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LIFTING THE NUCLEAR SHADOW: Creating the Conditions for Abolishing Nuclear Weapons

A Policy Information Paper by The Foreign & Commonwealth Office

FOREWORD by the Foreign Secretary

David Miliband

The threats to our security are changing. In today's world, so different from that of the Cold War less than twenty years ago, many ask why more is not being done to abolish nuclear weapons and to prevent them from falling into the wrong hands.

In fact, there have been very significant cuts in the numbers of nuclear weapons. And, despite dire predictions, the number of states which have them has been kept to less than ten.

But we cannot be complacent. Some governments and terrorist groups are actively seeking nuclear weapons. At the same time, nuclear materials and know-how are set to be more widely spread as more countries look to nuclear energy to power their growing economies while combating climate change.

The Prime Minister, President Obama and many other leading figures, across party political divides, have called for action to build a more secure world, free of all nuclear weapons.

We need an assertive and co-operative strategy, founded on the premise that the goal of a nuclear weapons free world is achievable but it will require a long-term, sustained effort from not only the Nuclear Weapon States but the entire international community. We need to build a global coalition around not only this shared vision but also how we are going to work together to make it happen. We must find common cause and move from a decade of deadlock to a decade of decisions.

We do not pretend that we have all the answers. But we are playing a leading role in efforts to build international agreement on constructive ways forward. And we will of course be ready to work closely with the new US Administration as it comes to grip with these critical issues.

These are issues which do not just concern Foreign or Defence policy. They are about the security of our world both now and in the next generation and deserve wider engagement. I therefore asked for the issues to be set out in a way that does not expect the reader to know the subject inside out. I hope that this document will help to inform, to explain and to promote a broader and deeper understanding of an issue of vital importance to the citizens of all countries.

The path to eliminating all nuclear weapons. To achieve this will require bold thinking and careful work by many nations. The UK is wholeheartedly committed to playing its part in this process. We, our parents, and grandparents have lived under the shadow of nuclear annihilation. We want to forge a global effort to reduce and ultimately to eliminate that threat to our children's and future generations' peace and security.

David Miliband
Secretary of State for Foreign and Commonwealth Affairs

1INTRODUCTION

"I pledge that in the run-up to the Non Proliferation Treaty in 2010 we will be at the forefront of the international campaign to accelerate disarmament amongst possessor states, to prevent proliferation to new states, and to ultimately achieve a world that is free from nuclear weapons."

Prime Minister,
Gordon Brown

Nuclear weapons remain potentially the most destructive threat to global security. Efforts to abolish them began almost as soon as they were invented in the 1940s, but ran up against the fundamental problem that most governments do not possess nuclear weapons for their own sake but for the security which they can provide. As the Cold War set in, nuclear weapons on both sides were seen as having a crucial role in keeping the peace. The dream of banning them had to be put on ice for the next forty years.

With the fall of the Berlin Wall in 1989, the threat of conflict between the major powers dwindled and with it, many thought, the rationale for nuclear weapons. There was hope of a new world order which would no longer rely on the threat of mutual annihilation as a basis for maintaining the peace. There has been substantial progress: the total explosive power of nuclear arsenal in the UK has been cut by around 75%, US, France and Russia have made similar reductions and efforts to prevent nuclear weapons spreading have been strengthened and new international rules to constrain them have been negotiated.

But the rationale for nuclear weapons, though it has evolved in the warmed relations between the major powers, has not evaporated. The essential basis for the retention of nuclear weapons remains their continuing value in deterring war as well as new threats to national security which may emerge in the future. (Including states which come under a 'nuclear umbrella', such as NATO allies, well over half of the world's population is covered by a nuclear deterrent. The impression that only a small minority benefit from nuclear weapons is misleading.)

Foremost amongst the new security threats are the risks of nuclear weapons spreading to more states or falling into the hands of terrorists. North Korea tested a nuclear device in 2006 and there are serious concerns that Iran is also developing nuclear weapons in defiance of the international community. Terrorist groups are known to be trying to acquire nuclear materials and knowhow. At the same time, these may become more widely available with the worldwide expansion of nuclear energy in response to climate change.

The response to these serious new threats must include tougher measures to prevent

▶ Nuclear bomb atmospheric test explosion

the spread of nuclear weapons. But there is an argument over whether the response should also include nuclear disarmament. Some believe that this would do nothing to help but, on the contrary, would leave states which currently benefit from nuclear deterrence open to coercion or attack if they gave up their nuclear weapons at the same time as others may be acquiring them.

But many argue that, as the threats to global security have changed, the balance of risks has shifted, making the continuing possession of nuclear weapons more a part of the problem than it is of the solution. They give five main reasons:

a) they point to serious concerns that the international co-operation essential to impose tougher controls to prevent nuclear proliferation may be dangerously undermined by the perceived lack of progress towards nuclear disarmament. This frustration risks weakening the readiness of some states to shoulder the increased constraints and costs of tighter controls on their peaceful nuclear activities;

b) they argue that in a world without a global ban on nuclear weapons, measures to stop them spreading can only go so far. However securely held, for as long as they exist, the weapons themselves and their related materials remain at risk of theft or diversion. Global agreements to place increasing controls on nuclear weapon-related activities and materials, and ultimately a global ban on all nuclear weapons themselves, would make proliferation increasingly difficult;

c) they contend that the security benefits of nuclear weapons are less than they were and that the preeminent security threat today is not conflict between the major powers but a terrorist attack, against which a nuclear deterrent is ineffective (except in the case of a state sponsoring nuclear terrorism);

d) they claim that as long as some states continue to attach importance to nuclear weapons in the interests of their national security, there will be a risk of other governments seeking to acquire nuclear weapons for the same reason;

e) finally it is argued that, despite all efforts to minimise the risks of nuclear weapons being used, whether deliberately or by accident, these risks cannot be eliminated altogether for as long as nuclear weapons exist.

Against this background, the Prime Minister, Gordon Brown, has given a lead, issuing a call to accelerate disarmament to prevent proliferation to new states and to ultimately achieve a world that is free from nuclear weapons. President Obama has stated that "America seeks a world with no nuclear weapons." Other world leaders and distinguished figures across the political spectrum have expressed strong support for the vision of a safer world free of nuclear weapons.

Some suggest that the UK should give a lead by destroying all our own nuclear weapons. But our serious commitment to global nuclear disarmament should not be confused with unilateral disarmament. In our recent White Paper ('The Future of the United Kingdom's

Nuclear Deterrent', December 2006), we explained in detail why in the current security environment it was necessary to maintain our nuclear deterrent. Furthermore, if the UK were to dismantle all our nuclear weapons, it is highly unlikely that others would do the same. Nor do we believe it would have any positive effect on current proliferators like Iran.

▲ Hiroshima

Most agree that, to succeed, a ban on nuclear weapons has to be global. Some suggest that this should be negotiated immediately and agreed within a tight deadline. However, this would put the focus in the wrong place. Securing agreement to a global ban will involve persuading those who are covered by a nuclear deterrent that it is in their security interests to give it up. For example, some states rely on nuclear weapons to counter-balance the superior conventional forces of others. They are not going to agree to give them up unless the perceived threat to their security is either eliminated or addressed in some other way. We need to create the political, military, legal, institutional, technical and other conditions which will give such states confidence that their security will on balance be greater if they agree to a global ban on nuclear weapons.

Establishing these conditions cannot be done unilaterally or in a single leap, but requires a series of incremental, mutually-reinforcing steps. Building this framework requires the active participation of the entire international community. Rallying their many disparate interests presents a massive diplomatic challenge but it is one in which the UK is already playing a leading role.

This booklet aims to explain the main issues and what the UK is doing to address them, focussing on three main sets of conditions which need to be put in place:

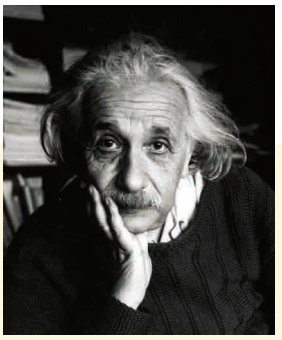
a) establishing a watertight regime to prevent nuclear weapons from spreading to more states or to terrorists, at the same time as exploiting the peaceful benefits of nuclear energy - chapters 3 and 4;

b) reducing arsenals and constructing an international legal framework which progressively tightens the constraints on nuclear weapons - chapters 5 and 6;

c) addressing the technical, political and institutional challenges of moving from small numbers of nuclear weapons to none at all in a way which will enhance rather than destabilise national and international security - chapters 7 and 8.

2 BACKGROUND

"If only I had known, I should have become a watchmaker."



Albert Einstein

This chapter gives some brief facts about the science behind nuclear weapons, the history of efforts to control them and where this effort now stands.

The core of a nuclear bomb is made of material which is capable of exploding in a process known as nuclear fission. The two main types of such 'fissile material' are high enriched uranium and plutonium.

High enriched uranium is produced by mining uranium ore, processing and then enriching it to high levels. The resulting high enriched uranium can then be turned into metal form and machined into components for a weapon.

Plutonium is produced by mining uranium ore, processing and fabricating it into fuel elements and then putting them into a reactor. The process which generates heat in the reactor at the same time creates plutonium in the fuel elements. Once the fuel elements have been removed from the reactor, they can then be reprocessed to separate out the plutonium. This plutonium can then be converted into metal form and machined into the components for a weapon.

The key step in producing high enriched uranium is therefore enrichment, and the key step in producing plutonium is reprocessing. On the face of it, banning enrichment and reprocessing would therefore be the obvious way to prevent the production of these materials for nuclear weapons. But the difficulty is that both enrichment and reprocessing also have peaceful uses, particularly in the process of generating electricity. High enriched uranium is also used to power some submarines, aircraft carriers and icebreakers, and for the manufacture of some radioactive substances used in, for example, cancer diagnosis and treatment.

Although some nuclear power reactors run on natural uranium fuel (which has not been enriched), most use low enriched uranium fuel. But a state which masters the technology to produce low enriched uranium for this entirely peaceful purpose has also mastered the technology it would need to produce high enriched uranium for a weapon, should it wish to do so.

A similar problem arises with reprocessing. Once power reactor fuel has been used up, it is removed from the reactor. Something then

has to be done with it. One option is to store it indefinitely but this means the energy potential in the remaining uranium and in the newly-generated plutonium will go unrealised. If that uranium and plutonium can be separated out from the used fuel by reprocessing, then those materials can be recycled to provide more fuel for power reactors. But, again, a state which masters reprocessing technology for this purely peaceful purpose has also mastered the technology it would need to produce plutonium for a weapon, should it wish to do so.

Since the beginning of the nuclear age, the international community has wrestled with the challenge of how to benefit from the peaceful use of nuclear energy without this leading of the proliferation of nuclear weapons.

History

In the immediate aftermath of the Second World War, the United States came up with an ambitious proposal to address this dilemma. It suggested that most nuclear energy activities should be put under the control of an International Atomic Development Authority for purely peaceful purposes, and it indicated that if this was agreed it would then eliminate its own (then few) nuclear weapons.

This proposal fell foul of the onset of the Cold War. But it was still felt there was a need to find some way in which other states could benefit from the peaceful uses of nuclear energy without this leading to their acquisition of nuclear weapons. This led to an approach under which states that exported relevant materials and equipment only did so if the importing states accepted what were called "safeguards" - a set of arrangements to check that the importing states were not misusing for military purposes the material and equipment supplied.

The International Atomic Energy Agency (IAEA)

In due course these safeguards came to be administered by the IAEA. This was set up in 1957, in Vienna. It has three main responsibilities. It acts as the world's nuclear inspectorate, to verify that safeguarded nuclear material and activities are not used for nuclear weapon purposes. It helps countries to upgrade their nuclear safety and security. And it helps countries exploit peaceful applications of nuclear science and technology.

