An End to UK Nuclear Weapons

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Glossary

ABM	anti-ballistic missile
AWE	UK Atomic Weapons Establishment
Blacknest	centre for UK research on forensic seismology, administratively linked to AWE
BNFL	British Nuclear Fuels plc
boosting	process used in most modern nuclear weapons, to fission more of a given quantity of fissile material
CBW	chemical and biological weapons
CD	Conference on Disarmament in Geneva, the world's principal multilateral disarmament negotiating forum
CTBT	Comprehensive Nuclear-Test-Ban Treaty
D5 SLBM	ballistic missile deployed on US and UK Trident submarines
Euratom	European Atomic Energy Community
FMCT	Fissile Material Cut-off Treaty
G-7	Group of Seven industrialized nations (Canada, France, Germany, Italy, Japan, UK, USA)
G-8	G-7 plus Russia
HEU	highly-enriched uranium
IAEA	International Atomic Energy Agency
INF	intermediate-range nuclear forces
kiloton (kt)	explosive power of 1,000 tonnes of TNT equivalent
MORI	Market and Opinion Research International
New Agenda Coalition	Coalition of Brazil, Egypt, Ireland, Mexico, New Zealand, Slovenia, South Africa, and Sweden pressing for progress towards nuclear disarmament
NIF	National Ignition Facility, Lawrence Livermore National Laboratory
NPT	Nuclear Non-Proliferation Treaty
nuclear safeguards	systems based on material accountancy and site inspection, designed to ensure that nuclear materials are not diverted from civil programmes to military usage and that states are not operating clandestine nuclear weapons programmes
Porton Down	UK's chemical and biological defence establishment (currently known as DSTL Porton Down)
SLBM	submarine-launched ballistic missile
SSBN	Ship Submersible Ballistic Nuclear (nuclear-powered ballistic missile submarine)
START	Strategic Arms Reduction Talks/Treaty
Trident (Ohio class)	strategic nuclear submarines deployed by US Navy
Trident (Vanguard class)	strategic nuclear submarines deployed by British Navy
Trilateral Initiative	initiative to develop a new IAEA verification system for weapons-origin material released from defence programs by the United States and the Russian Federation
tritium	element used in modern nuclear warheads to boost fission
warhead pit	core of fissile material in nuclear warhead
warhead primary	fission part of a thermonuclear warhead
warhead secondary	fusion part of a thermonuclear warhead

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Introduction

Fifty years ago, on October 3, 1952, the United Kingdom exploded its first nuclear weapon, a test plutonium fission bomb of 25 kiloton TNT equivalent, at Montebello Island off the coast of Australia. Margaret Gowing has recorded the extraordinary efforts made by the post-war British government to acquire nuclear weapons quickly.[1] At its peak the UK stockpile reached about 350 warheads, now reduced to about 200 deployed on four *Trident* submarines, named after the missile they carry. The annual cost of the UK nuclear deterrent, excluding supporting forces, is of the order of a billion pounds.

What good has this exceptional effort done the UK? A previous British Pugwash report [2] concluded that even at the height of the Cold War, Britain's nuclear weapons had no influence on the course of events. They deterred no enemy. An independent British nuclear force was rationalized as a "second centre of decision" that would give the Soviet Union pause should it doubt American willingness to use nuclear weapons in Europe's defence. But at no time did the British arsenal constitute more than two per cent of the total nuclear arsenal available to NATO, and it was never reasonable to think that the UK would be prepared to use nuclear weapons in circumstances that the US would not. No allied country depended on UK nuclear weapons and no serious consideration was given to the use of these weapons in any of the wars in which the UK has been involved (Suez, Falklands/Malvinas, Persian Gulf and Yugoslavia). The report's conclusion, that Britain could dispense forthwith with its nuclear weapons, was based *not* on the fact that the Cold War is over, but on the uselessness of the weapons during the entire period since the Montebello test. Subsequent events have not altered the basis for this conclusion: it holds good today.

Not only have UK nuclear weapons been of no military value, they are dangerous to possess. There could be accidents and at times of great international tension the weapons could attract pre-emptive strikes. Use of nuclear weapons by the UK would invite disastrous nuclear counterattack.[3] And each country that retains or acquires nuclear weapons serves, directly or indirectly, as an incentive for other nations to do likewise. The UK is legally committed to nuclear disarmament, moreover, under the terms of the Nuclear Non-Proliferation Treaty (NPT), an undertaking reaffirmed in unequivocal language at the 2000 NPT Review Conference.

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[1] Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945-52* (London: Macmillan, 1974).

[2] C R Hill, R S Pease, R E Peierls, and J Rotblat, *Does Britain Need Nuclear Weapons?* (British Pugwash Group, 1995).

[3] For a description of the likely effects of a nuclear attack on the UK, see Solly Zuckerman, *Nuclear Illusion and Reality* (London: Collins, 1982).

The current report discusses options open to the UK government in the areas of nuclear arms control, non-proliferation and disarmament. Chapter 2 reviews the state of the UK nuclear weapons programme, Chapter 3 addresses the prospects for multilateral disarmament, and Chapter 4 discusses existing UK disarmament policy. Because present UK public opinion favours nuclear disarmament only in conjunction with disarmament by other countries, it seems unlikely that the decommissioning of Trident could be achieved in the short run. Chapter 5 deals, therefore, with opportunities for action that, in political terms, may be more readily achievable. These are:

1. an intensification of the present policy of seeking multilateral disarmament;
2. unilateral reduction of the UK nuclear arsenal;
3. a commitment not to develop or procure a nuclear successor to Trident.

These courses of action are not mutually exclusive. However, our major recommendation is option 3: that the UK government should decide and announce that no successor nuclear weapons system will be developed or procured to replace Trident when it is decommissioned in about 20 years' time.

A decision not to develop a nuclear successor to Trident would be comparable in the nuclear weapons context to the decision by the UK in 1956 that it would no longer develop offensive chemical and biological weapons.[4] The UK's chemical and biological weapons facilities now concentrate their work entirely on defensive measures, including means of enforcing the international chemical and biological weapons conventions that prohibit possession of these weapons. In this way the UK has made a significant contribution to reducing the threat from chemical and biological weapons.

It is our main conclusion that by taking a similar approach in the nuclear field, ending development of UK nuclear weapons and intensifying UK efforts to address the political and technical problems confronting multilateral disarmament, the UK would make a significant contribution to reducing the global nuclear threat and, in doing so, increase national security.

The detailed conclusions of our report are given in Chapter 6.

[4] The decision that all UK work in the chemical and biological weapons field would henceforth be solely defensive in nature was taken at a Cabinet Defence Committee meeting, chaired by Prime Minister Anthony Eden, on 10 July 1956. See Gradon B. Carter, *Chemical and Biological Defence at Porton Down 1916-2000* (London: The Stationery Office, 2000).

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UK Nuclear Weapons Programme

Trident Nuclear Deterrent

The UK's nuclear deterrent consists of four British-built submarines each carrying up to 16 American Trident D5 missiles.[5] Although each missile can be armed with up to 8 independently-targetable warheads, a maximum of 48 warheads are currently deployed per submarine. The yield of each warhead is thought to be about 100 kilotons,[6] with a lower-yield option probably in the region of either a few kilotons or ~1 kiloton produced by detonating just the boosted or the unboosted warhead primary.[7] The UK maintains a stockpile of fewer than 200 "operationally available" warheads. No explanation is given for this warhead ceiling, which was announced in the Strategic Defence Review.[8] In the Cold War, retaining the ability to penetrate the missile defence system around Moscow was the criterion and the capability of such missile defences possibly remains a key determinant.

The UK has long considered its nuclear weapons both as a contribution to NATO's nuclear deterrent and an independent guarantee of UK security. Each 100 kt nuclear warhead is capable of devastating a built up area of 15-30 km^2.[9] These are weapons of mass destruction intended to deter an enemy by the threat of unacceptable damage to cities and industrial complexes, with consequent fatalities that could exceed 100,000 per warhead on a built-up area. The number of warheads retained by the UK is substantially lower than that reckoned by US authorities to be needed to inflict *military* defeat on Russia.[10] The capacity of the UK strategic nuclear weapons to deter thus depends largely on their potential for mass destruction.

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[5] The UK has purchased title to 58 Trident D-5 missiles in total. Of these, 10 have been or are earmarked for test firings, and 4 set aside for spares. *Official Report*, House of Commons, 30 July 1998, Written Answers col. 448-49.

[6] The Trident warhead is believed to be closely based on the US W-76 warhead, which has a yield of around 100 kt. (Reportedly, the yield is 100-120kt, see http://www.naval-technology.com/projects/vanguard/). The Trident warhead was tested after the Threshold Test Ban Treaty was in place, suggesting a yield of less than 150 kt.

[7] The option of two alternative yields is confirmed in *A New Beginning*, AWE Annual Report 2000, p. 14. The magnitudes are estimates offered on the website of the Natural Resources Defense Council at http://www.nrdc.org.

[8] *The Strategic Defence Review*, Cm 3999 (London: The Stationery Office, July 1998).

[9] Frank von Hippel, "The Effects of Nuclear War," in D W Hafemeister and D Schroer ed., *Physics, Technology and the Nuclear Arms Race* (New York: American Institute of Physics, 1983).

[10] Committee on International Security and Arms Control (CISAC) of the US National Academy of Sciences, *The Future of the US-Soviet Nuclear Relationship* (Washington DC: National Academy Press, 1991), p. 3.

Since plans to develop a new tactical air-launched nuclear missile were shelved in the early 1990s, it has been UK policy to use the Trident system to provide a substrategic nuclear capability. Speaking as Secretary of State for Defence in 1993, Malcolm Rifkind argued that a substrategic capability is necessary because an aggressor might, in certain circumstances, gamble on a lack of resolve on the part of the UK to make a strategic nuclear strike but believe that it could contemplate a lower level of nuclear use.[11] UK governments have not, in general, given examples of the sorts of scenarios in which substrategic strikes would be contemplated.[12] Presumably a sub-strategic strike might involve a single low-yield warhead. A 1 kt warhead has a lethal area of roughly 2 km^2.[13]

At least one submarine is on patrol at any given time, but operating at a state of reduced alert. The reduced alert is an operational rather than a technical status, meaning that the submarines are at a "notice to fire measured in days."[14] Trident missiles are not targeted,[15] although targeting can be restored in a matter of minutes. It may be that detargeting provides some additional insurance against accidental or unauthorized use of the weapons, but no information is in the public domain on which to base an independent assessment of operating safety.[16] The chain of command for a missile launch consists of a series of steps embodying the "two man" rule, that is to say the key steps in the process of firing a nuclear weapon cannot be activated by one person acting alone.

The UK has a large defence stockpile of plutonium and highly-enriched uranium, a proportion of which has been declared surplus to defence needs and will be transferred to international safeguards.[17] Tritium, which is used in many modern nuclear warheads to "boost" the fission process to a higher level, is currently manufactured at BNFL's Magnox reactors at Chapelcross, which are due to be decommissioned beginning in March 2005.[18]

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[11] Malcolm Rifkind, "The Role of Nuclear Weapons in UK Defence Strategy," *Brassey's Defence Yearbook* (London: Brassey's, 1994), p. 28.

