

RELOCATION, RELOCATION, RELOCATION

Could the UK's Nuclear Force be Moved after Scottish Independence?

Hugh Chalmers and Malcolm Chalmers



Royal United Services Institute

OCCASIONAL PAPER



Occasional Paper, August 2014

Relocation, Relocation, Relocation

Could the UK's Nuclear Force be Moved after Scottish Independence?

Hugh Chalmers and Malcolm Chalmers

The views expressed in this paper are the authors' own, and do not necessarily reflect those of RUSI or any other institutions with which the authors are associated.

Comments pertaining to this report are invited and should be forwarded to: Hugh Chalmers, Research Analyst, Nuclear Analysis, Royal United Services Institute, Whitehall, London, SW1A 2ET, United Kingdom, or via email to hughc@rusi.org

Published in 2014 by the Royal United Services Institute for Defence and Security Studies. Reproduction without the express permission of RUSI is prohibited.

About RUSI Publications

Director of Publications:	Adrian Johnson
Production Editor:	Ashlee Godwin
Editorial Assistant:	Derek Kang

Paper or electronic copies of this and other reports are available by contacting publications@rusi.org.

Executive Summary

A Scottish vote for independence would present a significant challenge to the rest of the UK's (rUK's) nuclear forces, which currently rely upon Scottish bases for operational support. While it is technically feasible that the rUK could continue to base its forces in Scotland after its independence, in the long term this option may not be politically feasible. The rUK would only seriously consider doing so if the costs of continued Scottish basing were clearly smaller than those of relocating forces to the rUK.

An initial analysis of previous nuclear submarine infrastructure projects suggests that the gross costs of relocating the rUK's nuclear forces to two separate sites in England could amount to between £3 billion and £4 billion (at 2012/13 prices), excluding any costs associated with land purchase and clearance. The net increase in infrastructure costs (excluding land purchase and clearance) created by relocation could be reduced to between £2.5 and £3.5 billion (at 2012/2013 prices) by the cancellation of planned investment to prepare Scotland for a successor submarine.

A vote for independence could be followed by a jointly commissioned study for relocation options, with a view to establishing an agreed baseline for subsequent decisions. Such a study is highly unlikely to suggest that relocation could be carried out safely by the 2020 target suggested by the Scottish government. An agreement to link relocation to the entry into service of a new generation of nuclear-armed submarines, currently anticipated to begin in 2028, could provide a more natural timeframe for relocation.

A pledge not to prepare Scottish bases for a successor submarine could reassure an independent Scotland that the Vanguard will be the last nuclear submarine based in Scotland. The rUK, for its part, could be confident that unforeseen delays in the construction programme would not leave it without a secure operating base.

The technical and political challenges of creating demonstrably safe nuclear facilities would be significant, and would likely generate significant local opposition. While past experience suggests that the Ministry of Defence possesses considerable levers that it can use where local opposition threatens to block important defence-related infrastructural projects, it could find it hard to use these levers without broader political support for relocation.

The various challenges of relocation would probably trigger a wider national discussion in the rUK on whether or not the strategic benefits of retaining nuclear weapons exceeded the costs involved. This paper argues that while the technical and financial challenges presented by Scottish independence would influence this discussion, they would not be severe enough to dictate it.

Could the UK's Nuclear Force be Moved after Scottish Independence?

Current polls suggest that Scotland will not vote for independence on 18 September. Whilst support for independence has surged from time to time (most recently following the cross-party rejection of a currency union with an independent Scotland),¹ those against have remained in the lead. Nevertheless, the referendum itself has revealed that a central pillar of UK defence and security may rest upon an unstable foundation.

The HM Naval Base (HMNB) Clyde outside Glasgow has hosted the UK's fleet of nuclear-armed ballistic-missile submarines (SSBNs) for more than forty years. During this time, these submarines have played a significant role in the UK's defence and foreign policy, offering it a distinct role within NATO, a unique connection to the US, and what is seen as an 'ultimate assurance' of national security.² With these roles in mind, both the current coalition government and its Labour predecessor have laid the groundwork to replace the current *Vanguard*-class SSBN with a successor once it begins retirement in 2026.

While successive governments have supported the maintenance of the UK's nuclear forces (known colloquially as Trident), nuclear weapons have always been a controversial topic in the UK. This is particularly the case in Scotland. Recent opinion polls indicate stronger support for nuclear disarmament in Scotland than in the rest of the UK (rUK),³ and some even indicate that the majority of Scots wish to see Trident abandoned.⁴

1. *BBC News*, 'Scottish Referendum Poll Tracker', <<http://www.bbc.co.uk/news/events/scotland-decides/poll-tracker>>, accessed 1 August 2014.