The Cornerstone: The Nuclear Non-Proliferation Treaty (NPT)

A major problem with the early safeguards arrangements, however, was that recipient states were not required to have safeguards on any nuclear materials or equipment which they developed indigenously. So they still had the option of being able to use those for weapons purposes. By the mid-1960s the Soviet Union, the United Kingdom, France and China, as well as the United States, had all tested nuclear weapons. These factors led to increased concern that there could soon be many more states with nuclear weapons.

This concern ultimately led to the negotiation of the NPT. This crucial treaty recognised the five states which had already tested nuclear weapons as 'Nuclear Weapon States' and invited

all other states to forswear nuclear weapons by becoming 'Non-Nuclear Weapon State' parties to the Treaty and accepting an obligation to have IAEA safeguards on all their nuclear material.

In return it was recognised that Non-Nuclear Weapon States should be able to pursue the peaceful uses of nuclear energy and that all parties to the Treaty would "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

The NPT entered into force in 1970. Since then there have, broadly speaking, been three separate streams of work flowing from it – one concerned with controlling and limiting the nuclear weapons that already exist, a second with strengthening efforts to prevent the further spread or proliferation of nuclear weapons and a third with developing the peaceful uses of nuclear energy.

Nuclear Disarmament

These efforts have taken the form of work by the United States and the Soviet Union/Russia to control and then limit their nuclear weapons; significant unilateral reductions by the UK and France; and discussions and technical work on further steps. Also under this heading come the various strands of work towards multilateral agreements such as the Comprehensive Nuclear Test Ban Treaty (which was agreed in 1996 but has yet to enter into force because it has not yet been endorsed by a number of states).

Preventing Proliferation

Almost all States have now joined the NPT as Non-Nuclear Weapon States and accepted the safeguards of the IAEA on all their nuclear material. A number of states such as South Africa, Libya, Ukraine, Kazakhstan, Belarus, Argentina and Brazil have given up active nuclear weapons programmes, turned back from pursuing them or (as in the case of the former Soviet countries) chosen to hand over weapons on their territory.

One of the most effective ways of persuading a state that it does not need to acquire nuclear weapons has been to ensure that it does not face threats which it feels could only be deterred by possession of its own nuclear weapons. A key means of doing so is termed 'extended deterrence.' This involves the extension of nuclear deterrence to some Non-Nuclear Weapons States such as South Korea, Japan, Australia and NATO allies.

Three states have not joined the NPT: India, Israel and Pakistan. They are known, or in the case of Israel widely assumed, to have developed nuclear weapons of their own.

In addition, some states which did join the NPT subsequently tried to cheat on their obligations (e.g. Iraq, Libya, and North Korea) or are strongly suspected of doing so (Iran)– though only North Korea has got as far as conducting a nuclear explosion and is believed to have enough fissile material for a small number of nuclear weapons. And there are now new concerns about 'non-state actors' such as terrorist groups.

Peaceful Purposes

The use of nuclear energy for peaceful purposes has followed a rather uneven course. The initial burst of enthusiasm for it in the 1950s lasted for a couple of decades and as a result a significant number of states acquired nuclear facilities of one sort or another. But interest in nuclear power waned after the accidents at Three Mile Island in the US in 1979 and Chernobyl in the

UK Fulfilment of Our Commitments under the NPT

Nuclear Disarmament

We continue to work towards the total elimination of our own nuclear arsenal and all others through multilateral, mutual and verifiable agreements. We have made clear that when it will be useful to include in any negotiations the small proportion of the world's nuclear weapons that belong to the UK, we will willingly do so. We have:

- significantly reduced the operational status of our nuclear weapons system;
- met the commitment outlined in the 2006 White Paper on the future of the United Kingdom nuclear deterrent to reduce the number of operationally available warheads to fewer than 160. The explosive power of our nuclear arsenal has been reduced by 75% since the end of the Cold War;
- ratified the Comprehensive Test Ban Treaty and maintained our voluntary moratorium on nuclear test explosions;
- played a leading role in diplomatic efforts to start negotiations without preconditions on a Fissile Material Cut-Off Treaty whilst maintaining our moratorium on the production of such material for nuclear weapons or other nuclear explosive devices;
- pursued a widely-welcomed programme to develop UK expertise in methods and technologies that could be used to verify nuclear disarmament.

Preventing Proliferation

We are pursuing a comprehensive national and multilateral strategy to strengthen the obligations on states to tighten export controls, combat supply chains and prevent old or unsecured materials from falling into the wrong hands. In particular:

- we are at the forefront of the international community's efforts to resolve the problems posed by Iran's nuclear activities. And we are fully supportive of the Six Party Talks process addressing North Korea's nuclear activities;

Ukraine in 1986. However, with previous safety fears receding and concerns about climate change and energy security mounting, there is now a widely held belief that nuclear power will experience something of a renaissance in the decades to come.

- we support the IAEA's efforts to improve safeguards and verification and have sought to persuade all states to agree Additional Protocols with the IAEA to allow for more rigorous and effective inspections;

- we support and are closely engaged in many other international efforts that broaden and strengthen the wider non-proliferation regime;

- we continue to press all three states which remain outside the NPT (India, Israel and Pakistan) to join it as Non-Nuclear Weapon States and in the meantime we are working to bring them closer to conformity with its rules;

- nationally, all civil nuclear material in UK facilities is subject to Euratom safeguards and to the terms of our voluntary offer safeguards agreement. Under the terms of that offer, the IAEA is free to designate any facility containing such material for inspection.

Peaceful Uses of Nuclear Energy

We strongly support states' rights under the NPT to the safe, secure and peaceful use of nuclear energy. We are working to create a viable regime of nuclear fuel assurances under IAEA auspices to guarantee supply of nuclear fuel to reinforce that right. We will host a conference in London in March 2009 called by the Prime Minister to further co-operation on these issues and build common ground. We are continuing to develop our proposal for 'Nuclear Fuel Assurances'. And we intend to develop nuclear cooperation agreements and Memoranda of Understanding with states that commit to the responsible development of civilian nuclear programmes and have already signed such understandings with the UAE and Jordan.

The Present Position

To sum-up, the present position is that:

- Most states do not have nuclear weapons, are parties to the NPT as Non-Nuclear Weapon States and have IAEA safeguards on all their nuclear material;

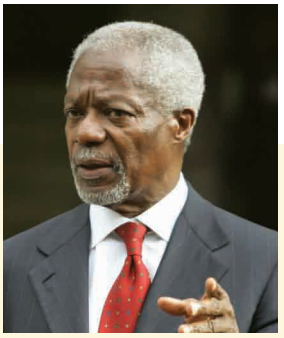
- There are five recognised Nuclear Weapon States (US, Russia, UK, France and China), three states which have not joined the NPT and are known or assumed to have nuclear weapons (India, Israel and Pakistan) and one other state that has conducted a nuclear test (North Korea). There are strong concerns that Iran is working to develop nuclear weapons;

- Many states have nuclear power reactors and quite a few also have fuel cycle facilities including in some cases enrichment and reprocessing facilities. The anticipated renaissance of nuclear power could in due course lead to pressures for the wider spread of enrichment and reprocessing plants that could give their owners the capacity to produce fissile material for weapons if they wished to do so.

Against this background, the next two chapters look at the challenges of preventing nuclear weapons from spreading while at the same time promoting the peaceful use of nuclear energy.

3 PREVENTING THE SPREAD OF NUCLEAR WEAPONS

"The debate between those who insist on disarmament before further non-proliferation measures, and those who argue the opposite, is self-defeating. It should be self-evident that both are essential for security."



Former UN Secretary General Kofi Annan

Preventing nuclear weapons from spreading is crucial both for current security and for making progress towards abolishing nuclear weapons. There are three main issues:

- stopping proliferators,
- tightening controls and
- strengthening the international commitment to prevent proliferation.

This chapter looks at what is being done and what more might be done in each of these three areas.

i) Stopping proliferation: Iran, North Korea and Syria

For nuclear disarmament to make serious progress, the international community needs to demonstrate that it is ready to take tough measures against any state which breaches its international legal obligations. How it responds to Iran and North Korea now represents a crucial test case for its willingness and ability to address future challenges. If Iran continues to defy the rules with impunity, it will severely undermine confidence that an agreement to enforce a nuclear weapons free world could be enforced. And the actions of both Iran and North Korea raise the spectre of provoking the proliferation of nuclear weapons by other states in their regions.

Iran

The international community – through five UN Security Council Resolutions - requires Iran to suspend all enrichment-related and reprocessing activities and all heavy water-related projects because it is not clear that these are being carried out for purely peaceful purposes. Iran has hidden aspects of its nuclear programme for two decades and continues to enrich uranium despite the lack of any

convincing civilian use. Successive IAEA reports have made clear that Iran refuses to answer key questions concerning a possible military dimension to its nuclear programme.

The UK, France, Germany, the US, Russia and China (the 'E3+3') are pursuing a strategy which offers a clear choice to the leaders of Iran. Further defiance of the international community can only lead to increasing confrontation and economic and political isolation. But if Iran engages with the international community and takes up the generous assistance which is on offer, Iran will have access to all it needs to develop a modern civil nuclear power industry and a transformed relationship with the international community. Exhaustive diplomatic efforts are being pursued to mobilise international support behind this strategy.

North Korea

In 2006, North Korea conducted a nuclear test. This directly contravened its obligations under the NPT. It is believed to have enough fissile material for a small number of nuclear weapons. It has developed short and medium range ballistic missiles and is working on long-range intercontinental ballistic missiles which could reach both the United States and Europe.

This threat is being addressed through the 'Six Party Talks' (US, Japan, China, South Korea, Russia, and North Korea). Progress has been made, with North Korea agreeing to disable its nuclear reactor and its reprocessing and fuel fabrication facilities and to make a declaration of its nuclear programmes. In return, among other incentives, the US has removed North Korea from its Trading with the Enemy Act and its State Sponsors of Terrorism List.
But the US has made clear that, should satisfactory progress not be made, sanctions can be re-imposed and the incentives withdrawn. The next step must be for North Korea to dismantle its nuclear facilities and give up its plutonium stockpile, ensure that its weapons programme is comprehensively closed down and cannot be restarted and cease any proliferation-related exports.

Syria

The IAEA is investigating reports of a clandestine Syrian attempt to build a nuclear reactor with North Korean help. (The Israeli Air Force destroyed the reactor in September 2007). In his first report, the IAEA Director General made clear that Syria had not fully co-operated with the IAEA's investigation, denying the inspectors access to a number of additional locations. It is vital that Syria answers the IAEA's questions and co-operates with them in a timely and comprehensive way to reassure the international community about its intentions.

ii) **Tightening Controls**

There need to be the toughest possible measures to prevent nuclear materials or know how falling into the wrong hands, whether governments or terrorists. A wide range of activity is being pursued urgently to this end. Most importantly strengthening the IAEA and safeguards; tightening nuclear security; drawing in the non-NPT states; and UN consultations.

Strengthening the IAEA and Safeguards

Institutional Strengthening

The IAEA faces a growing workload as nuclear power generation expands around the world, which also draws heavily on the limited numbers of qualified personnel available to work for the IAEA. A recent review by the Director-General has made wide-ranging recommendations to improve the IAEA's effectiveness such as developing safeguard technologies (e.g. remote cameras) and improving the recruitment, training and retention of high-quality personnel, particularly inspectors.