[12] An exception was when Tom King said in 1991 when Secretary of State for Defence that "…an aggressor with a limited nuclear capability might think he could get away with, possibly, the local use of nuclear weapons, without having to face the apparently unrealistic prospect of a total strategic nuclear reply." *Official Report Sixth Series, House of Commons,* 22 November 1991, col. 543.

[13] Von Hippel, "The Effects of Nuclear War."

[14] The submarines on patrol will "carry out a variety of secondary tasks … including hydrographic data collection, equipment trials and exercises with other vessels," see "Deterrence, Arms Control and Proliferation," *The Strategic Defence Review: Supporting Essays* (London: The Stationery Office, July 1998).

[15] Joint Declaration by the President of the Russian Federation and The Prime Minister of the United Kingdom of Great Britain and Northern Ireland, Moscow, 15 February 1994.

[16] Stringent and externally regulated safety measures and environmental standards are in place at the Trident naval base on the Clyde. See Malcolm Chalmers and William Walker, *Uncharted Waters: The UK, Nuclear Weapons and the Scottish Question* (East Lothian: Tuckwell Press, 2001).

[17] The UK has 7.6 tonnes of plutonium, 21.9 tonnes of highly-enriched uranium, and 15,000 tonnes of uranium in other forms. 4.4 tonnes of plutonium, including 0.3 tonnes of weapons-grade material, and more than 9,000 tonnes of non-highly-enriched uranium have been declared surplus to defence needs and these materials are now being placed under EURATOM safeguards and made liable to inspection by the IAEA. All HEU is being retained for use in submarine propulsion. "Deterrence, Arms Control and Proliferation," *The Strategic Defence Review: Supporting Essays*.

[18] BNFL Press Release, 21 June 2002.

Expenditure on the nuclear warhead programme in 1997/98 was £410m. This included costs directly attributable to maintenance of Trident, modernization of infrastructure at the Atomic Weapons Establishment, legacy issues (warhead dismantlement, past liabilities to the nuclear industry, waste management and decommissioning of facilities), and small expenditures on arms control and support to other government departments (intelligence, for example).[19] An additional £530m was spent "providing, operating, maintaining and disposing of the Royal Navy's ballistic missile submarine fleet and its missiles."[20] This gives an overall direct annual cost of the nuclear weapons programme of £940m or a little over £1bn at today's prices, which is just under five per cent of the defence budget. The substantial costs of support forces assigned to protect Trident and the land-based infrastructure have to be added.[21] These are difficult to estimate since these forces serve other defence roles in parallel. They perhaps double the above sum.[22] Decommissioning and other transitional costs would reduce the savings immediately realizable from this total outlay in the event of a decision to disarm, although expenditure on decommissioning a weapon system may properly be considered as part of the weapon system life-cycle cost rather than a cost of disarmament.[23]

UK TRIDENT LIFETIME

The operational lifetime of the UK's Trident nuclear deterrent is conventionally treated as 30 years,[24] corresponding to the approximate design lifetime of the submarine and missile. The UK's Vanguard-class Trident submarines entered into service between 1994 and 2001 and therefore it can be expected that they will begin to be decommissioned soon after 2020. The Trident warhead, designed and manufactured at the UK Atomic Weapons Establishment, can be maintained in service indefinitely through a programme of inspection, refurbishment, and remanufacture within original specifications.

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[19] "Deterrence, Arms Control and Proliferation," *The Strategic Defence Review: Supporting Essays*.

[20] Lord Gilbert, *Official Report Fifth Series: House of Lords*, v. 584, 9 December 1997, column 5. The annual operation costs of Trident, averaged over 30 years, were estimated at £277m (*c.* £310m at 2002 prices).

[21] The conventional force elements contributing to national nuclear forces include commandos, nuclear-powered submarines, minesweepers, destroyers, frigates, and Nimrod maritime reconnaissance aircraft. "Defending Our Future," *Statement on the Defence Estimates 1993*, Cm. 2270 (London: HMSO, July 1993).

[22] The "gross" cost of the nuclear deterrent in 1994/95 was estimated at £3.8bn (*c.* £4.6bn at 2002 prices), *Statement on the Defence Estimates 1993*. (Gross cost was defined as the combined cost of all force elements required for a given military task (i.e. provision of a nuclear deterrent) and included the earmarking of forces for multiple defence tasks producing a total gross defence cost roughly double the defence budget). For a variety of reasons, costs attributable to provision of a nuclear deterrent may be lower today, including firstly that the UK no longer deploys nuclear warheads on surface ships or aircraft, and secondly that in view of the current low level of perceived threat to deployed UK nuclear forces, with Russia having largely withdrawn from anti-submarine warfare, fewer conventional forces may be allocated to the protection of Trident than during the Cold War.

[23] Susan Willett, *Costs of Disarmament – Rethinking the Price Tag: A Methodological Inquiry into the Costs and Benefits of Arms Control* (UNIDIR, forthcoming).

[24] "We need to ensure that it [Trident] can remain an effective deterrent for up to 30 years." *Strategic Defence Review.* The costings for keeping Trident in service were calculated over a 30 year period.

The US, which operates a fleet of nuclear-powered submarines armed with the same missile used by the UK boats, has instituted a life extension programme for all components of its submarine-based deterrent. A decision was taken in 1998 to extend the planned service life of US (Ohio-Class) Trident submarines from 30 to 44 years using an enhanced schedule of refurbishments and maintenance. Life extension programmes are also scheduled for the (D5) missile and re-entry body to match the extended hull life. Production of the upgraded missiles (designated D5A) equipped with new rocket motors is expected to start in 2015, with the refurbished missile potentially operational until 2040.[25]

Even though it may be expected that UK Trident submarines will patrol mostly at low speeds and shallow depths, and will perhaps operate at 50 per cent or less of their design hours (with only one boat routinely on patrol at any time), the working assumption must be that the submarines will not remain seaworthy for more than 30 years. None of the previous generation of strategic submarine (*Polaris*) remained in service for as long as 30 years. By the mid 1980s, as the boats approached the end of their design life (originally planned as 20 years but later extended to 25-30 years), problems with the hull and reactor propulsion system began to make maintenance requirements prohibitively time-consuming and expensive.[26] We do not know the technical nature of the US hull life extension programme, nor whether a UK Trident hull life extension programme might be feasible, and if it were whether the UK would need to institute such a programme in the near future.

Lockheed Martin, a partner in the consortium running AWE Aldermaston, manufactures the Trident D-5 ballistic missile and re-entry body, with production of the missile propulsion system sub-contracted to other US firms. Should the US cease production of D-5 missiles for its own armed forces for any reason, then while it might be prepared to make surplus spare parts available to the UK, the UK would still be faced with the choice of either taking on the whole expense of keeping US production lines open or developing an indigenous manufacturing capability.[27] In reality, this probably is only a theoretical concern since Trident is an integral part of the US strategic nuclear deterrent, planned for deployment well past 2020. The UK, which has "title" to a certain number of missiles drawn from a shared missile pool at King's Bay Naval Base in Georgia where the

[25] Information on the life extension programme can be found on the Lockheed Martin website: http://lmms.external.lmco.com/.

[26] See E.R. Hooton, "The United Kingdom Trident Programme," *Military Technology*, X, 1, (January 1986) and R.S. Norris, R S, A S Burrows and R W Fieldhouse, *British, French, and Chinese Nuclear Weapons Databook: Volume V* (Boulder: Westview Press, 1994).

[27] The UK has been without ballistic missile design and production capacity since the cancellation of the Blue Streak ballistic missile in 1960.

missiles are serviced,[28] would presumably be able to buy into the US missile life extension programme.[29]

The MoD has said repeatedly in response to parliamentary questions that no decision has been taken on Trident life extension and/or a successor nuclear system, while noting that maximising the operational lifetime of any weapon system is a matter of routine examination.

Aside from accident or major system failure,[30] UK Trident's lifetime could in principle be shortened as a consequence of the obsolescence of its weapons systems. There is, however, no prospect that missile defences will be developed capable of neutralising the UK deterrent (as happened to Polaris). Even if there were, the straightforward solution would be to increase the number of warheads deployed per boat.[31] In terms of the submarine's tactical weapons systems, and ability to operate undetected, it is possible that developments in anti-submarine warfare capabilities could shorten UK Trident's useful lifetime. Submarines have nonetheless long been considered the most secure second-strike weapons platform and the consensus is still that strategic submarines remain relatively invulnerable to detection and attack.[32] Thus while it might in theory be possible, given sufficient effort, to find and destroy at sea one of the British Trident SSBNs, for the foreseeable future only the United States would be capable of mounting such an operation. If this situation changes it is likely to do so because of covert installation of tags on submarines.[33]

In sum, the submarines themselves, allowing that the missile can be upgraded, are the probable limit on the lifetime of the UK Trident nuclear deterrent. Were a decision taken to replace the whole weapon system, development work would have to start 10-15 years before the required in-service date.[34] Thus with the first of the Trident submarines having entered into service in 1994, preliminary work on a replacement system might start by around 2010. If the decision were essentially to replace the submarine only, the lead-time might be substantially reduced.

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[28] This arrangement saves Britain the expense of building its own servicing facilities and allows efficient maintenance and use of the whole missile pool.

[29] The estimated cost of replacing Polaris rocket motors was £549m at current prices (*c.* £1bn at 2002 prices), *Official Report Sixth Series: House of Commons*, v. 110, Written Answers 20 February 1987, col. 871.

[30] As well as the possibility of catastrophic accident at sea, were there to be any significant nuclear incident at the submarine base on the Clyde then the Scottish Parliament would be bound to involve itself in nuclear policy on the basis of concerns about safety and environmental standards, with uncertain consequences for the long-term viability of the UK nuclear weapons programme. See Chalmers and Walker, *Uncharted Waters*.

[31] See Paul Roper, "Technical Options for a Minimum UK Nuclear Deterrent if faced with a Proliferation of National Missile Defences," paper presented at meeting organized by Oxford Research Group and the Chinese People's Association for Peace and Disarmament, Beijing, 13-16 March 2000.

[32] For a discussion of anti-submarine warfare, see Richard L. Garwin, "Will Strategic Submarines be Vulnerable?" *International Security*, 8:2 (Fall 1983), pp. 52-67.

[33] Richard L. Garwin, personal communication.

[34] Fourteen years elapsed between the start of the Trident project and entry-into-service of the first boat.

AWE Aldermaston

The UK's Atomic Weapons Establishment (AWE) designs and manufactures UK nuclear warheads. Based at Aldermaston in Berkshire, it also operates a smaller site a few miles away at Burghfield Common responsible for final assembly, in-service maintenance, and decommissioning of warheads. AWE is run on a government-owned, contractor-operated basis, with the present contractor (AWE Management Ltd, an equal partnership of British Nuclear Fuels, Lockheed Martin and Serco Ltd[35]) holding a contract running to the year 2010 with an expectation that this will soon be extended to 2025.

