The United Kingdom's Defence Nuclear Weapons Programme

A Summary Report by The Ministry of Defence on the Role of Historical Accounting for Fissile Material in the Nuclear Disarmament Process, and on Plutonium for the United Kingdom's Defence Nuclear Programme

Introduction

1. The Government is committed to transparency and openness about the defence nuclear programme when compatible with continuing national security requirements and the United Kingdom’s international obligations under Article I of the Nuclear Non-Proliferation Treaty (NPT). The Government is also committed to work towards the goal of the global elimination of nuclear weapons As the Strategic Defence Review stated, eliminating nuclear weapons will require States which have had nuclear programmes outside international safeguards to account for the fissile material that they have produced. This contributes to the process of nuclear disarmament by developing confidence that as States reduce and eventually eliminate their nuclear weapons, they have not retained concealed stocks of fissile material outside international supervision with which to construct clandestine nuclear weapons. Such accounting was crucial to the International Atomic Energy Agency’s initial verification of the comprehensive safeguards agreement signed by South Africa when it eliminated its nuclear weapons programme and joined the Nuclear Non-Proliferation Treaty as a non-nuclear-weapon State. The United States has produced a comprehensive report on its production of plutonium for defence purposes, and is working on a similar study on its production of High Enriched Uranium.

2. It is important not to overestimate the contribution such historical accounting can make to the verification of the reduction and elimination of nuclear weapons. By its very nature it is dependent on the records still available today. It is an unfortunate reality that in the early days of nuclear programmes records were not kept to the standards required today, nor have all the records that were kept survived. Furthermore, the technology and equipment did not exist to conduct technical assessments and measurements to the level of sensitivity available today. In the light of the Ministry of Defence’s work on this issue over the last eighteen months, and taking account of the conclusions of the South African and the continuing US historical accounting programmes, the Government does not believe that it will ever be possible for any of the relevant States to be able to account with absolute accuracy and without possibility of error or doubt for all the fissile material they have produced for national security purposes.

3. A further complication is that technical information about the early years of the defence nuclear programmes of the Nuclear Weapon States is likely to be of particular value to any aspiring proliferator seeking to build a low-level, unsophisticated nuclear capability. The Nuclear Weapon States therefore have to consider the implications of declassification in this area very carefully in the light of their obligations under Article I of the Nuclear Non-Proliferation Treaty.

4. However, even taking these complications and restrictions into account, the Government continues to believe that accounting as far as possible for the United Kingdom's past production of fissile material for nuclear weapons is a necessary and appropriate process. The Government is committed to transparency about the defence nuclear programme, past and present, where possible. Historical accounting has a role here in its own right. Moreover, the Government believes that while it will never be possible to create an exact and absolute final account, in the United Kingdom or elsewhere, such accounting has an important confidence-building role, both as a demonstration that any figures declared for defence stockpiles of nuclear material are consistent with past declared production, and as an important indicator of good faith and commitment to the process of working for the elimination of nuclear weapons.

5. In this context, and mindful of its transparency objectives, the Government therefore set in hand in the Strategic Defence Review a process of declassification and historical accounting with the aim of producing, by the Spring of 2000, an initial report of defence fissile material production since the start of the United Kingdom's defence nuclear programme in the 1940s. This work complements and, for plutonium, expands on the SDR publication of the size of the defence stockpile of fissile material. This accounting has been a labour intensive process involving detailed scrutiny of a wide range of records by the staff of the Assistant Chief Scientific Adviser(Nuclear), the Defence Procurement Agency, and civil and defence nuclear facilities. In the first instance, to make the best use of the available resources for this work, the Ministry of Defence has therefore concentrated on a historic review of plutonium production for the United Kingdom's defence programme. The main conclusions of this review are set out below. The full report by the Ministry of Defence's Assistant Chief Scientific Adviser (Nuclear) is published on the Ministry of Defence website at **www.mod.uk**.

Historical Background

6. The United Kingdom's nuclear weapons programme was formally sanctioned in January 1947. In its early years it was carried out in parallel with the development of the civil nuclear programme, firstly under the Ministry of Supply until 1954, and then under the United Kingdom Atomic Energy Authority (UKAEA) until the creation of British Nuclear Fuels Limited (BNFL) in 1971 to take over the UKAEA's production activities. Nuclear weapons design work was moved from Fort Halstead to Aldermaston in 1950. This site transferred to Ministry of Defence ownership in 1973. The wide-ranging nature of the UKAEA organisation meant that in the early years there was an inevitable blurring of the distinctions between the military and civil nuclear programmes and sites. Some civil nuclear development work was carried out at nuclear weapons fabrication facilities and some plutonium was shipped to Aldermaston for civil applications. This was not seen as significant at the time.

