Report of the Inquiry into the Legality of Nuclear Weapons

King's College London
6-8 November 2004

Peace**rights**

FOREWORD

Weapons of Mass Destruction have been much in the news over the past few years. Numerous questions have been raised concerning their proliferation in the world and the threat they pose to global peace and security. However, all WMDs are not the same. Nuclear weapons are considerably more destructive than chemical or biological weapons, but unlike the latter they are not yet governed by a treaty of general prohibition. Although there is no doubt that the principles and rules of humanitarian law apply to nuclear weapons, the consequences of this are disputed. Furthermore, the future of the Nuclear Non-Proliferation Treaty is under threat as never before. It is in this legal and political environment that the United Kingdom's nuclear weapons system is in urgent need of review.

With this in mind, Peacerights, an organisation which promotes educational initiatives on international humanitarian and human rights law, commissioned an Inquiry into the legality of Trident, its possible replacement and the Mutual Defence Agreement between the UK and the USA. The aim was to provide a forum for transparent, expertly reasoned and authoritative analysis of these matters. Over a number of days in November 2004 this process was conducted mainly in public and entailed close scrutiny of available evidence and legal principles. The following Report is the product of the Inquiry. It represents our contribution to the deliberations that are so important today for the development of a global regime to reduce conflict and enhance peace.

Andrew Williams
Director, Peacerights

17th March 2005

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1. EXECUTIVE SUMMARY

1.1 The purpose of this Inquiry was to enable a Panel of experts to examine the legality of the Trident nuclear weapons system under international law and assess the United Kingdom's compliance with its obligations under the Nuclear Non-Proliferation Treaty (NPT). The Inquiry was prompted by the forthcoming NPT Review Conference (May 2005), the renewal of the UK-USA Mutual Defence Agreement (June 2004) and the UK Government's statement that a decision on whether to replace Trident will be made during the next Parliament.

1.2 The Inquiry was held in London over three days in November 2004. It was well-publicised and members of the public attended the open sessions.

1.3 The members of the Panel were chosen for their expertise in and experience of international law and international relations. They were:

- Professor Louise Doswald-Beck (Graduate Institute of International Studies, Geneva, and Director of the Centre for International Humanitarian Law)
- Ambassador Miguel Marín-Bosch (former Chairman of the UN Secretary General's Advisory Board on Disarmament Matters)
- Dr Gerry Simpson (Reader in Law, London School of Economics)
- Christopher G Weeramantry (former Vice-President of the International Court of Justice)

1.4 Counsel to the Inquiry was Professor Nick Grief (Bournemouth University and Doughty Street Chambers).

1.5 The evidence considered by the Panel comprised official documents and the written and oral submissions of expert witnesses. The witnesses were selected for their specialist knowledge of British defence policy, the Mutual Defence Agreement, current and future nuclear weapons technology, the health and environmental effects of nuclear weapons, and developments at Aldermaston. The witnesses were questioned by Counsel and by members of the Panel.

1.6 The Ministry of Defence and Foreign & Commonwealth Office were invited to participate in the Inquiry but declined to do so on the basis that the Government's position on the legal issues was already well known.

1.7 The Panel's principal findings can be summarised as follows:

1.7.1 Article 2(4) of the UN Charter prohibits the threat or use of force in international relations. Although Article 51 preserves the right of self-defence, any action in self-defence must be proportionate to the armed attack and necessary to respond to it. The use or threatened use of nuclear weapons would violate the law governing the use of force (*jus ad bellum*) except in the most extraordinary circumstances. However, a finding of illegality in relation to *jus ad bellum* is unnecessary given the unlawfulness of nuclear weapons under the laws of war (*jus in bello*), in particular the principles and rules of international humanitarian law. Although every State has the fundamental right of self-defence in accordance with Article 51 when its survival is at stake, the use of nuclear weapons in the context of such a war remains subject to international humanitarian law.

1.7.2 Any use of nuclear weapons would violate international humanitarian law because such weapons are inherently indiscriminate and would cause superfluous injury and unnecessary suffering. Their use would also be likely to breach the rules of international law requiring respect for the natural environment and the inviolability of neutral territory.

1.7.3 The UK is violating Article VI of the NPT, which obliges all States Parties to pursue negotiations in good faith on effective measures relating to cessation of the arms race at an early date and to nuclear disarmament. Emphasising the ICJ's unanimous ruling in the *Nuclear Weapons Case* (1996) regarding the obligation to pursue in good faith and conclude the negotiations required by Article VI, the Panel concluded that the UK has not pursued, and is still not ready and willing to pursue, negotiations in good faith on nuclear disarmament. On the contrary, the renewal of Article III *bis* of the Mutual Defence Agreement implies the continuation and enhancement of the UK's nuclear programme rather than progress towards its discontinuation.

1.8 The Panel made the following additional observations and recommendations:

1.8.1 *Compliance with the Non-Proliferation Treaty*: The NPT is one of the most important documents in international law. The future of civilisation may well depend on full compliance with its provisions. The Nuclear Weapon States cannot be the world's policemen, enforcing the very rules which they themselves violate.

1.8.2 *Public information and awareness*: The need for public information and awareness is paramount. Governments pursue their policies on nuclear weapons without any significant input from the public into the decision-making process, mainly because people are unaware of the vast issues of international law involved and of the horrendous consequences of even a single use of nuclear weapons. A programme of public information and education at all levels is therefore recommended. The proposed elements of such a programme are outlined in the report.

1.8.3 *Greater openness and transparency*: Matters concerning nuclear weapons, which may affect the very survival of civilization, should not be conducted behind closed doors. Members of the public have a right to know about weapon stockpiles, the effects of weapons, places of storage and precautionary measures, and to be kept informed of such matters as the transport of nuclear weapons and the disposal of hazardous waste. This requires the dissemination of much fuller information at national, regional and local level. In the UK, for example, nuclear weapons are transported on public highways, often at night, without the public's knowledge. Although there is a need for some secrecy in matters of national security, where public safety is at issue more transparency is required.

1.8.4 *An ethical code for scientists*: Scientists engaged in making nuclear weapons often do not see the full implications of their work as they work intensively only on some small segment of the research. They need to have the overall picture. It should be made clear to all working in this field that legal prohibitions cannot cover the whole spectrum of their moral duties. An ethical code for nuclear scientists should be articulated. The main principles of such a code are suggested in the report.

2. ORGANISATION OF THE INQUIRY

2.1 **Purpose**

The purpose of the Inquiry was to enable a Panel of experts to examine the legality of the Trident nuclear weapons system under international law and assess the UK's compliance with its obligations under the NPT.

2.2 **Timing**

The Inquiry was held from Saturday 6th to Monday 8th November 2004. The timing was important in view of the Nuclear Non-Proliferation Treaty (NPT) Review Conference in May 2005, the UK government's statement that a decision on whether or not to replace Trident would be taken in the next Parliament and the extension of the Mutual Defence Agreement between the USA and the UK for another ten years.

2.3 **Transparency**

2.3.1 The Inquiry was held in public at King's College London on 6th and 7th November with a closed session for Panel members and Counsel on 8th November. In the interests of openness and transparency, the Inquiry was advertised in the media and on various websites. Non-Governmental Organisations were contacted by email and notice of the Inquiry was circulated to their members. During the weekend, members of the public attended the open sessions. Most came from the UK but some were from other European countries.

2.3.2 The Inquiry took the form of an examination of evidence and of the related legal issues. During the open sessions, members of the audience were able to submit questions to members of the Panel and Counsel as well as to some of the witnesses. Many in the audience were very knowledgeable about nuclear issues, particularly nuclear sharing under NATO, as participants from Belgium and Germany demonstrated.

2.4 **The Panel of Experts and Counsel to the Inquiry**

2.4.1 The members of the panel were chosen for their expertise in international law and international relations. They combined academic, judicial and diplomatic expertise and experience, enabling the issues to be authoritatively examined from a variety of perspectives.

Professor Louise Doswald-Beck Graduate Institute of International Studies, Geneva, and Director of the Centre for International Humanitarian Law. Former legal adviser and Head of the Legal Division at the International Committee of the Red Cross. Former Secretary-General of the International Commission of Jurists.

Ambassador Miguel Marin-Bosch Former Deputy Foreign Minister of Mexico. Former member of the UN Secretary-General's Advisory Board on Disarmament Matters (1999-2002) and its chairman in 2000.

Dr Gerry Simpson Reader in International Law at the London School of Economics.
Author of Great Powers and Outlaw States: Unequal Sovereigns in the International Legal Order (CUP, 2004).

Christopher G Weeramantry Former member of the International Court of Justice (1991-2000) and a former Vice-President of the Court. President of the International Association of Lawyers Against Nuclear Arms (IALANA).

2.4.2 Counsel to the Inquiry was ***Professor Nick Grief***, Steele Raymond Professor of Law at Bournemouth University and an Associate Tenant at Doughty Street Chambers. Professor Grief prepared a detailed brief for the Inquiry.

2.4.3 The Inquiry and this Report were co-ordinated by ***Carol Naughton*** of Peacerights.

2.5 **Witnesses**

Written and oral evidence was presented by six witnesses chosen for their specialist knowledge of the military and political aspects of British nuclear forces and defence policy, the technology of nuclear weapons, new developments in nuclear weapons, the health and environmental effects of nuclear weapons, new developments at Aldermaston and the Mutual Defence Agreement. Each witness was questioned by Counsel and by members of the Panel.

Nicola Butler gave evidence on the military and political aspects of British Nuclear Forces and Defence Policy. She is a Research Associate at The Acronym Institute for Disarmament Diplomacy and writes extensively on nuclear arms control and disarmament issues.

Dr Frank Barnaby gave evidence on the technology of nuclear weapons and new developments in nuclear weapons. A nuclear physicist, Dr Barnaby currently works for the Oxford Research Group researching into military technology, the civil and military uses of nuclear energy and the terrorist use of weapons of mass destruction.

Dr Douglas Holdstock gave evidence on the health and environmental effects of nuclear weapons. Dr Holdstock is a member of Medact's Nuclear Hazards Group and the Editor of *Medicine, Conflict & Survival*. He is a retired hospital physician with experience of radiation protection.

Dr Sian Jones and ***Juliet McBride*** gave evidence on new developments at Aldermaston. Dr Jones is a member of Aldermaston Women's Peace Campaign. Juliet McBride is a member of Aldermaston Women's Peace Campaign and Nukewatch. She lectures in public law (constitutional & administrative law, including human rights & civil liberties and police powers).

Nigel Chamberlain gave evidence on the Mutual Defence Agreement. He is an Analyst and Press Officer with the British American Security Information Council (BASIC), specialising in nuclear weapons and missile defence.

2.6 **Government participation**

2.6.1 Strenuous efforts were made to persuade the Foreign and Commonwealth Office (FCO) Counter Proliferation Department, the Ministry of Defence (MoD) and government representatives on the Defence Select Committee to take part in the Inquiry. Shortly before the Inquiry began, however, the FCO and the MoD wrote to say that they had considered the invitation seriously but decided not to participate. They acknowledged that the Panel wished to hear the government's views. However, they considered that the government's position was well known and that there was nothing that any FCO or MoD witness could add to statements which Ministers and others had made over the years.

2.6.2 As part of the evidence submitted to the Inquiry, the Panel had access to ministerial statements in Parliament and official documents including:

Strategic Defence Review (1998)
www.mod.uk/issues/sdr/index.htm

Strategic Defence Review - A New Chapter (July 2002)
www.mod.uk/issues/sdr/newchapter.htm

Defence White Paper (December 2003)
www.mod.uk/publications/whitepaper2003/index.html

Defence Committee Report on the Defence White Paper 2003 (July 2004)
www.publications.parliament.uk/pa/cm/cmdfence.htm

2.7 **Dissemination**

This report will be made available to everyone who attended the Inquiry as well as to those who were unable to attend and have requested a copy. It will also be published on the Peacerights website and made available on linked websites. In addition, the report will be sent to all governments ahead of the 2005 NPT Review Conference and to all major political parties in the UK in advance of the general election.

3. WITNESS EVIDENCE

3.1 Military and political aspects of British nuclear forces and defence policy (Witness: Nicola Butler - Research Associate, The Acronym Institute for Disarmament Diplomacy)

3.1.1 **Are UK nuclear policy and doctrine in compliance with Article VI of the Nuclear Non-Proliferation Treaty?**

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

3.1.3 The UK government argues that, "under the Nuclear Non-Proliferation Treaty (NPT), five states—the United Kingdom, the United States, France, Russia and China—are legally entitled to possess nuclear weapons".[1] However, the NPT does not confer such a right, rather it imposes obligations on the nuclear-weapon states to pursue nuclear disarmament.

3.1.4 For many years, following signing of the NPT, the government privately argued that Article VI did not require it to disarm, save in the context of a treaty on general and complete disarmament – an objective regarded as utopian. Lord Chalfont, who was a Minister during the NPT negotiations in the 1960s, continues to argue that "there is no international agreement which calls upon anyone to promote the elimination of nuclear weapons except in the context of general and complete disarmament".[2]

3.1.5 In 1996, the International Court of Justice rejected the alleged linkage between nuclear disarmament and general and complete disarmament. In its advisory opinion, the Court unanimously concluded that: "There exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control."[3]

3.1.6 Following the ICJ's opinion, the 2000 NPT Review Conference essentially confirmed this interpretation of Article VI. At the Review Conference, all five nuclear-weapon states gave an "unequivocal undertaking… to accomplish the total elimination of their nuclear arsenals" and committed themselves to a programme of "practical steps for the systematic and progressive efforts to implement Article VI". The Final Document provides a benchmark by which to measure compliance with Article VI. (See Appendix 2)

3.1.7 **UK nuclear capability**

Trident is UK's the most advanced nuclear weapon system to date. The UK has procured four Trident submarines, each able to deploy with up to 16 Trident II D5 missiles. With a range of over 7,000 km, Trident is capable of quickly reaching a much broader range of targets than its

1 Hansard, House of Commons, September 1 2004, column 689W.
2 Hansard, House of Commons, January 26 1998, column 8.
3 *Legality of the Threat or Use of Nuclear Weapons ICJ Reports* 1996, p 226, para 105, point 2F.

predecessor, Polaris. Each Trident submarine is capable of deploying at least 128 Trident warheads. Unlike Polaris, these warheads are independently targetable, allowing Trident to cover many more targets.

Table 1: British nuclear-armed submarine deployment since the 1970s

Force size	1970s Polaris	1980s-1990s Polaris Chevaline	1994-1997 Trident Conservative Policy	1998 onwards Trident Labour Policy
Submarines	4	4	4	4
Submarines on patrol	1	1	1	1
Missiles per submarine	16	16	12-16	12-16
Warheads per submarine	48	32	60	48
Submarine targeting capability	16	16	60	48

3.1.8 The UK government describes Trident as "the ultimate guarantor of the UK's national security". The 2003 Defence White Paper states that the UK's nuclear deterrent capability is "likely to remain a necessary element of our security" and the government has announced that the question of whether to replace Trident will be considered in the next Parliament.[4]

3.1.9 **How does this affect the UK's record on nuclear disarmament?**
The UK government argues that it has an "excellent record" in fulfilling its legal commitment under Article VI of the NPT. Ministers make the following points:
"First, we have withdrawn and dismantled the RAF's freefall nuclear bomb, so that Trident is now our only nuclear weapons system. We dismantled the last Chevaline warhead in 2002, demonstrating our commitment to irreversibility in the reduction of the UK's nuclear weapons. We have reduced our operationally available stockpile to fewer than 200 warheads. That is a reduction of more than 70 per cent in the potential explosive power of our nuclear forces since the end of the cold war—a significant development, in my view."

"*We have also rightly reduced the readiness of our nuclear forces. A single Trident submarine is now on deterrent patrol, carrying 48 warheads. The submarine on patrol is normally on several days' notice to fire, and its missiles are de-targeted. That, too, is a significant de-escalatory move. We have rightly signed and ratified the comprehensive nuclear test ban treaty. As I said, we continue to promote its early entry into force."*[5]

4 "Delivering Security in a Changing World", Defence White Paper, Ministry of Defence, Cm 6041-I, December 2003.
5 Foreign Office Minister Bill Rammell MP, Hansard, House of Commons, March 24 2004, Column 301WH.

3.1.10 Despite the figures, however, the UK's record on nuclear disarmament is very weak. It cites the dismantlement of weapons such as the WE177 free-fall bomb and the Chevaline warhead, but these weapons had reached the end of their service life and were in fact replaced by the more capable Trident system.

3.1.11 Although the government highlights a reduction in the "potential explosive power" of its warheads, qualitative improvements make this comparison somewhat misleading. Trident's greater speed, accuracy and independently targetable warheads enable it to reach more targets than Polaris Chevaline, as Table 1 above demonstrates. As the Defence Select Committee noted in 1994, "Trident's accuracy and sophistication in other respects does - and was always intended to - represent a significant enhancement of the UK's nuclear capability. We have invested a great deal of money to make it possible to attack more targets with greater effectiveness using nominally equivalent explosive power".[6]

3.1.12 Far from effecting nuclear disarmament, therefore, the replacement of WE-177 and Polaris with Trident represents an enhancement in the UK's nuclear capability.