The length of the contract awarded to AWE Management is designed to facilitate large-scale private sector investment in infrastructure at Aldermaston, some of which is now 50 years old. Major new facilities are to be built to support the scientific programme, old buildings decommissioned, and work carried out on environmental remediation. At the same time, retrenchment and consolidation, reflecting AWE's reduced needs in the post-Cold War era, will continue. A former component factory at Cardiff has been demolished, AWE has withdrawn from the high explosive testing range at Foulness, and there are plans to close the Burghfield site over the course of the next decade with replacement assembly facilities to be built at Aldermaston.[36] AWE's workforce, which reached a Cold War level of nearly 9,000, has fallen to around 3,800 and is expected eventually to fall to 3,000. The annual running costs are currently about £300m,[37] with AWE anticipating that its nuclear programme budget will fall by 30 per cent over the course of this decade.[38]

AWE completed design of the Trident warhead in the late 1980s and has not had a warhead development programme underway since 1993 when development of a tactical airborne system was cancelled. AWE's current remit is to maintain and certify the Trident stockpile and to preserve a national warhead design and production capability. With the UK having signed and ratified the Comprehensive Test Ban Treaty, this must be accomplished without nuclear explosion testing.

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[35] BNFL's main business is the manufacture of reactor fuel, reactor services, electricity generation, spent fuel management, and decommissioning of nuclear power and process plants, see http://www.bnfl.co.uk. Lockheed Martin, among other things, runs Sandia National Laboratories and the Oak Ridge Y-12 plant (thereby involved in dismantlement, stewardship, and nuclear materials management and storage), see http://www.lmco.com. Serco is an international management contractor, providing a range of engineering, management and business support services to government and industry, see http://www.serco.com.

[36] The AWE Aldermaston Site Development Strategy Plan, AWE Corporate Communications, July 2002.

[37] See "Deterrence, Arms Control, and Proliferation," *Strategic Defence Review: Supporting Essays*. These costs are defined to include Trident production and maintenance, R&D, warhead dismantlement, verification and test monitoring, waste management, and infrastructure work including safety/environmental issues.

[38] *AWE Strategic Plan, 1999* (AWE Aldermaston, 1999), p. 13.

WARHEAD STEWARDSHIP

Nuclear explosion testing has never been used, in the US or the UK, for routine warhead maintenance. A stockpile of fully tested nuclear warheads, such as Trident, established in service for a number of years, has always been maintained through a programme of surveillance, refurbishment and, if necessary, remanufacture within initial specifications. Although the high profile and costly US stockpile stewardship programme was set up in response to the end to testing, this had more to do with maintaining nuclear weapons expertise than with maintaining the existing warhead stock. [39]

The main functions of testing were to develop new weapons designs, to check that production line weapons worked as the prototypes had, and to study weapons effects. Even in the US weapons programme, which carried out 1,030 test explosions as against the UK's 45, post-design testing was a rarity, used only on occasion to test weapons performance in marginal conditions not tested in the design phase (for example, with old tritium supply).[40] Warhead safety, as opposed to reliability, depends mainly on non-nuclear components such as electrical switches and fire barriers, and these are fully tested without test explosions. Nuclear explosion testing is needed to certify one-point safety on new designs (*i.e.* detonation of the high explosive at a single point instead of the specified two or more detonation points should not result in any nuclear yield), but weapons in service, including Trident, have already been passed one-point safe.[41] In sum, maintenance of Trident warheads can continue much as in the past, with warheads refurbished, repaired and/or rebuilt on a pre-determined timetable.[42]

Standard maintenance practice at AWE has been regularly to disassemble and inspect warheads withdrawn from the stockpile, replace limited-life components (neutron generators, tritium reservoirs, batteries, *etc.*) according to a fixed schedule, and repair any other parts of the warhead found to have deteriorated.[43] At the core of the stewardship programme, a small number of Trident warheads are completely dismantled

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[39] The FY1994 U.S. National Defense Authorization Act (P.L. 103-160) calls on the Secretary of Energy to "establish a stewardship program to ensure the preservation of the core intellectual and technical competencies of the United States in nuclear weapons." Projects such as the National Ignition Facility being built at Lawrence Livermore National Laboratory are mainly directed at attracting first-rate scientists and maintaining expertise in areas relevant to nuclear weapons.

[40] Richard L. Garwin, "The Future of Nuclear Weapons Without Nuclear Testing," *Arms Control Today*, November/December 1997.

[41] *Report on the Safety of UK Nuclear Weapons* (The "Oxburgh Report"), prepared by the Safety Review Group (chaired by the Chief Scientific Adviser to the Ministry of Defence), 12 February 1992.

[42] For a recent statement on the maintenance of US nuclear warheads under a test ban, see Committee on Technical Issues Related to Ratification of the Comprehensive Nuclear Test Ban Treaty, National Academy of Sciences, *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty* (Washington D.C: National Academy Press, 2002).

[43] AWE followed a similar approach to warhead maintenance when nuclear testing was curtailed in 1965. For details of AWE's stewardship plans at this time, see Report to the Ministry of Technology and the Chairman of the Atomic Energy Authority by the Working Party on Atomic Weapons Establishments, Chair: Lord Kings Norton (The "Kings Norton Report"), July 1968 [Public Records Office (PRO), Kew document ES13/1]. See also, "Cost of Military Nuclear R&D in A.E.A Weapons Group," note from E F Newley (Director, Atomic Weapons Research Establishment) to Sir William Cook (Ministry of Defence), 15 November 1968 [PRO document DEFE19/98]

and examined each year and reassembled with replacements for elements of the warhead destroyed in the testing process.[44] Manufacture of warhead pits at a rate of one or a few a year is maintained to replace those destroyed in the inspection process as well as to help maintain and pass on weapon production skills.[45]

The major areas of underlying scientific research in the UK stewardship programme are hydrodynamics (study of the warhead implosion), laser physics (thermonuclear reactions), materials science (especially materials ageing), and computer modelling, which supports all areas of warhead stewardship.[46] The UK continues to place a high priority on maintaining strong links with the US on warhead stewardship, with most UK research exposed to US laboratories. There is also a limited amount of collaboration with France in the form of reciprocal visits and sharing of data.

The most significant UK strength is in hydrodynamics where AWE has leading facilities, currently being upgraded. AWE's laser has recently also been upgraded and the MoD is considering building a new laser facility, which might be located either at AWE or at the Rutherford Appleton Laboratory, which is operated by a civilian science research council. The UK had planned to design and construct a target chamber at the National Ignition Facility (NIF) being constructed at Lawrence Livermore National Laboratory in the USA, but this project has been abandoned with remaining UK investment in NIF scaled back to about £30m.[47] Work is underway on materials ageing and developing replacements for materials used in the Trident warhead should they become unavailable. There is large investment in high performance computing, aiming at developing three-dimensional modelling capability to support hydrodynamics and materials work in particular.

Thus the stewardship programme in place at Aldermaston can adequately maintain the Trident warhead in service for as long as required. Meanwhile Aldermaston also remains ready, until advised otherwise, to design and develop a new warhead.

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[44] In the United States, 11 of each type of warhead remaining in the stockpile are selected at random for inspection and disassembly.

[45] The lifetimes of the fissile core of the warheads (the "pits") are currently considered to be at least 60-90 years. *Remanufacture*, JSR-99-300. The UK has experience with pits 30 years old, as does the United States.

[46] "A New Beginning," *AWE Annual Report 2000.* See also, Keith O'Nions, Robin Pitman and Clive Marsh, "Science of Nuclear Warheads," *Nature*, 415 (21 February 2002), pp. 853-857.

[47] The UK is supporting a shot-rate enhancement programme. Time on NIF is planned to be allocated in proportion to UK contribution to total NIF budget (i.e. £30m out of a ~ $1.5 billion budget, which is to say a few per cent), which might restrict UK access to NIF to levels below those that would meet UK requirements. In practice, the UK has in the past gained access to US laser facilities (at Los Alamos, Livermore and Rochester N.Y.) through collaborative work undertaken in conjunction with the weapons laboratories. It is reported that technical difficulties may mean that some of the technical objectives of NIF are not met, but even if this is the case, this would not reduce value of facility to MoD given that its primary requirements are for weapons-related experiments not fusion ignition or wider academic research.

3

Prospects for Progress in Multilateral Nuclear Disarmament

In addressing the prospects for progress in multilateral nuclear disarmament, political attitudes and public opinion in the United States are of primary importance. If the USA, as the dominant world power, were to make some further moves towards disarmament, then the other nuclear weapon states, including the UK, would probably follow the US lead. Thus before coming to the UK situation, it is relevant to look at the debate in the US and at wider international attitudes.

At face value there would seem to be strong reasons to expect the US to favour multilateral nuclear disarmament. Writing in 1992 as Chairman of the House Armed Services Committee, Les Aspin, who within a few months would be appointed as Clinton's first Secretary of Defense, produced a seminal paper entitled "From Deterrence to Denuking."[48] He argued that the change in the balance of conventional forces in Europe, the end to the nuclear arms race, and the rapprochement with Russia and the other successor states of the Soviet Union had "literally reversed US interests in nuclear weapons." Nuclear weapons remained the big equalizer, only now it was the United States that was "the potential equalizee," implying that the proliferation of nuclear weapons had become the greatest threat to US security.

It is not just that the elimination of nuclear weapons from the world would leave the United States facing no military threat. As the recent wars in the Persian Gulf, Yugoslavia, and Afghanistan have demonstrated, the US would also be in possession of unrivalled conventional military capability.[49] With nuclear weapons abolished, wrote McGeorge Bundy, William J. Crowe, Jr., and Sidney D. Drell, the US "should be free to enjoy two extraordinary strategic advantages: first, as the least threatened of major states and second, as the one state with modern conventional forces of unmatched quality."[50] It was therefore unsurprising that the 1990s saw a number of statements and reports from major US bodies and prominent individuals urging study, as a matter of immediate practical importance, of the conditions under which the global prohibition of nuclear

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[48] Les Aspin, *From Deterrence to Denuking: Dealing with Proliferation in the 1990s*, 21 January 1992, reprinted in "Shaping Nuclear Policy for the 1990s: A Compendium of Views," *Report of the Defense Policy Panel of the Committee on Armed Services*, 102nd Congress, 2nd Session (Washington DC: US Government Printing Office, December 1992).

[49] It can be argued that unless a nuclear-weapon-free world (NWFW) regime is put in place, US dominance in conventional weaponry will actively encourage the proliferation of weapons of mass destruction as a counterbalance. See, for example, Robert A. Manning, "The Nuclear Age: The Next Chapter," *Foreign Policy*, Winter 1997-98, pp. 70-84.

[50] McGeorge Bundy, William J. Crowe Jr., Sidney D. Drell, *Reducing Nuclear Danger* (New York: Council on Foreign Relations Press, 1993), p. 5.

weapons would become desirable and feasible. [51] The statements and reports set out a variety of proposals for arms reductions, changes to operational deployments, and verification and confidence building measures that could be implemented in the meantime.