7. Plutonium for the nuclear weapons programme was produced at Windscale until 1957 and reprocessed on site before being shipped to Aldermaston. Plutonium production at Calder Hall (on the Sellafield site) for the nuclear weapons programme began in 1956, and at Chapelcross in 1958, with reprocessing at Sellafield by the same facility used to reprocess spent fuel from the civil programme, before being shipped to Aldermaston. Both Calder Hall and Chapelcross were used to produce electricity for the national grid in addition to supplying material for the defence nuclear programme. The Government announced in April 1995 that the United Kingdom had ceased production of fissile material for explosive purposes, and the Calder Hall reactors now operate under EURATOM safeguards. The Chapelcross reactors are still used to produce Tritium for the defence programme, and are therefore not subject to international safeguards. However, in 1998

the Government announced in the Strategic Defence Review that reprocessing of spent fuel from Chapelcross would henceforth be conducted under EURATOM safeguards and made liable to inspection by the IAEA.

Records Available

8. Records were raised each time material was moved between sites (and within sites for local accounting procedures). The review was therefore conducted primarily from an audit of annual accounts and delivery records from Sellafield supported by receipt records at Aldermaston where these are available. Evidence was also sought from available secondary sources. Records for the early years are inevitably less complete and less detailed than for more recent years, although Sellafield has maintained good accounts throughout, which cover the great bulk of material transferred. Overall, confidence in the completeness and accuracy of the information available is very high for the 1980s and 1990s, but less so before the mid 1960s.

Results Of The Review

9. The review has drawn up a plutonium balance and annual breakdown of transfers of plutonium between Aldermaston and other UK sites. This indicates that some 16.8 tonnes of plutonium were delivered to Aldermaston for the weapons programme, for onward transfer to the United States mainly under the Barter arrangements (see paragraph 12 below), and for civil work.

10. Of this, the records identify the following subsequent transfers of Plutonium from Aldermaston to other locations:

- 3.9 tonnes to Sellafield;
- 0.2 tonnes to Dounreay;
- 2.8 tonnes to Winfrith;
- 0.5 tonnes to Harwell;
- 0.5 tonnes to the US;
- 0.2 tonnes consumed in weapons tests in Australia and the US;
- 5.4 tonnes transferred to the US under Barter arrangements;
- 0.1 tonnes tied up in waste.

The records indicate a net balance of 3.2 tonnes of plutonium available for the weapons programme. This compares to a stockpile of 3.5 tonnes identified in the Strategic Defence Review, including some 0.3 tonnes of weapons grade plutonium no longer required for defence purposes. The SDR identified in addition some 4.1 tonnes of non-weapons grade plutonium stored at Sellafield, now under EURATOM safeguards and liable to inspection by the International Atomic Energy Agency. None of this plutonium has ever been delivered to Aldermaston and it is therefore not included in the figures above.

11. These figures show that the weapon cycle stockpile is in fact some 0.3 tonnes larger than the amount of plutonium the records indicate as available. This is a positive discrepancy of about 1.7% of total acquisitions. The Ministry of Defence is confident of the accuracy of the stockpile figure declared in the SDR. This was established accurately using modern nuclear accounting practices. The explanation for the discrepancy is therefore likely to lie in the poorer quality and incompleteness of some of the older records, particularly in the 1950s and early 1960s. As explained in the introduction, such discrepancies are inevitable when seeking to account for material production and transfers over a period of over 50 years. Similar discrepancies were identified by the United States and South Africa in their reports.

Barter Arrangements

12. As noted above, between 1960 and 1979 the United Kingdom supplied the United States with approximately 5.4 tonnes of plutonium, from both the civil and defence programmes, under the 1958 Mutual Defence Agreement. Information on this has already been released by the US Department of Energy with the agreement of the Ministry of Defence. The US Government has given assurances that UK plutonium transferred to the US since 1964 was not used in the US nuclear weapons programme. It is theoretically possible, but very unlikely, that some UK civil plutonium may have been transferred to the US and used in the US nuclear weapons programme before 1964. The Review has established that the records do not exist to determine this with absolute certainty at this remove.

Conclusion

13. The Review has conducted a comprehensive investigation of existing records. This has identified that the defence stockpile of plutonium is some 0.3 tonnes larger than is indicated by the records examined, or a discrepancy of some 1.7% of total acquisitions. However, given the long period covered, the less rigorous accounting standards that applied in the early years of the programme, and the limited availability of records for the early years, the Government believes that the review has provided strong corroboration of the defence plutonium holdings declared in the Strategic Defence Review, and has further reinforced the significant increase in transparency about the defence nuclear stockpile set out in the SDR.

14. In view of its commitment to transparency and the role of historical accountancy for defence fissile material holdings in the process of nuclear disarmament, the Government intends to follow this review up in due course with publication of further material on other elements of the defence nuclear programme, including production of High Enriched Uranium for the defence programme. However, in view of the labour-intensive nature of the work involved and the limited resources available the Government intends now to seek the views of UK academic and non-governmental experts on their priorities for information in this area before setting any further internal work in hand.