3.1.13 Since the 2000 Review Conference, the UK has made little or no progress in fulfilling its obligations under the NPT. Although the 2000 Final Document was intended to provide a forward-looking agreement, the UK's official statements on the implementation of Article VI refer only to commitments made either in or prior to the 1998 Strategic Defence Review and demonstrate no progress since then.

3.1.14 **UK nuclear doctrine**

Trident is intended to provide the UK with an independent nuclear deterrent. It was originally designed as a strategic nuclear system aimed at deterring the Soviet Union. In 1993, however, following the end of the Cold War, Conservative Secretary of State for Defence Malcolm Rifkind announced that in future Trident's role would be to deter "potential aggressors" from threatening UK "vital interests".

3.1.15 In order to do this, Trident was assigned an additional "sub-strategic" role. Mr Rifkind argued that:

"The ability to undertake a massive strike with strategic systems is not enough to ensure deterrence. An aggressor might, in certain circumstances, gamble on a lack of will ultimately to resort to such dire action. It is therefore important for the credibility of our deterrent that the United Kingdom also possesses the capability to undertake a more limited nuclear strike in order to induce a political decision to halt aggression by delivering an unmistakable message of our willingness to defend our vital interests to the utmost".[7]

3.1.16 Trident's strategic and sub-strategic roles are intended to demonstrate that the UK's deterrence posture is credible in a wide range of scenarios – that the UK is willing to use or threaten to use its nuclear weapons, if necessary. As Mr Rifkind put it:

"Our analysis of deterrence, and the contribution of nuclear weapons to it, now has to relate to a new context. The basic ideas do not change. Deterrence is about sustaining in the mind of the potential aggressor a belief that our use of the weapons could not prudently be altogether discounted."[8]

6 HC 297 of Session 1993-94, p.xiv.
7 Malcolm Rifkind, *UK Defence Strategy; A Continuing Role for Nuclear Weapons?*
8 ibid.

3.1.17 Shortly after the 1997 General Election, the new Labour government reaffirmed the UK's commitment to retaining a nuclear deterrent in the Strategic Defence Review. The Review stated:

"*[I]n present conditions nuclear deterrence still has an important contribution to make in insuring against the re-emergence of major strategic military threats, in preventing nuclear coercion, and in preserving peace and stability in Europe.*"[9]

3.1.18 It also noted that the government needed "to ensure that [Trident] can remain an effective deterrent for up to 30 years".[10]

3.1.19 As part of the agreement under which the UK procures Trident missiles from the United States, UK Trident forces are assigned to NATO to be used for the defence of the Alliance "except where the UK government may decide that supreme national interests are at stake".[11] The UK is therefore committed to NATO's nuclear policy, which since the mid-1960s has been based on a doctrine of "flexible response".[12] One of the key elements of NATO's nuclear doctrine is that the Alliance refuses to rule out the first use of NATO nuclear weapons, thereby allowing its nuclear planners to prepare for that option.

3.1.20 Similarly, the UK has always refused to rule out the first use of its nuclear weapons, in particular in cases where biological or chemical weapons may have been used. For example, shortly after the 1997 election, then Minister of State Dr John Reid stated:

"*The role of deterrence... must not be overlooked. Even if a potential aggressor has developed missiles with the range to strike at the United Kingdom, and nuclear, biological or chemical warheads to be delivered by those means, he would have to consider – he would do well to consider – the possible consequences of such an attack... It seems unlikely that a dictator who was willing to strike another country with weapons of mass destruction would be so trusting as to feel entirely sure that that country would not respond with the power at its disposal.*"[13]

3.1.21 An MoD report in July 1999 asserted:

"*To date [1999] neither arms control nor export controls have been sufficient to prevent the proliferation of biological and chemical weapons. We must therefore also seek to deter the use of biological and chemical weapons by assuring a potential aggressor of three related outcomes, namely that: their use will not be allowed to secure political or military advantage; it will, on the contrary, invite a proportionately serious response; and that those, at every level, responsible for any breach of international law relating to the use of such weapons, will be held personally accountable.*"[14]

3.1.22 It is highly questionable whether the use of nuclear weapons would be a proportionate response to the use of biological and in particular chemical weapons.

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9 Strategic Defence Review, "Supporting Essay Five: Deterrence, Arms Control, and Proliferation", para. 5, The Stationery Office, July 1998. Also available at http://www.mod.uk/policy/sdr/essay05.htm

10 The Strategic Defence Review, presented to Parliament by the Secretary of State for Defence by Command of Her Majesty, July 1998, Cmnd 3999, The Stationery Office. Also available at http://www.mod.uk/policy/sdr/index.htm

11 The British Strategic Nuclear Force: Text of Letters exchanged between the Prime Minister and the President of the United States and between the Secretary of State for Defence and the US Secretary of Defense.

12 "The Alliance's Strategic Concept", NATO Press Release NAC-S(99)65, April 24 1999.

13 Hansard, House of Commons, December 4 1997, column 577.

14 "Defending Against the Threat: Chemical and Biological Weapons", Ministry of Defence, July 1999, Chapter 3.

3.1.23 And following the terrorist attacks on the US in 2001, a new chapter to the Strategic Defence Review extended the role of nuclear weapons further to include deterring terrorist organisations:

"*The UK's nuclear weapons have a continuing use as a means of deterring major strategic military threats, and they have a continuing role in guaranteeing the ultimate security of the UK. But we also want it to be clear, particularly to the leaders of states of concern and terrorist organisations, that all our forces play a part in deterrence, and that we have a broad range of responses available.*"**15**

3.1.24 The implication is that the UK is willing, if necessary, to use its nuclear weapons against states of concern and terrorist organisations, raising the question of how this could be done without also killing large numbers of civilians.

3.1.25 NATO and the UK's refusal to rule out the first use of its nuclear weapons has been a major obstacle to progress on Negative Security Assurances, a long-standing issue linked with the Nuclear Non-Proliferation Treaty. The 1995 NPT Review Conference agreed that "further steps should be considered to assure non-nuclear-weapon States party to the Treaty against the use or threat of use of nuclear weapons. These steps could take the form of an internationally legally binding instrument."**16** However, since 1995 there has been no significant change in NATO or UK nuclear posture and consequently there have been no further steps on negative security assurances.

3.1.26 **The UK's policy on nuclear disarmament negotiations**

The UK has always refused to enter the Trident system (or its predecessors) into nuclear disarmament negotiations despite requests to do so, arguing that such a move would be unnecessary, irrelevant or premature. I believe that this violates the UK's commitment to pursue disarmament negotiations in good faith under Article VI of the NPT.

3.1.27 During the 1970s and 1980s, the UK repeatedly refused to enter its nuclear weapon systems into the disarmament negotiations of that time. During the SALT I and SALT II talks in the 1970s, the UK's refusal to allow Polaris to be considered caused problems during negotiations. The Soviet Union repeatedly called for the ballistic missile submarines of US allies in NATO to be taken into consideration and argued that if "US allies in NATO should increase the number of their modern submarines… the Soviet Union will have the right to a corresponding increase in the number of its submarines".**17**

3.1.28 When the UK government first announced its decision to procure the Trident I C4 nuclear weapon system in 1980, it argued that Trident was compatible with the UK's arms control obligations on the grounds that it was: "fully consistent with the terms of the SALT II Treaty"; that "the scale of our new capability will in no way disturb existing and prospective East/West relativities"; and that "Britain's strategic SLBM force lies outside the category of those United States and Soviet long-range, land-based theatre nuclear forces about whose limitation the United States… invited the Soviet Union to negotiate".**18**

15 "The Strategic Defence Review: A New Chapter", Ministry of Defence, Cm 5566, Vol I, July 2002.
16 "Principles and Objectives for Nuclear Non-Proliferation and Disarmament", NPT Review Conference 1995.
17 "Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with respect to the Limitation of Strategic Offensive Arms", Unilateral Statement by Minister Semenov, May 17, 1972.
18 "The Future United Kingdom Strategic Nuclear Deterrent Force", Defence Open Government Document 80/23, Ministry of Defence, July 1980.

3.1.29 Similarly, when the UK announced that it was changing to procure the Trident II D5 system in 1982, it argued that Trident was not relevant to the INF and START negotiations. The government argued that Trident was not relevant because these negotiations were "bilateral", aimed at achieving a "level of strategic parity" between the US and the Soviet Union. The UK argued that the "British strategic force will account for no more than a very small fraction of the total size of the strategic nuclear forces maintained by the United States and the Soviet Union". However, it added:

"*If these circumstances were to change significantly, e.g. if Soviet military capabilities and the threat they pose to the United Kingdom were to be reduced substantially, we would of course be prepared to review our position in relation to arms control. But this point would appear to be a long way off.*"**19**

3.1.30 During the 1980s, the end of the Cold War resulted in massive cuts to Soviet/Russian military capabilities, in particular reductions in nuclear weapons. However, the UK's response to these reductions has not been to review its position on nuclear weapons or to allow British nuclear weapons to be entered into disarmament negotiations.

3.1.31 In 1987, the INF Treaty was signed by Presidents Reagan and Gorbachev. The Soviet Union had tried to involve UK nuclear weapons in the INF negotiations, but the UK, backed by its NATO allies, opposed this. Prime Minister Margaret Thatcher's response to INF was that she believed that nuclear arms cuts in Europe had gone far enough: "I will never give up Britain's independent nuclear deterrent", she told the media.**20**

3.1.32 According to the Defence Select Committee, as US and Soviet nuclear reductions gathered pace, rather than pursuing disarmament negotiations in good faith, Mrs Thatcher "sought and received assurances from the United States that the supply of Trident missiles to the UK will in no way be affected by any future arms control agreement."**21**

3.1.33 In 1997 Labour was elected to government with an explicit manifesto comment to press for "multilateral negotiations towards mutual, balanced and verifiable reductions in nuclear weapons." The manifesto continues: "When satisfied with verified progress towards our goal of the global elimination of nuclear weapons, we will ensure that British nuclear weapons are included in multilateral negotiations."**22**

3.1.34 Shortly after the 1997 election, the Strategic Defence Review stated: "The Government wishes to see a safer world in which there is no place for nuclear weapons. Progress on arms control is therefore an important objective of foreign and defence policy."

3.1.35 However, the government continued to make negotiations on nuclear disarmament a long-term aspiration rather than an immediate policy objective. The SDR states: "while large nuclear arsenals and risks of proliferation remain, our minimum deterrent remains a necessary element of our security."**23** And it essentially rules out any further reductions in UK nuclear weapons until further reductions have been made by the US and Russia:

19 "The United Kingdom Trident Programme", Defence Open Government Document 82/1, Ministry of Defence, Cmnd 8517, March 1982.
20 Nicholas Ashford and Alexander Chancellor, "Arms reduction accord threatens UK deterrent", The Independent, 22 September 1987.
21 "Progress of the Trident Programme", 422 of 1987-88, HMSO, May 11 1988.
22 Labour Party Manifesto, "New Labour: Because Britain deserves better", 1997.
23 Strategic Defence Review, Ministry of Defence, Cm 3999, July 1988.

"Our own arsenal, following the further reductions described above, is the minimum necessary to provide for our security for the foreseeable future and very much smaller than those of the major nuclear powers. Considerable further reductions in the latter would be needed before further British reductions could become feasible."[24]

3.1.36 In the Labour Party manifesto for 2002, the commitment to nuclear disarmament had been toned down and rephrased to read: "The Nuclear Non-Proliferation Treaty commits us to work for the global elimination of nuclear weapons" but gives no specific policy steps to achieve this goal.

3.1.37 Despite the reductions made by the US and Russia in the Strategic Offensive Reduction (SORT) Treaty of 2002, the UK continues to argue that the time is still not right for it to enter nuclear disarmament negotiations. In his speech to the 2004 NPT PrepCom, UK Ambassador David Broucher argued:

"We have consistently stated that when we are satisfied that sufficient progress has been made – for example, in further deep cuts in their nuclear forces by the US and Russia – to allow us to include the UK's nuclear weapons in any multilateral negotiations, without endangering our security interests, we will do so."[25]

3.1.38 The implication is that more than 35 years after signing the NPT, the UK is still not ready and willing to pursue negotiations in good faith on nuclear disarmament. Far from adopting a position of willingness to pursue nuclear disarmament negotiations, the UK has made it clear that it intends to maintain Trident for up to 30 years and is considering options to replace it. This is not consistent with the commitment to negotiate in good faith on nuclear disarmament.

3.1.39 **Questions to Nicola Butler and her responses**

1. How independent is Trident?
Trident is assigned to NATO. The government procures Trident from the USA. It is dependent on the USA.

2. What do we know about targeting?
The government has always refused to answer questions about this.[26] We know that targeting is controlled by computer software. There are fallback plans in case of computer problems. Trident uses the USA's Global Positioning System (GPS) and depends on US intelligence. The EU's attempt to develop a rival GPS has been blocked by the USA.

3. How much does Trident cost?
About £33-50 billion in total (i.e. procurement plus running costs plus a proportion of the cost of running Aldermaston and Faslane).

4. Have there been any improvements in Trident's firepower since the ICJ delivered its advisory opinion in July 1996?
There has been very little change since then.

5. What do we know about the command structure on a Trident submarine?
Not much information is in the public domain. In the USA the chain of command has been tightened.

24 ibid.
25 Statement by Ambassador David Broucher, NPT Preparatory Committee 2004, Cluster I, May 3 2004.
26 The missiles have been de-targeted since 1994. See Hansard, House of Lords, February 22 1996, Column 1137. The Parliamentary Under-Secretary of State, Earl Howe, added: "It is not our practice to comment further on targeting."

6. If the US resumes nuclear testing, will the UK do so too?
The UK used to use the Nevada test site. It is very difficult to say how the UK will respond if the US resumes testing. The UK is a party to the Comprehensive Test Ban Treaty but the Prime Minister is a close ally of George W Bush. There is concern that a replacement for Trident would require testing – unless the UK buys a US system 'off the shelf'.

7. It seems clear that UK nuclear strength has improved absolutely over the last 20 years.
Has it also improved relative to potential adversaries (e.g. Russia) and allies (the USA)?
Probably absolutely and relatively as the USA and Russia have substantially reduced their stocks of warheads since the end of the Cold War.

8. Might the UK argue that it needs an enhanced system as the world has become more dangerous?
Most 'states of concern' are non-nuclear weapon states.

9. You said that 'the US gives the UK missiles'. Are these transfers contrary to the NPT?
We must distinguish between missiles (i.e. delivery systems) and warheads. They are US missiles which the UK lease-purchases. The UK designs its own warhead (with US assistance).

10. If Trident is replaced over the next few years, how much will the replacement package cost?
The UK is likely to buy a US system 'off the shelf'.

11. How does the UK justify its claim to be implementing Article VI NPT?
Withdrawal of the WE177 and of Polaris, and other de-escalatory measures. But such measures can be quickly reversed.

12. What disarmament negotiations, if any, has the UK proposed?
None.

13. What can you tell us about 'negative security assurances'?
Assurances of non-use against non-nuclear weapon states are not legally binding. Labour had said that it would pursue a legally-binding commitment and a policy of 'no first use', but both were overridden by the USA and excluded from the SDR.

14. Were nuclear weapons deployed in the Falklands / Malvinas conflict or the Iraq war?
It is difficult to get confirmation one way or the other. The government will not rule anything in or out. It is deliberately ambiguous.

15. Do the armed forces like Trident? Is there a link to status (e.g. being a Permanent Member of the UN Security Council)?
The UK is a declining power in world terms. Therefore nuclear weapons are seen as important in order to reinforce the UK's position in the Security Council. When speaking of UK influence with the US, UK officials spoke of their fear of "sending the UK naked into the conference chamber". As far as view of the armed forces is concerned, unofficially RN personnel have made strong statements about Trident's lack of military utility.

16. Did the Secretary of State for Defence's statement in March 2002 (concerning the willingness to use nuclear weapons, even pre-emptively, against countries which used chemical or biological weapons against British troops in the field[27]) represent a departure from the government's previous position?

27 See Defence Select Committee, March 20 2002, www.parliament.the-stationery-office.co.uk/pa/cm200102/cmselect/cmdfence/644/2032008.htm.

He essentially reaffirmed what Malcolm Rifkind had said in 1993. However, the declared willingness to act pre-emptively was new. There is a tendency for UK nuclear doctrine to follow US doctrine. The US is setting the agenda.

17. Would the UK be vulnerable to nuclear coercion if it gave up its nuclear weapons?
South Africa and other countries which have renounced nuclear weapons have not become subject to such coercion.

18. How can we be certain that there would be reliable verification if nuclear weapons were to be banned?
Verification is not perfect but the five nuclear weapon states could and should bring their own verification proposals to the table.

19. There are US nuclear weapons in Germany and Italy etc. Have they not been "transferred" within the meaning of Article 1 of the NPT?
The US states that they are still under US "control" – they put forward this position, endorsed by the UK, in 1968. A number of other countries do not agree and the issue was raised at the 1995 and 2000 Review Conferences.

