non-party states. In many areas of international trade law, by contrast, the benefit of treaty obligations flows to other states on a purely reciprocal basis, even in the context of a multilateral treaty. That is, the benefit arising from the treaty obligations of one state party will flow only to other states party.

This propensity for the benefits of disarmament obligations to flow on to non-party states may lessen the impact of having two co-existing tiers of obligation. The new obligations assumed by those states parties which ratify an amending instrument are likely to benefit one and all, irrespective of adherence to the ratifying instrument or even to the unamended treaty. On the other hand, this feature may lessen the incentive for each state party to assume further obligations by ratifying an amending instrument, thereby perpetuating the messy two-tier situation.

The amendment provisions of the NPT are noteworthy. Any amending instrument must be ratified by a majority of all NPT parties which includes all the nuclear weapon state parties and all parties which were, at the time the proposed amendment was circulated, members of the International Atomic Energy Agency Board of Governors (in accordance with Article VIII.1 and VIII.2 of the NPT). Thus any one of 30 states could choose to exercise what is, in effect, a power of veto to prevent an amendment from entering

into force, however strong the support for the amendment. But in practice, an amendment supported by the nuclear weapon states to enforce obligations to bring about the achievement of a nuclear weapon free world could be expected to receive support from all non-nuclear weapon states party to the treaty.

Nevertheless an important point to note about the option of creating new disarmament obligations by amending existing instruments is the difficulty of 'quarantining' amendment proposals. All multilateral treaties are necessarily the product of much compromise. For some parties, a proposed amendment may appear to upset the original balance of rights and obligations which made the treaty acceptable. For others, it may herald an opportunity to attempt to redress every perceived problem in the unamended treaty by re-opening debate upon all aspects of the treaty – in what could prove to be a counterproductive exercise serving only to weaken the treaty in question.

Protocols

A protocol added to an existing treaty will bind only those parties to the treaty which express their consent to be bound by the protocol. However, entry into force of the protocol would take place on its own terms. In relation to the NPT, for example, a protocol could serve to situate important new obligations under the auspices of the NPT while avoiding the cumbersome and highly uncertain NPT amendment process. Since the protocol would not amend the NPT its provisions could not conflict with those in the NPT, but it could impose additional obligations, provided they are not inconsistent.

Optional protocols may be negotiated contemporaneously with the treaties to which they are attached or at a later date. If negotiated later, their potential existence may be foreshadowed in the text of the treaty, as a means of encouraging future efforts on questions incapable of resolution at the time of negotiation of the core treaty. However, this path would require agreement by the states adopting the treaty that the question at issue was one which should be debated and agreed upon at a later date.

Whenever negotiated, protocols could usefully facilitate a staged approach to nuclear disarmament.

New Treaties

There is also the option of negotiating an entirely new treaty. The attractiveness of this route would depend on a number of factors including the extent of support from the nuclear weapon states for this option. On the one hand, negotiation of an entirely new treaty will usually permit greater freedom as to the scope of subject matter covered. On the other, negotiations on the basis of a fundamental lack of consensus may impede progress. The time taken for negotiation and universal ratification also would need to be taken into account.

Revised Interpretation of Existing Treaty Provisions

Interpretation of the provisions of a treaty must take into account any subsequent agreement between parties regarding its interpretation, and any subsequent practice in the application of the treaty establishing such agreement (per Article 31.3 of the Vienna Convention on the Law of Treaties).

One possible application of this rule concerns Article VI of the NPT. The Principles and Objectives document of the 1995 NPT Review and Extension Conference may be viewed as an agreement among NPT parties as to the steps by which Article VI should be implemented. Future NPT Review Conferences will review this common understanding of implementation of Article VI.

Non-Treaty Measures

Unilateral Statements and Acts

A state may be bound by an obligation undertaken in a unilateral declaration if this is the intention of the state making the declaration and the undertaking is given publicly. Most unilateral statements, however, are political in character and are not intended to create legal obligations. Although these statements are not legally binding, they can engender goodwill and enhance the atmosphere for productive negotiations towards mutually accepted binding commitments.

Unilateral acts may also assist initial progress towards treaty negotiations, both by reducing substantive obstacles to agreement and by helping the psychological adjustment to the view that a secure nuclear weapon free world is feasible.