▼ IAEA building, Vienna

Additional Protocol

The NPT requires all Non-Nuclear Weapon States to have agreements with the IAEA to place their nuclear material under comprehensive safeguards to check that they are not diverted for nuclear weapon purposes. But in the 1990s it was discovered that Iraq had been able to conduct clandestine nuclear activities despite having such safeguards in place. As a result, the IAEA made improvements to the system, involving the provision by states to the Agency of additional information and greater access. Implementing this involves each state making a new agreement with the IAEA based on a model 'Additional Protocol'. While most of the larger member states have now made such agreements, there are still over 60 member states which have not.

Export Controls

The Nuclear Suppliers Group brings together countries which export nuclear and nuclear-related items to ensure that their exports do not contribute to proliferation. The participating governments need to have domestic legislation requiring exporters to seek licences, administrative arrangements for considering licence applications, and proper means of enforcing decisions to deny an application. The Group is considering proposals to make a state's adoption of the IAEA Additional Protocol a condition for agreement to supply it with sensitive nuclear items. It also aims to consider similar proposals for the same condition of supply for all nuclear-related items.

Weaponisation

Ensuring that peaceful nuclear programmes are not diverted into nuclear weapons programmes has been a key concern since the 1940s. But the IAEA's ability to verify that military research is not connected to nuclear weapons is very limited. The Director-General's Review, mentioned above, includes a recommendation for an 'Additional Protocol Plus' which would confirm the IAEA's right and obligation to access sites and information related to nuclear material production technologies and to nuclear weaponisation activities as well as its right to private interviews with individuals who may know about such activities.

Non-Compliance

It has been suggested that the IAEA should automatically have greater access in states found to be not to be complying with their obligations. For example, it may be impossible to prove that a suspected clandestine facility exists unless the IAEA can inspect suspect sites. This too is controversial but would provide greater confidence today that proliferators would be detected and, in due course, that a ban on nuclear weapons would be effective.

Other Proposals to Strengthen Safeguards

Among other proposals for strengthening safeguards are: widening the range of materials covered; increasing the frequency of inspections so that diversions would be detected more rapidly; and lowering thresholds to ensure the detection of the diversion of smaller quantities of material. Such steps would be expensive but might eventually be needed to provide the confidence necessary to enable a worldwide ban on nuclear weapons.

Nuclear Security Initiatives

A wide range of other initiatives are under way to help tighten the security of nuclear (and in some cases, chemical and biological) materials and know-how to prevent them from falling into the wrong hands. These include:

- IAEA Nuclear Security Plan: setting standards for and promoting the physical protection of nuclear materials e.g. guidance documents, training, advice, help setting up Nuclear Security Support Centres and Plans.

- G8 Global Partnership: a massive assistance programme (the UK has committed up to $750 million for 2002 – 2012) focused initially on the legacy of weapons of mass destruction in the Former Soviet Union. A key element is to improve the security of nuclear materials and technology.

- Proliferation Security Initiative: to advance international cooperation to stop shipments of weapons of mass destruction and related items flowing to state and non-state actors of proliferation concern. States involved participate in exercises to develop their capabilities.

- UN Security Council Resolution 1540: obliges all UN member states to pass and enforce legislation to prevent weapons of mass destruction and related delivery systems falling into the hands of terrorists, criminals and proliferation networks. Collective political pressure and practical support is needed to ensure it is fully implemented.

- Global Initiative to Combat Nuclear Terrorism: launched by President Bush and President Putin to expand and accelerate the development of global capacity to combat the threat of nuclear terrorism. This includes building the capacity of the now 75 partner nations to detect and prevent the illicit trafficking of nuclear and other radioactive materials and to respond to terrorist attacks.

- International Conventions on the Physical Protection of Nuclear Material, the International Convention on the Suppression of Acts of Nuclear Terrorism and the Code of Conduct on the Safety and Security of Radioactive Sources: contribute to improving the security of nuclear material and preventing nuclear terrorism.

- Proliferation Finance: the Financial Action Task Force, an inter-governmental group set up in 1989 to combat money laundering and terrorist financing, is also working on how to disrupt the financing of proliferation activities. This is likely to involve developing national and international capacity to isolate nuclear proliferators from the international financial system, and to require assisting other states, where necessary, with the adoption and implementation of tighter controls.

Engaging Non-NPT States

One other element in the effort to tighten controls is to encourage those states which have not joined the NPT - India, Israel and Pakistan - to act as though they were bound by all the features of the non-proliferation regime, to enforce their laws barring sensitive exports and to secure all their nuclear materials to the highest standards.

In particular, the US/India Civil Nuclear Co-operation Initiative will enable India to import nuclear items for its civil nuclear programme in return for agreeing to put designated civil nuclear facilities and material under IAEA safeguards, working towards an Additional Protocol, harmonising its export controls with those of the Nuclear Suppliers Group, continuing its moratorium on nuclear testing and supporting efforts for the conclusion of a Fissile Material Cut-Off Treaty (discussed in Chapter 6). Work with Pakistan is in hand to improve nuclear security and to encourage their active involvement as a partner in the Global Initiative to Combat Nuclear Terrorism.

Increased Consultations within the UN

Consultations on proliferation issues among the five Permanent Members of the UN Security Council (the same as the five Nuclear Weapon States: China, Russia, France, the US and the UK) already help build common understandings and pave the way to greater unity at times of crisis. Despite the challenges of pressure of other work and differences of approach, it has been suggested that these should become more regular and include looking ahead to anticipate and as far as possible to head off emerging proliferation threats. It has also been suggested that they might go further and consider possible, more effective sanctions/ tools and an 'omnibus' UN Security Council Resolution on Non-Proliferation to formalise steps and reaffirm basic principles.

iii) Strengthening International Commitment to Preventing Proliferation

To be effective in preventing proliferation, the international community must be united and resolute. But many of the Non-Nuclear Weapon States feel, rightly or wrongly, that the Nuclear Weapon States are not delivering on their side of the NPT 'grand bargain.' They want faster progress towards nuclear disarmament. Some worry that without this, the NPT consensus will erode and not only will it become increasingly difficult to agree on tighter measures to counter proliferation, support for existing measures will also erode.

Others argue that this would be perverse. Preventing the spread of nuclear weapons is in the national interests of the Non-Nuclear Weapon States at least as much as it is in the interests of the Nuclear Weapon States. They point to the importance of preventing proliferation if we are to create the conditions where nuclear disarmament can proceed.

Others (like Kofi Annan above) suggest a middle road: that disarmament and non-proliferation need to go forward together, mutually reinforcing each other as two sides of the same coin. They argue that unless all sides can reach a common understanding of disarmament requirements, progress on both non-proliferation and disarmament will be undermined. Progress on disarmament is unlikely to have a direct impact on the nuclear ambitions of determined proliferators. But the unqualified support of the international community is essential to ensure zero tolerance for proliferation. Proliferators must be denied the opportunity to deflect responsibility for their actions by claiming that the Nuclear Weapon States do not take their disarmament obligations seriously.

An understanding along these lines was reached at the 2000 NPT Review Conference which resulted in agreement on '13 Practical Steps' on nuclear disarmament. Some contend that there has been too little progress on these steps. But others suggest that a number of the steps have been overtaken and a fresh approach is needed. Some also suggest that the various sides in these arguments have become too entrenched in their positions and to break out of the stalemate requires raising the issue among Heads of Government. They believe that a high-level agreement between all sides might be possible, particularly if the Nuclear Weapon States significantly stepped up their disarmament efforts to show good faith and made clear that they were ready to go further but needed parallel progress on non-proliferation to be able to do so.

A major diplomatic effort is underway to prepare for the next NPT Review Conference of in 2010,(held every 5 years) to re-energise the international consensus on nuclear non-proliferation.

One key initiative concerns the right of any state to withdraw from the NPT. Under the current rules, states could acquire the technology which brings them to the brink of being able to make a nuclear weapon without violating the Treaty. They could then leave the Treaty without any penalty. The EU has proposed that if any state gives notice that it is withdrawing, this

should be immediately considered by the UN Security Council and there should be a special IAEA inspection of the notifying state. Any state which goes ahead and withdraws from the NPT should still be held liable if it violated the Treaty before it left and all the nuclear-related items it acquired while it was a member of the Treaty should remain subject to safeguards or be dismantled or returned to the supplier.

UK Approach

Stopping Proliferators

- We have strongly supported the work of the IAEA on Iran's nuclear activities. We have played a key role as a member of the 'E3+3', in developing the current international strategy. We are also looking at additional national measures (e.g. further restricting Iran's access to finance) to increase the pressure on Iran.

- we are not involved in the Six Party Talks dealing with North Korea's nuclear activities but we strongly support the process, including through the United Nations Security Council and the work of the IAEA. We have given similar support to the IAEA in investigating concerns about recent nuclear activities by Syria.

Tightening Controls

- we strongly support the IAEA and are determined to ensure that it remains effective. We have played a significant part in the efforts to strengthen the safeguards system and press every member state to have an Additional Protocol as the top priority. We also remain open to other ways in which the safeguards system can be strengthened. The UK, in most cases working with EU partners, has also been very active in supporting efforts to improve the security of nuclear materials and technology for example by:

- being a major voluntary donor towards the IAEA's Nuclear Security Plan, chairing work to revise the standards and helping to improve the management of the assistance programmes;

- spending some £200 million to date on implementing projects primarily to improve the security of nuclear materials and technology in the former Soviet Union;

- under the Proliferation Security Initiative, working to build capacity among the states involved and encouraging others to participate;

UK Approach *continued*

- helping states to draw up and implement the legislation required by UN Security Council Resolution 1540;

- negotiating an important amendment to the Convention on the Physical Protection of Nuclear Material and developing the Code of Conduct on Radioactive Sources and the related Supplementary Guidance;

- introducing screening arrangements for relevant materials at ports of entry and by developing a world-class forensic capability at the Atomic Weapons Establishment that would help us to attribute any attack to its perpetrators;

- checking the backgrounds of foreign graduate students applying to study proliferation-relevant subjects in the UK.

Strengthening International Commitment

- The UK is focussing diplomatic effort on achieving a successful 2010 NPT Review Conference, with higher levels of representation from States Parties and increased understanding of the concerns of both sides. We think it needs to be clearly and widely agreed that all states must abide by their legally-binding obligations. There need to be meaningful incentives for those which do so, complemented by robust and swift costs imposed on those which do not. We welcome the important work in this respect of the International Commission on Nuclear Non-Proliferation and Disarmament, co-chaired by former Australian and Japanese Foreign Ministers, Gareth Evans and Yoriko Kawaguchi, and the appointment of Baroness Williams (the Non-Proliferation Adviser to the Prime-Minister) as the UK Commissioner.

The next chapter goes on to look at how to sustain efforts to prevent nuclear weapons from spreading while at the same time managing an expected renaissance in the peaceful use of nuclear energy.

4 MANAGING THE GROWTH IN NUCLEAR POWER

"If the world as a whole chose nuclear power as the option of choice to replace coal - fired generating plants, we would face a dramatic increase in the likelihood of nuclear weapons proliferation."

Former Vice-President
Al Gore

To respond to the threats of climate change and growing pressure on oil reserves, governments are looking to increase the amount of energy they obtain from clean, green, secure and sustainable sources. (Without our existing nuclear power stations - which represent about 3.5% of total UK energy use - UK carbon dioxide emissions would be 5-12% higher than they are today if gas or coal power stations had been built instead). Nuclear power is seen by a number of countries, including the UK, as a potentially important source to meet increasing energy demands. It is predicted by the IAEA that 1,400 new nuclear power reactors may be built by 2050 (currently there are some 370 active nuclear reactors worldwide).

Such forecasts are of course subject to considerable uncertainty. A sustained fall in the prices of other energy sources and economic recession could decrease the demand for nuclear power. Governments might opt to make greater use of renewable energy sources, of clean coal technology or of energy conservation techniques. But most current indicators point to substantial growth in nuclear power and the need to prepare for that now.