3.2 Characteristics of the Trident warhead - Effects of the explosion of a Trident warhead - New nuclear weapons (Witness: Dr Frank Barnaby - Oxford Research Group, nuclear physicist)

3.2.1 Some characteristics of the Trident warhead

Comparison of Polaris and Trident SLBMs

	Polaris	**Trident(1994-)**
Missiles/sub	16 A3-TK	16 D-5
Warheads /missile	2	1 to 3*
No. of submarines	3	4
Maximum warhead no.	96	192
Yield per warhead	40 kt	100 kt
Type of warhead	MRV(man.)	MIRV
Range (km)	4,700	7,400
CEP (m)	900	120

** It is accepted that the usual number of warheads per missile is three but it should be noted that there can be anything from one to eight.*

3.2.2 The British Trident nuclear warhead is based on the American W-76 warhead, used on American Trident II D-5 warheads. The British nuclear warheads are built at the Atomic Weapons Establishment (AWE) at Aldermaston. The use of British materials may require some modifications of the design. The Americans are modernising the Mark 4 re-entry vehicles that carry the W-76 warheads by equipping them with a modified fuse designed to give the warhead a capability to explode on the surface. The CEP may be reduced to less than 10 metres. The accuracy of the delivery of the warhead is also being improved using the Global Positioning System (GPS). This may reduce the CEP to less than 10 metres.

3.2.3 Under the Mutual Defence Agreement (MDA), the British may be assisted in making similar improvements to their Trident warheads. The UK is, however, not currently known to be

significantly modernising its Trident D-5 warheads. Although the Americans do not provide the British with nuclear warheads, the British Trident strategic nuclear arsenal is almost entirely dependent on American technology and support. Trident is an American missile system. The UK does not manufacture or purchase its own Trident missiles but 'leases' missiles from America's missile stock.

3.2.4 The Americans also supply: highly enriched uranium to fuel British Trident submarines; the storage, assembly and servicing of the missiles; US facilities at Kings Bay, Georgia, for the preparation for entry into service of British Trident missiles and their refurbishment during each major submarine refit; and the information for the targeting and guidance of the missiles. The British nuclear deterrent is, therefore, by no means an independent one. Neither is it a true deterrent.

3.2.5 The targets of nuclear deterrence are the enemy's cities, civilian population, and industry. If he knows that he faces unacceptable death and destruction in retaliation if he attacks you, the enemy will not attack in the first place. But nuclear deterrence works only with inaccurate nuclear weapons.

3.2.6 With accurate weapons the enemy no longer believes that its cities are targeted. He believes instead that enemy warheads are targeted on his strategic nuclear forces. Nuclear-war fighting, based on the destruction of hostile military forces in a pre-emptive nuclear first strike, becomes the nuclear policy. If one side believes that the other side is likely to attack, it must fire its missiles before enemy missiles arrive. Otherwise, its strategic missiles will be destroyed before they can be launched. A nuclear-war fighting policy, therefore, makes nuclear war more likely. Trident nuclear warheads are accurate enough to be nuclear-war fighting weapons rather than nuclear deterrent weapons.

3.2.7 **Trident sub-strategic warheads**
The UK government has announced that it will not deploy more than 48 Trident II D-5 SLBM warheads on each Trident submarine. The 1998 Strategic Defence Review (SDR) says: "We will have only one submarine on patrol at any one time, carrying a reduced load of 48 warheads". This implies that each of the 16 missiles will carry on average three MIRVs.

3.2.8 The SDR states that Trident "covers both strategic and sub-strategic requirements". Exactly what sub-strategic means is not clear – it would be less confusing to call them tactical warheads. Trident strategic warheads are generally assumed to have an explosive yield equivalent to that of 100,000 tonnes of TNT (100 kt). The MoD keeps the yield secret but independent experts assume that the strategic warhead is similar to the American W76 warhead carried on the American Trident I C-4 SLBM, which has an explosive power of 100 kt.

3.2.9 Presumably a single "sub-strategic" warhead will be carried on a Trident SLBM. The yield of the "sub-strategic" warhead to be carried on British Trident SLBMs has not been announced. It may well be about 1 kt. This could be achieved by removing the tritium bottle from the boosted fission trigger in the warhead, a simple operation.

3.2.10 The yield of the trigger without boosting is probably about 1 kt; with boosting it is probably 10 kt. The thermonuclear stage will then give a thermonuclear yield of 100 kt. The warhead could then have variable yields of about 1 kt (achieved by removing the tritium bottle), 10 kt (by 'switching out' the thermonuclear stage), and 100 kt (using the total fission plus fusion yield).

3.2.11 **The effects of the explosion of a Trident warhead with a yield of 1, 10 or 100 kt**
The energy of a nuclear explosion is given off as blast, heat and radiation. Typically, about 50 per cent of the total energy goes into the blast effect, 35 per cent is in the heat effect, 5 per cent appears

as initial radiation (given off within a minute of the detonation), and 10 per cent as residual radiation, given off by the decay of radioactive isotopes in the fallout.

3.2.12 The magnitude of the effects will depend on a number of factors. These include: the medium in which the weapon is exploded, underwater, underground or in the air; the weather; and the altitude of the explosion. Radiation effects, for example, will be much greater for explosions on the surface or at low altitudes.

3.2.13 To maximise the death and destruction from, say, a 20 kt explosion, it will be exploded at a height of about 600 metres, the height at which the Nagasaki bomb was exploded. The Hiroshima bomb (12.5 kt) was exploded at an altitude of about 500 metres. The number of deaths at Hiroshima and Nagasaki is not known with any accuracy, but it was roughly 150,000 for the former and 100,000 for the latter – a death rate of about 40 per cent.

3.2.14 Air-bursts are significantly more damaging locally than ground bursts of the same yield; much of the energy of a ground burst goes into creating a large crater. Ground bursts, however, produce much larger amounts of fallout and, therefore, of residual radiation (see below).

3.2.15 **1 kt nuclear explosion**

The Cabinet Office has calculated the effects of a (terrorist) nuclear explosive detonated at ground level in a typical city. Although the study involves a primitive nuclear weapon, its conclusions apply to a military weapon of the same explosive yield. The explosion was equivalent to that produced by 1,000 tonnes (1kt) of TNT, a possible explosive yield from a sub-strategic Trident warhead. Within one minute, people outdoors or near windows inside houses would be killed by thermal radiation (heat) up to a distance of 200 metres from the point of detonation. Within one minute, blast would kill people up to a distance of 800 metres, and initial nuclear radiation would kill people up to a distance of 1 kilometre.

3.2.16 People within two kilometres would be injured by blast and those within one kilometre would be injured by heat. Communications equipment would be damaged by the nuclear electromagnetic pulse up to a distance of about two kilometres and electronic equipment would be damaged or disrupted up to a distance of about ten kilometres, with severe consequences for fire services, police headquarters, and hospitals. The electromagnetic pulse would affect motor vehicles out to about ten kilometres.

3.2.17 Assuming a 24 kilometre per hour wind, ionising radiation levels from radioactive fallout within an area of about 15 square kilometres would be high enough to cause radiation sickness in the short term to those exposed in the open, and in some cases to those in buildings. This area would extend to some ten kilometres downwind and would have a maximum width of about two kilometres. Furthermore, radiation levels in an area of about 400 square kilometres would be such that certain counter measures would have to be taken to protect people from the long term effects of exposure to radiation for example, fatal cancers. This area would extend some 80 kilometres downwind.

3.2.18 The most serious source of radioactive contamination from any crude nuclear explosive device is likely to arise from the dispersal of plutonium. If one kilogram of plutonium is uniformly distributed it will contaminate about 600 square kilometres to a level of one micro curie per square metre, the maximum permissible level allowed for plutonium by international regulations. This means that a very large area will have to be evacuated and decontaminated, an expensive procedure that could take years.

3.2.19 Areas of lethal damage blast, heat and radiation (excluding residual radiation) for nuclear weapons exploded at low heights above the ground with yields of 1, 5 and 100kt are shown in the table. It shows that for a 1 kt explosion there is a very high probability that people within about 1 kilometre of ground zero will be killed. For a 10 kt explosion, the lethal distance becomes about 2 kilometres. For a 100 kt explosion, the lethal distance becomes about 5 kilometres. For a 1 kt explosion, radiation is more lethal than blast and heat (a person cannot be killed twice).
For a 10 kt and 100 kt explosion, heat is more lethal than either blast or radiation.

Areas of lethal damage from blast, heat and radiation (in km^2)

	Explosive yield		
Type of damage	1 kt	10 kt	100 kt
Blast	1.5	4.9	17.7
Heat	1.3	11.2	74.2
Radiation	2.9	5.7	11.5

3.2.20 **New nuclear weapons**
Some people believe that scientists at the AWE are developing new nuclear weapons, perhaps including a warhead for replacement for Trident. But there is no public information to support this assertion. The USA is now taking steps to acquire new types of nuclear weapon, including one to attack targets buried deep underground and so-called mini-nukes. Under the Mutual Defence Agreement, British and American nuclear-weapon scientists collaborate. The US has provided the British with information on the design and characteristics of their nuclear weapons and information obtained by nuclear testing. This collaboration raises the suspicion that the British may copy some of the nuclear-weapon developments undertaken by the Americans. It is, therefore, relevant to look at current American nuclear weapon developments. A new British nuclear weapon, based on a new American design, may be used as warhead in a replacement for Trident.

3.2.21 **Nuclear weapons are back on the agenda**
Nuclear weapons are now back on the agenda to an extent reminiscent of that at the height of Cold War. For example, the US Nuclear Policy Statement, completed at the end of 2001, describes the role of nuclear weapons well into the future, not as part of a nuclear deterrent policy but as part of America's war-fighting strategy. Apparently, the Pentagon is preparing contingency plans to use nuclear weapons against targets in seven or more countries – including China, Iran, Iraq, Libya, Russia and Syria.

3.2.22 And in March 2002, the Secretary of State for Defence announced, for the first time ever, that British nuclear weapons could be used in a first strike and against countries that used biological or chemical weapons against British forces or targets in the UK. Both the American and British governments have now reneged on their security assurance guarantees not to use nuclear weapons against countries that do not have them and are not allied to a nuclear-weapon power.

3.2.23 **A new generation of American nuclear weapons**
The US has not developed a new nuclear weapon since 1988 and has not conducted a test of a nuclear weapon since 1992. That the USA is taking new nuclear-weapon initiatives is shown by the approval in the US defense budget for Fiscal Year 2004 of US efforts to design a new generation of low-yield nuclear weapons. The first move in this direction occurred in May 2003

when the Senate overturned the so-called 1994 Spratt-Furse Law, stating that the US may not conduct research and development that could lead to the production of low-yield nuclear weapons, weapons with explosive yields less than the equivalent of the explosive yield of 5,000 tonnes of TNT (5 kilotons {kt). The law, named after the legislative authors Representatives John Spratt and Elizabeth Furse, was adopted as part of the Fiscal Year 1994 Defense Authorisation Act.

3.2.24 The Spratt-Furse Law was a response to arguments of some in the Pentagon and some other policy makers for developing low-yield nuclear weapons and developing roles for them in the US post-Cold War arsenal. Representatives Spratt and Furse believed that these weapons would blur the distinction between conventional weapons and nuclear ones and that their deployment would significantly increase the probability that nuclear weapons would be used.

3.2.25 In 2003, the Bush Administration asked the Congress to remove the ban in the Spratt-Furse Law. For Fiscal Year 2004, it requested funds for the Robust Nuclear Earth Penetrator (RNEP) and for studying how to design warheads with specific radiation outputs and other effects. The request for the RNEP is to continue the study of modifying an existing weapon to penetrate completely into the ground before detonating, increasing its ability to destroy buried targets. Finally, the Administration requested funds for Nuclear Test Readiness to reduce the maximum time between a presidential order to conduct a nuclear test and the test itself. Since 1996, this time has been 24 to 36 months. The Administration asked for money to maintain this readiness and to begin reducing the time to 18 months. President Bush signed the Defense Authorisation Bill into law on November 24 2003.

3.2.26 The Administration requested $21 million for the programme, $15 million of which is to continue a study of the RNEP, started in May 2003 and the remaining $6 million for other advanced weapon concepts. The request for nuclear test readiness was $24.9 million. The funds requested have been provided. The Administration proposal for new nuclear weapons developments arose from arguments of some politicians, military officers, defence bureaucrats and senior scientists in America's nuclear weapon laboratories that the US should develop and deploy a new generation of low-yield nuclear weapons that can be delivered with great precision on hardened and deeply-buried targets.

3.2.27 These 'mini-nukes', with less than a 5 kt yield, would be designed for use in conflicts with Third World countries, or for attacks on terrorist groups, particularly ones armed with chemical or biological weapons, rather than for deterring warfare with another nuclear power. There could be a number of types of mini-nukes, enhancing blast or heat or radiation effects. This would allow a nuclear weapon with appropriate characteristics to be chosen for an attack on a specific target. A nuclear weapon with enhanced radiation effects would be similar to the enhanced-radiation weapon (neutron bomb) developed in the 1980s. The US Congress has not yet authorised any funds for the production of any low-yield (less than 5kt) nuclear weapons. Funds have been authorised only for work on the design of low-yield nuclear weapons but not for any more advanced work, such as development engineering.

3.2.28 **Robust Nuclear Earth Penetrators (RNEPs)**
Advocates of RNEPs suggest that they would significantly reduce collateral damage when used to attack hardened, deeply buried targets, compared to the use of a higher yield nuclear weapon exploded on the surface. This presumably makes their use easier to contemplate. But critics point out that no earth-penetrating weapon could penetrate deep enough into the earth to contain its blast and would ventilate, injecting into the atmosphere a cloud of radioactive material.

3.2.29 Nuclear-weapon scientists at the Nevada Test Site have discovered that a nuclear weapon with a yield of as little as that equivalent to 100 tonnes of TNT (0.1 kt or 0.8 per cent of the yield of the nuclear weapon that destroyed Hiroshima) would have to penetrate to a depth of about 57 metres to be confident that its blast effects would be contained and would not release into the atmosphere significant amounts of radiation.

3.2.30 Other experts put the depth at 70 metres. This does not take into account that, as the weapon penetrated the earth, the weapon would bore out and leave behind a chimney though which radioactive fallout and debris would escape into the atmosphere. The result would inevitably be a large crater and a cloud of radioactive fallout would shoot out like a fountain and seriously contaminate the region around the point on the surface above the centre of the explosion with deadly radioactivity. About 50 percent of the total radioactivity produced in the explosion would be spread far and wide as local fallout that would cause substantial collateral damage to civilians. The remainder would be confined to the highly radioactive crater.

3.2.31 The earth-penetrating nuclear weapon in the current American arsenal is the B-61 modification 11 (B61-11), first deployed in 1997. The yield of the weapon can be varied between 0.3 and 300kt. Designed to penetrate to explode at a depth of 15 metres, tests showed that, dropped from an altitude of 12 kilometres, it could penetrate only between 2 and 3 metres of frozen tundra or 6 metres of dry soil.

3.2.32 Critics of any move towards the development and production of new mini-nukes argue that they would blur the distinction between modern conventional weapons and nuclear ones. Their deployment would, therefore, significantly increase the probability that nuclear weapons would be used.

3.2.33 Advocates of RNEPs argue that they would reduce collateral damage when used to attack underground targets, compared to the use of a higher yield nuclear weapon exploded on the surface. But critics point out that RNEPs would not penetrate deep enough to contain effectively its blast and radioactivity and would, therefore, contaminate the atmosphere with a cloud of radioactivity.

3.2.34 The development of mini-nukes and RNEPs could lead to resumed nuclear testing by the US. This would threaten the integrity of both the CTBT and the NPT and probably accelerate the disintegration of the NPT. Those anxious to maintain and strengthen the NPT should, therefore, oppose any moves to deploy a new generation of nuclear weapons.

3.2.35 **Helen and Orion**

Some people believe that the fact that the installation of a new laser system is planned at Aldermaston is evidence that one or more nuclear weapons are being developed. The new system, called Orion, will replace the existing laser system, called Helen – High Energy Laser Embodying Neodymium. Orion will consist of 12 laser beams, 2 of which have very short pulse lengths and very high power. Both systems allow scientists to study fundamental physics in a regime that replicates the temperatures and densities produced in a thermonuclear explosion and in the stars.

3.2.36 It will create, albeit in a very small volume (one millimetre cubed), hot, dense matter, called a high energy density plasma. (In the explosion of a thermonuclear weapon, most of the energy is released when it is the plasma state.) Physicists can then study the physics of the plasma even though it is very short lived. Temperatures of up to three million degrees and pressures of millions of atmospheres will be produced in the tiny volume. This will enable computer code calculations

to be verified and data generated that can be used in supercomputing simulations. Orion will enable studies to be made at higher temperatures and densities than Helen. The plan is for Orion to be operational by the end of 2007. The long-pulse beams will compress a sample and the short-pulse beams will heat it.