Political Commitments by Two or More States

Like unilateral statements and acts, jointly expressed political commitments may help to accelerate progress on disarmament. A multilateral non-binding political declaration can be of potentially enormous influence. It may even have an indirect legal effect if it comes to be seen as representing customary international law. For example, the Universal Declaration of Human Rights adopted by the UN General Assembly in 1948 carries much weight and has been invoked by international tribunals. Moreover, even if the declaration does not involve legal obligations, any state would think twice before reneging on a well-publicised political commitment undertaken jointly with other states. As recommended in Part Two of the report, an immediately beneficial first step at this stage of the disarmament process would be a commitment to a nuclear weapon free world by all five declared nuclear weapon states, in the first instance. What is proposed is not a treaty but a political commitment or compact, entered into by those five states to which all other states could express their agreement and support.

Options for Action

A number of options for taking action on legal arrangements are therefore available as the world approaches and reaches the elimination of nuclear weapons. Two basic approaches could be adopted: an incremental approach and a comprehensive approach.

Incremental Approach

An incremental approach would build upon the existing NPT and other related treaties such as a Comprehensive Test Ban Treaty, and possible future conventions on the cessation of the production of fissile materials for nuclear explosive purposes and on the non-first use of nuclear weapons, rather than seek to replace them.

Such an incremental approach could entail supplementary commitments negotiated in the form of an NPT protocol or NPT amendments. These measures would be accompanied by a concerted effort to achieve universal adherence to the NPT and by the transition by the nuclear weapon states to non-nuclear weapon status under the NPT. This transition in nuclear weapon state status, in combination with global adherence to the NPT, would entrench verifiable commitments by all states to renounce nuclear weapons.

Each nuclear weapon state would thus renounce nuclear weapons and the formal assumption of legal obligations could be via a new protocol. The text of the protocol would be agreed by all NPT parties but signed only by the nuclear weapon states. Following from the protocol could be a fullscope safeguards agreement with the IAEA encompassing Article II obligations and any particular requirements for verification in former weapon states.

The transformation of the NPT to a central treaty outlawing nuclear weapons could then be affirmed by a declaration of all NPT parties, probably at a Review Conference of the Treaty.

Thus, in the incremental approach, the transformed NPT along with entire corpus of parallel treaty commitments, political declarations and undertakings would serve as the legal and institutional basis for the elimination of nuclear weapons.

Comprehensive Approach

The comprehensive approach would entail the negotiation of a new treaty prohibiting the development and possession of nuclear weapons to replace the NPT and possibly other treaties such as a CTBT and possible future conventions on the cessation of the production of fissile materials for nuclear explosive purposes and on the non-first use of nuclear weapons. An advantage of the new treaty option is that it would allow greater freedom as to the subject matter to be covered. It may also offer important political advantages by codifying, in a single instrument, the global community's shared will to eliminate nuclear weapons. A new treaty could also contain a clear focus on the complete elimination of nuclear weapons whereas many of the existing and prospective instruments that would be components of the incremental approach have arms control rather than disarmament as their basis. Negotiation of a new treaty would also be consistent with the approach taken with chemical weapons and biological weapons both of which have been prohibited through single legal instruments – the Chemical Weapons Convention and the Biological Weapons Convention.

The new treaty option may risk jeopardising the strength of the NPT regime, with its almost global adherence, by attempting to achieve a new treaty – especially as the benefits of such a new treaty may be achievable in other ways. Despite its poor implementation record until very recently, Article VI

and the preambular paragraphs to the NPT contain the only legally binding commitment to the elimination of nuclear weapons entered into by all nuclear weapon states. Efforts to reinvigorate Article VI may bring greater rewards than despairing of its potential. This is especially the case in view of the strong reaffirmation of the NPT provided by the 1995 decision of NPT parties to extend the Treaty indefinitely.

On the other hand, there are advantages to the proposal for a comprehensive new treaty. The new treaty option may also allow some distance from the disappointing implementation record of Article VI and from acrimonious debate about the extent to which the NPT is discriminatory. As to the risk that efforts towards a new treaty may undermine the achievements of the NPT without necessarily proving a better vehicle for disarmament, one or two options suggest themselves as ways of minimising that danger:

- The new treaty could provide that none of its provisions were intended to affect the operation of the NPT until such time as the new treaty had both entered into force and been adhered to by every state party to the NPT. At that stage, the NPT would be terminated, either explicitly by the terms of the new treaty, to which all NPT parties had adhered, or implicitly by virtue of Article 59 of the Vienna Convention on the Law of Treaties – assuming that the new treaty would either subsume the NPT in its entirety or be incapable of simultaneous application with it. However, this would be a very elaborate solution, and confusion would be likely as to the interaction between the provisions of the new treaty and those of the NPT during the period before the NPT was terminated
- The new treaty could provide that it was to enter into force only after it had been ratified by all states party to the NPT. Again, the NPT would at that stage be terminated, whether explicitly or implicitly. Thus, the provisions of the NPT would not be jeopardised prior to the clear-cut replacement of the NPT regime with the regime ushered in by the entry into force of the new treaty. The difficulty here is that such a high threshold requirement for entry into force may mean that the new treaty never did enter into force, so that despite all the efforts towards a new treaty the practical outcome would be the continuation of an unimproved NPT regime.