Governments investing in new nuclear power reactors rightly want to ensure that they will be safe, secure and have a guaranteed supply of fuel and the services associated with it (e.g. enrichment to make new fuel and reprocessing of spent fuel). Normally, the world market will work to deliver enrichment and reprocessing services reliably at market prices. But if governments do not have full confidence in obtaining these services on the open market they may decide, particularly as their reliance on nuclear energy increases, to guarantee the availability of those services by constructing their own enrichment or reprocessing facilities despite the costs and risks involved.

Considerable thought is being given to how to promote the significant expansion of nuclear energy as an important part of the global response to climate change in ways which are safe, secure and minimise the risks of nuclear weapons proliferation. A number of ideas – many of them complementary - have been put forward. The following summarises the five main categories.

i) **Export Controls**

One approach is to increase controls over transfers of enrichment and reprocessing facilities, equipment and technology. As noted above, the countries which are members of the Nuclear Suppliers Group already co-operate closely to ensure that their exports do not contribute to proliferation. Their existing arrangements already cover transfers of enrichment and reprocessing facilities, equipment and technology as 'sensitive exports'. But, given that these are the most sensitive parts of the nuclear fuel cycle, it may be appropriate to adopt additional controls over such transfers. This is under active consideration in the Nuclear Suppliers Group.

ii) **Multilateral Nuclear Fuel Assurances**

This approach focuses on the need to give a state confidence that its imports of nuclear fuel will not be withheld for non-commercial reasons. One of the main proposals is to set up a 'Fuel Bank'. This would hold stockpiles of nuclear fuel under IAEA control which could be drawn down by a state if the commercial market failed to deliver for other than commercial or non-proliferation reasons. Issues to be clarified include the costs, how to cope with demands for fuel for any type of reactor, it's location and responsibility for it's security. The EU is planning to contribute €25m to this project, once the conditions and modalities for the bank have been approved by the Board of Governors of the IAEA.

A complementary UK proposal is for a 'Nuclear Fuel Assurance'. This would rely on the commercial market to continue to provide nuclear fuel services but would back this with a 'bond' between the supplier and the customer state, overseen by the IAEA. This 'bond' would guarantee the supply of fuel services if the customer state had its normal commercial supplies withheld for other than non-proliferation reasons. The customer would still be expected to pay the commercial going rate for its fuel under this arrangement.

Another proposal would go a step further and establish multinational fuel-cycle facilities which would be built and run by the IAEA on international territory which would be ceded to it. In this way, the fuel-cycle facilities would be placed fully under international control. Issues to be clarified include where it would be sited, who would operate it and the impact on the commercial market.

iii) **Global Nuclear Energy Programme**

This initiative is working to develop new technologies to provide proliferation-resistant nuclear power (for example, reprocessing spent fuel without separating out plutonium) and sharing best practice with states new to nuclear power.

iv) **Nuclear Security**

While the fuel cycle is the main proliferation issue associated with an international expansion of nuclear energy, nuclear reactors and their fuel present a potential terrorist target and it is important they have effective security. The Convention on Physical Protection of Nuclear Material is the key international legally binding undertaking in the area of physical protection of civil nuclear material.

◀ Sellafield
Reprocessing facility

It establishes measures relating to nuclear material during international transport and provides for mutual cooperation against a range of offenses relating to nuclear material. There are 138 States which are party to the convention. An amendment to strengthen the Convention was agreed in 2005 which needs to be ratified and brought into effect by signatory states.

v) Banning High Enrichment and Reprocessing

The most radical proposal is that all high enrichment and all reprocessing should be stopped. Proponents of this approach argue that all high enriched uranium and plutonium pose unacceptable proliferation risks and alternatives can be found for their few, limited purposes. Verification of a nuclear weapons ban would be simplified and more robust if all production of high enriched uranium and plutonium was also banned and all stocks were eliminated.

The main uses of high enriched uranium besides nuclear weapons are for civil research reactors, submarines, aircraft carriers, icebreakers, satellites and medical/industrial isotope production. But all these could in theory be converted –with some compromises in performance and increased costs – to run on low enriched uranium, which cannot be used in weapons. Existing reserves of high enriched uranium might be sufficient for naval use until their reactors are converted or they go out of service and are replaced with reactors running on low enriched uranium. But ending the production of high enriched uranium would not address the potential spread of enrichment facilities to meet the demand for low enriched uranium as fuel for nuclear power reactors.

Several countries (e.g. France, UK, Japan, Russia and India) have invested heavily in reprocessing technology both as a means of recycling nuclear fuel and for spent fuel management. If all reprocessing were to be banned, they

would need to be persuaded to accept the considerable costs involved. In addition, plutonium has valuable energy potential which the world may wish to tap in the future.

A verification system for such a regime could form the foundation of the comprehensive system which would ultimately be needed to verify a ban of all nuclear weapons. Begun on a voluntary basis, it would eventually need to cover all countries, whether or not they were parties to the NPT and whether or not they had nuclear facilities. Its implementation could start to build confidence that a ban on nuclear weapons can be achieved and would be verifiable.

Moving Forward

The key challenge is to work with Non-Nuclear Weapon States to agree on ways forward. Sceptics need to be convinced that these proposals are in fact intended as affirming their rights to the peaceful exploitation of nuclear technology rather than undermining them, and helping them to develop civil nuclear energy in a safe, secure and cost effective way. To make an agreement attractive, it needs to reflect the concerns of customers.

The UAE has taken a commendable step in this direction by setting out in a white paper its vision for deploying civil nuclear power in a way which addresses safety, security and proliferation concerns through the effective implementation of international standards and a clear policy on fuel management.

The UK and other countries with well-developed civil nuclear industries have much to offer states, like the UAE, through advice, training and support. These are formalised in Memoranda of Understanding and Nuclear Cooperation Agreements, the latter placing formal legally-binding commitments on both parties.

UK Approach

The UK co-sponsored a conference in Berlin in April 2008 bringing together supplier and customer states for the first time. We aim to continue the dialogue at a conference in London in March 2009 called by the Prime Minister to further co-operation on these issues and build common ground. We are continuing to develop our proposal for 'Nuclear Fuel Assurances'. And we intend to develop Nuclear Cooperation Agreements and Memoranda of Understanding with states that commit to the responsible development of civilian nuclear programmes and have already signed such understandings with the UAE and Jordan.

The next two chapters look at the second set of building blocks towards a world free of nuclear weapons: reducing current arsenals and constructing a robust international legal framework which progressively tightens the constraints on nuclear weapons.

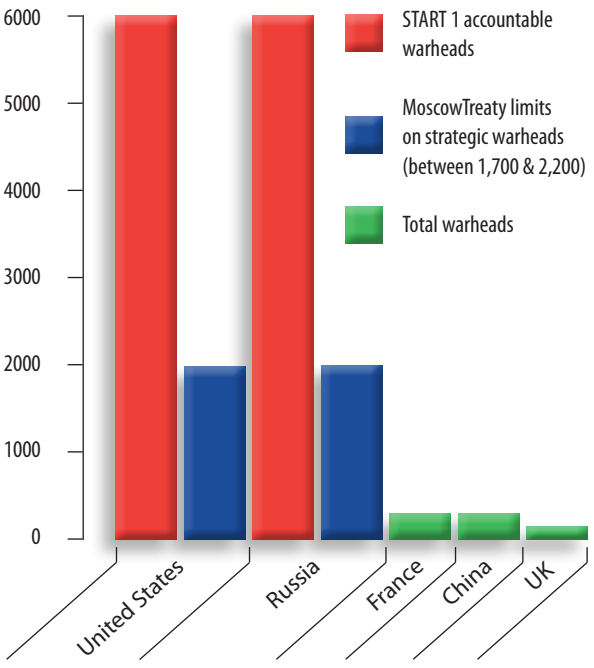
5 REDUCING ARSENALS

"I will seek real, verifiable reductions in all U.S. and Russian nuclear weapons - whether deployed or non-deployed, whether strategic or nonstrategic - and work with other nuclear powers to reduce global stockpiles dramatically by the end of my presidency."

US President
Barack Obama

Significant reductions in the nuclear arsenals of the US and Russia should be achievable without necessarily raising fundamental security issues. This chapter looks at US/Russia negotiations and complementary steps by others.

Numbers of warheads (*China: based on estimates*)



US/Russia Reductions

The US and Russia are currently working to reduce their strategic nuclear warheads to between1,700 and 2,200 by 31 December 2012,

as agreed in the Strategic Offensive Reductions Treaty (the 'Moscow Treaty'). They have also agreed in principle to negotiate further reductions in a new treaty which would succeed both the Moscow Treaty and the 1991 Strategic Arms Reduction Treaty (START) which expires in December 2009. The substance of this will be for the US and Russia to negotiate. But two particular issues are whether it will go beyond previous treaties to cover non-operational warheads and 'tactical' weapons.

Operational and Non-Operational Warheads

Current treaties do not explicitly include warheads in storage or awaiting dismantlement. This leaves open the possibility that, if either side has spare capacity on its delivery systems (e.g. ballistic missiles), in a crisis they could take non-deployed warheads out of storage and deploy them, thereby rapidly increasing the numbers of deployed warheads. This is not crucial while overall numbers remain high, but as they reduce it will become necessary to reach some formal arrangements that cover these types of warheads as well.

A critical factor will be the level of confidence in the reliability of the warheads. If this is high, there will be less need for large reserves. This may be an issue for the US which, in contrast to Russia, has not recently modernised its warheads. (The US is considering whether to develop a 'Reliable Replacement Warhead' but a decision on this has yet to be taken. Though the modernisation of nuclear weapons might be seen as a step backwards, it could alternatively be seen as a step forwards if it resulted in a reduction in the number of reserve warheads).

'Tactical' or Non-Strategic Weapons

Although the US and Russia have agreed (in the Intermediate Nuclear Forces Treaty) not to have any intermediate and shorter-range missiles, and though various unilateral Presidential Nuclear Initiatives have reduced substantially the number of non-strategic warheads in each side's armoury, current US and Russian agreements do not cover non-strategic nuclear warheads. (These refer to a nuclear weapon with a range shorter than 3,500 miles, and often of relatively low explosive power, designed primarily to be used on a battlefield in military situations. The UK believes that the use of any nuclear weapon would be strategic in nature and has consequently stopped using the terms 'sub-strategic', 'tactical', 'non-strategic' or 'battlefield' nuclear weapon).

US non-strategic nuclear weapons are deployed not only in the US but also in Europe, to demonstrate the US commitment to NATO and burden-sharing among Allies. Under threat, they are intended to demonstrate that NATO is united and serious, sending a strong political message to any potential aggressor. At the same time, Russia maintains a substantial arsenal of non-strategic nuclear weapons, thought to number in the thousands.

Some suggest that the US weapons in Europe could be withdrawn to the US and the political reassurance they provide to NATO Allies could be given in other ways, for example by reaffirming that the US, including its nuclear capability, remains fully committed to the defence of NATO Allies and that the weapons could be redeployed in Europe if circumstances

required. But, clearly, these are issues which would need to be carefully considered amongst NATO Allies.

Complementary Steps by Others

Steps taken by the US and Russia will need to supported by other states with nuclear weapons making complementary efforts to reduce and keep their own forces to an absolute minimum – not least since any growth in these forces is likely to make it more difficult for the US and Russia further to reduce their own.

United Kingdom

Since the end of the Cold War, the UK has reduced the total explosive power of its nuclear forces by around 75% and, since 2006, cut to fewer than 160 the number of its operationally available warheads, now deployed only on the Trident submarine-launched ballistic missiles. Normally, only one ballistic missile submarine is on deterrent patrol at any one time; it is at several days'"notice to fire"; and its missiles are not targeted at any country.