For several years, in the latter part of the 1980s and early 1990s, significant progress was made in bilateral US-Russian nuclear arms reductions. Although the support base for a nuclear-weapon-free world had widened, however, serious interest in nuclear disarmament was far from established in the mainstream of US strategic thought. Concerns began to be voiced about chemical and biological weapons, for example, with the term "weapons of mass destruction" increasingly used as a blanket description for all three types of weapon, implying a continuing utility for US nuclear forces.[52]

Following the election of George W. Bush, the salience of nuclear weapons in defence planning has increased markedly. All official statements of policy, most recently the leaked 2002 Nuclear Posture Review, contemplate the maintenance of stockpiles of thousands of warheads indefinitely, as do reports from currently influential bodies such as the National Institute for Public Policy.[53] There are indications that the US may be prepared to use nuclear weapons in a widening range of circumstances, in particular in operations such as attacks on underground military facilities, or to pre-empt or respond to chemical or biological weapons attack; that it will invest heavily in its nuclear weapons infrastructure; that new warheads may be developed[54] and nuclear explosion testing may resume.

The Administration's open aversion to arms control is evident in the Bush-Putin Strategic Offensive Reductions Treaty (SORT), which commits each side to reduce its deployed arsenal of strategic nuclear weapons to 1,700-2,200 by 31 December 2012 when the treaty expires. By failing to require destruction of infrastructure, delivery vehicles or warheads, and specifying no schedule of reductions between now and the treaty's expiry date, the US has effectively abandoned the bilateral process of verified nuclear disarmament that had been developing through the INF and START agreements and which, it had been hoped, would eventually broaden to include the other nuclear weapon states.

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[51] For example, Committee on International Security and Arms Control (William F. Burns, Study Chair; John P. Holdren, Committee Chair), *The Future of U.S. Nuclear Weapons Policy* (Washington D.C: National Academy Press, 1997).

[52] PDD(Presidential Decision Directive)-60 in November 1997, for example, allowed for possible use of nuclear weapons in case of a chemical or biological weapons attack.

[53] National Institute for Public Policy, *Rationale and Requirements for U.S. Nuclear Forces and Arms Control*, January 2001.

[54] New weapons development is being promoted by the weapons laboratories in particular. For example, C. Paul Robinson [director of Sandia National Laboratories], "Pursuing a New Nuclear Weapons Policy for the 21st Century: a White Paper," 22 March 2001 (presented at the 2nd Annual Nuclear Security Decisionmakers' Forum, Alberquerque, New Mexico, 26-29 March 2001); and Stephen M. Younger [former Associate Director of Los Alamos National Laboratory and currently Director of the Defense Threat Reduction Agency], *Nuclear Weapons in the Twenty-First Century*, LAUR-00-2850 (Los Alamos, NM: Los Alamos National Laboratory, 27 June 2000).

The US general public also continues to view nuclear weapons as important to US security (see Appendix 1 for a detailed discussion). Although strong public support can be found for the objective of nuclear disarmament, as well as for various partial measures of arms control, further questioning elicits widespread doubts that other nations could be trusted to abide by treaty commitments or that disarmament could be effectively verified. The familiarity of the US arsenal continues to serve as "a literal security blanket that most Americans as yet are unwilling to forego."[55]

Outside the United States there has also, since the Cold War ended, been an increased amount of serious attention paid to the question of nuclear disarmament, including a number of high profile statements and reports, some directly from national governments or from research projects sponsored by governments, stressing the importance of making progress in multilateral nuclear disarmament.[56] In addition are notable developments such as the formation of the New Agenda Coalition and pro-nuclear-disarmament positions taken by Canada and Germany within NATO. But as in the United States, this body of advocacy has failed to generate much progress. The International Institute for Strategic Studies *Strategic Survey* was surely correct when it observed, even some five years ago, that it is "patently clear that the abolitionist influence does not dominate current policy."[57]

In terms of treaty development, a statement of "Principles and Objectives" at the Non-Proliferation Treaty (NPT) Review and Extension Conference in 1995 endorsed by all states parties called for "the determined pursuit by the nuclear weapon states of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goal of eliminating those weapons". And the 2000 NPT Review Conference produced an "unequivocal undertaking"[58] from the nuclear weapon states to accomplish the total elimination of their nuclear arsenals together with a plan of action (see Box) for producing the "systematic and progressive" efforts to which they had committed themselves in1995. But it is far from clear what precisely has been agreed and how or when it will be implemented.[59] In the US case, by flouting several of the "steps towards disarmament" set out in the action plan – for example, by developing ballistic missile defence, withdrawing support for the comprehensive test ban, [60] and planning under SORT to retain thousands of intact warheads and warhead components in reserve, thus

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[55] Kerry G. Herron and Hank C. Jenkins-Smith, *Public Perspectives on Nuclear Security: US National Security Surveys 1993-1997* (Albuquerque, New Mexico: UNM Institute for Public Policy, University of New Mexico, June 1998).

[56] For example, the Canberra Commission in which one of us (Rotblat) was involved: Canberra Commission on the Elimination of Nuclear Weapons, *Report of the Canberra Commission* (Canberra, Department of Foreign Affairs and Trade, August 1996).

[57] "Nuclear Weapons: The Abolitionist Upsurge," in *Strategic Survey 1997/98* (London: Oxford University Press for the IISS, 1998), p. 54.

[58] "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." Excerpted from NPT 2000 Review Conference Final Document.

[59] John Simpson, "The 2000 NPT Review Conference," *SIPRI Yearbook 2001* (Oxford: Oxford University Press, 2001).

[60] For official confirmation see Statement by Ambassador Eric M. Javits, Permanent Representative of the United States of America to the Conference on Disarmament, April 11, 2002.

ensuring that reductions being made to the operational arsenal can rapidly be reversed – policymaking would appear now almost entirely to disregard the NPT.

THE MAIN STEPS TOWARDS DISARMAMENT AGREED AT THE 2000 NPT REVIEW CONFERENCE

- To achieve the necessary ratifications to enable early entry into force of the Comprehensive Test Ban Treaty.
- A moratorium on nuclear tests pending entry into force of the CTBT.
- The immediate commencement of negotiations on a Fissile Material Cut-Off Treaty with a view to their conclusion within five years.
- The Conference on Disarmament urged immediately to establish a body with a mandate to deal with nuclear disarmament.
- The principle of irreversibility in nuclear disarmament to apply.
- An unequivocal commitment to complete nuclear disarmament by the nuclear weapon states.
- The early entry into force and full implementation of START II and the conclusion of a 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 in offensive weapons."
- The completion and implementation of the Trilateral Initiative between the US, Russia, and the IAEA.
- Steps towards nuclear disarmament:
  - Unilateral efforts.
  - Increased transparency.
  - Reduction of non-strategic weapons.
  - Reduction in the operational status of nuclear weapons.
  - Diminishing role for nuclear weapons in security policies.
  - All the nuclear weapon states to engage in the process of disarmament as soon as appropriate.
- Arrangements to place all fissile material no longer needed for military purposes under IAEA or other relevant international verification and to ensure it remains permanently outside military programmes.
- Reaffirm the ultimate objective of general and complete disarmament.
- To provide regular reports on disarmament progress.
- Further development of verification capabilities relevant to assuring compliance with nuclear disarmament agreements and for achievement and maintenance of a nuclear-weapon-free world.

Reproduced from "Weapons of Mass Destruction," *Eighth Report of the Foreign Affairs Committee 1999-2000* (London: The Stationery Office, 25 July 2000) p. xxi.

Other progress in treaty-based nuclear disarmament has largely ground to a halt. The Conference on Disarmament, which is supposed to be negotiating a fissile material cut-off treaty, is moribund. Thirteen of the 44 states that must ratify the nuclear test ban before it can enter into force (the test ban was the last treaty negotiated at the CD, from 1994-1996) have failed either to sign or to ratify the treaty, including five of the eight nations in possession of nuclear weapons (China, India, Israel, Pakistan, and the USA).

In sum, although in the 1990s there were positive developments in US thinking about marginalizing and eliminating nuclear weapons, for some time policy has been moving in the opposite direction and the present US administration is increasing the emphasis placed on its nuclear capability. There is therefore little reason at the present time to anticipate significant or rapid progress towards multilateral nuclear disarmament.

4

UK Attitudes to Nuclear Disarmament

The 1998 Strategic Defence Review, the most complete statement of defence policy from the present government, says that the UK wishes to see "mutual, balanced and verifiable reductions in nuclear weapons," and when satisfied with international progress towards the goal of a nuclear-weapon-free world will "ensure that British nuclear weapons are included in the negotiations."[61] In what is considered a restatement and update of policy, George Robertson argued in 1999 that "Britain can best contribute by setting a lead through our philosophy of minimum deterrence combined with steps to build a wider framework for nuclear arms reductions, particularly through measures which improve transparency and confidence."[62] In this connection:

- The Ministry of Defence has provided some transparency on military plutonium and highly-enriched uranium stockpiles.[63] In the case of plutonium, it has not reported on material production but has instead produced a record of transfers of plutonium into and out of AWE Aldermaston. Since all plutonium entering the weapons programme passes through Aldermaston, recording material transfers to and from AWE is a straightforward alternative to a historical audit of production data.[64] A sister report on highly-enriched uranium is in preparation.
- The entire production of fissile materials in the UK is open to international safeguards, under both the Euratom Treaty and the UK's voluntary offer agreement with the IAEA,[65] with the exception of reactor operations at Chapelcross, where tritium will continue to be produced for the weapons programme to 2005.[66]
- The UK has signed and ratified the Comprehensive Nuclear-Test-Ban Treaty, supports negotiation of a Fissile Material Cut-Off, and although having done nothing to promote it is willing to see "an appropriate subsidiary body with a mandate to deal with nuclear disarmament" established immediately at the Conference on Disarmament in Geneva.[67]

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[61] "Deterrence, Arms Control, and Proliferation," *The Strategic Defence Review: Supporting Essays*.

[62] George Robertson, "Nuclear Disarmament in the Modern World," speech at Aberdeen University, 1 March 1999.

[63] *Plutonium and Aldermaston: An Historical Account,* Ministry of Defence (2000).

[64] … but less convincing to an outside party. For a review of the report, calling for a more comprehensive study, see William Walker, "Defence Plutonium Inventories and International Safeguards in the UK," *VERTIC Briefing Paper 00/5*, October 2000.

[65] The NPT does not require the nuclear weapon states to conclude safeguards agreements with the IAEA. Voluntary offer agreements are those through which the nuclear weapon states open part or all of their civilian nuclear fuel cycle to safeguards, in order to allay concerns that nuclear industry in the non-nuclear weapon states might otherwise be placed at a commercial disadvantage.

[66] Reprocessing of spent fuel from Chapelcross *is* open to international safeguards.

