III. British nuclear forces

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The United Kingdom's nuclear deterrent consists exclusively of a sea-based component: Vanguard class Trident nuclear-powered ballistic missile submarines (SSBNs) armed with the UGM-133 Trident II D5 submarine-launched ballistic missile (SLBM) and associated warheads, and their support infrastructure. The UK possesses an arsenal of about 150 operational nuclear warheads that are available for use by a fleet of four Trident SSBNs stationed at the Faslane Naval Base in western Scotland (see table 11.4). The UK does not own the missiles, but leases them from a pool of 58 Trident SLBMs shared with the United States Navy. The UK has joined a US programme to extend the service life of the Trident II D5 missile from 2028 until 2042.

Each Vanguard class SSBN is equipped with 16 Trident II D5 missiles, each carrying up to 3 warheads, for a total of up to 48 warheads. The warheads are manufactured at the Atomic Weapons Establishment (AWE), Aldermaston, but are believed to be very similar to the US W76 warhead.[1] The UK enjoys close cooperation with the USA on nuclear warhead design and production, including the sharing of warhead components, as well as on stockpile maintenance under the terms of the 1958 US–UK Mutual Defence Agreement (MDA).[2] The current warhead was first deployed in the early 1990s and is expected to remain in service until the 2040s. The AWE began a Nuclear Warhead Capability Sustainment Programme in 2005 to ensure that the current warhead 'remains safe and operational until its final disposal following withdrawal from service'.[3]

[1] According to some reports, the UK may have been supplied with the US-produced W76-1 nuclear warhead with an improved firing mechanism. See Kristensen, H. M., 'British submarines to receive upgraded US nuclear warhead', FAS Strategic Security Blog, Federation of American Scientists, 1 Apr. 2011, <http://blogs.fas.org/security/2011/04/britishw76-1/>.

[2] Norton-Taylor, R., 'UK to step up collaboration with US over nuclear warheads', *The Guardian*, 12 June 2014. The US–UK Mutual Defence Agreement provides for the 2 parties to share classified information, nuclear technology and scientific knowledge in relation to each country's respective nuclear weapon programmes. The agreement was revised and extended in 2014 for an additional 10-year period. Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Co-operation on the Uses of Atomic Energy for Mutual Defence Purposes (US–UK Mutual Defence Agreement), opened for signature 3 July 1958, entered into force 4 Aug. 1958 <http://treaties.fco.gov.uk/docs/pdf/1958/TS0041.pdf>.

[3] British Ministry of Defence, 'The United Kingdom's future nuclear deterrent: 2014 update to parliament', 15 Dec. 2014, <https://www.gov.uk/government/publications/the-united-kingdoms-future-nuclear-deterrent-2014-update-to-parliament>, p. 6.

Table 11.4. British nuclear forces, January 2015

Type	Designation	No. deployed	Year first deployed	Range (km)[a]	Warheads x yield	No. of warheads
Submarine-launched ballistic missiles						
D5	Trident II	48	1994	>7 400	1–3 x 100 kilotons	215[b]

[a] Range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

[b] Approximately 150 warheads are operationally available, *c.* 136 to arm 48 missiles on 3 of 4 nuclear-powered ballistic missile submarines (SSBNs). Only 1 SSBN is on patrol at any time.

Sources: British Ministry of Defence, white papers, press releases and website, <http://www.mod.uk/>; British House of Commons, *Parliamentary Debates (Hansard)*, various issues; Norris, R. S. et al., *Nuclear Weapons Databook*, vol. 5, *British, French, and Chinese Nuclear Weapons* (Westview: Boulder, CO, 1994), p. 9; 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; and authors' estimates.

Although Trident II D5 missile can carry up to three warheads, it is believed that a number of them are deployed with only one warhead, possibly with a reduced explosive yield, to increase the flexibility of nuclear targeting options.

In a posture known as continuous at-sea deterrence (CASD), one British Vanguard class SSBN is on patrol at all times. While the second and third SSBNs can be put to sea rapidly, the fourth would take longer because of the cycle of extensive overhaul and maintenance. Since the end of the cold war, the SSBN on patrol has been kept at a level of reduced readiness with its missiles de-targeted and a 'notice to fire' measured in days.[4]

In the 2010 Strategic Defence and Security Review (SDSR) the British Government made a commitment to retain a nuclear deterrent force for the indefinite future based on a 'like-for-like' Trident successor programme.[5] The British Ministry of Defence (MOD) currently plans to replace the four Vanguard class SSBNs, which will reach the end of their service lives in the 2020s, with three or four submarines of a new class. As a cost-saving measure the new submarine will have a smaller missile compartment designed jointly with the US Navy equipped with 8 launch tubes carrying no more than 40 warheads.[6] The 'initial gate' of the programme, releasing funds for a five-year assessment phase, was approved in 2011. The SDSR deferred the 'main gate' decision—on when the detailed acquisition plans, design and number of the successor submarines are to be finalized—until

[4] British Ministry of Defence (note 3), para. 68.