Work has begun to develop a new generation of submarine and to extend the life of the Trident missiles. A decision will be needed in the next Parliament on whether a replacement warhead should be developed. But none of this means that we have taken any irreversible decisions that commit us irrevocably to possessing nuclear weapons indefinitely. The British Government's consistent position remains that when it will be useful to include its weapons in any negotiations to reduce warhead numbers, we will willingly do so. In the meantime, the UK retains only the minimum amount of destructive power required to achieve our deterrence objectives.

France

France, too, has significantly scaled back its nuclear forces. When the latest round of reductions is complete, France's nuclear arsenal will include fewer than 300 nuclear warheads, a 50% cut since the Cold War. These can be deployed on ballistic missiles capable of being launched from submarines and cruise missiles designed to be launched from aircraft. A new French ballistic missile is in development and will be carried on board a new class of four submarines, the last of which is due to come into service in 2010. France is also developing a new cruise missile for deployment on aircraft.

China

China does not publish information on the scale and capabilities of its nuclear arsenal. Its weapons are deployed on land-based intercontinental ballistic missiles and on intermediate range ballistic missiles. It too is modernising its weapons and working on new mobile land-based and submarine-launched ballistic missiles and air-launched cruise missiles.

EU

The EU put forward a comprehensive proposal of nuclear disarmament measures in December 2008 in a letter from President Sarkozy to the UN Secretary General Ban Ki Moon. j

Others

Restraint is also needed on the part of other states possessing nuclear weapons if increases in their forces are not to make reductions

elsewhere more difficult. Like China, India and Pakistan do not publish information on their nuclear arsenals. Both countries are continuing to develop their warheads and their delivery systems. North Korea conducted a nuclear test in October 2006 and is assessed to have enough fissile material for a small number of nuclear weapons. Israel does not confirm or deny that it has nuclear weapons, but is widely assumed to have them.

Reductions and restraint by the US, Russia and others need to be underpinned by an international legal framework. This is the subject of the next chapter.

6 INTERNATIONAL AGREEMENTS

"The Comprehensive Test Ban Treaty - the longest - sought, hardest - fought prize in the history of arms control."

Former US President
Bill Clinton

Efforts by the US/Russia or by single states can only go so far. Constructing a world free of nuclear weapons involves building a robust framework of international laws to constrain what all states can legally do. These need to be universal (i.e. not exclude any state), irreversible (so no-one can retreat on their commitments), verifiable (to detect and deter cheating), enforceable and, above all, enhance and not diminish international and national security.

The current focus is on two treaties - the Comprehensive Test Ban Treaty and the Fissile Material Cut-Off Treaty - which together would limit the qualitative and quantitative development of nuclear weapons and thereby act as stepping stones on the road to a world free of nuclear weapons. Beyond these, there are various proposals but so far no agreement on how to proceed.

Comprehensive Test Ban Treaty

This was completed and opened for signature in 1996. It will ban nuclear weapon test explosions,

▲ Comprehensive Test Ban Preparatory Commission exercise

thereby constraining the development and improvement of nuclear weapons. The UK and France signed it immediately and have since ratified. But for the treaty to enter into force, all 44 States listed in it must ratify. Nine of these states have not yet done so: China, Egypt, India, Indonesia, Iran, Israel, North Korea, Pakistan and the US. President Obama has indicated that he will seek US ratification at the earliest practical date. This would provide invaluable impetus for a renewed global diplomatic push to secure ratification by the others and to bring the Treaty into force.

Fissile Material Cut-Off Treaty

Obtaining fissile material (i.e. high enriched uranium and plutonium) remains the greatest challenge to any new nuclear weapon programme. For more than 50 years, this recognition has underpinned both support for and opposition to the adoption of a binding international treaty banning the production of fissile materials for nuclear weapons or other nuclear explosive devices. Such a treaty, if effectively verified, would put a ceiling on the total amount of fissile material available for weapons and thereby deliver a number of important benefits:

- turn existing moratoria on the production of fissile material for nuclear weapons or other nuclear explosive devices announced by the US, Russia, UK and France into legally binding commitments;

- place such a commitment on states that have not announced such a moratorium (China, India, Israel and Pakistan);

- ensure verification arrangements were applied, probably in the form of IAEA safeguards, to all enrichment and reprocessing facilities in these states and on any fissile material they produced for peaceful purposes;

- and in the process put in place an essential building block towards an eventual global ban on nuclear weapons.

But negotiations on this treaty have yet to begin because certain states, notably Pakistan and Iran, have blocked agreement to start.

Verification of a Fissile Material Cut-Off Treaty

Some have expressed concern over how this treaty could be effectively verified. Others argue that some verification is possible if two conditions are met. First, if all enrichment and reprocessing facilities are verified, along with any fissile material they produce after the cut-off date. And second, if there are arrangements in place to detect any undeclared enrichment or reprocessing facilities. There is debate about how these conditions should be met, which could be resolved in negotiations. The verification system could ultimately form part of the wider system needed to verify a ban on all nuclear weapons.

Eliminating Stockpiles of Fissile Materials

Some argue that banning only new production of fissile material for nuclear weapons would not be a genuine disarmament measure since the recognised Nuclear Weapon States (with the possible exception of China) are

thought to have sufficient stockpiles of such materials to meet all their weapons needs. They propose that the treaty should also require the elimination of existing military stockpiles. But this would effectively turn the treaty into a ban on nuclear weapons. Though ultimately desirable, this would suffer from the same hurdles as seeking a ban itself. So while we work towards a ban, we should use a less ambitious agreement on new production – where fewer hurdles exist – to take us one step closer.

Controlling Stockpiles of Fissile Materials

As an alternative to addressing existing stockpiles in the treaty now, some propose a separate but complementary set of (at this stage mostly voluntary) measures to secure and verifiably and irreversibly reduce global stocks of fissile material, both civil and military. They point out that the great majority of fissile material stocks are held outside international safeguards by the Nuclear Weapon States and the non-NPT states. An essential condition of an eventual nuclear weapons ban will be the tightest possible controls of all fissile material worldwide. Such controls are also needed to reduce the risks of terrorists acquiring them. Such a regime might entail:

a) placing all civil fissile materials under IAEA safeguards, including in the Nuclear Weapon States and in India, Israel and Pakistan;

b) declarations of all military fissile materials, including in nuclear weapons, and applying the highest standards of security to them;

c) regularly placing amounts excess to nuclear weapons purposes under IAEA safeguards pending conversion or disposal.

Nuclear Weapons Control Treaty

This has been suggested as a possible intermediate step on the road to a total ban. It would not limit the numbers of nuclear weapons but instead enhance their safety and security. It would involve all states with nuclear weapons agreeing to the placing of foreign inspectors at the entrances to all of their nuclear weapons sites. Items moving between the sites (including weapons) would be sealed but not inspected, but any other items would be subject to intrusive inspection.

Once it was fully in place, the items within the system could serve as the baseline from which to negotiate downwards, without initially limiting the sizes or uses of warhead stockpiles. Such a system could increase experience and confidence in the techniques of verification and provide a substantial foundation before moving to a ban on all nuclear weapons. But the proposal faces the same resistance to transparency, particularly over the locations of all elements of nuclear weapons complexes, which has already been identified.

Nuclear Weapon Free Zones

Latin America and the Caribbean and the South Pacific are at present the only functioning nuclear weapon free zones. A similar treaty for Africa has been agreed but has yet to enter into force. Treaties covering South East Asia and Central Asia are still under discussion.

There is widespread support for a Middle East Zone free of nuclear as well as other weapons of mass destruction - this would require Israel to renounce nuclear weapons, all states in the region to join the global bans on chemical and biological weapons, and full confidence in Iran's compliance with its non-proliferation obligations. The treaties establishing these zones provide the best way for the Nuclear Weapon States to give effect to the stated desire of Non-Nuclear Weapon States for treaty-based 'negative security assurances' that nuclear weapons will not be used against them.

Nuclear Weapons Convention

Another proposal to achieve a global ban (mentioned in the Introduction) is for the international community to begin immediate negotiations, with a tight deadline to prevent prevarication, on a universal, verifiable and legally-binding agreement to ban all nuclear weapons. This approach is championed by many of the Non-Nuclear Weapon States and Non-Governmental Organisations. A model text has been tabled at the UN to illustrate how the main issues might be resolved.

But most of the states with nuclear weapons, including the UK, while accepting that some form of such an agreement is likely to be necessary in due course to establish the final ban, consider that it would be premature and potentially counter-productive to focus efforts on it now when the many other conditions necessary to enable a ban have yet to be put in place. Words alone will not rid the world of nuclear weapons.

UK Approach

The UK and France were the first Nuclear Weapon States to ratify the Comprehensive Test Ban Treaty. We encourage the remaining states to adhere to the Treaty so that it can be brought into force as soon as possible. Pending that, we are maintaining our voluntary moratorium on nuclear test explosions and supporting work to complete the Treaty's extensive verification machinery - which would also play a valuable role as a part of a wider system to verify a global ban on nuclear weapons.

The UK continues to play a leading role in diplomatic efforts to start the negotiations on a Fissile Material Cut-Off Treaty. The UK has produced historical records of all our defence holdings of fissile material and placed stocks surplus to defence requirements under international safeguards. We have also ceased exercising our right, as a Nuclear Weapon State, to withdraw fissile material from safeguarded stocks for nuclear weapons. Withdrawals are now limited to small quantities of materials not suitable for weapons purposes and the details are made public. No material withdrawn from safeguards is used in nuclear weapons.

The UK gave 'negative security assurances' in a formal letter to the Secretary-General of the UN in 1995 (noted in UN Security

Council Resolution 984) stating that the UK will not use nuclear weapons against Non-Nuclear Weapon States Parties to the NPT except in the case of attack on the UK, or its allies, carried out by such a state in alliance with a Nuclear Weapon State. With other Nuclear Weapon States, we have also given such assurances by ratifying the protocols annexed to the Treaties establishing nuclear-weapon-free zones in Latin America and the Caribbean, the South Pacific and Africa. As a consequence, we have granted treaty-based negative security assurances to almost 100 countries. We are keen to help resolve outstanding differences that will enable us to sign protocols to the Treaties establishing the South-East Asia and Central Asia Nuclear Weapon-Free Zones and thereby bring them into force. We have consistently supported the principle of establishing a Middle East Zone free from all weapons of mass destruction.

A new US/Russian agreement on their nuclear forces, complementary measures by other states possessing nuclear weapons, the entry into force of the CTBT and the negotiation of an FMCT would amount to major steps forward. But fundamental issues would still remain to be tackled. The next two chapters look at the crucial, longer-term steps to zero nuclear weapons.

7 GOING TO ZERO

Covenant of the League of Nations, 1919

"The maintenance of peace requires the reduction of national armaments to the lowest point consistent with national security and the enforcement by common action of international obligations"

Reducing nuclear arsenals and constraining their development are necessary steps but of themselves are not sufficient to achieve the ultimate elimination of all nuclear weapons. Fundamental issues will need to be addressed if the world is to transition securely from low numbers to zero. This chapter discusses three main sets of doctrinal and technical challenges:

i) maintaining the strategic balance as the numbers of weapons goes down;

ii) reducing the importance of nuclear weapons in military doctrines;

iii) building transparency and confidence.

i) Maintaining Strategic Balance

A potential difficulty with reducing the numbers of nuclear weapons to low levels is that this will increase the risk of instability. If states have large numbers of such weapons, then if one has a few more than another this is of little overall strategic significance. But if states only have a few weapons, then the significance of one state acquiring a few more is much greater.

This could potentially lead to an incentive to cheat in the final stages of any process leading to zero. Tackling this problem is likely to require a combination of favourable political circumstances, fierce verification requirements, and confidence in effective enforcement action against any suspected violation.

