House of Commons

Defence Committee

The Future of the UK's Strategic Nuclear Deterrent

Written evidence from the Ministry of Defence

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Written Evidence

UK'S STRATEGIC NUCLEAR DETERRENT

Memorandum from Ministry of Defence

This memorandum provides some detailed information on the UK's existing nuclear deterrent, against the background of possible future decisions on its replacement. The memorandum is divided into three sections. The first contains an assessment of the legal constraints on the UK Government in considering the possible replacement of Trident (Annex A). The second provides some information on the expected life of each element of the current deterrent system (Annex B). The memorandum contains some additional information on the programme of investment at the Atomic Weapons Establishment, which was announced by the MoD in July 2005 (Annex C).

Written evidence

Annex A

POSSIBLE CONSTRAINTS ON FUTURE UK DECISION-MAKING ON ANY REPLACEMENT FOR TRIDENT

What international constraints/obligations would we face if we were to take a decision to replace Trident?

The Government is yet to take a decision on whether or not to replace Trident. However, were a decision taken to acquire a successor system, we foresee currently that the most relevant international obligations would be: a) the Treaty on the Non-Proliferation of Nuclear Weapons; b) the Comprehensive Nuclear Test-Ban Treaty; c) the Hague Code of Conduct; d) the Missile Technology Control Regime; and e) the Nuclear Weapons Free Zones treaties. The Government will continue to comply fully with these international legal and political commitments.

a) The Treaty on the Non-Proliferation of Nuclear Weapons

In this context, the two most relevant articles of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) are Articles I and VI:

- In accordance with Article I nuclear-weapon States have undertaken "not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices."
- As one of the five nuclear-weapon States, the UK is obliged under Article VI of the NPT to "pursue negotiations in good faith on effective measures relating to the cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

We have already taken a number of significant steps in meeting our disarmament obligations under the NPT. For example, we have reduced our nuclear capability to a minimum deterrent, represented by a single nuclear- weapons system. Since the end of the Cold War we have reduced the total explosive power of our nuclear forces by over 70%. We have also reduced the readiness of our nuclear forces: only a single Trident submarine is now on deterrent patrol, carrying 48 warheads which are de-targetted and are at several days "notice to fire".

b) Comprehensive Nuclear Test-Ban Treaty

We signed the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in September 1996 and ratified it in April 1998. This treaty prohibits any nuclear weapon test explosion or any other nuclear explosion. The Treaty's preamble recognises that the cessation of such tests constitutes an effective measure of nuclear disarmament by constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of such weapons. We view the CTBT as an important part of the international regime to implement global nuclear disarmament and prevent the proliferation of nuclear weapons. Although it has not yet entered into force and is therefore not a legally binding constraint, the UK is observing a moratorium on testing and has not conducted any nuclear test explosions since 1991.

c) Hague Code of Conduct

The Hague Code of Conduct (HCOC) aims to bolster efforts to curb ballistic missile proliferation. Under the HCOC the UK has committed to producing an annual statement of our missile policy, details of test sites and the numbers and types of missiles held. The UK is also committed to notify partners in advance of any launch of a long-range missile. It is intended to supplement, not replace, the Missile Technology Control Regime.

In paragraph 3c) of the HCOC States resolved to exercise maximum possible restraint in the development, testing and deployment of Ballistic Missiles capable of delivering weapons of mass destruction (WMD), including, where possible, to reduce national holdings of such missiles.

d) Missile Technology Control Regime

Under the Missile Technology Control Regime (MTCR) States seek to co-ordinate national export control licensing efforts and policies with the aim of preventing the proliferation of delivery systems for WMD.

The UK has committed to apply the MTCR's common export control policy to our list of controlled items according to our own national export control legislation. Greatest restraint is applied to "Category I" systems. These comprise complete rocket systems capable of carrying at least a 500kg payload to a range of at least 300km, and their complete sub-systems and production facilities. For these systems, there is a strong presumption to deny transfer among MTCR members. However, an "aide memoire" attached to the MTCR states that the regime does not supersede any agreement that came into force prior to 1997. This, for example, allows the transfer of Category 1 systems between NATO members.

e) Nuclear Weapons Free Zones

The UK supports the principle of Nuclear Weapon Free Zones (NWFZs) treaties, which are regional in nature and set out the international legal constraints on the stationing, use and transiting of nuclear weapons among the States party to them. We believe they can make a valuable contribution to nuclear non-proliferation and global and regional peace and security.

For that reason, we have signed and ratified the relevant Protocols to the Treaties establishing NWFZs in:

— Latin America (Tlatelolco). This treaty prohibits inter alia the testing, deployment, possession and use of nuclear weapons or explosive devices in the Territories of the States party to the Treaty.

— The South Pacific (Raratonga). This treaty applies to an area south of the equator, including Australia. Parties are bound inter alia to prevent the stationing and testing of nuclear weapons and explosive devices within their territory.

— Africa (Pelindaba). This treaty, inter alia, prohibits the stationing of nuclear weapons and explosive devices within the territory of States Parties.