While universal adherence to a new treaty would be the goal, no means exist to force all states to adhere to it. Even if it were universally accepted that the possession of nuclear weapons breached customary international law, states would not be thereby obliged to accept the particular variant of non-proliferation and verification commitments negotiated in the new treaty. However, there is no legal difficulty in formulating an absolute treaty prohibition on the development and possession of nuclear or any other weapons, and in giving such a prohibition binding force for the states parties.

Fundamental, in any reflection on the legal regime required as a basic part of the architecture for a nuclear weapon free world, is the recognition that the legal regime supports but does not itself bring about such a world. Questions about what the legal regime would comprise are important and do play a role in the political negotiations through which a nuclear weapon free world will be established. But it is these negotiations and determination to make them effective which are central to the elimination of nuclear weapons.

MANDATE

The Commission will develop ideas and proposals for a concrete and realistic program to achieve a world totally free of nuclear weapons. The proliferation of nuclear weapons is widely recognised as having become the most serious threat to global security, and member states of the United Nations and the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) have committed themselves to the objective of a world totally free of nuclear weapons. While various studies relevant to the achievement of such a world have been and are being conducted, there has been no attempt to develop a comprehensive and practical answer to the crucial question of how this objective can be achieved.

The practical steps towards a nuclear weapon free world, to be suggested by the Commission, will also address the related problem of maintaining stability and security during the transitional period and after the ultimate goal is accomplished.

The Commission will present a report to the Prime Minister of Australia by 31 August 1996. It is the Government of Australia's intention to submit the Commission's report to the 51st Session of the General Assembly of the United Nations and to the Conference on Disarmament.

The Commission will consider and develop recommendations on the following issues:

- Identification of concrete and realistic steps for achieving a nuclear weapon free world, including the development and establishment of necessary verification and control mechanisms and new international legal obligations. Possible areas of focus include:
    - — the contribution of a Comprehensive Test Ban Treaty; nuclear weapon free zones; a 'cut-off' convention on the cessation of production of fissile material for nuclear weapons; a possible treaty requiring all states to declare and account for their present stocks of fissile material; and the strengthening of the international safeguards system;

— carrying through of the commitment by the nuclear weapon states to eliminate their nuclear stockpiles through a systematic process, including safe and secure arrangements for weapons dismantlement and destruction; and

— the problem of nuclear threshold states and the related issue of achieving universal participation in the NPT.

- Development of durable security arrangements, both globally and regionally, including

  — the maintenance of a system of stable deterrence while the reduction and eventual elimination of nuclear weapons is being achieved;

  — the link with other weapons of mass destruction and their control or elimination; and

  — measures to prevent break-out, nuclear theft and nuclear terrorism/criminality.

- Other related issues the Commission may identify during its work.

November 1995

The Commissioners

Celso Amorim

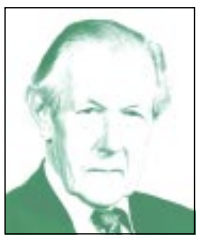
Ambassador Amorim was Brazilian Foreign Minister from 1993-1994, and Lecturer, Department of Political Science and International Relations, University of Brasilia. He was Ambassador to the Conference on Disarmament, Geneva, 1991-1993. He is currently Brazil's Permanent Representative to the United Nations, New York.

Lee Butler

General (Ret.) Butler was Commander in Chief of the US Strategic Air Command (1991-1992) and subsequently the US Strategic Command (1992-1994) with responsibility for all US Air Force and Navy nuclear deterrent forces. He was closely involved in the development of US nuclear doctrine.

Richard Butler (Convenor)

Ambassador Butler was Australia's Ambassador for Disarmament from 1983-1988 and led the Australian Delegation to the Conference on Disarmament. He is now Australia's Permanent Representative to the United Nations, New York.



Michael Carver

Field Marshal Lord Carver was Commander in Chief Far East of the British Army (1967-1969), Chief of General Staff (1971-1973), and Chief of Defence Staff (1973-1976). He is author of *A Policy for Peace* (1982), on nuclear policy, and numerous other works on military history.