Discussions amongst the Nuclear Weapon States will need to address the fact that their nuclear forces are used to deter attacks from more than one direction. US/Russia bilateral agreements have tended to assume the two sides should have broadly equal numbers of weapons. The arguments will become more complex when there are five states around the table and as the numbers of weapons grow smaller and the balance becomes more delicate.

Thought also needs to be given to when and how to involve other states which have or may have nuclear weapons, without legitimising their status. One suggestion is to hold discussions amongst states which have unsafeguarded fissile materials and to negotiate incrementally bringing these under safeguards. This would not require declaring possession of nuclear weapons.

In the meantime, one proposal is for the Nuclear Weapon States to commit voluntarily to make a pledge not to increase their nuclear arsenals. This could be a useful confidence-building measure but is opposed by those concerned about the need for flexibility in the face of future potential threats.

Ballistic Missile Defence

These are systems designed to intercept an enemy's ballistic missiles before they reach their target. Large-scale ballistic missile defences could have the ability to defend against substantial and concerted ballistic missile attacks. This in turn could reduce the confidence of other Nuclear Weapon States in the capabilities of their nuclear weapons to achieve the desired effect, leading them to acquire greater numbers of weapons.

To restrain their arms race during the Cold War, the US and Soviet Union restricted the deployment of such systems by agreeing the Anti-Ballistic Missile Treaty. But in 2002 the US withdrew from this treaty, arguing that while relations with Russia had much improved, a limited ballistic missile defence system was necessary to protect the US and their allies from attack by countries such as Iran or North Korea.

Under the terms of the Anti-Ballistic Missile Treaty, Russia constructed a ballistic missile defence system around Moscow. However, it opposes the deployment of a US ballistic missile defence system in Europe claiming that such a system would be able, if not now then later, to intercept Russian missiles and thus give the US a strategic advantage. Russian objections may also reflect their general sense of resentment at NATO expansion and deployments in areas

◀ Ballistic missile defence system

which were once part of the Soviet Union or the Warsaw Pact.

But any missile threat from a country of concern to Europe or the United States could also be a threat to Russia, so there is common interest in working together. Russia and the US have suggested a number of ways to resolve these concerns, such as including Russian radars in a joint system, the creation of joint missile defence data exchange centres and the phased activation of the European system linked to the emergence of a serious ballistic missile threat from the Middle East. These negotiations have yet to reach a conclusion but greater mutual understanding will be vital if Russia (and, in due course, China) are to be assured that ballistic missile defence is not aimed at them.

A longer term thought is that ballistic missile defence systems might prove valuable in promoting stability when the global numbers of nuclear weapons are low since an aggressor contemplating an attack with only a few nuclear weapons could not be confident that they would all penetrate the defence system. This essentially is the rationale behind current US plans to deploy a defence system against the threat of a possible missile attack on Europe from a state such as Iran. It is conceivable that a similar rationale could be valuable as the Nuclear Weapon States reduce their numbers of weapons towards zero.

Missiles and Weapons in Space

Since a large part of the drive for missile defence stems from the spread of missile capabilities to countries of concern, such proliferation also needs to be restrained. This is the purpose behind the Missile Technology Control Regime, the Hague Code of Conduct, and proposals for getting all other states to accept the same ban on intermediate-range and shorter-range missiles that the US and Russia accepted in the Intermediate Nuclear Forces Treaty.

Russia and China, in particular, are also concerned that US technological superiority could lead to it gaining military advantage by developing space weapons. They have jointly proposed a treaty to prevent the placement of weapons in space. But there is no international consensus on the need for this, given that the 1967 Outer Space Treaty already imposes constraints on the military uses of space. An alternative way forward in the medium term may be an International Code of Conduct on Outer Space Activities aimed at enhancing transparency and confidence-building measures.

ii) Reducing the importance of nuclear weapons

Many proponents of nuclear disarmament argue that it will continue to be difficult for the states which possess nuclear weapons to give them up as long as they continue to give these weapons a key role in their defence strategies. They recommend that the role of nuclear weapons should be progressively narrowed and de-emphasised. By decreasing reliance on nuclear weapons, it is argued that the numbers of weapons can logically, and without risking national or international security, be reduced and eventually eliminated. The two most

commonly debated elements of this approach are reducing the operational status of nuclear weapons and adopting a doctrine of 'No First Use'.

Operational Status

Some argue that, twenty years after the end of the Cold War and with the prospect of armed conflict between any of the Nuclear Weapons States increasingly remote, nuclear weapons should not be targeted and should be held on a decreasing state of alert so that decisions to use them would be counted in weeks or months rather than in minutes. By increasing the warning and decision time, this would reduce the risks of the weapons being fired by accident or miscalculation and lower their prominence in military doctrine.

In fact, substantial moves have already been made. The UK's Trident missiles are at 'several days readiness' to fire and are not targeted. The French position is similar. US forces are also not targeted and there are extensive procedures to prevent any unauthorised launch or accident. But to the extent that the US and Russia could agree on mutual steps in this direction, it could help to build confidence.

Reducing the Role of Nuclear Weapons

There are some powerful arguments for reducing the role of nuclear weapons solely to deterring the use of nuclear weapons by others. This would mean ruling out any other purpose for them, such as deterring an attack with conventional, biological or chemical weapons. Some extend this argument further by calling on the Nuclear Weapon States to declare a policy of 'No First Use' i.e. that they would only use their nuclear weapons in response to an attack on them or their allies by nuclear weapons.

It is argued that the use of nuclear weapons for any purpose other than deterring their use by others has been increasingly overtaken since the end of the Cold War, particularly by the development of new conventional military technology. There are now, it is asserted, better and more effective non-nuclear ways of addressing all military challenges short of a nuclear attack itself.

Narrowing the role of nuclear weapons in this way could, it is suggested, enable a viable nuclear deterrent to be maintained with many fewer weapons than some Nuclear Weapons States currently hold. And, if the purpose of nuclear weapons was limited in this way, then it would become logical for each possessor to give them up if all others did so as well.

However, a number of states hold nuclear weapons to protect them against superior conventional forces. So in order to narrow the role of nuclear weapons, we find ourselves needing to resolve at least some of the same security conditions as will be required for the total ban. This is illustrated by the case of Russia, which used to have a policy of 'No First Use' but has since withdrawn it. The (unstated) reason is that when Russia enjoyed superiority in conventional weapons over the West, it could afford to restrict the use of its nuclear weapons only in response to a nuclear attack. Since that superiority has been reversed, Russia

has reopened the option of using its nuclear weapons to deter a conventional attack.

A further counter-argument is that, despite the international conventions banning chemical and biological weapons, there is no guarantee that some states will not use them. As a result, some retain the option of using nuclear weapons to deter an attack on them or their allies using chemical and biological weapons.

iii) Building Transparency and Confidence

A global ban on nuclear weapons will require an extremely robust multilateral agreement or set of agreements, possibly in the form of a Nuclear Weapons Convention as outlined in the previous chapter. It is difficult today to define all the elements of this but there is scope to do more to lay the groundwork by increasing transparency and confidence, particularly through exploratory work on how to verify nuclear disarmament and through strategic dialogue and analysis.

Transparency

The US and Russia have been transparent on significant aspects of their nuclear arsenals through their bilateral arms control agreements. In several areas, the US has gone further. The UK and France have also provided considerable transparency on their nuclear forces and infrastructure.

Transparency can be more difficult for those states with smaller arsenals since ambiguity about their capabilities is a key part of their doctrine. Keeping adversaries guessing reduces vulnerability to a nuclear first strike. Opacity about numbers of weapons and fissile material stocks also gives governments freedom to determine for themselves how much is enough and avoids domestic or international pressure to increase or reduce them. Loss of secrecy could therefore be counter-productive if it drove states with smaller arsenals to increase their numbers or warheads and possibly their alert status too.

But if we are to make progress on reducing and ultimately eliminating nuclear weapons, it will eventually be necessary for all possessors to be transparent – at least to one another – about their holdings of nuclear weapons. As a starting point, the Nuclear Weapon States could discuss their reservations about transparency and explore areas which are potentially less sensitive, such as their historical records on the past production of fissile material and nuclear weapons, which will be important in verifying an eventual ban.

Verification

This leads to the second potential difficulty, that of verifying that every relevant state has eliminated all its nuclear weapons. This would probably have to involve each such state declaring all its nuclear warheads and relevant facilities and accepting verification arrangements for the dismantlement of its nuclear weapons, for the storage and disposition of their component parts, for the destruction or conversion of relevant facilities, and for ensuring there were no clandestinely held weapons, materials or facilities.
This would have to be backed by the tightest

possible safeguards on all nuclear-related facilities throughout the world to ensure against any diversion of materials for weapons purposes. The challenge is to create a robust, trusted, effective system which can provide that confidence while at the same time not giving away national security or proliferation-sensitive information.

Creating the levels of transparency and developing the verification techniques and institutions needed to meet these requirements would be a massive undertaking. That is not to say that such an undertaking is impossible. But it is certainly an enormous challenge, and meeting it will require much technical creativity, political will and financial underpinning.

Some of the requirements involved are already fairly well-developed. The IAEA is well-practised in applying safeguards to nuclear material. Much thought has been given in the context of IAEA safeguards, the regime to verify the global ban on chemical weapons and the on-site inspection regime for the Comprehensive Test Ban Treaty to how to enable inspectors to be confident that no proscribed activities are taking place while at the same time permitting the inspected state to protect legitimate secrets.

But techniques for verifying the dismantling of nuclear warheads are relatively undeveloped and complex. A particular difficulty is that inspectors from Non-Nuclear Weapon States would not be permitted, under the NPT, to know or see the detailed design of the weapons whose dismantlement needs to be verified. Treaties between the US and Russia have provided for the verification of delivery systems with an attributed number of warheads each, but there has been no verification of the total numbers of warheads or of their dismantling. (The UK is doing ground-breaking work in this area which is set out below.)

THE SCIENCE OF VERIFICATION

Verification techniques take many years to develop, which is why the UK embarked on such research almost a decade ago. We have volunteered the UK as a 'disarmament laboratory' – a role model and testing

▲ UK Atomic Weapons Establishment exercise on part of the process of nuclear disarmament

ground for measures which we and others can take on key aspects of disarmament. As part of the project, we are taking forward work on both technical and non-technical challenges. For example, the UK's Atomic Weapons Establishment is carrying out ground-breaking work on the technical issues. There are four areas that we are working on:

1 Authentication of warheads: inspectors will be presented with the warheads in sealed containers. They will not be allowed to see the warhead, but nonetheless will need to prove that what is inside the box is indeed a warhead. To do this we are developing sensors to detect a warhead's characteristic radioactive signature without revealing any classified information about the design of the warhead;

2 Chain of custody: once the warhead has been dismantled, inspectors will need assurance that the separate components did indeed come from the warhead and that they cannot be diverted or go astray. We are examining how tags and seals and other tracking procedures, developed by the IAEA to counter proliferation and prevent diversion, can be used for tracking nuclear weapon components;

3 Monitored Storage: the final stage is for the dismantled components to be stored in such a way that inspectors can be sure that

nothing can be removed from the store without them knowing;

4 Managed access to sensitive nuclear facilities: i.e. developing procedures and conducting trial inspections that would allow international inspectors sufficient access to facilities without jeopardizing security. This will be fundamental to the other three verification tasks just discussed and is a subject we have pursued in collaboration with Norway in an exercise in which Norwegian officials took the role of the Nuclear Weapon State being inspected by UK experts.

But perfect verification is unattainable. There will need to be trade-offs between what states are prepared to pay, how far they are prepared to accept intrusive inspections and restrictions on their freedom of action and how far weaknesses in verification can be compensated by rigorous enforcement. Ultimately, there would still need to be a substantial level of trust, which could only flow from improvements in political relationships but also from greater transparency and dialogue.