3.2.37 Aldermaston scientists argue that, in the absence of nuclear testing, the laser system is essential to their ability to maintain and enhance their understanding of nuclear-weapons physics. This is presumably the main purpose of the system. It cannot contribute directly to maintaining confidence in the reliability and safety of British nuclear weapons (so-called Stockpile Stewardship). With or without nuclear test explosions, reliability is maintained by dismantling weapons taken at random from the stockpile, inspecting their components, and replacing parts that have deteriorated. Nuclear parts that cannot be tested without a nuclear explosion must be replaced with parts whose essential properties replicate those of the parts being replaced.

3.2.38 The laser system is designed to achieve temperatures and pressures that approach those reached in a nuclear explosion. Therefore, if the advanced nuclear-weapons codes now under development are able to predict correctly the behaviour of the small nuclear explosions produced by the laser system, there will be more confidence in the correctness of their predictions for actual nuclear weapons. Although it could be argued that, in this sense, the laser system indirectly contributes to the design of new nuclear weapons, it will not directly contribute to it.

3.2.39 **Questions to Dr Frank Barnaby and his responses**

1. What do you mean by CEP?
It is a measure of the accuracy of delivery of the missile.

2. You say that “the UK is not currently known to be significantly modernising its Trident D-5 warheads”. What do you mean by “significantly”?
The MoD won’t give any details but it is reasonable to assume that this statement is true.

3. Can we really speak of the “accuracy” of Trident given the blast, heat and especially the radiation effects?
Accuracy determines policy. Trident is a qualitatively improved system compared with Polaris. The technology forces us to switch from deterrence to war-fighting. This is not generally understood. It is an elite view currently confined to a small number of people. The greater the accuracy, the more likely it is that a warhead would be detonated at or near ground level, which will maximise fallout.

4. What do we know about targeting?
In the past, Trident was almost certainly targeted on ABM systems around Moscow. You don’t need particularly accurate weapons for that. So why are we improving accuracy? It suggests that there are now new targets, i.e. strategic targets which will need attacking with a first strike.

5. In its advisory opinion, the ICJ referred to the “unique characteristics of nuclear weapons” and observed that “the first two causes of damage (i.e. heat and energy) are vastly more powerful than the damage caused by other weapons, while the phenomenon of radiation is said to be peculiar to nuclear weapons”. Do you agree with that assessment?
Yes, the most serious problem is the dispersal of plutonium which is very toxic when inhaled. The lower the yield, the more lethal proportionately is the radiation. The new ‘mini nukes’ could enhance blast, heat and radiation.

6. Why are the radiation effects of nuclear weapons much greater for explosions on the surface or at low altitudes?
Because at, or near, ground level solid material is 'sucked in' and irradiated. A 1kt bomb would take radioactivity high enough to spread it over long distances.

7. Is it possible to predict where the fall-out will be and therefore where the casualties will be?
The full effects of fall-out - the scale of civilian casualties - are impossible to foresee. Where the fall-out goes will depend on the winds.

8. Is there the technology to counteract "launch on warning"?
No, the US doesn't have the capacity to extinguish "launch on warning". You would have to "blind" all the satellites.

9. Would nuclear weapons be useful to reach bunkers deep underground?
Not really. Any weapon can only reach so far below ground and nuclear weapons cannot burrow deep enough to reach such bunkers. Even if in due course they could, people would simply build the bunkers deeper underground. In any event, underground bunkers, assuming they can be reached, can be destroyed using conventional weapons.

10. Would 'small' nuclear weapons and 'bunker busters' produce radiation?
Yes, they would ventilate radiation above ground by creating a funnel effect from the tunnel produced to reach the bunker. If used against bunkers containing chemical or biological weapons deep underground, those weapons' noxious ingredients would also be ventilated, along with the radiation, but the radiation would be more significant. Even NATO troops would be contaminated by NATO's use of small nuclear devices. Another stated potential use of "small" nuclear weapons is against terrorist cells. In order to hit these accurately, the weapon would be exploded near the ground, thus producing a high level of fall-out. A less accurate nuclear weapon would have to be exploded higher in the air because then there would be a more widespread blast effect.

11. What would be the radiation effect of a "mini-nuke" (1 kt) compared with the radiation spread by the accident at Chernobyl?
The fall-out from Chernobyl was a fraction of the expected fall-out from a 1 kt nuclear weapon. A 5kt explosion would release a roughly comparable amount of caesium-137 (a very important radioisotope from the human health and environmental contamination points of view) as the amount released by the Chernobyl nuclear accident. These figures are, however, very tentative and a sensible comparison is not really possible.

12. Why would a state want to develop a nuclear weapon with enhanced radiation effects?
Because it would kill people while minimising damage to buildings and equipment.

13. Can you think of a military use for nuclear weapons that conventional weapons are incapable of achieving?
No.

14. Do you believe that the planned installation of a new laser system at Aldermaston is evidence that new nuclear weapons are being developed?
I think the purpose is to keep our young scientists happy and so stop the "brain drain". It helps improve knowledge of nuclear physics.

3.3 The health and environmental effects of nuclear weapons (Witness: Douglas Holdstock - Nuclear Hazards Group, Medact)

3.3.1 The consequences for human life and health of nuclear explosions and radiation are all too familiar as a result of the 1945 Hiroshima and Nagasaki A-bombs, the above-ground nuclear-weapon tests of the late 1940s and 1950s, and the Chernobyl accident of 1986. Accordingly, there is little new in this paper, but an attempt is made to relate information from these sources to the possible use of Trident, with a brief reference to possible successors.

3.3.2 **Hiroshima and Nagasaki**

The Hiroshima bomb was a uranium fission weapon with an explosive yield equivalent to about 12.5kt (12,500 tonnes) of conventional explosive. That of Nagasaki was a plutonium fission bomb of yield about 22.5kt. (For comparison, the largest "block-buster" conventional bombs used in the later years of World War 2 contained about 20 tonnes of high explosive.) The number of deaths at Hiroshima and Nagasaki will never be known with any degree of certainty, but is thought to be of the order of 150,000 for the former and 100,000 for the latter. These figures are given to emphasise the uncertainties in predicting the possible consequences of the use of today's nuclear weapons, which will depend, apart from the population density where they might be used, on various climatic and environmental factors. For instance, although the Hiroshima bomb was of lower explosive yield from that of Nagasaki, it caused more casualties. Hiroshima is situated on a low but flat plateau, whereas Nagasaki is in a more hilly area, and some of its population was sheltered from the effects of the explosion by ridges of hillside.

3.3.3 Both Hiroshima and Nagasaki were air-bursts. The local effects of air-bursts are significantly greater than ground level bursts of the same yield; a significant proportion of the energy of the latter is dissipated in producing a large crater. On the other hand, ground bursts result in much larger amounts of fallout (see below).

3.3.4 **Effects of nuclear explosions**

The adverse effects of nuclear explosions are due to three physical processes: blast from shock waves; heat; and ionising radiation. The latter in turn can be subdivided into prompt radiation (principally high-energy neutrons and gamma-rays), and fallout of radioactive and unfissioned material, particularly plutonium. I hope that Dr Barnaby will give the panel sufficient detail on the physics and chemistry involved; there follows brief comments on the adverse health effects of each.

Blast

The shock wave from a nuclear explosion travels outwards at supersonic speeds. Those caught out-of-doors will suffer direct head injury, fractures, or soft-tissue major trauma. As Dr Barnaby will have explained, and as is familiar from photographs of Hiroshima and Nagasaki, buildings in the innermost zones around ground zero are flattened, and further out are severely damaged. Those within them are crushed or injured by flying glass, furniture etc.

Heat

The intense heat wave incinerates those who are out-of-doors close to the explosion, and causes severe burns further out. In the zone where buildings are severely damaged but not flattened, fierce fires, very likely amounting to a firestorm, will cause many severe burns. Those looking at the explosion from a distance will suffer from flash burns to the retina which could lead to permanent blindness.

Prompt Radiation

Gamma rays and neutrons from the explosive will cause varying degrees of radiation sickness (see below) according to distance.

3.3.5 All these factors of course act virtually simultaneously. In the innermost area, the zones of virtually 100% mortality from blast and heat are larger than the zone of most severe radiation sickness so that all deaths are attributable to the former; you cannot die twice. On the other hand, those trapped or incapacitated by fracture and head injuries are unable to escape from fires.

3.3.6 Injuries that are in themselves treatable are likely to be fatal, either because no help is available or because the number of casualties swamp hospitals still functioning further out. For victims who do reach adequate medical care, the effects of their injury will summate; for example, injuries and burns that would normally be survivable will be fatal on account of superadded radiation sickness.

3.3.7 The death and injury rate would be affected by many factors. The daytime population of the centre of large cities is very much larger than at night, and many more people will be out-of-doors. In winter-time, more and thicker clothing will protect the skin from direct flash burns, though the clothing itself may ignite. Rain, fog and cloud will reduce the areas affected by the heat flash.

3.3.8 **Radiation sickness**

Ionising radiation kills or damages all living cells; the extent depends upon the radiation dose received. There are three main forms of acute (early) radiation sickness.

The highest doses of radiation cause the “neurological syndrome” of coma or prostration or and are rapidly fatal; as mentioned, such doses of radiation from nuclear weapons would be received in the zones with virtually total mortality from blast and heat.

With rather lower doses, the “gastrointestinal syndrome” of severe vomiting, intestinal ulceration and copious diarrhoea has a very high mortality.

Rather lower doses affect the bone marrow, causing progressive anaemia, with lowering of the white cell count and blood-clotting factors. This can be severe or fatal in itself, requiring complex treatment in intensive care with isolation facilities, and as noted predisposes to infection and severely handicaps the management of burns and trauma cases.

3.3.9 The survivors of these forms of radiation sickness and also some of those exposed to lower dosage of radiation and not overtly ill at the time, are at increased risk of leukaemia and several forms of cancer for many years. Foetuses exposed in the early weeks of pregnancy are often born deformed, particularly with microcephaly (small heads) with mental impairment. There is a theoretical risk of congenital illnesses in children conceived after exposure, but this has not been observed in the children of Hiroshima and Nagasaki survivors.

3.3.10 **Radioactive fallout**

As well as prompt radiation, a nuclear explosion creates large amounts of highly radioactive material by fission of uranium or plutonium. In addition, if the explosion is low in the atmosphere or at ground level, so that the fireball is in contact with the ground, solid material is sucked into it and irradiated also creating radioactive isotopes.

3.3.11 The fate of this material depends upon particle size and weather conditions. Much of it is deposited in an approximately cigar-shaped area down-wind of the explosion. The various forms of radiation sickness described above would result, the most severe of course closest to the

explosion site. The extent of fallout would depend on the size of the explosion and wind speed. After the first multi-megaton H-bomb explosion at Bikini Atoll in the Pacific in 1954, the plume extended for over 400 km, most of the islanders in atolls 200km from Bikini were affected by radiation-induced illnesses including cancers. Some of these atolls were still uninhabitable 25 years later.

3.3.12 If Trident warheads were detonated as ground blasts, similar effects would occur, of course, over shorter distances but still over many miles.

3.3.13 Some of the irradiated material is carried high into the stratosphere and comes down slowly over a wide area as delayed fallout. Concern over this, particularly over strontium-90, which is incorporated into bone and could irradiate the bone marrow leading to leukaemia, led to a moratorium on above-ground tests and eventually the Partial Test Ban Treaty of 1963 banning them.

3.3.14 Similar fallout was observed after the April 1986 Chernobyl explosion. The radiation from a nuclear power plant explosion is initially less intense, but contains a higher proportion of longer-lived radioisotopes and so decays more slowly. The high content of radioactive iodine from Chernobyl resulted in an increased incidence of thyroid cancer, particularly in children; whether Chernobyl increased leukaemia is still disputed.

3.3.15 Over 500 above-ground nuclear tests were carried out between 1945 and 1963. There can be no certainty over the consequences; one estimate is of over 400,000 leukaemia and cancer deaths - approximately 80 per test. Few accurate cancer registers existed in most countries for most of this time, and cancer is a common disease, so that an increase of this order would not be detectable. But it is reasonable to conclude that the fallout from a single Trident ground blast would cause at least some cases of cancer or leukaemia in years to come.

3.3.16 Estimates in the literature on the death rates from exposure to ionising radiation draw largely on observations on the survivors of Hiroshima and Nagasaki. The dose rates are subject to considerable uncertainly, and most of the exposure was external whole-body radiation, though it is now believed that there was also some fallout in rain. Much of the radiation from fallout is, however, internal, from inhaled or ingested radioisotopes, and recent work on the cellular effects of internal radiation, particularly from alpha-emitters, raises the possibility that its biological effects are larger than hitherto assumed. This would imply that fallout would be appreciably more dangerous than assumed in previous assessments.

3.3.17 This is relevant to the possible use of “tactical Trident”. Information on such usage is classified, but a single warhead could have a yield of 5 to 10 kt, half that of the Hiroshima bomb. Presumably such a weapon would be intended for use against a military or governmental target, which would be “hardened” for protection against conventional bombing, and would therefore be detonated as a ground blast. The lower yield of “tactical Trident”, while reducing blast and heat injury, would result in an appreciable number of fallout casualties.

3.3.18 It is also relevant to a possible successor to Trident, which has not been ruled out. In the United States there is interest in the development of so-called “bunker-busting” weapons, relatively low-yield weapons designed to burrow into hardened targets. The UK, either making use of the Mutual Defence Agreement or independently, might develop a similar weapon. Independent experts are clear that the yield from such weapons could not be contained; there would be venting of highly irradiated material, which would behave like the fallout from existing weapons.

3.3.19 **Environmental effects**
Radiation damages other living things as well as humans. The immediate surroundings of a nuclear explosion are reduced to a radioactive desert, which as already noted would be uninhabitable for some years. Although there would be mutations in animals and plants in the surrounding area (as have been seen around Chernobyl), on balance it is unlikely that there would be serious long-term consequences from the use of a few Trident missiles alone.

3.3.20 Major environmental effects of global nuclear war are possible, such as the "nuclear winter" scenario. Later, because different species vary in their susceptibility to radiation, the earth could be reduced to "a republic of insects and grass" in Jonathan Schell's memorable phrase. It is for the panel to decide whether they should consider the effects of the use of Trident alone or its use as part of a global nuclear war, bearing in mind that today's global stockpiles could be returned to high alert if the worldwide security situation deteriorates.

3.3.21 **The production of nuclear weapons**
The hazards of nuclear weapons may extend to their production as well as their use. Radioactive contamination is severe and widespread around production facilities in the US and the former Soviet Union. There are clusters of childhood leukaemia around reprocessing plants in the UK at Sellafield and Dounreay and Cap de la Hague in France, and in west Berkshire where UK warheads are produced at AWE Burghfield and Aldermaston. On conventional models of radiation risk, population exposures from plutonium and other radionuclides are too small to cause these, but the recent work in radiobiology cited above suggests that these models could under-estimate the risk at least tenfold, and the issue is still wide open.

3.3.22 **Overview**
As already noted in respect of Hiroshima and Nagasaki, a single nuclear-weapon explosion over a city can result in around 100,000 deaths. The lowest possible yield of "tactical Trident" could be of the order of 1 kt. The attached sketch map shows the area affected by an explosion of this magnitude (which might perhaps also be achieved by a terrorist device) in Trafalgar Square. The venue of this hearing is just outside the area of 100% fatality; even such a limited explosion could clearly cause thousands of deaths.

3.3.23 At the other end of the scale, the detonation of all three warheads of a single Trident missile (which are independently targetable) would have similar effects to those of the single one-megaton weapons which were deployed in the early 1980s. Estimates for these were of death rates of the order of half to one million if a large city were targeted; when first deployed, Trident was, so we are told, targeted on Moscow.

3.3.24 The Secretary of State for Defence, Geoff Hoon MP, would apparently not rule out he use of Trident in the run-up to the latest Gulf war. It would be theoretically possible for a single "tactical Trident" missile to be used against a remote military target, say in a desert or high in the Arctic, with only slight "collateral damage" (code for civilian casualties). The panel will need to consider whether such hypothetical use could justify maintaining or replacing the system.

3.3.25 But it appears that the government expects to retain the "minimum deterrent" capacity of Trident, or possibly of its successor, for at least the foreseeable future. A deterrent is only credible if the threat of its use is regarded as credible. The panel will, then, also have to decide whether situations can be conceived for the use of a system that has such a wide range of potential harm beyond its immediate military utility, is possible within the constraints of international law.

3.3.26 Sources

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3.3.27 **Questions to Dr Douglas Holdstock and his responses**

1. Presumably "flash blindness" could affect civilians far from a military target?
Yes, especially on a clear night, when the retina is fully dilated, people several miles away would be blinded.

2. In terms of the heat effects, what kind of temperatures would be reached?
Close to a nuclear explosion, the temperatures are thousands of degrees The human body is incinerated, perhaps, as at Hiroshima, leaving a few scorch marks. Further out, temperatures are hundreds of degrees, with instant death. Varying severity of flash burns (third-, second- and first-degree in descending order) result from direct exposure down to a few tens of degrees. Distances would depend upon the extent of the burst but would extend to several kilometres for Trident. This range of temperatures also creates fires of clothing and in buildings (perhaps with a firestorm as at Hiroshima) causing many more burns in those not directly exposed.