Jacques-Yves Cousteau

Captain Cousteau, writer, film producer and former naval officer, has been for many years a leading international campaigner on environmental and global survival issues. He is a former President of the French Council for the Rights of Future Generations established by President Mitterrand in 1993.

Jayantha Dhanapala

Ambassador Dhanapala chaired the 1995 Nuclear Non-Proliferation Treaty Review and Extension Conference, represented his country in the Conference on Disarmament as Permanent Representative of Sri Lanka to the United Nations, Geneva (1984-1987), and is a former Director of the UN Institute for Disarmament Research (UNIDIR). He is a prominent figure in international nuclear non-proliferation and disarmament issues and is currently Sri Lanka's Ambassador to the United States.

Rolf Ekeus

Ambassador Ekeus is Executive Chairman, United Nations Special Commission (UNSCOM), whose mandate is to identify and eliminate Iraq's weapons of mass destruction. He is a former Swedish Ambassador for Disarmament and Ambassador to the Conference on Security and Co-operation in Europe (CSCE).

Nabil Elaraby

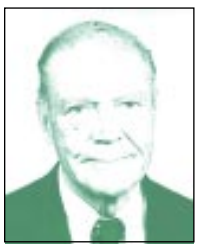
Ambassador Elaraby is a specialist international lawyer and a member of the International Law Commission. He has been a key figure in nuclear non-proliferation matters for many years, and was formerly Permanent Representative of Egypt to the United Nations, Geneva (1987-1991). He is currently Permanent Representative of Egypt to the United Nations, New York.

Ryukichi Imai

Professor Imai is a Counsellor to the Atomic Energy Commission of Japan and a Professor at Kyorin University. He is a former Ambassador of Japan to the Conference on Disarmament (1982-1987), to Kuwait and to Mexico. He has been a Distinguished Scholar and a member of the Board of the Institute for International Policy Studies. Professor Imai is an author of numerous books and articles mainly on nuclear energy, non-proliferation and disarmament matters. He received a Dr. Eng in Nuclear Engineering from the University of Tokyo. He is a member of the International Governing Board of the Stockholm International Peace Research Institute (SIPRI).

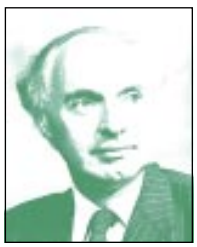
Ronald McCoy

Datuk McCoy is Vice President of the Asia Pacific Region and Chairman of the Malaysian Chapter of International Physicians for the Prevention of Nuclear War. This organisation won the Nobel Peace Prize in 1985. He is currently President of the Malaysian Medical Association.



Robert McNamara

Mr McNamara was Secretary of Defense under Presidents Kennedy and Johnson. He is a former President of the Ford Motor Company and the World Bank. Since leaving the World Bank he has been active in economic and development efforts across the globe and in the areas of arms control and nuclear non-proliferation.



Robert O'Neill

Professor O'Neill is Chichele Professor of the History of War, All Souls College, Oxford University and was formerly Director, International Institute of Strategic Studies, London.

Qian Jiadong

Ambassador Qian is a member of the National Committee and Vice-Chairman of the Foreign Affairs Committee of the Chinese People's Political Consultative Conference. Previously, he was Deputy Director-General of the China Centre for International Studies, Ambassador and Permanent Representative to the United Nations in Geneva, Ambassador for Disarmanent Affairs and Representative to the Conference on Disarmament.

Michel Rocard

M. Rocard was Prime Minister of France 1988-1991. He is now a member of the European Parliament and the French Senate, and a member of the Foreign Affairs and Defence Commission in each.

Joseph Rotblat

Professor Rotblat, winner of the 1995 Nobel Peace Prize, is President of the Pugwash Conferences on Science and World Affairs and a long standing activist and writer on nuclear disarmament. He worked on the atom bomb during World War II in Liverpool and Los Alamos and was a signatory of the Russell-Einstein Manifesto. He is Emeritus Professor of Physics at St Bartholomew's Hospital, University of London.

Roald Sagdeev

Professor Sagdeev is Distinguished Professor, Department of Physics, University of Maryland and Director of the East-West Space Science Centre. He has held the post of Director of the Space Research Institute of the USSR Academy of Sciences and was former President Gorbachev's science adviser. From 1987-1988 Professor Sagdeev was Chairman of the Committee of Soviet Scientists for Global Security.

Maj Britt Theorin

Dr Theorin has been a Member of the European Parliament since 1995 and is a former Member of Parliament in Sweden (1971-1995). She is a former Swedish Ambassador for Disarmament, in charge of Swedish disarmament policy (1982-1991). She is President of the International Peace Bureau and President of Parliamentarians for Global Action. She was Chairman of the UN Commission of Experts on Nuclear Weapons (1989-1990), Chairman of the UN Study on Military and the Environment (1990-1991) and Chairman of the UN Expert Group on Women and the Agenda for Peace 1994.