Strategic Dialogue and Analysis

A sustained strategic dialogue, particularly between the five Nuclear Weapon States but also in due course drawing in others, including the non-parties to the NPT, is vital to building trust and understanding. The many complex issues involved in moving from low numbers of nuclear weapons to zero need to be carefully examined and discussed so that negotiations, when they do happen, are thoroughly prepared. In addition to work by governments, this will need to include studies and discussions among non-government think tanks and experts, including from the non-NPT states.

It has also been suggested that the Security Council should hold regular consultations on nuclear disarmament and non-proliferation issues to promote greater understanding of others' approaches and concerns. The UN Secretary General has also recently proposed that the Security Council's five Permanent Members should commence discussions on security issues in the nuclear disarmament process.

UK Approach

We have welcomed US proposals for a European ballistic missile defence system and support efforts to resolve Russian concerns over this. We are also working to prevent the proliferation of missiles (e.g. through the Missile Technology Control Regime, the Hague Code of Conduct and national export licensing measures). We are working closely with our EU partners to promote an international Code of Conduct on outer space activities which aims at enhancing transparency and confidence building measures.

With respect to our nuclear doctrine, the UK's position is that we deliberately maintain ambiguity about precisely when, how and at what scale we would contemplate use of our nuclear deterrent. We will not simplify the calculations of a potential aggressor by defining more precisely the circumstances in which we might consider the use of our nuclear capabilities. Hence, we will not rule in or out the first use of nuclear weapons.

The UK has sought to lead the way in being transparent about our own holdings of nuclear weapons and of fissile material, and about our past production and use of fissile material for military purposes. As part of our Strategic Defence Review in 1998, the UK made a statement on all its military holdings of fissile material. Subsequent statements in 2002 and 2006 covered our past production

and use of plutonium and high enriched uranium respectively.

To promote dialogue, the UK has taken the initiative and offered to host a conference in 2009 of the five Nuclear Weapon States aimed at building confidence and discussing some of the challenges of nuclear disarmament, including technical verification issues (see separate box above).

To promote independent analysis of the key issues, the UK Government supported work at the International Institute for Strategic Studies leading to the recent publication of an in-depth study of the political and technical requirements for abolishing nuclear weapons which makes a substantial contribution to the debate. We are carefully considering its recommendations.

Progress towards narrowing the roles of nuclear weapons and ultimately abolishing them is likely to be linked to progress on banning other weapons of mass destruction, restricting conventional military forces and improvements in political relationships. These issues are discussed in the next chapter.

8 SECURITY WITHOUT NUCLEAR WEAPONS

"In view of the fact that in any future world war nuclear weapons will certainly be employed, and that such weapons threaten the continued existence of mankind, we urge the governments of the world to realize, and to acknowledge publicly, that their purpose cannot be furthered by a world war, and we urge them, consequently, to find peaceful means for the settlement of all matters of dispute between them."

Russell-Einstein Manifesto 1955

Reducing and eliminating nuclear weapons without also addressing the balance of power in other respects could be dangerously destabilising. A global ban will need to be preceded or accompanied by developments in political and military relationships which no longer rely on nuclear weapons to deter conflict. This chapter looks at three key issues this raises: political relations, non-nuclear weapons and collective security.

◀ Foreign Office Minister Bill Rammell signs bilateral agreements with Libyan counterpart, Abdulatti al-Obidi"

i) **Political relations**

One of the main reasons why states possess nuclear weapons, or are allies of those who do, is because of long-standing political tensions and the risk that new and unforeseeable issues might arise in the future. It is evident that permanently reducing or eliminating those tensions would reduce or eliminate the requirement for nuclear as well as other weapons. Those who wrote the Non-Proliferation Treaty fully recognised this - the Treaty asks all parties to work towards 'the easing of international tension and the strengthening of trust between states in order to facilitate ... the elimination of nuclear weapons.'

A fundamental priority must be to promote ever-closer trust and understanding between the major powers to the point that a nuclear exchange between them – already remote - becomes unthinkable. Despite existing tensions, economic, technological and social links are increasing the interdependence between them. They increasingly share many common interests and challenges – dealing with the economic crisis, combating terrorism, addressing climate change and growing trade and investment. This generates opportunities to work together to build not only a more prosperous but also a more secure world based on shared interests, stronger international institutions and a rules-based approach to dealing with disputes. But serious and consistent effort will be required to capitalise on these opportunities and to build partnership in place of rivalry and co-operation in place of competition.

At the same time, longstanding disputes need to be resolved to remove key causes of conflict and generators of terrorism. A substantial improvement in the relationship between India and Pakistan is almost certainly a prerequisite for them to be able to give up their nuclear weapons. Similarly, a just, durable and comprehensive peace settlement in the Middle East would undoubtedly give a huge boost to the prospects for Israel giving up the nuclear weapons it is assumed to have, as well as reducing the threat of terrorism worldwide.

These are large issues and the considerable efforts to address them go well beyond the scope of this paper. The key point here is to recognise that nuclear weapons do not exist in a political vacuum. A global ban will not be successfully achieved and sustained without removing or at least significantly improving the political tensions which have led states to maintain their nuclear weapons.

ii) **Non-Nuclear Weapons**

Building the confidence needed to ban nuclear weapons will involve ensuring that their absence does not provoke arms races in other forms of weapon – chemical, biological or conventional. While improvements in political relations could go a long way towards reducing the dangers of such arms races, they are likely to need to be reinforced by effective international controls on other weapons before a global ban on nuclear weapons could be agreed:

- The Chemical Weapons Convention has a verification system to check that no state is

breaching its ban on all chemical weapons. Only 10 states have still to join. Of all the States Parties, only four (US, Russia, India and Libya) still possess chemical weapons and the process of destroying them is underway.

- The Biological and Toxin Weapons Convention bans all such weapons but has no means to verify compliance. Efforts to agree on such provisions have so far failed due to the sensitivities involved. Over 40 states have yet to join.

- Conventional weapons: nuclear weapons play an important role for some states (e.g. Russia and China) as a counter-weight to the superior conventional forces of other states (e.g. the US). Complete balance in conventional forces is unlikely to be attainable. But complex, multi-faceted conventional arms control agreements and confidence building measures may be necessary to underpin a ban on nuclear weapons. Other states which benefit from a nuclear 'umbrella' - for example Japan, South Korea, Australia and NATO members - would also need reassurance that its withdrawal would not expose them to a risk of conventional attack.

iii) **Collective Security**

Picture UN Security Council meeting on the situation in the Middle East, 6 January 2009
Unless all key states have confidence that robust action would be taken in a timely way against a state which breaks the rules, a global ban on nuclear weapons will not attract agreement. How can this be ensured?

▲ UN Security Council meeting on the situation in the Middle East, 6 January 2009

Discovering a breach of the rules

A basic requirement would be a high level of confidence by all states in the effectiveness of an international system with thorough procedures for verifying that the rules are being observed and raising the alarm if they are breached. This will be extremely complex and impose considerable costs and constraints. We look further at this in the next chapter.

Deciding on Enforcement Action

As soon as the verification system sounds the alarm, a decision would need to be taken on whether the rules had in fact been broken and if so what to do about it. The decision-making procedures would need to enjoy international legitimacy and be timely and robust enough to deter threats. There are a number of suggestions but each presents major challenges.

First, the obvious decision-making body is the UN Security Council. But its record in dealing with, for example, North Korea and Iran, suggests that there will not readily be agreement on whether a state is pursuing nuclear weapons nor on the action to be taken. To address this, some have suggested that the Security Council should agree in advance on 'red lines' which, if crossed, would trigger automatic action. But experience again suggests that there would be strong resistance to this as Security Council members will want to reserve themselves room for deliberation on the facts of each case.

Second, the five Permanent Members of the Security Council – the same five as the Nuclear Weapon States – have a veto over Security Council decisions. Other states will not be satisfied with a global ban on nuclear weapons knowing that if any of the Nuclear Weapon States were to violate the ban, it could veto any decision to take action against it. It has been suggested that the Permanent Members should give up their veto in such circumstances. But securing agreement amongst the Permanent Members to give up the veto has proved elusive in the past.

An alternative would involve setting up a new international body to oversee the nuclear weapons ban in which no state has a veto. But any separate body would still need to operate within the framework of the UN Charter, within which the Security Council is the pre-eminent body. It is difficult to imagine that a new body would be able to circumvent or over-rule the Security Council.

Another proposal is that individual states or coalitions could respond with force to a breach if the Security Council itself fails to act. But the risk here is that, to the extent that such a right would go beyond the present right of inherent self-defence against an armed attack under the UN Charter, this could prove destabilizing and serve as a disincentive to agree to a ban on nuclear weapons.

Taking Enforcement Action

Assuming that the need to take enforcement action could be agreed, there would need to be measures sufficiently severe to deter breaches of a nuclear weapons ban and to respond to such breaches if they occur. It is suggested that the Security Council might draw up a list of possible strategies, some of which might include targeted political, economic and financial sanctions, to be applied in the case of breaches of varying degrees of seriousness. But, again, experience suggests that Security Council members will still wish to reserve themselves room for deliberation on the facts of each case. If peaceful measures proved insufficient to deter a state which was determined to acquire a nuclear weapon in defiance of the international community, possible military action also raises a number of challenges, to which the proposed solutions remain problematic.

a) Virtual Nuclear Weapons Capacity

Governments are likely to be unwilling to take military action against a state which has, or may have, nuclear weapons when they do not. To address this, it has been suggested that

some states should be permitted to retain a capability to make nuclear weapons quickly in order to deter any other state from breaking the ban. But the time needed to re-establish a credible nuclear capability would probably be longer than the likely warning time. And any move from a dormant programme towards an active one could be seen as escalatory, and thus potentially destabilising in a crisis. Permitting a virtual capacity in a few states would also undermine the principle of global equity and be strongly resisted by many states which would see it as prolonging the existing inequalities.

b) **UN as World Policeman**

A second option would be for the UN to have its own military forces and act as a world policeman. But it has never established its own standing forces as envisaged in the Charter. Distrust between states has prevented them from agreeing to cede sovereignty to a global authority. Overall, the UN's record of managing a response to state aggression is likely to need considerable improvement before states would have sufficient confidence to leave their security in its hands.

c) **Obligatory Global Action**

Thirdly, it has been suggested that an agreement to ban nuclear weapons should include a provision obliging all states collectively to take action, including if necessary military action, against any state which was found to be in breach of the ban. Against this, it is argued that the history of attempts at such collective security agreements is unimpressive. In a world of sovereign states, there can be no absolute assurance that any state will abide by any set of rules nor that they will meet commitments, legal or otherwise, to join in enforcement action.

But proponents of this option point out that the main problem in the past was that breaches of the agreements rarely impinged directly on the immediate national security interests of the majority of the states involved. In the case of a ban on nuclear weapons to which all the major powers were fully signed up, all of them would arguably have a high national interest in preventing a break out and would therefore be ready to co-operate vigorously to make the costs of a break out unacceptable to any state which might contemplate it.

Strengthening International Institutions

This analysis suggests that deciding on and then taking effective enforcement action against a breach of a global ban on nuclear weapons pose some major challenges. Resolving these is likely to require the reform and strengthening of international institutions and the international rules-based system as a whole. Despite positive signs, the international security architecture has yet to adapt to the new challenges we face. The UN membership recognises the emergence of new global powers and continues to debate Security Council reform in order to be more representative of the modern world. It is yet to agree a model of reform that attracts a majority of support. Indeed, across all the key institutions, we should look to raise the level of ambition in the face of these new challenges, and to improve the speed of response to crises.