3. Is it possible for people to protect themselves against the health and environmental effects of nuclear weapons?
Shelter and food stocks are better than nothing. NBC suits provide some protection.

4. Is there a causal link between the exposure of a father to radiation and leukaemia in a child subsequently conceived?
This is controversial. In experiments on animals, there is damage to chromosomes including the testes. Damage has been observed in animals and plants but not actually in humans. Children of fathers working in Sellafield got more cancers, but this has been contested by the government.

5. Can we be sure that there is no such link for humans?
No.

6. Judge Weeramantry made an observation about Japan's evidence to the ICJ, drawing attention to the US news blackout on radiation injuries following the attacks on Hiroshima and Nagasaki: the medical world doesn't know the full extent of the health and environmental effects.
I agree.

7. Have there ever been experiments to see the effects of nuclear weapons on human beings?
I don't know of any but there have been experiments on pigs. These were tethered in buildings set up around above-ground test sites to assess weapons effects.

8. What would be the effects on civilians if a single 'tactical Trident' warhead were detonated in the Arctic or the Sahara?
It probably wouldn't do very much physical damage. The surrounding area would become desert (if it were not desert already). The fallout would be mainly in uninhabited areas, but some would go high up into the stratosphere, carried by the wind and come down all over the earth. Civilian deaths could not be ruled out.

9. What would be the effects of using a nuclear device at sea?
A tidal wave-like effect. Irradiated water would not be as dangerous as irradiated debris. But radiation would get into the food-chain (through fish). Internal radioactivity, through inhalation of radioactive fall-out or though ingestion of affected food, is much worse than external effects. It would produce cancers and could produce birth defects. References to severely deformed babies in the Bikini Islands could well have been caused by the fact that people ate a lot of fish in that region.

10. What would be the effects of radiation on the injured? Could most recover or would they die as a result of the radiation poisoning?
All the injuries would interact. Radiation suppresses the healing response leading to reduced chances of recovery. How many would then die depends on the degree of exposure – more exposure exponentially increases the lack of recovery.

11. Are children and the elderly more vulnerable to radiation poisoning?
Children and the elderly are particularly susceptible. The worst affected are children because of the faster rate at which their cells multiply. After Chernobyl a lot of children developed thyroid cancer. The elderly are more affected than younger adults because their cells are less robust and have a weakened healing capacity.

3.4 Is the UK complying with the Nuclear Non-Proliferation Treaty? (Witnesses: Dr Sian Jones – Aldermaston Women's Peace Campaign; and Juliet McBride - Aldermaston Women's Peace Campaign, Nukewatch and a Lecturer in Public Law)

3.4.1 Submission from Aldermaston Women's Peace Campaign referring to work at Atomic Weapons Establishment (AWE) Aldermaston under the Mutual Defence Agreement.

Evidence will relate to the UK's obligations under Article VI of the NPT: *"Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."*[28]

3.4.2 Available evidence suggests that the UK government is preparing to develop the next generation of nuclear weapons, either in the form of a replacement to Trident or in the development of new weapons systems (probably in conjunction with the USA).

28 For the government's position, see Hansard, House of Lords, February 12 1997, Column 240, where Baroness Chalker of Wallasey (Minister of State, Foreign and Commonwealth Office) stated: "we remain committed to pursuing nuclear disarmament under our international obligations, including Article VI of the Nuclear Non-Proliferation Treaty. Nuclear disarmament measures cannot be divorced from the broader global security context."

3.4.3 **Government statements**

In March 2004, the Parliamentary Under-Secretary of State for Foreign and Commonwealth Affairs, Bill Rammell MP, citing the December 2003 White Paper, stated: *"Decisions on whether to replace Trident are not needed during this Parliament, but are likely to be required in the next one. We will therefore continue to take appropriate steps to ensure that the range of options for maintaining a nuclear deterrent capability is kept open until that decision point."*[29]

3.4.4 Amplifying this point, the Secretary of State for Defence stated on 19 July 2004: "Work on a range of options for maintaining a nuclear deterrent capability is in hand in accordance with the policy set out in last December's Defence White Paper." [30]

3.4.5 This work referred to was envisaged in the Strategic Defence Review in 1998, which stated: "Following ratification by the United Kingdom in 1998 of the Comprehensive Nuclear Test Ban Treaty, the maintenance of Trident and the capability to build a successor will have to be achieved without conducting nuclear tests. This poses considerable scientific and technical challenges. We are therefore developing a complex science-based programme at AWE that will require special facilities across a variety of disciplines. These are the main drivers for the future development of the Aldermaston site."

3.4.6 **Developments at AWE Aldermaston**

We will present evidence to suggest that the decision has been all-but made, and that plans to build the infrastructure required to support the next generation of nuclear weapons are in place, and that construction of at least one element on this infrastructure will begin in 2005.

3.4.7 The evidence to support this argument relies of a series of separate elements which when taken together, are indicative that practice may well be in advance of declared policy.

- In June 2002, the Observer and Guardian reported on plans for new developments at AWE. A spokesperson for AWE told the Guardian that the new facilities would provide Aldermaston with the capacity to design and produce "mini-nukes".

- In July 2002, AWE published their Site Development Strategy Plan (SDSP), outlining new facilities, including a new supercomputer, a laser facility, hydro-dynamic testing facilities and materials laboratories.[31]

- January 2003: the government announced the extension to 25 years of AWE ML's [32] existing 10 year contract to manage Aldermaston; the value of the contract was increased from £2.3 bn to £5.3 bn.

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29 Hansard, House of Commons, March 16 2004, Column 297.

30 Hansard, PQ 184480.

31 The Site Development Strategy Plan includes four elements which, combined together, would enable AWE to design, test and build new weapons:
- The new laser facility, which will replace the existing HELEN laser, with "the UK's own national laser facility", and enable the testing of nuclear materials under simulated test conditions;
- The new hydrodynamics facility will enable test data to equal that previously only available from underground nuclear tests;
- The new material science laboratories will also provide underground-test quality diagnosis of weapons' materials;
- A new supercomputer will be able to transpose test data into mathematical models of warhead performance, and is already in place; another is planned.

AWE does not need to build new production facilities. The A90 warhead production complex (built during the Trident programme) can be used to build and service nuclear warheads for many years ahead. The skills and equipment to build small nuclear weapons also exist. The new developments provide the means to test new weapons, Disarmament Diplomacy, bi-monthly journal of The Acronym Institute, Volume 76, March/April 2004.
Aldermaston is run as a government-owned, contractor-operated company. The current contractors, AWE ML, comprise British Nuclear Fuels Ltd (BNFL), Lockheed Martin and Serco. The UK government retains the "golden share" in the company, AWE plc.

32 Options for a new generation weapon detonated by a relatively small thermonuclear explosion could be perfected at laboratory level in 10-15 years, Disarmament Diplomacy, Volume 76, March/April 2004.

- May 2003: the *New Scientist* reported the recruitment of new scientific staff at AWE, reportedly envisaged to rise from 3,500 to 3,800 by 2008; a spokesperson for AWE stated that some of these staff were "highly likely to work under the Mutual Defence Agreement".

- October 2003: the Ministry of Defence submitted outline plans for the new Orion laser facility to West Berkshire council. It was approved in December, but in February 2004 the MoD withdrew this planning notice in the face of a threat of legal challenge;

- April 2004: Notice of Planning Development (NOPD) for outline planning permission for the Orion laser facility was resubmitted, and subsequently passed unanimously by the Thatcham Parish Council Planning Committee on 23 June 2004. Construction is expected to start in spring 2005, with an estimated completion date of 2007.

- 6 August 2004, an NOPD was submitted by the MoD for an Explosives Fabrication Facility; the NOPD was withdrawn on 10 August 2004.

- September 2004, preparatory work appears to have begun on the site of the proposed laser facility in advance of the granting of full planning permission. The contractor, Golder Associates, specialises in ground engineering. It is assumed that they have been brought it to carry out investigations into ground-water/drainage on the site which was identified as an environmental problem in objections presented to the planning committee.

3.4.8 Although each of these elements could, as AWE and the government state and as some scientists suggest, be used merely for the stockpile stewardship operations, we suggest that – taken with government statements – it is more likely that they represent a substantial investment in facilities to assist in the design and development of new systems.

3.4.9 We note that the Trident system took 14 years to complete, from decision to deployment. Trident was brought into service in 1994 and has a life-span of 30 years, to 2024. Although there are arguments that this may be extended, if the same timescale were envisaged, work on a replacement system would have to begin by 2010. **33**

3.4.10 **The Mutual Defence Agreement**
Under the Mutual Defence Agreement, scientists at Aldermaston regularly take part in exchanges and experiments with their counterparts at nuclear facilities in the US. **34**

3.4.11 The exchange of technical information on warhead matters takes place regularly in Joint Working Groups and through exchange of information and visit reports between AWE and the US. Warhead materials for research are exchanged by air via RAF Brize Norton in Oxfordshire.

3.4.12 In 2002, 313 AWE scientists visited 25 US institutions including Dept. of Defence, laboratories, arms companies and other sites including the Los Alamos National Laboratory, Lawrence Livermore National Laboratory, National Nuclear Security Administration Headquarters, Bechtel Nevada and Lockheed Martin Missiles and Space. 485 scientists from 19 US sites made reciprocal visits to AWE.**35**

33 For example, on 14th February 2002 the Los Alamos National Laboratory carried out an underground sub-critical test at the Nevada test site in which one of the super computers at AWE was used in analysing the data.
34 Reply to parliamentary question by Alan Simpson MP, 2003.
35 "All Members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the purposes of the United Nations."

3.4.13 With the exception of the now decommissioned WE-177 free-fall bomb, all UK systems – including the current Trident system – have, since 1958, been developed in conjunction with the US under the MDA.

3.4.14 US nuclear policy and practice may indicate that AWE Aldermaston may be involved in the research and development of low-yield "useable" nuclear weapons; Funds have already been approved in the US for research into the development of RNEPs or "bunker busters". Significantly, approval for the development of "low-yield" weapons was blocked in Congress until earlier this year.

3.4.15 This would suggest that the new facilities at Aldermaston could be used to assist in the design and development process of either a successor to the Trident D-5 warhead
and/or a low yield "useable" nuclear weapon

3.4.16 **Questions to Dr Sian Jones and Juliet McBride and their responses**

1. What is carried by the SNM convoys?
We don't know exactly.

2. What happens to the materials in the USA?
We don't know.

3. Please elaborate on your views as to what is happening at Aldermaston.
The developments are far too sophisticated to be merely about stockpile stewardship.
Nor are they just to stop the "brain drain" of scientists to the USA.

4. Are you saying you are certain about what is happening or merely drawing a conclusion on the basis of a balance of probabilities?
The latter.

5. Have there been advertisements for scientists at Aldermaston? What sorts of skills have been called for?
See the New Scientist advertisement.

6. Have you thought of asking IAEA's Legal Counsel (possibly through a State) to give an opinion on whether the SNM convoys breach IAEA regulations?
No but it's a good idea.

7. For the purposes of Article I of the NPT, is a warhead the same as an explosive device?
No. Both are manufactured in the UK. Things are transferred but we don't know what. Tritium might have come from the US.

3.5 The Mutual Defence Agreement and the NPT: a questionable relationship (Witness: Nigel Chamberlain - Analyst, British American Security Information Council)

3.5.1 Thank you for this opportunity to air our concerns about the activities conducted under the Mutual Defence Agreement (MDA) and its implications for the Non-Proliferation Treaty. I will start with a quote by Admiral William Crowe, a former US Ambassador to London under President Clinton about the 'special relationship':

"I have always described the relationship like an iceberg, in that there is a small tip of it sticking out, but beneath the water there is quite a bit of everyday business that goes on between our two governments in a fashion that's unprecedented in the world."

3.5.2 UK-US nuclear weapons collaboration is almost entirely submerged. Lorna Arnold, in her book Britain and the H-Bomb, provides an historical account of the initial benefits to Britain's nuclear weapons research and development following the signing of the MDA. She recounts how two leading Aldermaston scientists, Plowden and Penny, told Prime Minister Macmillan that Britain would soon be in a position to build up a stock of kiloton and megaton bombs of advanced design, thanks to knowledge obtained from the United States. It was stressed that the US had agreed to the MDA on the understanding that the UK would continue to invest in scientific research and development work in order to maintain the special relationship on defence collaboration, or have such access denied in the future.

3.5.3 This is substantiated by official AWE documents and on their website. Apparently, British development of the hydrogen bomb prompted the United States to sign the MDA in 1958 which "ushered in a series of technical exchanges which have been a cornerstone of life for our nuclear weapons community ever since". The AWE website describes this co-operation as follows:

"Based around a series of Joint Working Groups, each concentrating on a specific area of physics, engineering and material science, Aldermaston's specialists have for more than forty years been able to exchange and develop ideas with their counterparts from the American Laboratories to the benefit of the nuclear weapons programme on both sides of the Atlantic."

3.5.4 AWE admits to the significance of the MDA when they say it has been a "cornerstone of life for our British nuclear weapon community ever since". Somewhat ironically, the NPT is usually referred to as "the cornerstone of arms control and reduction treaties", but the two edifices are at opposite ends of the non-proliferation architecture.

3.5.5 Our research led us to the understanding that the US-UK "special nuclear relationship" is more a two-way exchange, if unequal, than a straight one-way dependency. Clearly, the MDA predates the NPT but does it have precedence? What does it permit?

- it permits the transfer of nuclear warhead components, fissile material (plutonium and highly enriched uranium) and tritium;
- it permits the transfer of delivery systems (missiles) and
- it permits the transfer of submarine design specifications, nuclear propulsion plants and HEU to fuel them which amount to aid the building of the platforms.

3.5.6 Thus all three aspects of a deployable nuclear weapon - warhead, deliver system and platform - are put together, collaboratively, under the auspices of the MDA. In fact, it would be much easier to say what is not permitted under the MDA - the transfer of a complete nuclear warhead. We have heard this weekend that the amendments to the MDA since the addition of Article III (bis) in 1959, have often amounted to little more than a change of date for a further 10 year period. In reality, the MDA is so open-ended that it can accommodate any needed changes to existing arrangements without having to delineate them.

3.5.7 This is why we suggested that the MDA was a material breach of Article 1 of the NPT which obliges Nuclear Weapons States (NWS) NOT to transfer their nuclear weapons to other states "whatsoever" and "directly or indirectly". Previously we had stuck to the suggestion that these

MDA transfers were merely a breach of the spirit of the NPT, thus avoiding an accusation of illegality (i.e. a breach of the letter of the NPT). The fundamental purpose of the NPT is set out in the Preamble: "the prevention of the wider dissemination of nuclear weapons".

3.5.8 But we ran into some unexpected obstacles, other than those presented by HMG and the Administration. My counterpart in our Washington office, Matt Martin, spoke to several people who told him that the MDA was legally constituted and there was no case to answer. Anyway, the Brits were a good ally and trusted in Washington. In an exchange of e-mails one senior arms control specialist told a journalist I was working with that if the BASIC report "suggests that the 1958 US-UK agreement violated the NPT, it is wrong" and:

"I was very much involved in the negotiations that produced Article I of the NPT. We were aware of various agreements for deploying US nuclear weapons in the territory of NATO allies, of the separate arrangements with the UK, and of then current proposals for a NATO Multilateral Force (MLF). The language we finally agreed on with the Soviets barred an MLF, but did not bar agreements such as those with Germany for deployment of US nuclear weapons in that country under US control, or the arrangements with the UK derived from the 1958 agreement."

3.5.9 More recently, a leading US academic working in this country stated: "I believe that the US/UK nuclear co-operation agreement, being older than the NPT, and being contracted between two Nuclear Weapon States is fully legal - and in the best interests of the world."

3.5.10 These encounters encouraged us to move our research efforts away from Article 1 of the NPT and towards Article VI - an effort which was supported by the legal opinion of Rabinder Singh QC and Professor Christine Chinkin, who in July 2004 concluded: "In our view…it is strongly arguable that the renewal of the MDA is in breach of the NPT."

3.5.11 BASIC's Special Report was an attempt to make the executive accountable to parliament. We failed, partly because parliament declined to take the limited opportunity offered it via the Select Committee procedures.

- The Defence Committee, after showing initial interest, decided not to conduct an inquiry into the MDA renewal.
- The Foreign Affairs Committee said from the outset that the MDA fell within the Defence Committee's remit, despite our attempts to suggest that it had treaty implications vis-à-vis the 2005 NPT Review Conference.
- The government even suggested that they would look favourably upon a request for a parliamentary debate from the Defence Committee, the Foreign Affairs Committee or the Liaison Committee - no such request was forthcoming.
- Our efforts to encourage the Leader of the House to timetable a debate on the MDA renewal met a stone wall.
- Finally, the frequent reference to Exemption 1 of the Code of Practice on Access to Government Information, i.e. claiming that it is "not in the interests of national security" to release defence information, is a clear and unwarranted impediment to transparency and accountability.

3.5.12 The Government delayed ratification of the MDA until 20 July 2004, having indicated to me that they were prepared to do it earlier, just before the summer parliamentary recess two days later. In summary, the UK has:

- failed to set out a plan or timetable to reduce its nuclear arsenal;
- failed to establish a diminished role for nuclear weapons in its national security policy; and
- actively blocked efforts to provide non-nuclear weapon states with legally binding assurances that they will not be targeted by Trident missiles.