2. HM Government, *The Future of the United Kingdom's Nuclear Deterrent*, Cm 6994 (London: The Stationery Office, December 2006), p. 5.

3. The YouGov 2013 Public Administration Select Committee found that when asked whether the government should renew its nuclear forces if no cheaper alternative were available, 41 per cent of Scots disagreed compared to a national average of 29 per cent. See House of Commons, 'Engaging the Public in National Strategy', Fourth Report of Session 2013–14, HC435, 28 June 2013, <<http://www.publications.parliament.uk/pa/cm201314/cmselect/cmpublicadm/435/435.pdf>>, accessed 1 August 2014.

A 2010 Chatham House/YouGov Survey suggested that 29 per cent of Scots would wish to abandon nuclear weapons entirely even if a cheaper option were available, compared to the national average of 20 per cent. See Chatham House-YouGov, 'British Attitudes towards the UK's International Priorities', July 2010, <http://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Europe/0710ch_yougov_survey.pdf>, accessed 1 August 2014.

4. A ComRes poll conducted in collaboration with the *Independent* suggested that 66 per cent of Scots polled agreed with the statement that 'Given the state of the country's finances, the Government should scrap the Trident nuclear missile system'. ComRes

To date, this regional dynamic has had little effect on the UK's ability to operate Trident (and its predecessor Polaris) out of the Clyde. Since the Act of Union in 1707, the Parliament in Westminster has had sole legislative authority over matters of defence and foreign policy, leaving few mechanisms to translate any Scottish opposition to nuclear weapons into a change in UK policy.⁵

Following the devolution of many aspects of domestic policy to a new Scottish Parliament in 1999, pressure has been growing for dissenting voices to be heard. This pressure has manifested itself most clearly in the 2011 victory in the Scottish elections for the Scottish National Party (SNP), the party's subsequent arrangement of a referendum on Scottish independence, and its pledge to remove nuclear weapons from Scotland if the country were to become independent.

Scotland's Future – the SNP's 670-page blueprint for an independent Scotland – states that in the event of a vote for independence, the Scottish government would work quickly to expel nuclear weapons from Scotland. After a vote for independence in September, the Scottish government plans to establish a timetable for negotiations with the rUK over the division of assets and liabilities and the transfer of power such that it can formally declare independence on 24 March 2016.

These negotiations – to be carried out by a representative selection of the Scottish polity (but which would likely be dominated by the SNP) – will make 'early agreement on the speediest safe removal of nuclear weapons a priority'.⁶ Furthermore, these negotiations would proceed 'with a view to the removal of Trident within the first term of the Scottish Parliament following independence' – implying a removal date of no later than April 2020. During this negotiation period and prior to independence, the Scottish government also intends to express its interest in joining NATO and the Nuclear Non-Proliferation Treaty (NPT) as a non-nuclear state. Having secured an arrangement for the removal of Trident from HMNB Clyde, Scotland would

Poll, 'Published Voting Intention Figures', <http://www.comres.co.uk/polls/Political_Poll_7_Sept_2009.pdf>, accessed 1 August 2014.

A YouGov/University of York poll suggested 64 per cent of Scots would choose to abandon nuclear weapons immediately or at the next replacement decision. YouGov Archive, 'YouGov/University of York Survey Results', <<http://www.york.ac.uk/media/politics/documents/research/YouGov%20-%20University%20of%20York%20-%20nuclear%20weapons%20results%20130311%20RESULTS.pdf>>, accessed 1 August 2014.

5. It should be noted that the continued operation of HMNB Clyde does depend upon co-operation between the UK government and Scottish emergency services and regulators, leaving Scotland some (hazardous) opportunity to affect the operation of the UK's nuclear forces.
6. Scottish Government, *Scotland's Future: Your Guide to an Independent Scotland*, (Edinburgh: Scottish Government, November 2013), p. 14.

then set about transforming the nuclear submarine base into a conventional naval base whilst Trident is removed.⁷

In contrast to the Scottish government, the UK government has been extremely reluctant to outline how it might approach these issues in the event of a vote for independence. With little political incentive to be clearer, the UK has only gone so far to say that relocating Trident ‘would cost billions of pounds and take many years’.⁸ Despite encouragement from the Electoral Commission to establish and communicate joint positions on an independent Scotland,⁹ the UK has stated that relocation options will not be discussed prior to the referendum.¹⁰ Indeed, the government has been quick to distance itself from any speculation regarding its plans for Trident in the event of a vote for independence.¹¹

Breaking Up is Hard

Due to the sensitive nature of their work, the two primary facilities at HMNB Clyde – the Faslane naval base and the Royal Naval Armaments Depot (RNAD) at Coulport – require highly specific and expensive capabilities developed to very stringent safety standards. Previous experiences in updating elements of nuclear submarine infrastructure suggest that redeveloping these capabilities elsewhere could be very challenging.¹²

7. *Ibid.*, p. 246.