This survey suggests that ultimately it will only be possible to move to a secure world without nuclear weapons if there are major improvements in political relations between key states, if non-nuclear weapons can be kept under control, and if collective security arrangements can be put in place to enforce a global ban on nuclear weapons and to maintain international security without them.

Some argue, pointing to the evidence from history and human nature, that major powers will never trust each other sufficiently to be able to lay down their weapons. They worry that, if a global ban on nuclear weapons has to wait until all the intractable problems identified above are resolved, it will not be achieved for a very long time, if ever. But they might be encouraged by the perspective of former UN Secretary General Dag Hammarskjold: "Disarmament is not likely to start without an improvement in the international situation. On the other hand, nothing contributes more to improvement in the international atmosphere than an agreement on even the most modest steps in the direction of disarmament." Working together towards the goal of a world free of nuclear weapons in itself has the potential to build trust and co-operation in overcoming apparently intractable challenges.

UK Approach

The UK is engaged in a very wide range of work to promote international security, closer political and economic relations and the peaceful resolution of disputes.

Working with our EU partners, we remain focussed on securing universal adherence to both the Biological and Toxin Weapons Convention and the Chemical Weapons Convention and providing practical support to help states implement their obligations under them.

We remain closely engaged in conventional arms control work in Europe and are also taking the lead in global efforts for an Arms Trade Treaty and bans on whole categories of weapons such as landmines and cluster munitions.

We are supporting a wide range of reforms to build more open, credible, accountable and effective global and regional institutions, and to equip them with the capabilities they need for the challenges of the twenty-first century.

9 CONCLUSIONS

"We must abolish the weapons of war before they abolish us."

Former US President
John F. Kennedy

Achieving agreement to a global ban on nuclear weapons clearly involves persuading states who currently rely on them to give them up. This requires creating the conditions to give them confidence that their security will on balance be greater in a world without nuclear weapons than with them. The three main sets of such conditions are:

i) watertight means to prevent nuclear weapons from spreading to more states or to terrorists, at the same time as the use of nuclear energy is expanding;

ii) minimal arsenals and an international legal framework which puts tight, verified constraints on nuclear weapons;

iii) solutions to the technical, political, military and institutional challenges of moving from small numbers of nuclear weapons to zero in ways which enhance national and international security.

Although the challenges are considerable, at least six concrete steps to create these conditions are potentially attainable within the next few years. Progress on these would mark a decisive break from the deadlock of the past decade:

1 stopping further proliferation and securing agreement among all the NPT states that the way forward must include tougher measures to prevent proliferation and tighten security and the vigorous implementation of such measures including practical help to states which need it;

2 working with the IAEA to help states which want to develop a civil nuclear energy industry to do so in ways which are safe and secure and which minimise the risks of nuclear weapons spreading;

3 US-Russia negotiations and agreement on substantial further reductions in their total nuclear arsenals, complemented by efforts by other states with nuclear weapons to reduce and keep their own forces to an absolute minimum;

4 bringing the Comprehensive Test Ban Treaty into force, banning all nuclear weapons test explosions and thereby constraining the qualitative development of nuclear weapons.;

5 starting negotiations without preconditions and making progress on a Fissile Material Cut-Off Treaty. This is vital to help make reductions in nuclear weapons irreversible and to establish many of the mechanisms that would constitute the core of an eventual regime to oversee a global ban; and

6 exploring the many complex political, military and technical issues which will need to be resolved if the states which possess nuclear weapons are to reduce and ultimately eliminate their arsenals securely, and to prevent nuclear weapons from ever re-emerging.

The UK's Role

We are committed to driving forward progress on these key steps. From the Prime Minister down, we aim to provide leadership to the international community in setting out the vision of where we need to go, in working bilaterally and in concert with our partners and allies to persuade others to join us, and in doing the hard diplomatic and technical work to find effective ways forward and to build consensus around them. We can build on our proposal to use the UK as a 'disarmament laboratory' – a testing ground for measures which the international community could take on key aspects of disarmament.

We are raising these issues in our dialogue with international partners. We have regular high-level meetings with France and the US as well as with China and Russia. We also work closely with states such as Brazil, South Africa and Egypt. We are working closely with the EU Presidencies to ensure EU outreach to key opinion formers. The Prime Minister, Foreign Secretary, Defence Secretary, their Cabinet colleagues and Foreign Office ministers continue to put the case to international and domestic audiences. We have an active programme of outreach to Members of both Houses of Parliament and to civil society, regularly meeting stakeholders from outside Government to listen to new ideas, brief on UK objectives and policies, and to answer questions.

Global Responsibility

But, clearly, no country can do it all alone. The world faces serious new threats which are beyond the ability of any one state or group of states to address on their own. Making progress will require building a broad coalition including states, international organisations, businesses and non-governmental organisations. While the Nuclear Weapon States have a special responsibility to give a lead, eliminating nuclear weapons needs to be a co-operative project with the active engagement of the entire international community to create the political and security conditions which will be necessary.

We need to build a global coalition around not only a shared vision of a world free of nuclear weapons but also of how we are going to work together to make it happen. We need to make a clean break from current perceptions that in this field everything is a zero sum game and instead work to establish virtuous circles in which progress on non-proliferation, disarmament and political and security conditions reinforce

each other, enabling breakthroughs in areas which for many years have seemed intractable. We must find common cause and move from a decade of deadlock to a decade of decisions. We face a long hard road. But the dream of those early pioneers who first tried to ban nuclear weapons can yet be made a reality.

ANNEX - Relevant websites and background

The following lists a selection of websites, books and articles which provide further information on the issues discussed in this paper. With the exception of the official British Government websites and papers, their inclusion does not imply that the British Government endorses the views expressed or the information contained in them.

Official Statements and Publications

- Prime Minister: www.number10.gov.uk. Includes speech by the Prime Minister in Delhi in January 2008 and announcement to Parliament in March of an international conference in London in early 2009 to take forward work on nuclear energy. The UK National Security Strategy of March 2008, can be found at the Cabinet Office website www.cabinetoffice.gov.uk

- Foreign Secretary: www.fco.gov.uk. Includes an article by the Foreign Secretary published in the Guardian-Online on 8 December 2008 and a speech by the former Foreign Secretary, Margaret Beckett, on "A World free of Nuclear Weapons?" to the Carnegie Endowment in Washington in June 2007.

- Defence Secretary: www.mod.uk. Includes a speech by the former Secretary of State for Defence, Des Browne, announcing in February 2008 the UK's proposal to host a conference of Nuclear Weapon States in 2009. Also the White Paper: 'The Future of the United Kingdom's Nuclear Deterrent', December 2006.

- Secretary of State for Energy and Climate Change: www.decc.gov.uk. White Paper on Nuclear Power, January 2008.

Parliament

- The Select Committee on Foreign Affairs is conducting an inquiry into 'Global Security: Non-Proliferation'. Oral and written evidence to the Committee can be found at www.publications.parliament.uk/pa/cm/cmfaff.htm

Other Statements and Reports

- March 2008 speech by President Sarkozy of France: www.ambafrance-uk.org/President-Sarkozy-s-speech-at,10430.html

- Report of the US Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism, December 2008. www.preventwmd.gov

- Interim Report of the US Congressional Commission on the Strategic Posture of the United States, December 2008: http://www.usip.org/strategic_posture/index.html

- Campaign statements of President Obama: htpp://www.barackobama.com/issues/foreign _policy/foriegnpolicy/index.php

- International Commission on Nuclear Non-proliferation and Disarmament: a joint initiative of the Australian and Japanese Governments: www.icnnd.org

- Weapons of Mass Destruction Commission: www.wmdcommission.org

- Canberra Commission on the Elimination of Nuclear Weapons: Report, 1996: www.dfat.gov.au/cc/index.html

- Model Nuclear Weapons Convention submitted to the UN by Costa Rica and Malaysia, December 2007: http://www.lcnp.org/mnwc/

- Debate on Disarmament – Letter from M. Nicolas Sarkozy, President of The Republic, to Mr Ban Ki-Moon, United Nations Secretary-General: http://www.ambafrance-uk.org/Disarmament-debate-President.html

International Organisations and Groups

- The United Nations: www.un.org/disarmament. (Includes papers for NPT meetings.) The United Nations Institute for Disarmament Research: www.unidir.org. The Conference on Disarmament (CD): the single multilateral disarmament negotiating forum of the international community: www.unog.ch

- The International Atomic Energy Agency: www.iaea.org. Report of Independent Commission on Reinforcing the Global Nuclear Order for Peace and Prosperity can be found at http://www.iaea.org/NewsCenter/News/PDF/2020report0508.pdf

- The Preparatory Commission for the Comprehensive Nuclear Test Ban Treaty Organisation: www.ctbto.org

- Nuclear Suppliers Group: implements guidelines for nuclear exports and nuclear related exports. www.nuclearsuppliersgroup.org

- Organisation for the Prohibition of Chemical Weapons, based in The Hague: www.opcw.org. Provides information on the Chemical Weapons Convention and monitors compliance among the states parties that have ratified the treaty.

Academic and Policy Research Institutions and NGOs

- Acronym Institute for Disarmament Diplomacy: www.acronym.org.uk

- Arms Control Association : www.armscontrol.org

- Belfer Center for Science and International Affairs at Harvard University: belfercenter.ksg.harvard.edu

- Bradford University Peace Studies Dept: www.brad.ac.uk/acad/peace

- British American Security Council: www.basicint.org

- Brookings Institution: www.brookings.edu

- Campaign for Nuclear Disarmament: www.cnduk.org

- Carnegie Endowment for International Peace: www.carnegieendowment.org

- Center for Strategic and International Studies www.csis.org

- Council on Foreign Relations: www.cfr.org

- David Davies Memorial Institute of International Studies: http://www.aber.ac.uk/interpol/en/research/DDMI/DavidDavies.htm

- Federation of American Scientists: www.fas.org

- Global Zero: www.globalzero.org

- Heritage Foundation: www.heritage.org
- Institute for Public Policy Research: www.ippr.org.uk. A Commission on National Security in the 21st Century, co-chaired by Lords Owen and Robertson, has issued an interim report which can be found at: http://www.ippr.org.uk/publicationsandreports/publication.asp?id=636
- International Institute for Strategic Studies: www.iiss.org
- International Panel on Fissile Material: www.fissilematerials.org
- James Martin Center for Non-Proliferation Studies: cns.miis.edu/
- MEDACT: www.medact.org: health professionals campaign to prevent violent conflict, improve health and raise standards of health care worldwide.
- Mountbatten Centre for International Studies (MCIS) Southampton University www.mcis.soton.ac.uk
- Nuclear Threat Initiative: www.nti.org: US-based body working to strengthen global security by reducing the risk of use and preventing the spread of nuclear, chemical and biological weapons
- Pugwash Conferences: www.pugwash.org. Brings together scholars and public figures concerned with reducing the danger of armed conflict and seeking cooperative solutions for global problems
- Reaching Critical Will: www.reachingcriticalwill.org
- Royal Institute of International Affairs: www.chathamhouse.org.uk
- Royal United Services Institute for Defence and Security Studies: www.rusi.org
- Stimson Center: www.stimson.org
- Stockholm International Peace Research Institute (SIPRI): www.sipri.org

- Verification Research, Training and Information Centre (VERTIC): www.vertic.org:

- 2020 Vision Campaign: www.2020visioncampaign.org: (Mayors for Peace)

- War Studies Department, King's College London: www.kcl.ac.uk/depsta/wsg

- World Nuclear Association:www.world-nuclear.org: (a confederation of companies connected with nuclear power production)

Articles, Reports and Books

- 'Orienting the 2009 Nuclear Posture Review: A Roadmap' by Andrew Grotto and Joe Cirincione. Center for American progress, Washington DC November 2008

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