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The Commission received encouragement and assistance from a wide range of sources. Background papers on issues relevant to the report were prepared by Alexei Arbatov (Deputy Chair of the Defense Committee, State Duma of the Russian Federation), Eric Arnett (SIPRI), Frank Blackaby (former Director of SIPRI), Barry M. Blechman and Cathleen S. Fisher (Henry L. Stimson Center), James Crawford and Philippe Sands (University of Cambridge and the University of London respectively), Jonathan Dean (Union of Concerned Scientists), John P. Holdren (University of California), James Leonard (Washington Council on Non-Proliferation), Andrew Mack (Australian National University), Michael MccGwire (University of Cambridge), Marvin Miller (Massachusetts Institute of Technology), Janne E. Nolan (Brookings Institution), Christopher E. Paine, Thomas B. Cochran and Robert S. Norris (Natural Resources Defense Council), Tariq Rauf (Monterey Institute of International Studies), Leonard S. Spector (Carnegie Endowment for International Peace) and Ramesh Thakur (Australian National University). These papers will be published separately.

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The Commission met four times – twice in Australia, once in the United States and once in Austria. Staff at the meeting venues were of great assistance to the Commission, particularly at the Harrison Conference Center at Glen Cove, NY and the proprietors of the Schlosshotel Obermayerhofen, Sebersdorf, Austria, Mr and Mrs Kottulinsky.

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The Commission gratefully acknowledges the support of the Australian Government, the support and work of the Secretariat and staff at Australia's overseas missions, without which this report would not have been possible. While the Commission was established by the Australian Government the views expressed in this report are those of the Commission alone, and should not be understood as representing, necessarily, attitudes or policies of the Australian Government.

Secretariat

A secretariat was established within the Australian Department of Foreign Affairs and Trade to support the Commission.

Rory Steele *(Head of the Secretariat)*

Roger Hodgkins

John Page

Louise Holgate

Chui Fong Yap

Rory Medcalf

Julie McDonald *(Media Liaison)*

A number of other Australian officials assisted the Commission, in particular Mr Kim Jones, Deputy Secretary, Department of Foreign Affairs and Trade, Mr Ian Cousins, First Assistant Secretary, International Security Division, Department of Foreign Affairs and Trade and Dr Ron Huisken, Assistant Secretary, North America and Intelligence Branch, Department of Defence.

Glossary

ABM	Anti-Ballistic Missile (US – USSR ABM Treaty, 1972).
BW	Biological Weapons.
BWC	Biological (and Toxin) Weapons Convention.
CTBT	Comprehensive Test Ban Treaty.
CW	Chemical Weapons.
CWC	Chemical Weapons Convention.
Comprehensive or fullscope safeguards	Safeguards covering all current and future nuclear activities in a state.
Fissile material	Any material fissionable by thermal neutrons, principally uranium-233, uranium-235 and plutonium-239.
Highly enriched uranium	Uranium enriched to 20 percent or more in the isotope uranium-235.
IAEA	International Atomic Energy Agency.
INF	US-USSR Intermediate-range Nuclear Forces Agreement of 1987.
NPT	Treaty on the Non-Proliferation of Nuclear Weapons, 1968.
NPTREC	NPT Review and Extension Conference (April-May 1995).
NWFZ	Nuclear weapon free zone.
Nuclear weapon state	Under Article IX.3 of the NPT the term means a state which manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967 i.e China, France, Russia, UK, US.

Non-nuclear weapon state	A state that has not made and tested (exploded) a nuclear weapon. Formally, a state that had not made and tested a nuclear weapon or other nuclear explosive device by 1 January 1967.
Plutonium recycle	The reuse of plutonium in fresh fuel after separation from fission products in spent fuel at a reprocessing plant.
Reactor grade plutonium	Plutonium that contains more than 19 percent of the higher isotopes of plutonium (Pu240 and above). It is created in most power reactors under normal operating conditions.
Safeguards	A series of technical measures or regulations specified in international arrangements designed to detect and hence deter the use of nuclear facilities or materials for proscribed purposes, such as the production of nuclear weapons.
Spent fuel	Nuclear fuel elements removed from a reactor after use. Usually done when the fuel contains too little fissile and fertile material and too high a proportion of fission by-products to sustain economical operation of the reactor.
START (I & II)	US-Russian Strategic Arms Reduction Treaties.