3.5.13 Article VI, the nuclear disarmament component of the NPT, remains a blind spot in the government's field of vision. The fundamental purpose of the NPT is set out in the Preamble: "the prevention of wider dissemination of nuclear weapons". In contrast, the MDA provides an open-ended arrangement for two named states to "disseminate" information, technology and materials in their pursuit of more sophisticated nuclear weaponry. The UK has ratified the MDA, as confirmed by Defence Minister Adam Ingram in response to a Parliamentary Question put down by Mike Hancock MP:

Mr. Hancock: To ask the Solicitor-General if the Attorney-General will make it his policy to adopt the legal opinion of Rabinder Singh QC and Professor Christine Chinkin regarding the Nuclear Non-Proliferation Treaty in relation to the Mutual Defence Agreement; and if she will make a statement.

Mr. Ingram: I have been asked to reply as the Minister responsible for this issue.
I can confirm that the Government are satisfied that the extension of the Mutual Defence Agreement for a further 10 years is compatible with the UK's obligations under the Nuclear Non-Proliferation Treaty. There is a long-standing convention, followed by successive Governments, that neither the fact that the Law Officers have advised on a particular matter, nor the substance of any advice they may have given, is publicly disclosed. This is consistent with paragraphs 2 and 4(d) of the Code of Practice on Access to Government Information.

3.5.14 The United States has not yet ratified the MDA as it is required to lie before Congress for 60 sitting days (compared with only 21 days before Parliament). My BASIC colleague in Washington, Matt Martin, said this in a recent message:

The MDA needs two more days in Congress to meet the 60-day mark, which they will achieve when they come back for the lame duck session, now expected to start November 16th. Following that, the agreement will need to be signed by the executive branch, although that does not need to be the president, and will likely not be accompanied with any fanfare.

3.5.15 Article XII of the MDA states:

This Agreement shall enter into force on the date on which each Government shall have received from the other Government written notification that it has complied with all statutory and constitutional requirements for the entry into force of this Agreement.

3.5.16 **Questions to Nigel Chamberlain and his responses**

1. Is the UK assisting the US to develop new nuclear weapons?

This is difficult to answer because of the secrecy surrounding this. It is difficult to understand where the line is drawn but it is clearly a two-way process with the flow of information going both ways. There is sharing of information and expertise between the two nations' scientific establishments and a sharing of scientific endeavour.

2. What is the purpose of the first sentence of Article I of the NPT? If it allows MDA-type collaboration, why was it included?
It is cosmetic, a legally agreed form of words to allow the two states to carry on activities they had already been engaged in without being seen to be breaking the NPT.

2. Have any states objected that UK-USA collaboration under the MDA is contrary to the spirit of the NPT?
Yes, but the NPT meetings are a talking shop with little engagement. BASIC circulated the MDA at a recent Preparatory Committee but it was too late in the day and the Preparatory Committee had started. It did cause a lot of concern, shown by statements at the UN First Committee.

4. Do the travaux préparatoires of the NPT shed light on the interpretation of Article 1?
The word “indirectly” is meant to mean via third countries. Some countries, such as Mexico, have raised the interpretation of the first sentence of Article 1 but the nuclear weapon states refuse to engage.

5. Is there any verification of the nuclear weapon states’ compliance with the NPT?
No, the IAEA only verifies non-nuclear weapon states.

3.5.17 **Questions about the NPT answered by Ambassador Marín-Bosch**

1. What is the interpretation of Article 1 NPT, first sentence? :
There was an understanding during the negotiations that this banned the transfer of the nuclear explosive, but that the transfer of other parts continued to be permitted. The MDA was taken into account and the intention was that it would not be contrary to Article 1, first sentence, which was intentionally drafted differently from the second sentence.

2. Are there cases of non-nuclear weapon state pilots flying nuclear weapons from the USA to Europe, e.g. Germany?
Mexico has asked this question and the USA and UK have refused to answer.

4. CONCLUSIONS OF THE PANEL

4.1 Nuclear weapons and the law governing the use of force (*jus ad bellum*)

4.1.1 Article 2(4) of the UN Charter contains a general prohibition on the threat and use of force in international relations.[36] In 1946, The Nuremberg War Crimes Tribunal put the matter more bluntly: "Aggression is the supreme international crime". Indeed, the whole thrust of the UN Charter is in favour of resolving disputes by peaceful means and in promoting co-operation.[37] The Preamble to the Charter refers to the need to save "succeeding generations from the scourge of war"[38] and there are norms outside the Charter in customary international law forbidding intervention and unauthorised uses of force. This has been confirmed by the International Court of Justice and in decades of state practice. The norm prohibiting the threat or use of force is *jus cogens* (i.e. a peremptory norm of international law from which no derogation is permitted).[39] There are two clear exceptions to this rule. States can use force in self-defence under Article 51 of the Charter and when the UN Security Council has authorised military action.[40]

4.1.2 Under customary international law, any action in self-defence is subject to the conditions of necessity and proportionality.[41] In the *Nicaragua* case, the International Court of Justice held that any act of self-defence must be proportional to the armed attack and necessary to respond to it.[42]

4.1.3 Proportionality refers to a similarity in scale between the attack and the response. Necessity refers to the action required to terminate the attack and/or subdue the threat. The standard formulation is conjunctive: the use of force in self-defence must be both proportionate to the threat faced and limited to what is necessary to deal with the threat.

4.1.4 Ultimately, any use of force must accord with *jus ad bellum*. The use of nuclear weapons would be compatible with *jus ad bellum* only if there were clear grounds for self-defence and a response that was both necessary and proportionate. But in the *Nuclear Weapons Case*, the ICJ observed that "the very nature of all nuclear weapons and the profound risks associated therewith are further considerations to be borne in mind by States believing that they can exercise a nuclear response in self-defence in accordance with the requirements of proportionality".[43]

4.1.5 The use or threatened use of nuclear weapons would violate *jus ad bellum* except in the most extraordinary circumstances. However, a finding of illegality in relation to *jus ad bellum* is unnecessary given the unlawfulness of nuclear weapons under the *jus in bello* (the laws of war, in particular the principles and rules of humanitarian law). Any use of force, whether in self-defence or authorised by the Security Council, must comply fully with international humanitarian law. We agree with the ICJ in the *Nuclear Weapons Case*, that "the Court cannot lose sight of the

36 See Articles 2(3) and 33 of the UN Charter.
37 UN Charter, Preamble, first recital.
38 Nicaragua v. USA ICJ Reports 1986, p. 14, para 190.
39 There may be an argument, though this is not yet a strong one in law, for the use of force to protect vulnerable foreign populations from gross and systematic violations of their human rights, i.e. humanitarian intervention of the sort called for in the case of Rwanda and applied in Kosovo.
40 Nuclear Weapons Case ICJ Reports 1996, p 226, para 41.
41 ICJ Reports 1986, p 94, para 176.
42 ICJ Reports 1996, p 226, para 43.
43 ibid, para 96.

fundamental right of every State to survival, and thus its right to resort to self-defence, in accordance with Article 51 of the Charter, when its survival is at stake".[44] We would emphasise, however, that even in the context of such a war the use of nuclear weapons remains subject to international humanitarian law.

4.2 Nuclear weapons and international humanitarian law

4.2.1 Purpose of international humanitarian law and applicability to nuclear weapons
International humanitarian law regulates the conduct of hostilities and the protection of persons not, or no longer, taking a direct part in hostilities. This body of international law originated centuries ago and has as its purpose the limitation of the destructiveness of war. This is done by achieving a balance between military necessity and the needs of humanity, in particular by outlawing behaviour that is excessively cruel or destructive, i.e. not strictly necessary to achieve military aims. International humanitarian law applies whether or not the inception of the conflict is lawful under *jus ad bellum*.

4.2.2 The main international treaties regulating the conduct of armed conflict are the Hague Conventions of 1907, the Geneva Conventions of 1949 and two Additional Protocols of 1977. The United Kingdom is party to all these treaties.

4.2.3 There is no international treaty that explicitly prohibits the use of nuclear weapons altogether, unlike chemical and biological weapons which are explicitly prohibited by treaty. However, it is generally accepted, including by the United Kingdom, that the general rules of international humanitarian law apply to any potential use of nuclear weapons. Therefore the question to be asked is whether nuclear weapons, including the new generation of "mini-nukes", could be used in a way that would not breach the rules of humanitarian law.

4.2.4 Basic rules of international humanitarian law applicable to all weapons
There are three basic rules that are relevant to an evaluation of whether it would be lawful to develop, with a view to possible use, a new generation of nuclear weapons. The first is that indiscriminate attacks are prohibited and therefore it is unlawful to use a weapon which is by nature indiscriminate. The second is that it is unlawful to use a weapon of a nature to cause superfluous injury or unnecessary suffering. The third is that the States party to Additional Protocol I (including the United Kingdom) are required to analyse, when considering the development or acquisition of a new weapon, whether its use would be prohibited by humanitarian law. Each of these rules will now be considered in relation to a possible new generation of nuclear weapons.

4.2.5 **The prohibition of the use of weapons which are by nature indiscriminate**
This prohibition stems from the "principle of distinction" which requires belligerents to target only military objectives or combatants and never civilians or civilian objects. A definition of "indiscriminate attacks" is given in Article 51(4) of Additional Protocol I of 1977. The relevant parts read as follows:

"Indiscriminate attacks are prohibited. Indiscriminate attacks are:
(a) ….
(b) those which employ a method or means of combat which cannot be directed at a specific military objective; or

44 See Rule 44 of the Study on Customary International Humanitarian Law published by the ICRC (CUP 2005).

(c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol;
and consequently, in each case, are of a nature to strike military objectives and civilians or civilian objects without distinction."

4.2.6 The pertinent question is, therefore, whether nuclear weapons fall foul of this rule. It is not contested, from the evidence provided, that the new generation of nuclear weapons are capable of being accurately targeted. Therefore the relevant provision that needs more attention is sub-paragraph (c) above, including whether nuclear weapons are of a nature to strike military objectives and civilians without distinction. This element turns not on targeting ability, but on whether the effects of the weapon are sufficiently controllable and foreseeable. In particular, the "incidental" damage caused to civilians must not be excessive or disproportionate to the value of the military objective targeted.

4.2.7 The evidence provided to the Panel was that even the smallest nuclear weapon is bound to emit, not only heat and blast, but also radiation. The heat and blast effects (which are considerable) are reasonably foreseeable – whether the destruction caused is excessive will depend on the value of the military objective pursued. However, what is striking is that the whereabouts of the radiation emitted are not foreseeable – it would depend entirely on the direction of the wind, something that can change at any moment. Further, a certain amount of radioactive fall-out rises into the stratosphere and then falls in any part of the world, a phenomenon that was observed after the explosion of the nuclear power plant at Chernobyl. The health effects of radiation are not minor, a point that will be explored below in the section on superfluous injury or unnecessary suffering. Therefore this "incidental" damage is serious.

4.2.8 The evidence explained that some of the intended uses would include destroying underground bunkers or terrorist cells. Aiming at an underground bunker would result in creating a funnel effect with a large amount of radioactive fall-out being released into the atmosphere. Aiming accurately at a terrorist cell would require the weapon to be exploded at surface level, thus creating a lot of fall-out because of the very large amount of irradiated dust blown around. For less fall-out, the weapon would have to be detonated high in the air, but this would result in a much wider area being destroyed through blast. Either way, considerable incidental effects can be expected. Another potential use mentioned is to attack submarines. However, this would have the effect of irradiating seafood, with the likely result of this being ingested by humans at some later time with potentially very damaging results. A tidal wave-like effect was also said to be probable – the Asian tsunami in December 2004 may give us some idea of the potentially devastating effects of such a phenomenon.

4.2.9 All these elements lead us to conclude that nuclear weapons are inherently indiscriminate, primarily because of the widespread and uncontrollable nature of the radiation emitted.

4.2.10 **The prohibition of the use of weapons of a nature to cause superfluous injury or unnecessary suffering**

This is a very long-standing rule which is codified in the Hague Regulations attached to the Fourth Hague Conventions of 1899 and 1907, and, more recently, in Article 35(3) of Additional Protocol I of 1977. The purpose of the rule is to outlaw weapons that are excessively cruel; i.e. which cause more death or suffering than required to defeat the enemy's military forces. A yardstick frequently referred to is whether the same military aim could be achieved by using a less destructive weapon. Another element is whether a weapon exacerbates the suffering of a soldier after he or she has been put out of action. It is on the basis of these elements that certain weapons have been

prohibited; in particular, poisoned weapons (e.g. bullets smeared with poison) because the poison is an aggravating element and the bullet itself is enough to put the combatant out of action; dum-dum or exploding bullets because they cause more serious wounds than regular military bullets; and weapons whose primary effect is to injure by fragments that are not detectable by x-rays. All of these prohibited weapons have an element in common, namely, they reduce the possibility of recovery of wounded soldiers.

4.2.11 Turning now to nuclear weapons, we note that the blast and heat effects (thousands of degrees) are such that they are likely to cause more inevitable death than conventional weapons. This alone would make it questionable whether such a result is really necessary from a military point of view. However, even more serious is the effect of the radiation. The Panel were informed that radiation suppresses the healing response, thus preventing many injured soldiers from recovering from their injuries. This clearly falls into the category of unnecessary suffering as such an effect has no military value.

4.2.12 Although the rule prohibiting the use of weapons of a nature to cause superfluous injury or unnecessary suffering is intended to apply to the effects of weapons on combatants, it is appropriate to look at the combined effects of this rule and the one prohibiting weapons that are by nature indiscriminate, from the point of view of the effect on all persons. It is striking that irradiated food, or inhaled radio-active fall-out, is likely to produce cancers and some birth defects. The suppression of the healing response caused by radiation has a much worse effect on children and the elderly who may be injured, a fact that clearly violates the principle that the civilian population is to be spared the effects of war as much as possible. Dr Barnaby told the Panel that he could not think of a military use of nuclear weapons that could not be achieved by conventional weapons. If this is so, all these damaging effects of nuclear weapons are militarily unnecessary. The need for military necessity for any action is a fundamental principle that applies in addition to the more detailed rules of humanitarian law which, as mentioned above, are a balance between military necessity and humanitarian imperatives.

4.2.13 **The obligation to evaluate whether the use of a weapon would be unlawful**

Article 36 of Additional Protocol I of 1977 provides that in the study, development, acquisition or adoption of a new weapon, a State must determine whether its use would be prohibited by international law. The purpose of this provision is, of course, to deter a State from acquiring weapons the use of which would be prohibited. A good faith implementation of this provision (as required by the law of treaties) requires a government to re-evaluate its views of the lawfulness of a weapon each time it considers the development or acquisition of a new type of weapon, in this case, any replacement of the present Trident system.

4.2.14 **Other relevant rules of international law**

Two other rules should be referred to in this context. First, a rule of customary humanitarian law has developed (through State practice and *opinio juris*) that States must pay due regard to the natural environment of other States and of areas outside national jurisdiction.[45] The use of nuclear weapons, given the expected radio-active fall-out, is hardly compatible with this requirement.

4.2.15 Secondly, it is a very long-standing rule that States not party to a conflict are entitled to benefit from the rules of neutrality; in particular, the requirement of belligerent States, under Article 1 of Hague Convention V, to respect the inviolability of neutral territory. This has been interpreted as including an obligation to avoid damaging neutral territory during attacks on belligerents[46],

45 In particular, belligerents apologised to the Swiss authorities for accidental bombings of Swiss territory during the Second World War.

46 ICJ Reports 1996, p. 226, para 78.

a condition that is virtually impossible to comply with when using nuclear weapons given their widespread and uncontrollable effects.

4.2.16 **Conclusion**

Any use of nuclear weapons would be contrary to international humanitarian law because such weapons are indiscriminate in nature and cause superfluous injury and unnecessary suffering. Their use is also likely to breach the rules requiring due respect for the natural environment and the inviolability of neutral territory.

4.3 The Non-Proliferation Treaty and the Mutual Defence Agreement

4.3.1 The Panel examined the question of the United Kingdom's compliance with the NPT. It focused on Articles I and VI of the Treaty, which provide:

4.3.2 Article I

"*Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.*"

4.3.3 Article VI

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

4.3.4 The Panel has reviewed the close co-operation on nuclear weapon matters between the United Kingdom and the United States. The UK's Trident nuclear warhead is based on a United States design. While the UK builds its own warheads, its nuclear arsenal is largely dependent on US technology and support. The UK also leases its Trident missiles from the US, which services them.

4.3.5 The Panel has considered carefully the language of Article I of the NPT. The UK does not appear to be in violation of this provision, although a case might be made that it is not acting in accordance with the spirit of the article.

4.3.6 However, the Panel has reached a very different conclusion regarding Article VI. We have reviewed the UK government's nuclear policy and doctrine and examined how its nuclear capability has been enhanced over the years and its plans to continue to modernize its Trident nuclear arsenal or to replace it in the near future.