The consequence of UK ratification of these Protocols is, inter alia, an undertaking by us not to test nuclear weapons within the zone of the Treaties or to contribute to any act which would constitute a violation of the Treaties or the relevant protocol by States Parties, and, where relevant, that our Overseas Territories situated within the zone of the Treaties will be subject to certain of the provisions of those Treaties, including the prohibition on stationing nuclear weapons within those Territories situated within the zone.

Annex B

THE EXPECTED LIFE OF THE TRIDENT SYSTEM

1. The UK's current nuclear deterrent capability comprises several elements: first, the nuclear warheads, which were designed and manufactured in the UK by the Atomic Weapons Establishment; second, the Trident D5 missiles, which were procured from the United States under the Polaris Sales Agreement (as amended for Trident); third, four Vanguard-class nuclear powered submarines, built at Barrow-in-Furness by what was then Vickers Shipbuilding and Engineering Limited, who also designed the bulk of the submarine; and finally a range of logistic infrastructure—at the naval facilities at Coulport (weapons handling and storage), Faslane (submarine basing) and Devonport (submarine refit and maintenance).

2. While each element of the capability has a design life, its longevity in practice is not fixed, as items can be withdrawn from service before the end of their design life or, alternatively, the design life may be extended by updates, refurbishments or by being able to run on a system for longer, based on experience gained during its operational life. The current situation is as follows:

a) *The Warhead*

The current warhead came into service with the Trident system in 1994. An extensive research programme to assure the safety and effectiveness of the warhead stockpile, coupled with the additional investment at AWE Aldermaston announced on 19 July 2005, gives a high level of confidence that the current warhead design can, if required, be maintained in service at least into the 2020s, with some relatively minor upgrading and refurbishment during the first half of the next decade.

b) *The Ballistic Missiles*

The Trident D5 missile came into service with the Royal Navy in 1994, with a planned life of some 25 years. The US Navy has recently announced plans for a life extension programme for the D5 missile, which will ensure it can remain in-service with the US Navy into the 2040s. The UK Government has yet to decide whether or not to participate in this programme.

c) *The Submarines*

HMS VANGUARD entered operational service with the Royal Navy in 1994, with the other three submarines in its class following in 1995, 1998 and 2001. The submarines were procured with a designed operational life of 25 years and on this basis, they would start to be withdrawn from service late in the next decade. A series of studies have considered whether it would be practicable and cost effective to continue to operate the submarines beyond the original design intent. We now believe that, if required, this would be possible, albeit with gradually increasing cost and some increasing risk of reduced availability, perhaps out to the mid-2020s.

d) *Shore Infrastructure*

Under the Trident programme, successive Governments have made significant investment in the facilities at Coulport, Faslane and Devonport. We envisage that the facilities at these locations needed to support the nuclear deterrent will not require any significant additional investment to sustain them throughout the currently planned in-service life of the existing system. Clearly, the extent of any additional investment in logistics or infrastructure beyond that point will depend on future decisions on whether and how to maintain a nuclear deterrent beyond the planned life of the current system.

Annex C

INVESTMENT AT THE ATOMIC WEAPONS ESTABLISHMENT

Background

1. In the early 1950s, the main research and development activity in support of the UK's atomic weapons programme were transferred from Fort Halstead near Sevenoaks to a former air base near the village of Aldermaston in Berkshire. Since then, all the UK's atomic and nuclear weapons have been designed and manufactured by the Atomic Weapons Establishment (AWE, formerly Atomic Weapons Research Establishment) on this site and a neighbouring facility near Burghfield.

2. In 1993, AWE moved from its position as a Government establishment to one which was still Government-owned but operated by a private contractor. Nuclear licensing was introduced in 1997: site licenses and discharge authorities for Aldermaston and Burghfield were granted by the Nuclear Installations Inspectorate and the Environment Agency. This brought the AWE sites under the same regulatory controls as the civil nuclear industry. On 1 April 2000—co-incidentally, 50 years to the day after its foundation—and following a competition, the Ministry of Defence placed a contract with a new company, AWE Management Limited (a consortium comprising Lockheed Martin, Serco and BNFL) to manage and operate the two sites at Aldermaston and Burghfield. The contract was initially awarded for an initial period of 10 years with an option to extend to 25 years with access to private finance. This option was taken up in 2003.

Capability at the Atomic Weapons Establishment

3. A major feature of this new contract was for the replacement of many of the major science, manufacturing and assembly facilities on the two sites. This was driven by three factors. First, over 80% of the infrastructure at Aldermaston and Burghfield pre-dates 1960 and was becoming increasingly difficult and expensive to sustain. Second, the introduction of a moratorium on nuclear weapons testing required the introduction of significant new methods to underwrite the safety and reliability of the UK's nuclear weapons stockpile. This is all the more important as the UK is the only recognised Nuclear Weapon State whose nuclear deterrent is wholly dependent on a single warhead design. As has been reported in detail elsewhere,[1] the UK has introduced a major science-based programme to ensure we can retain the current very high levels of confidence in the safety and performance of the stockpile. This approach requires investment in a range of new facilities, such as super-computers, high energy lasers and hydrodynamics facilities. The nuclear regulatory regime also rightly imposes stringent safety requirements on the establishment itself, which are increasingly challenging to meet without additional investment in facilities built to modern safety standards.