[67] "Towards a Nuclear-Weapon-Free World: The Need for a New Agenda," resolution tabled at First Committee of the United Nations (Disarmament and International Security), October 2000 (UNGA55/33C

- A small verification programme has been established at AWE Aldermaston, the objective of which is to "ensure that, when the time comes for the inclusion of British nuclear weapons in multilateral negotiations, we [the UK] will have a significant national capability to contribute to the verification process."[68]

As regards the UK's strengthened NPT disarmament commitment, officials responsible for nuclear policy say that this new declaratory position will have little practical impact on UK day-to-day activities. Peter Hain, Minister of State at the Foreign and Commonwealth Office, says of the same decision, however, that it is "the most explicit pledge ever made by the nuclear weapon states to work for complete nuclear disarmament" and "an important statement of intent which we hope will provide a timely boost to international non-proliferation and disarmament efforts."[69]

UK officials argue that the UK now possesses "the minimum effective deterrent in the present circumstances, deployed in the most stable configuration: Continuous At Sea Deterrence."[70] The UK has indeed gone a considerable way along the road towards nuclear disarmament.

However, UK public interest in the nuclear weapons issue has all but disappeared over the last 15 years and when the question of the UK's possession of nuclear weapons is put before the British public, in opinion polling, a substantial majority continues to favour retaining nuclear weapons for as long as other nations have them (for a detailed discussion see Appendix 1). If one adds to this picture Labour's experience of advocating unilateral nuclear disarmament in the 1980s, it is easy to see that the major political parties can see no electoral advantages, only potential risks, in raising the question of the UK's nuclear status. As in the US, the objective of nuclear abolition has strong public support. There is also clear public support in Britain for a policy of no first use of nuclear weapons and for UK leadership in multilateral nuclear disarmament endeavours.

(L.4/Rev.1) and supported by the UK. This was also one of the steps towards nuclear disarmament agreed in the Final Document of the NPT Review Conference.

[68] *Strategic Defence Review*, Cm. 3999 (London: The Stationery Office, July 1998). See also Garry George *et al. Confidence, Security and Verification: The Challenge of Global Nuclear Weapons Arms Control*, AWE/R/2000/01(Atomic Weapons Establishment, 2000).

[69] Peter Hain, *Official Report Sixth Series: House of Commons*, v. 351, 8 June 2000, Written Answers col. 306.

[70] Paul Schulte (Director of Proliferation and Arms Control at the Ministry of Defence), "Britain and Nuclear Disarmament: Record, Realities and Opportunities," speech at the 50th Pugwash Conference on Science and World Affairs, *Eliminating the Causes of War*, Queens' College, Cambridge, 5 August 2000.

5

Opportunities for UK Action to Further Nuclear Disarmament

The case for independent nuclear disarmament by the UK was made in an earlier British Pugwash report.[71] We endorse the view there expressed that "independent UK disarmament by stages and with the agreement of its NATO allies" would be "a straightforward policy which we would welcome." However, because we think it currently politically unrealistic to expect such a decision to be made, we here consider three sets of opportunities for action that may be more readily achievable. These are not mutually exclusive, and could be followed individually or in various combinations.

1. Intensifying work towards multilateral disarmament.
2. Unilateral reduction of the UK nuclear arsenal.
3. A commitment not to develop or procure a nuclear successor to Trident.

There is overlap between the options and they would be mutually reinforcing.

1. Intensifying Work Towards Multilateral Nuclear Disarmament

Over recent years the UK has placed increasing emphasis on the importance of multilateral arms control regimes.[72] Britain's security requires, it is argued, the promotion of worldwide measures of arms control and disarmament, as one of the most effective ways of reducing the use of military force worldwide and reducing the threat from the proliferation of weapons of mass destruction. With respect to its commitment to treaty-based disarmament, the UK has more in common with many non-nuclear weapon states, such as the New Agenda Coalition states, than with the United States.

The UK has demonstrated an ability to contribute positively to multilateral arms control, having made significant contributions to the negotiation of the Comprehensive Test Ban Treaty (see Appendix 2), the Chemical Weapons Convention, and the Biological Weapons Convention.[73] While there is a danger that a British initiative to promote multilateral nuclear disarmament might be nullified by the current policies of the United

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[71] Hill, Pease, Peierls and Rotblat, *Does Britain Need Nuclear Weapons?*

[72] See "UK Policy on Weapons Proliferation and Arms Control in the Post-Cold War Era," *Second Report of the Foreign Affairs Committee 1994-95* (London: HMSO, 30 March 1995), and "Weapons of Mass Destruction," *Eighth Report of the Foreign Affairs Committee, 1999-2000* (London: The Stationery Office, 25 July 2000). Both reports were welcomed by the government of the day: "UK Policy on Weapons Proliferation and Arms Control in the Post-Cold War Era," *Second Report from the Foreign Affairs Committee 1994-95: Observations by the Secretary of State for Foreign and Commonwealth Affairs*, Cm 2895 (London: HMSO, June 1995); "Weapons of Mass Destruction," *Eighth Report from the Foreign Affairs Committee, 1999-2000: Response of the Secretary of State for Foreign and Commonwealth Affairs*, Cm 4884 (London: The Stationery Office, October 2000).

[73] For details, see Tom Milne and Henrietta Wilson, *Verifying Nuclear Disarmament: A Role for AWE Aldermaston* (British Pugwash Group, 1998).

States, were the UK to show a more determined commitment to nuclear disarmament, especially following a decision not to replace Trident (discussed below), it could expect to become a leading member, if not the leader, of the group of states actively working for creation of a nuclear-weapon-free world.[74]

CONFERENCE ON DISARMAMENT

As a step towards reinvigorating the Conference on Disarmament (CD) in Geneva, the world's principal multilateral disarmament negotiating forum, the UK could take the initiative to institute a working group on multilateral nuclear disarmament. While it may be premature to attempt to begin to draft a nuclear weapons convention by way of a "rolling text," multilateral discussions could begin on technical issues associated with a prospective global treaty. AWE could provide the needed technical back up, through working papers and participation in the UK delegation.

The government sees a fissile material cut-off treaty (FMCT) as the logical next step in multilateral nuclear disarmament and has declared its readiness to enter into "immediate negotiations" for an FMCT in the CD.[75] The UK is in a position to place all fissile material production facilities under international safeguards[76] and is thus easily able to accommodate likely FMCT verification measures.

Since agreeing a negotiating mandate some seven years ago, however, the CD has made no progress towards securing an agreement and the political obstacles to a fissile material cut-off treaty are so intractable that significant progress is not in prospect. These obstacles include the likely unwillingness of certain states to freeze their stocks at current levels, resistance on the part of others to on-site inspection, political "linkages" (China, in particular, demands US participation in negotiations on the non-weaponization of space in return for agreeing to negotiate on a cut-off), and fundamental disagreements over whether existing stockpiles, as opposed to just future production, should be accounted for in a treaty. Thus, at the current time we believe that it would be a mistake to make negotiation of an FMCT the primary objective of UK disarmament policy to the detriment of other initiatives.

Failure to achieve an FMCT need not, in any case, inhibit progress towards global fissile material protection, control and accounting. None of the five established nuclear weapon states is currently producing fissile materials for weapons use;[77] the US and the UK have

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[74] Michael MccGwire makes this point in "Shifting the Paradigm," *International Affairs* 78: 1 (January 2002). MccGwire also makes the case that a British decision to reverse its policy on nuclear weapons might invigorate the grassroots anti-nuclear movement in the United States.

[75] "Deterrence, Arms Control, and Proliferation," *The Strategic Defence Review: Supporting Essays*.

[76] As discussed, only the Chapelcross tritium production reactors, scheduled for closure in 2005, remain outside safeguards, and Euratom argues that safeguards could be applied without compromising tritium production. William Walker, personal communication.

[77] China has not declared a moratorium but is reported to have informed US officials that production has stopped. "China is not currently believed to be producing fissile material for nuclear weapons, but it has a

begun processes of historical accounting of materials produced outside safeguards, and similar work may be attempted in Russia (supported by US funding); preparations are being made for making surplus military nuclear material open to IAEA verification under the US-Russia-IAEA Trilateral Initiative; and progress, if very slow, is being made in blending down surplus highly-enriched uranium and developing plans for the disposition of surplus military plutonium. The UK could provide financial and technical resources to support enhanced activity in these areas which might, among other things, serve to reduce risks associated with terrorist use of this material.

NO FIRST USE OF NUCLEAR WEAPONS

Another UK initiative that we would welcome would be the promotion of no first use of nuclear weapons as national *and* NATO policy. By "no first use" it is meant that the role of nuclear weapons is explicitly confined to deterring nuclear attack or coercion by threat of nuclear attack.

With the balance of conventional forces in Europe now in NATO's favour, the argument that NATO might need to make first use of nuclear weapons in the face of a conventional invasion of Western Europe is no longer credible. No first use is apparently not of interest to the current US administration, but the UK could expect support from Canada and Germany, among NATO states, for any initiative to promote a change of NATO policy. Both countries pushed for consideration of no first use in NATO's Strategic Review at the end of the 1990s, with Germany openly favouring a policy shift. There is strong UK public support for no first use, including on the part of NATO (see Appendix 1). A more ambitious initiative would be for the UK to seek a multilateral treaty of no first use among all the nuclear weapon states, as has previously been Labour Party policy.[78] China has long maintained a declaratory policy of no first use.

2. Unilateral Reduction of the UK Nuclear Arsenal

It has been commented, in discussion of UK nuclear weapons policy options, that reductions to UK nuclear forces over recent years mean that "there now remains little that could be put on the table, other than the complete abandonment of the capability, were we [the UK] to be included in some wider START-type arms-reduction negotiation."[79] Presumably the scope for reducing the number of warheads deployed is judged to be limited if nuclear deterrence is to be maintained as a plausible military strategy against a large nation, especially one with missile defence capability.

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stockpile of fissile material sufficient to increase or improve its weapon inventory. Office of the Secretary of Defense, *Proliferation: Threat and Response*, January 2001.

[78] Up to June 1996 the Labour Party endorsed No First Use. *A Fresh Start for Britain*, a forerunner to the 1997 Election Manifesto, reads: "Labour in government will work for…a negotiated multilateral no first use agreement amongst the nuclear weapons states…"

[79] Memorandum from Michael Quinlan, *Eighth Report of the Foreign Affairs Committee 1999-2000*, p. 156.

The UK government has not provided any technical justification of its present decision to maintain a stockpile of 200 warheads and deploy up to 48 warheads per submarine. Most governments, for example, and the civil populations of most countries would fear being the target of half this number, or would perhaps regard even one 100kt bomb on one city as a catastrophe.[80] The government should venture a reasoned argument to justify the position that it has reached on the size of the "minimum" deterrent.

It may be doubted whether any reductions to a level short of zero would in themselves be effective either in promoting further multilateral progress in disarmament or in reducing the (presumably already small) risk of accidental or unauthorized nuclear use inherent in the possession of a nuclear deterrent. Nonetheless we would welcome any further reduction in the UK stockpile as a step towards ultimate nuclear disarmament.