4.3.7 In examining the UK's record regarding nuclear disarmament negotiations, the Panel concludes that the UK has not presented any initiative and has refused to enter negotiations proposed by others. We note the impasse regarding nuclear disarmament negotiations at the Geneva Conference on Disarmament.

We have also considered, and would emphasize, the ICJ's unanimous ruling in the *Nuclear Weapons Case* regarding the obligation to pursue in good faith and conclude the negotiations envisaged in Article VI of the NPT. In violation of that obligation, the UK has not pursued, and is

still not ready and willing to pursue, negotiations in good faith on nuclear disarmament. On the contrary, Article III *bis* of the Mutual Defence Agreement was recently renewed, implying the continuation and enhancement of the UK's nuclear programme rather than progress towards its discontinuation as required by Article VI.

5. FURTHER OBSERVATIONS AND RECOMMENDATIONS

5.1 Compliance with the NPT

5.1.1 At the NPT Review Conference 2005, as well as in meetings leading up to it, the following points should be emphasised with a view to securing full compliance with the NPT.

5.1.2 The opening words of the Treaty refer to the devastation that would be visited upon mankind by a nuclear war. This provides the setting in which the Treaty must be considered. Viewed in this way, the NPT is one of the most important documents in contemporary international law as the future of civilization may well depend on full compliance with it. The seminal importance of the NPT must placed at the forefront of all submissions.

5.1.3 Respect for the letter and spirit of the NPT is dangerously on the decline, thereby bringing perilously closer the devastation envisaged in the opening words of the Treaty.

5.1.4 In regard to the spirit of the Treaty, the Preamble emphasizes the strengthening of trust between states. Such trust is integral to the Treaty and measures are required to build confidence, such as token reductions of nuclear arsenals.

5.1.5 The threat or use of force against the territorial integrity or political independence of any state is a violation of the NPT and obstructs compliance with it. The Preamble to the NPT expressly incorporates the obligation enshrined in Article 2(4) of the UN Charter.

5.1.6 The ICJ's advisory opinion in the *Nuclear Weapons Case* considerably strengthens Article VI of the NPT. This article obliges all parties to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament. The Court's unanimous opinion was that there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control. Read with Article VI, this leaves no room for any doubt regarding the legal obligation to pursue total disarmament in good faith.

5.1.7 The obligations set out in the NPT are not merely Treaty obligations but are reinforced by customary international law and by principles which are *jus cogens*. Any State which does not comply with these obligations is violating intransgressible principles of international law.

5.1.8 Another fact to be stressed in this regard is that weapons of mass destruction are condemned by every major cultural and religious tradition.

5.1.9 Non-nuclear weapon states are unlikely to observe any restraints in terms of the NPT unless the nuclear-weapon states take steps in good faith to eliminate their nuclear arsenals. Such was the *quid pro quo* for the undertakings in the NPT and there has been a serious breach by the nuclear-

weapon states which has provided the atmosphere for possible breaches by the non-nuclear weapon states.

Moreover, the nuclear-weapon states cannot, against the background of their own breaches of good faith, treaty obligations and basic international law principles, seek to play the role of international policemen, enforcing the very rules which they themselves violate. If the UK is sincere about its commitment to the NPT, it must at the very least desist from upgrading or replacing Trident.

5.1.11 There must also be an end to the lack of transparency regarding the number and yield of Trident warheads, and in regard to the command structure determining on whose orders the Trident missile would be fired - the UK, the USA or NATO. With "launch on warning" capability, is the response automatic? Does a commander give the orders? Or the political authorities? Is there time for the latter to consider the various factors involved? Lack of transparency on these matters is not consistent with the spirit of the NPT.

5.1.12 A factor seriously undermining the credibility of the UK in this regard is that the evidence points to a growth in the UK's proportion of nuclear weapon power on the planet – a total contradiction of the commitment to disarm. This continuous enhancement of the UK's power ratio must cease.

5.1.13 Unwinding the spiral of escalation is absolutely vital if civilization is to survive. The public needs to be informed. The danger of nuclear weapons being used somewhere in the world grows by the month due to inexcusable violations of international law, including the NPT, and total disregard of the ICJ's clear exposition of the obligations involved. This is largely because the moral authority of the nuclear-weapon states to enforce compliance is eroded by their own acts and the readiness of other states to "go nuclear" is correspondingly enhanced. In this climate of disregard of treaty obligations, all the control mechanisms of the international community are weakened. Furthermore, nuclear know-how is spreading at an alarming rate, as is the number of States and non-State entities that seek access to nuclear weapons.

5.1.14 The extent of the UK's violations of its treaty obligations is highlighted by a comparison of current arsenals with the only nuclear bombs ever used to date in war. The Hiroshima bomb was designed to yield an explosive force of 20 kt but is believed to have detonated only 13 kt, causing the deaths of 80,000 to 100,000 people. Each Trident submarine can carry up to 16 missiles, each with the explosive power of 100 kilotons – roughly 8 times that of the Hiroshima bomb. If there are 4 Trident submarines carrying up to 16 missiles each, the violation of the obligation to disarm nuclear arsenals is manifest. Any doubt as to the UK's violation of its obligations under international law is completely removed by such considerations. Trident also represents a progression of nuclear power beyond the Polaris system which it replaced, because it has a much longer range and much greater accuracy. Another improvement of the Trident system over Polaris is that the missiles have multiple, independently targetable warheads.

5.1.15 Some clarification is required of the impact of the ICJ's advisory opinion in the *Nuclear Weapons Case*. To argue that it does not require any change in the UK's defensive deterrence policy is to overlook the clear contradiction between the use of nuclear weapons and the basic humanitarian rules of warfare as contained in treaty law as well as customary international law. Although the Court expressed no opinion on the use of the weapon in extreme circumstances of self-defence, there would always be an overriding proviso that no weapon can be used in any circumstances in which these basic humanitarian rules would be violated, something which the Court itself stressed.

5.1.16 The ICJ stressed the cardinal principles of international humanitarian law that States must never make civilians the object of attack and must consequently never use weapons that are incapable of distinguishing between civilian objects and military objectives.[47] The Court went on to emphasize that all states must observe these principles because they constitute intransgressible principles of customary international law.[48]

5.1.17 Unless the nuclear-weapon states comply now with the letter and the spirit of the NPT, we are on the slippery slope that leads precipitously towards nuclear confrontation. A nationwide publicity campaign should be launched to bring this to the attention of the British public, who may not fully realize how dangerously close current policies are to precipitating the use of nuclear weapons. Since the 5 yearly review of the NPT is a rare opportunity for a consideration of these matters, public opinion in the nuclear-weapon states should be alerted, as a matter of urgency, to the importance of insisting to their respective governments that they comply with the legal obligations which they have undertaken and the fundamental principles of international law on which those obligations are based.

5.2 Public information and awareness

5.2.1 The need for public information and awareness is of primary importance. Governments are able to pursue their nuclear weapons policies without any significant public input into the decision-making process, mainly because the public are unaware of the issues of international law involved and of the horrendous consequences of even a single use of nuclear weapons.

5.2.2 A programme of public information and education at all levels is therefore recommended and this should comprise:

- Information about the many principles of international law that are violated by the manufacture, storage, deployment and use of nuclear weapons.
- Information about the history of the evolution of these principles and the vast sacrifices entailed in their achievement.
- Basic information about the humanitarian content of international law.
- Information about the traditions from across the world and from all religions that condemn weapons of mass destruction. This information is not readily available.
- Basic information regarding the prohibition of weapons of mass destruction and hyper-destructive weapons in all the world's traditions and cultures.
- Information about the effects of the Hiroshima and Nagasaki bombs in causing deaths, destruction, continuing suffering and social problems.
- Information regarding the stockpiles of nuclear weapons in the arsenals of states.
- Information regarding the nuclear winter and other consequences of a multiple nuclear exchange.

47 ibid, para 79.
48 A specimen code is suggested in C.G.Weeramantry, Nuclear Weapons and Scientific Responsibility, p 225.

- Information regarding the views of experienced military personnel regarding the effects of nuclear weapons.
- Information regarding the Nuclear Non-Proliferation Treaty and the obligations which it imposes on the states which are parties to it

5.3 Openness and transparency

5.3.1 Secrecy poses numerous problems by blocking and hindering public participation in the decision-making process. Matters concerning nuclear weapons, which concern the very survival of civilization, cannot be conducted behind closed doors. Greater openness and transparency are required.

5.3.2 Members of the public have a right to know not only about weapon stockpiles, effects of weapons, places of storage and precautionary measures, but also about such matters as the transport of nuclear weapons and disposal of hazardous waste, which may concern them in their local communities.

5.3.3 This requires information at national, regional and local level. When there is a nuclear incident there should be full disclosure of the extent of any damage, the resultant dangers and the factors causing the accident. The public should be given a clearer indication of the sources of supply of nuclear materials and details of the disposal of nuclear waste.

5.3.4 The evidence placed before us indicated that nuclear weapons convoys use the public highways and do not stop overnight. There could be terrorist threats during the journey, which takes about 16 hours, much of it in darkness. The convoys sometimes use narrow back roads with no advance warning to oncoming traffic. Although there is a need for some secrecy in matters of national security, where public safety is at issue more transparency is required.

5.4 An ethical code for scientists

5.4.1 Scientists engaged in making nuclear weapons often do not see the full implications of the results of their work, as they work intensively only on some small aspect of the research. They need to have the overall picture.

5.4.2 Moreover, it should be made clear to all working in this field that legal prohibitions cannot cover the whole spectrum of their moral duties. Law can only reach a fraction of the total area of right conduct.

5.4.3 An ethical code for nuclear scientists should be evolved and implemented.[49] It should include the following principles:

- It is the personal responsibility of every scientist engaged in any aspect of the production of nuclear weapons to inquire into and ascertain the end result of the work he or she is engaged in. If it would lead in any way to the production or improvement of a nuclear weapon, it is the scientist's right and duty to refuse to pursue such work.

- Work on nuclear weapons is incompatible with the dominant principle underlying all scientific activity, namely service to humanity, and is therefore unethical.

49 Issued in London on July 9th 1955. For the full text, see www.pugwash.org/about/manifesto.htm.

- Those who consciously participate in the manufacture of nuclear weapons and in nuclear weapons research are personally guilty of a violation of international law and of a crime against humanity and/or complicity in such acts.

5.4.4 The legal and moral responsibility borne by scientists participating in such activities today is infinitely greater than at any time since the creation of the first nuclear weapons. This is because of the greater knowledge now available of the disastrous atmospheric, agricultural, medical and social impacts of the use of nuclear weaponry, the possibility of nuclear retaliation, the enormously enhanced destructive power of current nuclear weaponry and the vast nuclear arsenals now available in the event of nuclear war.

5.4.5 Scientists should also be reminded of the Russell-Einstein manifesto,[50] which includes the following words:

There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death.

50 Issued in London on July 9th 1955. For the full text, see www.pugwash.org/about/manifesto.htm.

Appendix 1

Treaty on the Non-Proliferation of Nuclear Weapons

Signed at Washington, London, and Moscow July 1, 1968.
Entered into force March 5, 1970

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

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

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

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

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

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

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties of the Treaty, whether nuclear-weapon or non-nuclear weapon States,

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

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

Urging the cooperation of all States in the attainment of this objective,

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

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

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

Have agreed as follows:

Article I
Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II
Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III
1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agencys safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this article shall be applied to all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article.

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

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

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also cooperate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

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

Article VII

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

Article VIII

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

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on

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

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

Article IX

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

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

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

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

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

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

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.

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

IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Treaty.

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

Appendix 2

Nuclear Disarmament Plan of Action, NPT Review Conference 2000

15. The Conference agrees on the following practical steps for the systematic and progressive efforts to implement Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons and paragraphs 3 and 4 (c) of the 1995 Decision on 'Principles and Objectives for Nuclear Non-Proliferation and Disarmament':

1. The importance and urgency of signatures and ratifications, without delay and without conditions and in accordance with constitutional processes, to achieve the early entry into force of the Comprehensive Test Ban Treaty.

2. A moratorium on nuclear weapon test explosions or any other nuclear explosions pending entry into force of that Treaty.

3. The necessity of negotiations in the Conference on Disarmament on a non-discriminatory, multilateral and internationally and effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices in accordance with the statement of the Special Coordinator in 1995 and the mandate contained therein, taking into consideration both nuclear disarmament and nuclear non-proliferation objectives. The Conference on Disarmament is urged to agree on a programme of work which includes the immediate commencement of negotiations on such a treaty with a view to their conclusion within five years.

4. The necessity of establishing in the Conference on Disarmament an appropriate subsidiary body with a mandate to deal with nuclear disarmament. The Conference on Disarmament is urged to agree on a programme of work which includes the immediate establishment of such a body.

5. The principle of irreversibility to apply to nuclear disarmament, nuclear and other related arms control and reduction measures.
6. An unequivocal undertaking by the nuclear-weapon states to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament to which all States Parties are committed under Article VI.

7. The early entry into force and full implementation of START II and the conclusion of START III as soon as possible while preserving and strengthening the ABM Treaty as a cornerstone of strategic stability and as a basis for further reductions of strategic offensive weapons, in accordance with its provisions.

8. The completion and implementation of the Trilateral Initiative between the United States of America, the Russian Federation and the International Atomic Energy Agency.

9. Steps by all the nuclear-weapon states leading to nuclear disarmament in a way that promotes international stability, and based on the principle of undiminished security for all:

- Further efforts by the nuclear-weapon states to reduce their nuclear arsenals unilaterally.
- Increased transparency by the nuclear-weapon states with regard to their nuclear weapons capabilities and the implementation of agreements pursuant to Article VI and as a voluntary confidence-building measure to support further progress on nuclear disarmament.
- The further reduction of non-strategic nuclear weapons, based on unilateral initiatives and as an integral part of the nuclear arms reduction and disarmament process.
- Concrete agreed measures to further reduce the operational status of nuclear weapons systems.
- A diminishing role for nuclear weapons in security policies to minimise the risk that these weapons ever be used and to facilitate the process of their total elimination.
- The engagement as soon as appropriate of all the nuclear-weapon states in the process leading to the total elimination of their nuclear weapons.

10. Arrangements by all nuclear-weapon states to place, as soon as practicable, fissile material designated by each of them as no longer required for military purposes under IAEA or other relevant international verification and arrangements for the disposition of such material for peaceful purposes, to ensure that such material remains permanently outside of military programmes.

11. Reaffirmation that the ultimate objective of the efforts of States in the disarmament process is general and complete disarmament under effective international control.

12. Regular reports, within the framework of the NPT strengthened review process, by all States parties on the implementation of Article VI and paragraph 4 (c) of the 1995 Decision on 'Principles and Objectives for Nuclear Non-Proliferation and Disarmament', and recalling the Advisory Opinion of the International Court of Justice of 8 July 1996.

13. The further development of the verification capabilities that will be required to provide assurance of compliance with nuclear disarmament agreements for the achievement and maintenance of a nuclear-weapon-free world.

Appendix 3

Mutual Defence Agreement

AGREEMENT BETWEEN THE GOVERNMENT OF THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND AND THE GOVERNMENT OF THE UNITED STATES OF AMERICA FOR COOPERATION ON THE USES OF ATOMIC ENERGY FOR MUTUAL DEFENCE PURPOSES

Sign 1958, last amended 2004

The Government of the Great Britain and Northern Ireland on its own behalf and on behalf of the United Kingdom Atomic Energy Authority and the Government of the United States of America,

> Considering that their mutual security and defense require that they be prepared to meet the contingencies of atomic warfare;

Considering that both countries have made substantial progress in the development of atomic weapons;

> Considering that they are participating together in an international arrangement pursuant to which they are making substantial and material contributions to their mutual defense and security;
>
> Recognizing that the mutual defense of both countries will be advanced by the exchange of information concerning atomic energy and by the transfer of equipment and materials for use therein;
>
> Believing that such exchange and transfer can be undertaken without risk to the defense and security of either country; and
>
> Taking into consideration the United States, Atomic Energy Act of 1954, as amended, which was enacted with these purposes in mind.
>
> Have agreed as follows:

ARTICLE I
General Provision
While the United States and the United Kingdom are participating in an international arrangement for their mutual defense and security and making substantial and material contributions thereto, each Party will communicate to and exchange with the other Party information, and transfer material and equipment to the other, in accordance with the provisions of this Agreement, provided that the communicating or transferring Party determines that such cooperation will promote and will not constitute an unreasonable risk to its defense and security.

ARTICLE II
Exchange of Information
A. Each Party will communicate to or exchange with the other Party such classified information as is jointly determined necessary to:

1. the development of defense plans;
2. the training of personnel in the employment of and defense against atomic weapons and other military applications of atomic energy;
3. the evaluation of the capabilities of potential enemies in the employment of atomic weapons and other military applications of atomic energy; and
4. the development of delivery systems compatible with the atomic weapons which they carry.
5. research, development and design of military reactors to the extent and by such means as may be agreed.

B, In addition to the cooperation provided for in Paragraph A of this Article, each Party will exchange with the other Party other classified information concerning atomic weapons, after consultation with the other Party, the communicating Party determines that the communication of such information is considered necessary to improve the recipient atomic weapon design, development, and fabrication capability.