8. House of Commons Scottish Affairs Committee, ‘The Referendum on Separation for Scotland: Terminating Trident – Days or Decades? Government Response to the Committee’s Fourth Report of the Session 2012-13’, 1st Special Report of Session 2012–2013, HC861, January 2013, <<http://www.publications.parliament.uk/pa/cm201213/cmselect/cmsscota/861/861.pdf>>, accessed 1 August 2014.

9. Electoral Commission, ‘Referendum on Independence for Scotland, Advice of the Electoral Commission on the proposed referendum question’, January 2013, p. 36, <http://www.electoralcommission.org.uk/__data/assets/pdf_file/0007/153691/Referendum-on-independence-for-Scotland-our-advice-on-referendum-question.pdf>, accessed 1 August 2014.

10. *Ibid.*

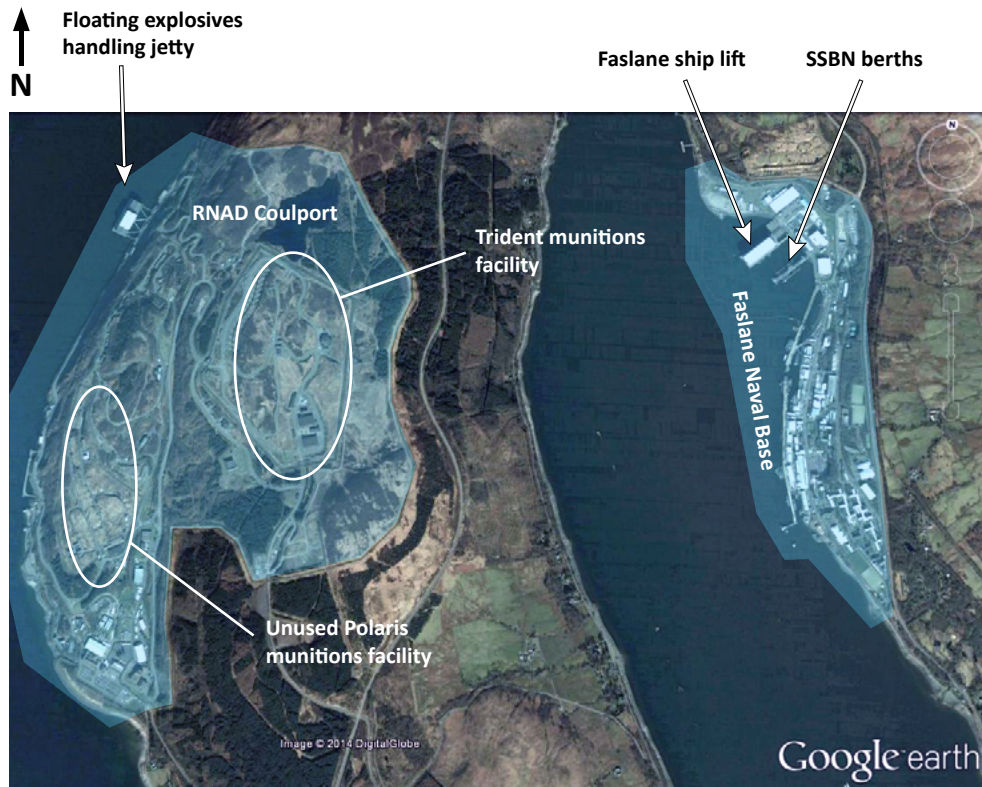
11. Lindsay McIntosh, ‘No 10 Denies Plot to Keep Faslane in UK after Independence’, *The Times*, 12 July 2013.

12. For reports from the National Audit Office on the development of nuclear submarine facilities at HMNB Clyde and HMNB Devonport, see National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General* (London: The Stationery Office, July 1994) and National Audit Office, *Ministry of Defence: The Construction of Nuclear Submarine Facilities at Devonport, Report by the Comptroller and Auditor General* (London: The Stationery Office, December 2002), <<http://www.nao.org.uk/wp-content/uploads/2002/12/020390.pdf>>, accessed 1 August 2014.