The UK could also choose to remove all 100 kt warheads from the stockpile – and thus abandon the policy of strategic nuclear deterrence based on the threat of mass destruction – and retain only low yield substrategic nuclear weapons. It is open to question whether, in this scenario, all 200 warheads would need to be retained, because the substrategic role is ill-defined, especially in the absence of strategic forces. Although the destructive potential of UK forces would be greatly reduced, we argue strongly against this option. Continuing to deploy Trident in its current form is less provocative to non-nuclear weapon states than justifying UK nuclear weapons afresh by placing new emphasis on substrategic nuclear capability. Far preferable would be for the UK to oppose apparent US moves to incorporate low yield nuclear weapons into areas of conventional defence planning.

3. A Commitment Not to Replace Trident

Our main recommendation is that the UK government make and announce an early decision not to develop or otherwise procure a nuclear successor to Trident and commit to decommissioning Trident at the end of its design life, that is to say, around 2020 or shortly thereafter. The 50th anniversary of the NPT in 2020 suggests itself as an appropriate historical date.

Although the direct consequences of a no-successor-for-Trident policy would be few, and the UK might continue to deploy nuclear weapons for more than 20 years, by announcing that Trident is to be decommissioned over a specified period and not replaced the UK would establish a timetable in which it would meet its disarmament obligation under the NPT. Inevitably this would increase pressure on the other nuclear weapon states to announce disarmament measures of their own. Furthermore the decision would

[80] "In the real world of political leaders – whether here or in the Soviet Union – a decision that would bring even one hydrogen bomb on one city of one's own country would be recognized in advance as a catastrophic blunder; ten bombs on ten cities would be a disaster beyond history; and a hundred bombs on a hundred cities are unthinkable." McGeorge Bundy, "To Cap the Volcano," *Foreign Affairs*, October 1969, p. 10.

galvanise the UK to throw its full weight behind multilateral nuclear disarmament. The policy would be made credible by the public positions taken by the UK government on nuclear issues.

A number of supporting actions would provide tangible evidence that UK policy could not readily be reversed:

- A reduction of the UK's stockpile of military plutonium to the minimum needed to see out the Trident system – one tonne or less. This would mean placing at least 2.2 tonnes of plutonium under international safeguards in addition to that declared surplus in the Strategic Defence Review.
- An announcement that the UK will not produce or acquire tritium for military purposes after Chapelcross closes down in 2005. We assume that by 2005 the UK will have sufficient stocks of tritium to see out the Trident programme, but since tritium decays at a rate of over 5 per cent a year, a commitment not to replenish the stockpile would provide a further indication of the UK's long-term intention to disarm itself of nuclear weapons.
- A fundamental reassessment of the role of AWE. While there would still be a need to maintain the Trident stockpile safe and operational for up to 20 years, the requirement to maintain the expertise and infrastructure necessary to design and produce a new generation of warheads would end. Stockpile stewardship capabilities that would be needed were there a requirement to maintain warheads in service indefinitely would be renounced.

It will certainly be objected that the potential political benefits and financial savings from renunciation of a Trident successor are insufficient to justify taking such a decision sooner than is necessary. It will be said that prudence dictates that the UK follow a wait-and-see approach, rather than risk the unknown and possibly dangerous consequences of an early decision to relinquish nuclear weapons. But the UK's continuing retention of nuclear weapons is not cost free and thus not self-evidently "prudent." In particular, while it is obvious that the actions of states such as the US, Russia or China are of greatest consequence for the future of nuclear weapons, the UK nonetheless contributes to sustaining a climate in which nuclear weapons are considered legitimate and in which a reversion to nuclear arms racing and proliferation is all too possible. Indeed, as one of the smaller nuclear weapons states, the UK is one whose actions to implement its NPT obligations might be seen by non-nuclear signatories of the NPT as a relevant and convincing argument against the need to acquire nuclear status.

It might also be objected that the UK should wait in order to link any announcement on Trident to multilateral negotiations in progress or in prospect, or even that the decommissioning of Trident should be made contingent on future progress in multilateral disarmament.[81] But setting a timetable for relinquishing nuclear weapons begins to fulfil

[81] In the late 1960s, for example, there were internal government discussions on the future of the UK nuclear force, including the option of unilateral disarmament when, or before, it was assumed that Polaris would no longer remain a credible delivery system. The option of announcing such a decision to relinquish nuclear weapons in conjunction with signing the NPT was considered. "British Nuclear Policy - paper

the UK's legal obligations under the NPT, and hence no other "bargain" need or should be extracted in return, whether or not such a bargain is attainable.

Lastly it could be objected that the proposal would become a focus for continuing controversy. We are confident that if the policies of the nuclear weapon states were subject to open and extensive debate, with full information made available about doctrines, policies, and arsenals, public support for UK disarmament would be enhanced. Any controversy raised by this decision is thus likely to be more positive than negative for prospects for nuclear disarmament.

THE FUTURE OF AWE

Moving towards closure of AWE is an obvious option following a decision not to replace Trident. The scientific and technical expertise, however, together with the hardware and infrastructure, are assets that are of high potential value, both with respect to arms control and disarmament, and important areas of civil science. A study might usefully be undertaken to examine options for redirecting these capabilities from their current nuclear weapons focus.

While not pre-empting the results of such a study, two clear possibilities seem to us to be worth pursuing. First, current work on verification and other aspects of nuclear arms control, non-proliferation and disarmament could be expanded – some of the possibilities have been discussed in a previous British Pugwash report.[82] AWE has published the findings of a pilot verification study that ran from 1998-2000[83] and a small three year verification research programme is currently underway, funded at about £1m a year.

Specific work that could be undertaken at an AWE-based arms control programme includes, among other things: an expansion of the existing verification research programme with a view to developing a complete and systematic approach to the problem of verifiably eliminating the UK's nuclear warhead stockpile on the Aldermaston campus; maintenance of world leading research in forensic seismology; and development of scientific and technical collaborations in the field of nuclear verification and arms control with US, Russian and other national nuclear facilities. This would generate indispensable national expertise in advance of possible UK participation in a process of verified nuclear disarmament.

In addition, AWE could contribute, together with UK civil nuclear industry, to US-led initiatives to enhance the security of nuclear materials in Russia and other successor states of the Soviet Union. To date the UK has failed to respond to this major security threat. *Total* DTI spending on safeguards-related collaboration with Russia and other

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prepared along the line requested by the Prime Minister in his minute No. 94/67 of 24 July [1967] to the Foreign Secretary," Public Records Office, Kew.

[82] Milne and Wilson, *Verifying Nuclear Disarmament: A Role for AWE Aldermaston.*

[83] George *et al. Confidence, Security and Verification: The Challenge of Global Nuclear Weapons Arms Control.*

countries of the former Soviet Union, dating back to 1992, is of the order of £1m. The budget for 2001/2002 is *c.* £150,000.[84] Belatedly the UK announced in 2001 funding of £83.8m over three years to support nuclear-related activities in Russia,[85] which has since been subsumed into a UK pledge to contribute up to $750m[86] to the "10 plus 10 over 10" G-8 initiative (Global Partnership Against the Spread of Weapons and Materials of Mass Destruction), calling for the US to contribute $US10bn and the other G-7 nations a combined $US10bn over the next ten years to assist Russia and other nations in their efforts to address non-proliferation problems. Projects are being developed for use of UK funds in several important areas, including reactor decommissioning and defueling and dismantlement of nuclear-powered submarines, and money is earmarked to support plutonium disposition, but still there are no plans to address the most directly urgent problems involved with protecting nuclear materials. Responsibility for Russian non-proliferation programmes rests with the Department of Trade and Industry, which currently makes no use of AWE in its Russian programmes, even though the US weapons laboratories have for a decade been major contributors to US work in the field. MoD could be given the policy lead on Russian material protection, control and accounting issues and AWE commissioned to produce a study of the contribution that it might potentially make in this area.

We have already commented on the positive consequences of the 1956 UK decision that it would no longer develop offensive chemical and biological weapons. Following that decision, the chemical and biological weapons facilities concentrated their work entirely on defence against such weapons, including treaty enforcement work. This has enabled the UK to contribute significantly to limiting the threat of chemical and biological warfare. Following a decision not to replace Trident, AWE could develop its work in a way parallel to that of Porton Down following 1956. Whereas the emphasis at Porton has been more on defensive measures than verification, however, the main body of work in an AWE-based programme would be on verification and treaty enforcement, which is seen both as more manageable in the nuclear than in the CBW area, and more important in view of the potential seriousness of a treaty breach.

The second issue relates to the scientific expertise and infrastructure currently involved in warhead stewardship and related work. The laboratory's capabilities in areas such as high energy density physics and computational modelling of complex systems may be highly valuable in the civil sector. As an example, we might take the materials modelling work, for which state-of-the-art massively parallel computing is essential and which will be available at AWE following the current investment programme. Modelling the behaviour of materials – from the atomic level, through the mesoscopic to the macroscopic – is a major research effort in several of the leading UK universities. It is also highly relevant to the aim of enhancing UK competitiveness that is central to UK

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[84] Glenn Hawkins, Head of UK Safeguards Office, personal communication.

[85] *Spending Review 2000: New Public Spending Plans 2001-2004*, Cm. 4807 (London: The Stationery Office, July 2000), p. 143.

[86] Tony Blair, "Statement on the G8 Summit in Kananaskis," House of Commons, 1 July 2002. It is not clear from which ministries and which budgets this funding is to be drawn, nor how this will affect the areas of work that the UK is likely to support.

government research funding policy. More effective than allowing AWE staff to disperse through the UK and abroad might be to open the establishment up as a central resource for the UK research effort in this important area, thereby keeping together functioning research teams. Similar considerations might apply to the other AWE research areas, though the nearby world-leading laser expertise at the Rutherford Appleton Laboratory suggest that integrating the efforts of the two laboratories, where there is presumably already considerable collaboration, might be the better option to pursue.

PUBLIC DEBATE

The government said in 1998 that while it would be premature to abandon the capability to build a successor to Trident, it aims "to take forward the process of nuclear disarmament to ensure that our security can in future be secured without nuclear weapons."[87] The Defence Committee of the House of Commons has since commented, with respect to long-term UK nuclear policy, although not explicitly on the Trident replacement issue, that the government, which is "now rightly thinking (if not yet forming policy) for the period 30 years ahead, needs to address this issue more squarely."[88] In view of these statements, and the UK's strengthened NPT commitment, we would welcome a public inquiry into current and future UK nuclear weapons policy.

[87] "Deterrence, Arms Control, and Proliferation," *The Strategic Defence* Review*: Supporting Essays*.
[88] "The MoD's Annual Reporting Cycle 2000-01," *Eighth Report of the Defence Committee 2000-01* (London: The Stationery Office, 2 May 2001), p. xxvii.

6

Summary and Recommendations

SUMMARY

1. The British strategic nuclear deterrent consists of four Trident submarines, each deploying with up to 48 nuclear warheads. One boat is normally at sea at any time. The stockpile of operationally available warheads is under 200.

2. The British government also envisages a substrategic use of these nuclear weapons, possibly using a missile armed with fewer and much less destructive warheads.

3. The lifetime of the UK Trident nuclear weapons system is determined mainly by the expected operational life of the British-built submarines which is about a further 20 years. It might be possible to extend the operational life of the submarines.