ARTICLE III
Transfer of Submarine Nuclear Propulsion Plant and Materials
A. The Government of the United States will authorize, subject to terms and conditions acceptable to the Government of the United States, a person to transfer by sale to the Government of the United Kingdom or its agent one complete submarine nuclear propulsion plant with such spare parts therefore as may be agreed by the Parties and to communicate to the Government of the United Kingdom or its agent (or to both) such classified information as relates to safety features and such classified information as is necessary for the design, manufacture and operation of such propulsion plant. A person or persons will be authorized, for a period of ten years following the date of entry into force of this agreement and subject to terms and conditions acceptable to the Government of the United States, to transfer replacement cores or fuel elements for such plant.

B. The Government of the United States will transfer by sale agreed amounts of U-235 contained in uranium enriched in the isotope U-235 as needed for use in the submarine nuclear propulsion plant transferred pursuant to paragraph A of this Article, during the ten years following the date of entry into force of this Agreement on such terms and conditions as may be agreed. If the Government of the United Kingdom so requests, the Government of the United States will during such period reprocess any material sold under the preent paragraph in facilities of the Government of the United States, on terms and conditions to be agreed, or authorize such reprocessing in private facilities in the United States. Enriched uranium recovered in reprocessing such materials by either Party may be purchased by the Government of the United States under terms and conditions to be agreed. Special nuclear materials recovered in reprocessing such materials and not purchased by the Government of the United States may be returned to or retained by the Government of the United Kingdom and any U-235 not purchased by the Government of the United States will be credited to the amounts of U-235 to be transferred by the Government of the United States under this Agreement.

C. The Government of the United States shall be compensated for enriched uranium sold by h pursuant to this Article at the United States Atomic Energy Commission’s published charges applicable to the domestic distribution of such material in effect at the time of the sale. Any purchase of enriched uranium by the Government of the United States pursuant to this Article shall be at the applicable prices of the United States Atomic Energy Commission’s for the purchase of enriched uranium in effect at the time of purchase of enriched uranium in effect at the time of purchase of such enriched uranium.

D. The Parties will exchange classified information on methods of reprocessing fuel elements of the type utilized in the propulsion plant to be transferred under this Article, including classified information on the design, construction and operation of facilities for the reprocessing of such fuel elements.

E. The Government of the United Kingdom shall indemnify the Government of the United States against any and all liabilities whatsoever (including third party liability) for any damage or injury occurring after the propulsion plant or parts thereof, including spare parts, replacement cores or fuel elements are taken outside the United States, for any cause arising out of or connected with the design, manufacture, assembly, transfer or utilization of the propulsion plant, spare parts, replacement cores or fuel elements transferred pursuant to Paragraph A of this Article.

ARTICLE III bis
Transfer of Materials and Equipment
A. The Government of the United States shall transfer to the Government of the United Kingdom the following in such quantities, at such times prior to December 31 2014, and on such terms and conditions as may be agreed.
1. Non-nuclear parts of atomic weapons, which parts are for the purpose of improving the United Kingdom's state of training and operational readiness.
2. Other non-nuclear parts of atomic weapons systems involving Restricted Data, which parts are for the purpose of improving the United Kingdom's state of training and operational readiness.
3. source, by-product and special nuclear material, and other material, for research on, development of, or use in atomic weapons when, after consultation with the Government of the United States determines that the transfer of such material is necessary to improve the United Kingdom's atomic weapon design, development or fabrication capability.

B. The Government of the United States shall transfer to the Government of the United Kingdom special nuclear material and authorise the transfer of other material for research on, development of, production of, or use in utilization facilities for military applications, in such quantities, at such times prior to December 31 2014, and on such terms and conditions as may be agreed.

C. The Government of the United States shall transfer enriched uranium, and shall arrange enrichment and other uranium services for the Government of the United Kingdom, for military purposes, in such quantities, at such times prior to December 31 2014, and on such terms and conditions as may be agreed.

D. The Government of the United Kingdom shall transfer to the Government of the United States for military purposes source, by-product and special nuclear material, and equipment of such types, in such quantities, at such times prior to December 31 2014, and on such terms and conditions as may be agreed.

E. 1. With respect to by-product material, special nuclear material and other material transferred from one Party to the other under this Article, the recipient Party agrees not to use any such material for purposes other than those for which it was received, provided that material which has lost Us identity as a result of commingling with other material of the recipient Party may be put to other uses if the recipient Party retains an equivalent amount of its own material for the purpose for which the other Party's material was received.
2. For material or equipment transferred from one Party to the other Party, the recipient Party shall pay or reimburse, as may be agreed, all packaging, transportation and related costs. Packaging, shipping containers and shipping containers shall be as may be agreed.
3. Should either Party desire to acquire materials or components for use in the manufacture or in preperation for manufacture of atomic weapons from any source with the jurisdiction of the other Party, the procuring Party shall inform the other Party of the proposed procurement in order that such other Party may determine whether the proposed procurement involves classified information and if so whether the proposed procurement is in compliance with its applicable laws and regulations.

ARTICLE IV
Responsibility for Use Of Information Material, Equipment and Devices
The application or use of any information (including design drawings and specifications), material or equipment communicated, exchanged or transferred under this Agreement shall be the responsibility of the Party receiving it, and the other Party does not provide any indemnity, and does not warrant the suitability and completeness of such information, material or equipment for any particular use or application.

ARTICLE V
Conditions
A. Cooperation under this Agreement will be carried out by each of the Parties in accordance with its applicable laws.

B. Under this Agreement there will be no transfer by either Party of atomic weapons.

C. Except where specifically authorized by this Agreement or, as may be agreed for civil uses, the recipient Party agrees not to use the information communicated or exchanged, or the materials or equipment transferred, by either Party pursuant to this Agreement for other than the preparation or implementation of defense plans in the mutual interests of the two countries.

D. Nothing in this Agreement shall preclude the communication or exchange of classified information, sensitive nuclear technology, or controlled nuclear information, which may be transmissible under other arrangements between the Parties.

ARTICLE VI Guaranties
A. Classified information, materials and equipment communicated or transferred pursuant to this Agreement shall be accorded full security protection under applicable security arrangements between the Parties and applicable national legislation and regulations of the Parties. In no case shall either Party maintain security standards for safeguarding classified information, materials and equipment made available pursuant to this Agreement, less restrictive than those set forth in the applicable security arrangements in effect on the date this Agreement comes into force.

B. Sensitive nuclear technology and controlled nuclear information transferred pursuant to this Agreement shall be accorded at least the same level of protection by the recipient Party as that accorded to such information by the transferring Party. The Parties shall consult with each other regarding the appropriate protections for such information.

C. Adequate physical security shall be maintained with respect to any source material, special nuclear material and equipment transferred pursuant to the Agreement, and with respect to any special nuclear material used in or produced through the use of any material or reactor so transferred. Such protection shall be commensurate with the importance of the material or equipment involved.

D. Classified information, sensitive nuclear technology and controlled nuclear information, communicated or exchanged pursuant to this Agreement will be made available through channels existing or hereafter agreed for the communication or exchange of such information between the Parties.

E. Classified information, sensitive nuclear technology and controlled nuclear information, communicated or exchanged, and any materials or equipment transferred, pursuant to this Agreement shall not be communicated, exchanged or transferred by the recipient Party or persons under this jurisdiction to any unauthorized persons, or, except as provided in Article VII of this Agreement, beyond the jurisdiction of that Parry. Each Party may stipulate the degree to which any information or equipment communicated, exchanged or transferred by ft or persons under its jurisdiction pursuant to this Agreement may be

disseminated or distributed; may specify the categories of persons who may have access to such information, materials or equipment; and may impose such other restrictions on the dissemination or distribution of such information, materials or equipment as it deems necessary.
F. Adequate materials control and accountability shall be maintained with respect to any nuclear material (including source material and special nuclear material) transferred pursuant to the Agreement, and with respect to any nuclear material used in or produced through the use of any nuclear material or equipment transferred pursuant to the Agreement. Each Party guarantees adequate materials control and accountancy shall be maintained so long as such materials or equipments remains under its jurisdiction or control. As may be mutually agreed, the Parties shall consult with each other regarding methods and technology for providing such materials control and accountability.

ARTICLE VII
Dissemination
Nothing in this Agreement shall be interpreted or operate as a bar or restriction to consultation or cooperation in any field of defense by either Party with other nations or international organizations. Neither Party, however, shall communicate classified information, sensitive nuclear technology and controlled nuclear information, or transfer or permit access to or use of materials or equipment made available by the other Party pursuant to this Agreement to any nation or international organization unless:

A. It is notified by the other Party that all appropriate provisions and requirements of such other Party's applicable laws, including authorization by competent bodies of such other Party, have been complied with as necessary to authorize such other Party directly so to communicate to, transfer to, permit access to or use by such other nation or international organization; and further that such other Party authorizes the recipient Party so to communicate to, transfer to, permit access to or use by such other nation or international organization; or

B. in the case of classified information, sensitive nuclear technology and controlled nuclear information, and access to materials or equipment, such other Party has informed the recipient Party that such other Party has communicated such classified information to, or permitted access to such materials or equipment by, such other nation or international organization; or

C. in the case of material which has lost its identity as a result of commingling with other material of the recipient Party, the recipient Party retains an amount under its jurisdiction equivalent to that made available to it by the other Party under this Agreement.

ARTICLE VIII
Classification Policies
Agreed classification policies shall be maintained with respect to all classified information, materials or equipment communicated, exchanged or transferred under this Agreement. The Parties intend to continue the present practice of consultation with each other on the classification of these matters.

ARTICLE IX
Patents
A. With respect to any invention or discovery employing classified information which has been communicated or exchanged pursuant to Article II or derived from the submarine propulsion plant, material or equipment transferred pursuant to Article III or Article III bis, or any agency or corporation owned or controlled thereby, or any of their agents or contractors, or any employee of any of the foregoing, after the date of such communication, exchange or transfer but during the period of this Agreement:
1. in the case of any such invention or discovery in which rights are owned by the recipient Party, or any agency or corporation owned or controlled thereby, and not included in subparagraph 2 of this paragraph,

the recipient Party shall, to the extent owned by any of them:
(a) transfer and assign to the other Party all right, title and interest in and to the discovery of the invention or discovery, or patent application or patent thereon, in the country of that other Party, subject to the retention of a royalty-free, non-exclusive, irrevocable licence for the governmental purposes of the recipient Party and for the purposes of mutual defense; and
(b) grant to the other Party a royalty-free, non-exclusive, irrevocable licence for the governmental purposes of that other Party and for the purposes of mutual defense in the country of the recipient Party and third countries, including use in the production of material in such countries for sale to the recipient Party by a contractor of that other Party;
2. In the case of any such invention or discovery which is primarily useful in the production or utilization of special nuclear material or atomic energy and made or conceived prior to the time that the information it employs is made available for civil uses, the recipient shall:
(a) obtain, by appropriate means, sufficient right, title and interest in and to the invention or discovery, or patent application or patent thereon, as may be necessary to fulfill its obligations under the following two subparagraphs;
(b) transfer and assign to the other Party all right, title and interest in and to the invention or discovery, or patent application or patent thereon, in the country of that other Party, subject to the retention of a royalty-free, non-exclusive, irrevocable licence, with the right to grant sublicenses, for all purposes; and
(c) grant to the other Party a royalty-free, non-exclusive, irrevocable licence, with the right to grant sublicenses, for all purposes in the country of the recipient Party and in third countries.

B. 1. Each Party shall, to the extent owned by it, grant to the other Party a royalty-free, non-exclusive, irrevocable licence to manufacture and use the subject matter covered by any patent and incorporated in the submarine propulsion plant and spare parts transferred pursuant to paragraph A of Article III or paragraph A or paragraph A, B, C or D of Article III bis for use by the licensed Party for the purposes set forth in paragraph C of Article IV.
2. The transferring Party neither warrants nor represents that the submarine propulsion plant or any material or euipment transferred under Article III or Article III bis does not infringe any patent owned or controlled by other persons and assumes nno liability or obligation with respect thereto, and the recipient Party agrees to indemnify and hold harmless the transferring Party from any and all liability arising out of any infringement of any such patent.

C. With respect to any invention or discovery, or patent application or patent thereon, or license or sublicense therein, covered by paragraph A of this Article, each Party:
1. may, to the extent of its right, title or interest therein, deal with the same in its own and third countries as it may desire, but shall in no event discriminate against citizens of the other Party in respect of granting any license or sublicense under the patents owned by ft in its own or any other country;
2. hereby waives any and all claims against the other Party for compensation, royalty or award, and hereby releases the other Party with respect to any and all such claims.

D. 1. No patent application with respect to any classified invention or discovery employing classified information which has been communicated or exchanged pursuant to Article II, or derived from the submarine propulsion plant, material or equipment transferred pursuant to Article III or Article III bis, may be filed;
(a) by either Party or any person in the country of the other Party except in accordance with agreed conditions and procedures; or
(b) in any country not a Party to this Agreement except as may be agreed and subject to Articles VI and VII.
3. Appropriate secrecy or prohibition orders shall be issued for the purpose of giving effect to this paragraph.

ARTICLE X
Previous Agreements for Cooperation
Effective from the date on which the present Agreement enters into force, the cooperation between the Parties being carried out under or envisaged by the Agreement for Cooperation Regarding Atomic Information for Mutual Defense Purposes, which was signed at Washington on June 15, 1955, as amended by the Amendment signed at Washington on June 13,1956, shall be carried out in accordance with the provisions of the present Agreement.

ARTICLE XI
Definitions
For the purposes of this Agreement:
A. "Atomic Weapon" means any device utilizing atomic energy exclusive of the means for transporting or propelling the device (where such means is a seperable and devisable part of the device), the principle purpose, of which is for use as, or for development of, a weapon, a weapon prototype, or a weapon test device.

B. "Classified Information" means information, data, material, services, or any other matter with the security designation of "United Kingdom Restricted" or "United States Confidential" or higher applied under the legislation or regulations of either the United Kingdom or the United States, including that designated by the Government of the United States as "Restricted Data" or "Formerly Restricted Data" and that designated by the Government of the United Kingdom as "ATOMIC".

C. "Sensitive nuclear Technology" means any information (including information incorporated into a production or utilization faculty or important component part thereof) which is not available to the public and which is important to the design, construction, fabrication, operation or maintenance of a uranium enrichment or nuclear fuel reprocessing faculty or a faulty for the production of heavy water, but shall not include information designated "Restricted Data" by the Government of the United States.

D. "Controlled Nuclear Information" means information protected by the Government of the United States from unauthorized dissemination pursuant to sections 57.b or 148 of the United States Atomic Energy Act, as amended.

E. "Equipment" means any instrument, aparatus or facility and includes any facility, except an atomic weapon, capable of making use of or producing special nuclear material, and components parts thereof, and includes submarine nuclear propulsion plant, reactor and military reactor.
"Equipment" also includes non-nuclear parts of atomic weapons and other non-nuclear parts of atomic weapons systems involving Restricted Data.

F. "Military Reactor" means a reactor for the propulsion of naval vessels, aircraft or land vehicles and military package power reactors.

G. "Person" means:
1. any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, government agency, or government corporation other than the Ministry of defence and the Department of Energy; and
2. any legal successor, representative, agent or agency of the foregoing.

H. "Reactor" means an apparatus, other than an atomic weapon, in which a self-supporting fission chain reaction is maintained and controlled by utilizing uranium, plutonium or thorium, or any combination of uranium, plutonium or thorium.

I. “submarine nuclear propulsion plant” means a propulsion plant and includes the reactor, and such control, primary, auxiliary, steam and electric systems as may be necessary for propulsion of submarines.

J, “Non-nuclear parts of atomic weapons” means parts of atomic weapons which are specially designed for them and are not in general use in other end products and which are not made, in whole or in part, of special nuclear material; and “other non-nuclear parts of atomic weapons systems involving Restricted Data” means parts of atomic weapons, other than non-nuclear parts of atomic weapons, which contain or reveal atomic information and which are not made, in whole or in part, of special nuclear material. -

K. “atomic information” means information which is designated ‘Restricted Data’ or ‘Formerly Restricted Data’ by the Government of the United States and information designated ‘ATOMIC’ by the Government of the United Kingdom.

ARTICLE Xll
Duration
This Agreement shall enter into force on the date (August 4 1958) on which each Government shall have received from the other Government written notification that it has complied with all statutory and constitutional requirements for the entry into force of this Agreement, and shall remain in force until terminated by agreement of both Parties, except that, if not so terminated, Article H may be terminated by Agreement of both Parties or by either Party to take effect on December 31, 1969, or thereafter on one year’s notice to take effect at the end of any succeeding term of five years.

IN WITNESS WHEREOF, the undersigned, duly authorized, have signed this Agreement.
WHO SIGNED THE AMENDMENT

Done at Washington, in duplicate, this 14th day of June, 2004.

FOR THE GOVERNMENT OF THE UNTIED STATES OF AMERICA
Stephen G Rademaker

FOR THE GOVERNMENT OF THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
F.R. Baker