[5] British Ministry of Defence, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, Cm 7948 (The Stationery Office: London, Oct. 2010), paras 3.8–3.9.

[6] British Ministry of Defence, Cm 7948 (note 5), paras 3.11–3.12, 3.14.

2016.[7] The first of the new class of submarines is expected to enter service in 2028.

The cost of the Trident successor programme has continued to be a source of political controversy. In December 2014 the MOD confirmed that the forecast costs for the Trident successor programme remained within the estimates set down in a 2006 White Paper, that is, a total of £15–20 billion ($23–31 billion), including £11–14 billion ($17–22 billion) for the procurement of the submarine (at 2006–2007 prices).[8] However, some critics have argued that the real cost of building and operating the new submarines over many years is likely to be much higher than the MOD's estimate—possibly as much as £100 billion ($155 billion).[9] In addition, the increasing annual cost of the programme's initial gate assessment phase has come under criticism in parliament.[10]

Concern about future cost projections has led to calls for the government to scrap the Trident successor SSBN in favour of a cheaper alternative platform and delivery system.[11] In a concluding report published in July 2014, the Trident Commission—an independent, cross-party body consisting of eight prominent academic experts and former senior government officials—recommended that the government proceed with the current Trident successor programme rather than choose alternative systems 'on the basis of possible but speculative cost savings'.[12] The commission concluded that since Trident currently met key 'criteria of credibility, scale, survivability, reach and readiness', there were 'no benefits to be had from choosing a different' type of system.[13] In this regard, the report supported the main finding of the British Government's Trident Alternatives Review published in July 2013.[14] However, the commissioners were divided on the question of whether the UK should relax the current requirement to maintain a continuous at-sea deterrence posture—a move that had been ruled out by the 2013 review.

The 2010 SDSR revealed plans to cut the size of the British nuclear arsenal. The stockpile of operational nuclear warheads will be reduced to

[7] Mills, C. and Brooke-Collins, L., 'The Trident successor programme: an update', Standard Note SN06526, British House of Commons Library, version dated 26 June 2014, pp. 4–6.

[8] British Ministry of Defence (note 3); and British Ministry of Defence and British Foreign and Commonwealth Office, *The Future of the United Kingdom's Nuclear Deterrent*, Cm 6994 (The Stationery Office: Norwich, Dec. 2006), p. 13.

[9] Campaign for Nuclear Disarmament (CND), *The Real Alternative: What the Government's Trident Alternative Review Isn't Telling You* (CND: London, June 2013), p. 5.

[10] Dowd, J. and Sloggett, C., 'Trident future back on election agenda as costs spiral', *The Guardian*, 17 Jan. 2015.

[11] Hopkins, N., 'Trident: no need for like-for-like replacement, says Danny Alexander', *The Guardian*, 22 Jan. 2013.

[12] Browne, D., et al., *The Trident Commission: Concluding Report*, (British American Security Information Council: London, July 2014), p. 7.

[13] Browne et al. (note 12).

[14] British Cabinet Office, *Trident Alternatives Review* (Cabinet Office: London, 16 July 2013).

no more than 120, of which 40 will be on patrol at any given time. Similarly, the overall size of the nuclear stockpile, including non-deployed weapons, will decrease from the 225 warheads reported in 2010 to 'not more than 180 by the mid 2020s'.[15] The British Government announced in 2014 that these reductions were under way.[16] It is estimated that as of January 2015 the British stockpile consisted of approximately 215 warheads.

[15] British Ministry of Defence Cm 7948 (note 5), para. 3.11.

[16] Statement by Lidington, D., Minister for Europe, British House of Commons, 'US–UK Mutual Defence Agreement', *Hansard*, 6 Nov. 2014, column 321WH, <http://www.publications.parliament.uk/pa/cm201415/cmhansrd/cm141106/halltext/141106h0001.htm>.