III. British nuclear forces

SHANNON N. KILE, PHILLIP SCHELL AND HANS M. KRISTENSEN

The United Kingdom’s nuclear deterrent consists exclusively of a sea-based component: Vanguard class Trident nuclear-powered ballistic missile submarine (SSBNs), Trident II (D5) submarine-launched ballistic missiles (SLBMs) and associated warheads, and support infrastructure. The UK possesses an arsenal of about 160 operational nuclear warheads that are available for use by a fleet of four Trident SSBNs (see table 7.4). The UK leases the Trident II (D5) SLBMs from the US Navy under a system of ‘mingled asset ownership’.

Each Vanguard class SSBN is equipped with 16 Trident II (D5) missiles carrying up to 48 warheads (i.e. up to 3 per missile). The warhead is similar to the US W76 warhead and has an explosive yield of about 100 kilotons. It is being upgraded with the US-produced arming, fusing and firing system for the Mk-4A re-entry vehicle. It is believed that a number of the D5 missiles are deployed with only one warhead, possibly with a reduced explosive yield, instead of three.¹ The reduced force-loading option reflects a decision by the Ministry of Defence (MOD) in 1998 to give a ‘sub-strategic’, or limited-strike, role to the Trident fleet aimed at enhancing the credibility of the British deterrent.²

In a posture known as Continuous at Sea Deterrence (CASD), one British SSBN is on patrol at all times.³ While the second and third SSBNs can be put to sea rapidly, not enough missiles have been leased from the US Navy to simultaneously arm the fourth British submarine. 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.

In the 2010 Strategic Defence and Security Review (SDR) the British Government made a commitment to retain a submarine-based nuclear deterrent force for the indefinite future. The MOD has plans to replace the four Vanguard class SSBNs, which will reach the end of their service lives from 2024. The new submarines will be based on the current Trident system and equipped with the modified Trident II (D5) SLBM developed under the US Navy’s D5 Life Extension (LE) programme. As a cost-saving

measure, they will have a smaller missile compartment, designed jointly with the US Navy, that will carry 12 launch tubes rather than the 16 carried by the Vanguard class submarines. The maximum number of nuclear warheads carried on each submarine will decrease from 48 to 40.\(^4\)

In May 2011 the MOD announced the completion of the ‘initial gate’ phase for the replacement submarine programme. This involved decisions about the broad design parameters for the new SSBN, including the choice of reactor propulsion systems.\(^5\) The SDR delayed the ‘main gate’ decision—when the detailed acquisition plans, design and number of submarines are to be finalized—until 2016. As a result, the first of the new generation of SSBNs is not scheduled to enter service until 2028. The service lives of the Vanguard submarines are to be further prolonged in accordance with the government’s commitment to reliably sustain the CASD posture.

The 2010 SDR revealed plans for cutting the size of the British nuclear arsenal. The stockpile of operational nuclear warheads will be reduced from fewer than 160 at present to no more than 120. Likewise, the overall size of the nuclear stockpile, including non-deployed weapons, will decrease from the current 225 warheads to ‘not more than 180 by the mid 2020s’.\(^6\)

In announcing the results of the SDR, the British Government said it would defer a decision about whether to refurbish or replace the nuclear warhead carried on the Trident II (D5) SLBM until the next parliament (i.e. after May 2015).\(^7\) However, in 2011 there were reports, based on a publication from the US Sandia National Laboratory, indicating that the Royal Navy has decided to procure the W76-1 warhead that is currently in production in the USA.\(^8\) The warhead is an enhanced version of the US W76 warhead and will make Trident missiles more accurate and more effective against hardened targets.\(^9\) Together with the modified D5LE SLBMs, the new warhead will extend the service life of the Trident missile system into the 2040s.

The UK has launched a long-term investment programme aimed at sustaining key skills and facilities at the Atomic Weapons Establishment at Aldermaston. In 2011 the MOD confirmed that it plans to build a new


\(^7\) British Ministry of Defence (note 4), para. 3.9, p. 39.


facility at Aldermaston to store and handle enriched uranium components for nuclear warheads and reactor fuel for nuclear-powered submarines. It is intended to replace an ageing facility built in the 1950s that does not meet modern safety design standards.\(^{10}\)

### The British–French nuclear cooperation agreement

On 2 November 2010 France and the UK signed an agreement for technical cooperation and the exchange of classified information in the areas of nuclear weapon safety, and security and stockpile certification. The agreement entered into force in July 2011 and entails the establishment of ‘joint radiographic/hydrodynamics facilities’, one in France and one in the UK, to conduct computer-based testing of nuclear weapon components to ensure their safety and reliability in the absence of explosive testing of nuclear weapons.\(^{11}\) Both countries, however, emphasized that they will continue to maintain independent nuclear deterrent forces under the agreement.

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### Table 7.4. British nuclear forces, January 2012

<table>
<thead>
<tr>
<th>Type</th>
<th>Designation</th>
<th>No. deployed</th>
<th>Year first deployed</th>
<th>Range (km)(^{a})</th>
<th>Warheads x yield</th>
<th>Warheads in stockpile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Submarine-launched ballistic missiles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>Trident II</td>
<td>48</td>
<td>1994</td>
<td>&gt;7400</td>
<td>1–3 x 100 kilotons</td>
<td>225(^{b})</td>
</tr>
</tbody>
</table>

\(^{a}\) Range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

\(^{b}\) Fewer than 160 warheads are operationally available, c. 144 to arm 48 missiles on 3 of 4 nuclear-powered ballistic missile submarines (SSBNs). Only 1 SSBN is on patrol at any time, with up to 48 warheads. In 2010 it was decided that the number of operational warheads will be reduced to a maximum of 120 within the next few years, of which 40 will be on patrol at any given time. The stockpile will be reduced to no more than 180 by the mid-2020s.