4. The Trident missiles are manufactured and maintained in the USA, where a missile life extension programme is being scheduled. UK infrastructure can support the Trident nuclear warheads indefinitely and has the potential to develop new warheads.

5. The UK is legally committed to nuclear disarmament under the terms of the Nuclear Non-Proliferation Treaty, as reaffirmed unequivocally at the 2000 NPT Review Conference.

6. We concur with the conclusion of a previous report from the British Pugwash Group, that UK nuclear weapons have played no role in the wars in which the UK has been involved over the past 50 years, that Britain does not gain significant influence from its possession of nuclear weapons, and that if Britain were to relinquish its nuclear weapons its security would not be reduced.

RECOMMENDATIONS.

In view of the constraints of UK public opinion, which exclude immediate unilateral disarmament as a practical option, we recommend the following:

7. The UK government should decide and announce that the UK will not acquire a nuclear replacement for Trident when its operational life expires about 20 years from now.

8. The UK government should justify the number of warheads deployed in the meantime and clarify the circumstances in which they might be used.

9. The UK stockpile of military plutonium should be reduced to the minimum needed to see out the Trident system – one tonne or less. Surplus plutonium should be placed under international safeguards.

10. The UK government should announce that the UK will neither produce nor purchase further quantities of tritium for military purposes after the reactors at Chapelcross shut down in 2005.

11. The Atomic Weapons Establishment should no longer be required to retain the capability to design and develop a new warhead. It should be re-oriented towards work on verification and other aspects of nuclear arms control, non-proliferation and disarmament and consideration given to the potential for realigning the stewardship-related science towards civil research.

12. The UK should take an initiative to institute a working group on multilateral nuclear disarmament at the Conference on Disarmament in Geneva.

13. While continuing to support negotiation of a fissile material cut-off treaty, the UK should seek other means to strengthen global fissile material protection, control and accounting, including by placing all UK fissile material production facilities under international safeguards and by increasing financial and technical support for efforts to prevent the illicit diversion of fissile material worldwide.

14. The UK should work to secure a multilateral agreement on no first use of nuclear weapons, in the first instance within NATO and subsequently among all the nuclear weapons states.

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The decision in 1956 that the UK would no longer develop chemical and biological weapons, with the consequent concentration of work on defensive measures and treaty enforcement, has contributed to a reduction in the threat from chemical and biological weapons. A similar step today by the UK in the nuclear weapons field could prove at least as useful with respect to reducing the threat from nuclear weapons. It would confer integrity on to UK efforts to strengthen non-proliferation and foster multilateral disarmament.

Appendix 1

US Public Opinion on Nuclear Weapons

Major public opinion surveys by the Henry L. Stimson Center[89] and the University of New Mexico (UNM) Institute for Public Policy[90] suggest that the US general public continue to see nuclear weapons as instruments of power, important to their nation in many ways.

Some of the headline findings of the Stimson survey are summarized as follows:[91]

> The breadth and depth of public support for significantly reducing the force and levels of nuclear weapons is revealed in a number of key results. For example:
> - Eighty per cent of those questioned favoured eliminating all nuclear weapons from all countries in the world through a verifiable, enforceable agreement.
> - Seventy-seven per cent believe the world would be safer without any nuclear weapons.
> - Two-thirds were in favour of taking all existing nuclear forces off alert, separating the nuclear warheads from the missiles, so that a nuclear attack could no longer be launched in a matter of seconds.
> - Two-thirds were also in favour of reducing all countries' nuclear arsenals to a few hundred weapons each.
> - Sixty-one per cent thought it likely within the next ten years that the United States could greatly reduce the number of its nuclear weapons.

While this might seem to show reasonably strong support for progress in disarmament, a number of replies to other questions in the survey alter the picture considerably. For example, after the endorsement of a worldwide treaty to eliminate all nuclear weapons, two further questions showed that 82 per cent thought it was somewhat or very unlikely that other countries would abide by the treaty, and 71 per cent that it was somewhat or very unlikely that the USA would be able to verify whether or not the treaty was being broken. Immediately after the endorsement of the idea of reducing the US arsenal to a few hundred weapons, moreover, there was a question asking whether the US should maintain and improve its nuclear arsenal. Fifty-three per cent were somewhat or strongly in favour; 41 per cent somewhat or strongly opposed. In answer to another question, 55 per cent said that nuclear weapons enhanced US security.

In the Stimson survey the question on elimination was: "Do you favour or oppose the proposal to eliminate all nuclear weapons from all countries in the world through a verifiable, enforceable agreement?" This produced an 80 per cent response strongly or somewhat in favour. In the UNM survey, which used data collected in 1993, 1995 and 1997, the question was: "How do you feel

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[89] *Public Attitudes on Nuclear Weapons: An Opportunity for Leadership*, prepared and published by the Henry L. Stimson Center for the Committee on Nuclear Policy (a collaborative project by the directors of 18 independent research groups on nuclear weapons policy), March 1998.

[90] Kerry G. Herron and Hank C. Jenkins-Smith, *Public Perspectives on Nuclear Security: US National Security Surveys 1993-1997* (UNM Institute for Public Policy, University of New Mexico, Albuquerque, New Mexico, June 1998). (An earlier published study was Herron and Jenkins-Smith, *Evolving Perceptions of Security: US National Security Surveys 1993-1995* (UNM Institute for Public Policy, The University of New Mexico, March 1996).)

[91] *Public Attitudes on Nuclear Weapons*, pp. 9-10.

about the US agreeing to a provision that requires us to eventually eliminate all of our nuclear weapons?" This produced a small margin of support. The UNM survey, like the Stimson survey, showed strong doubts about the observation of the treaty by other countries.

The UNM study, like the Stimson survey, showed support for reductions in the number of nuclear warheads. The level to which the interviewee "would be willing to reduce the number of US nuclear weapons," had a median range of 1,501-2,000, somewhat more than the "few hundred" of the Stimson survey. Both surveys showed strong support for the nuclear test ban. UNM also showed fairly strong support for a "treaty that bans production of nuclear materials that could be used to make nuclear weapons," and Stimson showed strong support for dealerting nuclear weapons.

	1993 (mean fig.)	1995 (mean fig.)	1997 (mean fig.)
How important are US nuclear weapons for US Influence over international events?	6.1	6.2.	6.3
How important are US nuclear weapons for maintaining US status as a world power?	6.3	6.7	6.6
How important is it for the US to remain a military superpower?	7.6	7.9	8.2
How important have nuclear weapons been to preserving America's way of life?	6.1	6.3	6.3
How important is it for the US to retain nuclear weapons today?	6.6	6.8	7.2

Reproduced from Herron and Jenkins-Smith, *Public Perspectives on Nuclear Security: US National Security Surveys 1993-1997*

Especially revealing was a battery of questions in the UNM survey on the present role of nuclear weapons in the United States. The answers to these questions were on a 0-10 scale, with 0 corresponding to "not at all important," and 10 to "extremely important." All the questions gave a high rating to the importance of nuclear weapons to the USA today (a mean of over 5 shows support for the "important" end), and what is more, in its answers to all the questions in this tranche of the survey, the public gave more importance to the role of nuclear weapons in 1997 than it had in 1993 (see *Table*). Kerry Herron, one of the authors, comments as follows:

> My colleagues and I have been repeatedly surprised at the tenacity with which elites and members of the general public alike seem to be retaining their confidence in nuclear security. We hypothesized a substantial decline in perceptions of external nuclear weapons risks and benefits and a devaluation of nuclear deterrence after the end of the Cold War…[and yet] we have found considerable evidence that most Americans are simply not yet ready to eliminate the US nuclear arsenal. People in this country consider the nature of nuclear risks to have changed from a standoff with the Soviet Union to one in which nuclear proliferation and the potential for nuclear terrorism are replacing older

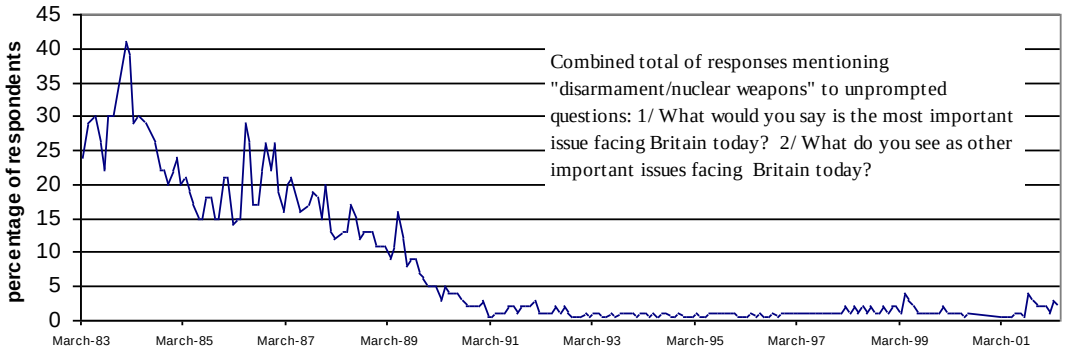
concerns. Though the nature of the threat has changed, most of the people we have interviewed consider international security to remain very fragile. Notwithstanding public positions supporting the elimination of US nuclear weapons by well respected former military leaders, or the questionable utility of nuclear weapons for deterring nuclear proliferation or terrorism, the familiarity of the US arsenal is serving as a literal security blanket that most Americans as yet are unwilling to forego.

In sum, it would seem that although further measures of arms limitation and control might find public support in the US, there would have to be quite a considerable change in the popular mind-set before the US public takes the idea of US disarmament, or worldwide elimination of nuclear weapons, seriously.

UK Public Opinion on Nuclear Weapons

UK public interest in the nuclear weapons issue has all but disappeared over the last 15 years. Nuclear weapons issues had a high salience up to the end of 1988, but had virtually ceased to be a matter of public concern by the early 1990s. The *Figure* below is drawn from a Market and Opinion Research International (MORI) poll asking two questions: "What would you say is the most important issue facing Britain today?" and "What do you see as other important issues facing Britain today?" These are unprompted questions. It is for the interviewer to classify the answers into various categories, such as unemployment, inflation, disarmament, *etc.* The data given here are the combined total for the two questions, that is, they give the percentage of respondents who mentioned a disarmament or nuclear weapons issue.

Salience of Nuclear Weapons Issues in UK Public Opinion



Source: MORI Public Opinion Newsletter 1983-2002

For the "disarmament/nuclear weapons" category, the high point in this series of figures came at the beginning of 1984 (a time when there was much controversy about the stationing of US cruise missiles in the UK), with an "incidence of mention" of around 40 per cent. The incidence of mention figure stayed relatively high for most of the rest of the 1980s, but by the early 1990s it had fallen to close to zero and has remained at this level ever since with only a minor and short-lived resurgence of interest following events such as the testing of Indian and Pakistani nuclear

weapons in 1998 and the attacks on 11th September 2001. Clearly, Britons no longer feel immediately concerned about nuclear weapons issues.

As regards the UK's retention of nuclear weapons the picture is blurred, with the answers sensitive to the formulation of the question.