4. When AWE ML's initial contract was awarded, it was recognised that a detailed appraisal would be required of the condition of the infrastructure and skills base within the establishment to ascertain whether this was sufficient to deliver the requirement set out in the 1998 Strategic Defence Review, specifically:

> "For as long as Britain has nuclear forces, we will ensure that we have a robust capability at the Atomic Weapons Establishment to underwrite the safety and reliability of our nuclear warheads, without recourse to nuclear testing. There are no current plans for any replacement for Trident,

[1] O'Nions, Pitman and Marsh, Nature Volume 415 page 853 21 February 2002.

and no decision on any possible successor system would be needed for several years. But we have concluded that it would be premature to abandon a minimum capability to design and produce a successor to Trident should this prove necessary."[2]

5. This appraisal has now been completed and the Written Ministerial Statement made by the Secretary of State for Defence on 19 July 2005 marked the end of the process to agree contract amendments with AWE ML to deliver the new programme.

The Future Programme at the Atomic Weapons Establishment

6. Under the revised contract the Ministry of Defence intends investing on average an additional sum of some £350 million per annum at AWE over each of the next three years. The objective of this investment will be to sustain the core capabilities required to meet the MOD's requirements. The programme falls into three broad categories: upgrading of a range of research facilities to underpin the science programme that enables AWE to underwrite the safety and performance of the warhead; the refurbishment of some of the key infrastructure on the sites; and investment in sustaining core skills within the Establishment.

Science Facilities

7. The programme at AWE is focussed on providing assurance of the safety and effectiveness of the UK's stockpile of operational warheads for use on the Trident D5 missile. To provide assurance of warhead safety and reliability without undertaking full-scale testing, scientists must be able to demonstrate their understanding of the physical and chemical processes that occur within the warhead. In addition, age-related changes must be investigated and the implications understood. Computer simulations are used to predict the effect of future changes and warheads are routinely withdrawn from the operational stockpile for forensic examination, which further improves the accuracy of these simulations. The specific capabilities required to undertake this assurance work fall into three main areas—high performance computer simulation, hydrodynamics and high energy density physics. Experiments and models are used to test theoretical understanding of the scientific principles and processes involved. This warhead assurance work represents the core activity presently undertaken at AWE.

8. Particular projects to be taken forward include concept and design studies for the replacement of major facilities for hydrodynamics experiments; and the development of a new high energy laser facility (Project Orion).

Manufacturing, Assembly and Disassembly Facilities

9. Much of the basic infrastructure at AWE (such as the heating and electrical systems and a considerable percentage of the office accommodation) dates back to the 1950s and is increasingly expensive and inefficient to operate. A great deal of the additional investment will therefore focus on refurbishment work in this area. In addition, AWE are required to ensure that we can sustain the Trident warhead in-service throughout its operational life, and also that the warhead can safely be taken out of service at the end of its service life. It is possible that during the in-service life of a warhead, faults can emerge in components as they age. In extremis, this may require the remanufacture of new replacement components in order to ensure the safety and performance of the overall warhead. It is therefore necessary that AWE sustain a basic capability to remanufacture key components of the Trident warhead. Moreover, when the time comes to withdraw the Trident stockpile, a range of skills and facilities will be required safely to disassemble the warheads.

10. An additional focus of the programme at AWE will therefore be to replace or refurbish some of the basic assembly and disassembly facilities at Aldermaston and Burghfield. These will include new facilities for handling high explosives and highly enriched uranium, modernisation of the assembly/disassembly facilities at Burghfield, and facilities for non-nuclear components in the warhead.

Investment in Skills

11. The average age of the workforce at AWE has been increasing, as the generation recruited to meet the initial requirements of the Chevaline and Trident programmes near the end of their careers. There is therefore a requirement to recruit new members of staff to ensure that the core skills within AWE are sustained. Other new staff will be required to assist the infrastructure sustainment programme and also to operate the new facilities as they come on stream. We have therefore started a programme of recruitment and it is planned to increase the current workforce by around 350 staff per annum until 2007–08, of whom some 70% will be Non-Industrial staff and 30% Industrial staff.

[2] Supporting Essay 5, Strategic Defence Review: July 1998.

SUMMARY

12. For as long as the UK remains committed to retaining a nuclear deterrent, it is essential that we ensure our stockpile of nuclear weapons remains safe and effective. This programme of additional investment in skills and infrastructure will ensure that this is achieved, against the background of the additional demands placed on AWE by the current and future regulatory regime, the introduction of the moratorium on underground nuclear tests and the increasing age of the Trident warhead stockpile, and of the scientists and engineers who support it.

13. This additional investment at AWE is required to sustain the existing warhead stockpile in-service irrespective of decisions on any successor warhead. The investment will sustain core skills and facilities that could also be used in future to develop a successor but no decisions have yet been made either in principle or practice on this issue.

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