- In 1995 and 1997 it was asked: "Do you think it will be best for the security of your community if Britain does or does not have nuclear weapons?" In this period the vote for "does not" rose from 51 to 59 per cent, and the "does" response fell from 39 to 36 per cent.[92]

and

- A 1999 MORI poll asked for reactions to the statement: "I feel that Britain needs nuclear weapons to increase my sense of security." Forty-one per cent either strongly agreed or tended to agree to this proposition; 44 per cent strongly disagreed or tended to disagree.[93]

But more tellingly:

- A survey conducted for the Ministry of Defence in 1998, where the question was "Should Britain keep its nuclear weapons?", found 35 per cent said they should be kept in all circumstances, and a further 35 per cent that they should be kept in some circumstances, which is to say a large majority of 70 per cent.[94]

In sum, the nuclear deterrent has all but ceased to be a matter of public debate. When the question of the UK's possession of nuclear weapons is put before the British public in opinion polling, a substantial majority continues to favour retaining nuclear weapons for as long as other nations have them. If one adds to this picture Labour's experience of advocating unilateral disarmament in the 1980s, it is easy to see that the major political parties[95]can see no electoral advantages, only potential risks, in raising the question of the UK's nuclear status.[96]

Where public opinion may offer better prospects for progress is in the case of Britain's involvement in multilateral nuclear disarmament and non-proliferation endeavours. A 1999 MORI poll found that more than two-thirds of Britons would support Tony Blair taking a lead in

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[92] *National Security Studies*, The Gallup Organization, 1995 and 1997.

[93] *Attitudes Towards Nuclear Defence.*

[94] Strategic Defence Review, Omnibus Survey Report, prepared by BMRB International Limited, BMRB/JT/SK/1153-344, July 1998.

[95] The following statements were made in the respective 2001 General Election Manifestos.
"We support Trident, Britain's minimum deterrent. The Nuclear Non-Proliferation Treaty commits us to work for the global elimination of nuclear weapons," *Ambitions for Britain* – Labour Party.
"We remain fully committed to Britain's independent nuclear deterrent," *Time for Common Sense* – Conservative Party.
"We will work for the elimination worldwide of all nuclear weapons. We will urge a new round of multilateral arms reduction talks, but will retain the UK's minimum nuclear deterrent for the foreseeable future," *Freedom, Justice, Honesty: Defence and International Institutions* – Liberal Democrats.

[96] Philip Gould writes that Labour research in 1986, when the policy review was set in train, found that "people had a simple, common-sense view of the issue – if you have a dog, no one will attack you; if someone else has a knife you should have a knife also. There was some support for multilateral disarmament, but none for unilateralism." Philip Gould, *The Unfinished Revolution* (London: Little, Brown & Co., 1998), p. 70.

negotiations to remove nuclear weapons worldwide.[97] The difficulty is in assessing the significance of such a poll. The *objective* of total abolition of nuclear weapons gets a high rating in opinion polls taken all over the world including the USA. In particular, beginning work towards a verified treaty for a worldwide ban on nuclear weapons seems to receive at least 80 per cent support wherever it is asked.[98] The meaning of this support probably varies from country to country. In some (perhaps in the USA, for example) it may just be an expression of the thought 'How nice it would be if the world did not have nuclear weapons!' In others, (perhaps Ireland or Canada, for example), it may represent support for an actual government initiative.

There is clear public support in Britain for a policy of No First Use.[99] A 1998 study conducted for the Ministry of Defence reports that: "When pressed, most respondents agreed that we could only legitimately use nuclear weapons if we had been subjected to a nuclear attack."[100] A MORI poll, carried out in March 1999, also shows support for no first use in a NATO context, with 55 per cent opposed to NATO's reserving the right to use nuclear weapons first in a conflict and 35 per cent in favour.[101]

[97] "I would think more highly of the Prime Minister, Tony Blair, if he were to take a lead in negotiations to remove nuclear weapons worldwide." Agree 68%, Disagree 16%. Market and Opinion Research International (MORI), *British Public Opinion Newsletter* XXII, 2 (March 1999), p. 6.

[98] For more details, see Frank Blackaby and Tom Milne, "Public Opinion on Nuclear Weapons," in Frank Blackaby and Tom Milne ed., *A Nuclear-Weapon-Free World: Steps Along the Way* (Basingstoke: Macmillan, 2000). See also opinion poll commissioned for and reported in Hill, Peierls, Pease and Rotblat, *Does Britain Need Nuclear Weapons?*

[99] It should, however, be understood that the vast majority believe that this is and has always been UK policy. Only seven per cent of those questioned in a 1987 survey thought that the UK reserved the right to use nuclear weapons first "if we or any of our allies are attacked by conventional means." Cited in Peter M Jones and Gordon Reece, *British Public Attitudes to Nuclear Defence* (Basingstoke: Macmillan, 1990).

[100] Strategic Defence Review: Presentation and Publicity Strategy.

[101] *British Public Opinion*, vol. XXII, No. 2 (March 1999), p. 6.

Appendix 2

The UK's Contributions To Monitoring Nuclear Test Explosions[102]

By the early 1960s AWE (then AWRE, the Atomic Weapons Research Establishment) was involved in monitoring nuclear test explosions in all environments. From 1958 the UK had been negotiating with the USA and Soviet Union for a comprehensive ban on nuclear testing. In 1963 the three governments signed and ratified the Limited Test Ban Treaty, which banned nuclear explosions in the atmosphere, in outer space and under water, and AWE then concentrated its efforts on detecting underground testing.

Seismological research began at AWE in 1958. The work was carried out at Aldermaston until 1960, when it moved to its present location at Blacknest, a mile away from the main site. Blacknest is administratively linked to Aldermaston, but is outside the wire, engaged in open, unclassified work.

Over the years, an average of 15 staff have worked at Blacknest at any one time, constituting the UK's principal expertise in forensic seismology. Blacknest scientists have provided advice to government on ambiguous seismic events and foreign test explosions, and supported over many years the development of a comprehensive ban on nuclear testing. Blacknest has amassed a unique library of technical reports and seismic data from arrays around the world.

Blacknest has a strong international reputation. Blacknest scientists have achieved important advances in forensic seismology, developing leading expertise in seismological methods for estimating the yield of underground nuclear explosions, and distinguishing explosions from earthquakes. They have designed steerable seismometer arrays, and pioneered their application to seismic detection (technology and techniques later used by the USA); and they have proposed an explanation, now widely accepted, of the physical basis for the best criterion for discriminating between explosions and earthquakes.

This expertise has been usefully applied to politically sensitive issues, notably to demonstrate that the Soviet Union was not violating the Threshold Test Ban Treaty between 1974 and 1990, when the Treaty remained unratified. In this period, US seismological techniques estimated the yield of several of the Soviet test explosions at significantly above 150kt, whereas Blacknest was able to show that the seismological evidence was compatible with yields within the Treaty's 150kt threshold.[103] The USA subsequently came to agree with the UK's estimates and analyses. The UK's moderating influence was important because it stopped the United States from adopting too strong a position, making the final ratification process less difficult than it might otherwise have been.[104] In addition, Blacknest has produced conclusive analyses of ambiguous

[102] The following assessment of Blacknest's contributions to nuclear test monitoring is in part based on several discussions with senior Blacknest staff, interviews with members of the US test monitoring research programme, a number of meetings with MOD officials, and discussions with diplomats and others present at test ban negotiations in Geneva.

[103] Blacknest showed that the geological conditions at the Soviet test site were significantly different from those at the Nevada Test Site on which the US analysis was based.

[104] Statement by Robert Blandford, Senior Scientist, Treaty Monitoring Directorate, Air Force Technical Applications Center (US National Data Centre), US Department of Defense, 1998.

seismic disturbances in the vicinity of the Soviet test sites at Semipalatinsk in 1976[105] and Novaya Zemlya in 1986.[106] Most recently, in August 1997, Blacknest scientists correctly identified a seismic disturbance in the Novaya Zemlya region as an earthquake, while suspicions were voiced in the USA for more than a month after the event that this might have been a nuclear explosion.[107]

The excellence and independence of Blacknest's work is widely acknowledged. According to a statement made in 1998 by the senior scientist at the US National Data Centre, the Blacknest group has been of immense assistance to the United States monitoring community over the course of approximately 40 years, and continues to be so to this day.[108] Other independent assessments of Blacknest's contributions can be found in the literature.[109]

The Blacknest group played an important role in the Comprehensive Test Ban Treaty (CTBT) negotiations. At an early stage in the negotiations, Peter Marshall, Blacknest's deputy director, was appointed Friend of the Chair of the Verification Working Group on Non-Seismic Techniques, and then, when it was agreed that seismic detection technologies should not be considered separately from other verification systems, he was made chairman of the Group of Scientific Experts on Verification, occupying this key position until the Treaty was opened for signature. In a seminal speech at the Conference on Disarmament,[110] Marshall proposed the four technologies that were eventually used in the International Monitoring System (IMS) and later helped to determine the location of the IMS monitoring stations. The UK's significant role in the CTBT negotiations is noted in the Strategic Defence Review.[111]

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[105] C.I. Pooley, A. Douglas and R.G. Pearce, The Seismic Disturbance of March 20, 1976, East Kazakhstan: Earthquake or Explosion?, *Geophysical Journal of the Royal Astronomical Society*, 74 (1983), pp. 621-631.

[106] P.D. Marshall, R.C. Stewart, & R.C. Lilwall, The Seismic Disturbance on 1 August 1986 near Novaya Zemlya: a source of concern? *Geophysical Journal*, 98 (1989), pp. 565-573.

[107] Lynn R. Sykes,"Small Earthquake Near Russian Test Site Leads to U.S. Charges of Cheating on Comprehensive Test Ban Treaty," *F.A.S. Public Interest Report*, 50: 6 (November/December 1997), pp. 1-12.

[108] Statement by Robert Blandford, Senior Scientist, Treaty Monitoring Directorate, Air Force Technical Applications Center.

[109] See, for example, Bruce A. Bolt, *Nuclear Explosions and Earthquakes: The Parted Veil* (San Francisco, W. H. Freeman, 1976), pp. 123-128; Patricia Lewis, "The United Kingdom," in Eric Arnett ed., *Nuclear Weapons After the Comprehensive Test Ban* (Oxford: Oxford University Press, 1996); and Sykes, "Small Earthquake Near Russian Test Site Leads to U.S. Charges of Cheating on Comprehensive Test Ban Treaty."

[110] Peter D. Marshall, personal comments presented to the 25th meeting of Working Group 1 of the Ad Hoc Committee on a Nuclear Test Ban, 8 June 1994.

[111] "Deterrence, Arms Control, and Proliferation," *Strategic Defence Review: Supporting Essays*. See also parliamentary Written Answer from then Secretary of State for Defence George Robertson where it is said that of Blacknest that: "Its specialist staff made a widely recognised contribution to the negotiation of an effective verification regime for the Comprehensive Nuclear Test Ban Treaty." *Official Report Sixth Series: House of Commons*, v. 304, Written Answers 12 January 1998, col. 140-141.