Faslane

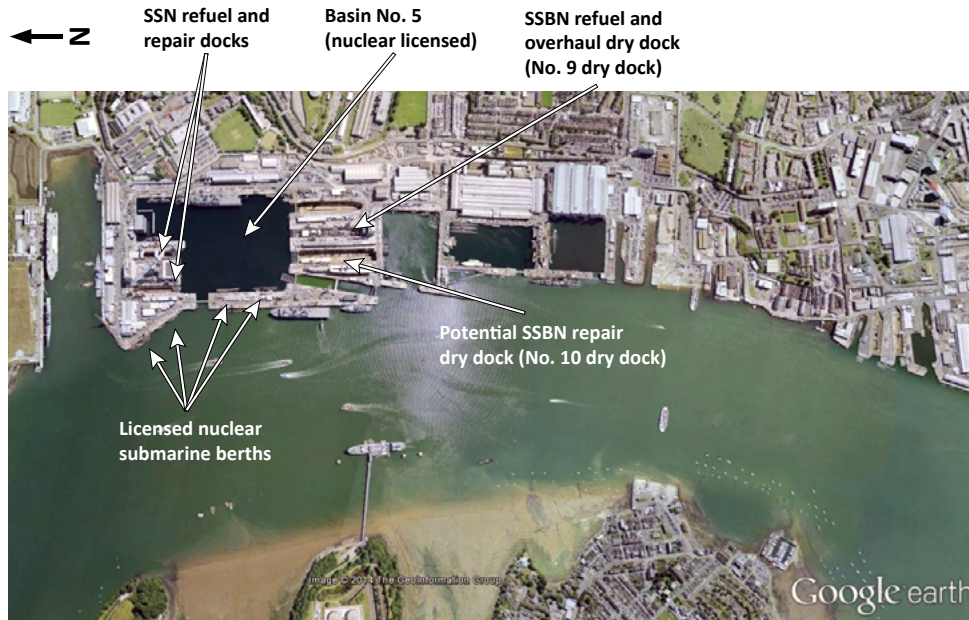
The Faslane naval base provides a safe home for the UK’s fleet of nuclear submarines, with a number of certified berths equipped with backed-up, high-voltage power supplies to maintain and monitor submarine systems. Furthermore, its covered ship lift – a necessary part of its operating capability – can remove fully-armed submarines from the water for basic repairs and maintenance, whilst keeping them supplied with power and reactor coolant and protected against risks such as earthquakes, tidal surges, high winds, high temperatures, explosions and dropped loads. Faslane also hosts mine-clearing vessels, Royal Marine Commandos and specialist divers, as well as a series of engineering-support, material-processing, accommodation and training facilities to support the safe and secure operation of submarines.

Map 1: HMNB Clyde



The most obvious replacement for the Faslane submarine base is HMNB Devonport in Plymouth. Here the existing infrastructure used to base conventionally armed nuclear submarines, and to refuel and overhaul the entire nuclear submarine fleet, provides many of the services currently used to support SSBNs. Other elements could be provided through further investment.

Map 2: HMNB Devonport



Relocating SSBNs to Devonport would not be trivial. While there are at least seven licensed and operational nuclear berths at Devonport,¹³ more might have to be created to accommodate the increase from four *Trafalgar*-class conventional submarines today to the maximum of eleven nuclear- and conventionally armed submarines (four SSBNs and seven SSNs) that it would have to host following the relocation of the nuclear-armed submarines.¹⁴ Relocating the submarines and their surface support vessels, and providing any additional training and support facilities may strain the current capacity at Devonport. It might force out some of Devonport's existing conventional surface fleet (and support infrastructure), presumably to HMNB Portsmouth.¹⁵ Access routes to new berths may have to be dredged to allow larger nuclear-armed submarines to dock. Furthermore, a spare dry dock would have to be redeveloped to provide the minor maintenance and repair capability currently provided by the Faslane ship lift.¹⁶ Finally, additional personnel

13. Babcock Engineering, 'Decommissioning/Disposal Strategy: Submarine Dismantling – Facility Gap Analysis', 000025472, 2011, p. 16, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34127/20110815FFacilit_Gap_Analysis_Oct_2010U.pdf>, accessed 1 August 2014.

14. Whilst patrolling patterns make it unlikely that all of these submarines would be in port at once, an emergency capability to host the entire fleet would still be desirable.

15. This includes three amphibious assault ships (HMS *Ocean*, *Albion* and *Bulwark*), seven Type-23 frigates (HMS *Argyll*, *Monmouth*, *Montrose*, *Northumberland*, *Portland*, *Somerset* and *Sutherland*), and four surveying vessels (HMS *Echo*, *Enterprise*, *Gleaner* and *Scott*).

16. The no. 10 dry dock, adjacent to the no. 9 dry dock used for the refuelling and overhaul of current SSBNs, is large enough to house the current Vanguard-class submarine

would need to be brought in to bring any new facilities up to operational capacity whilst its predecessor remained operational.

Safety concerns will also complicate matters. Introducing nuclear-armed SSBNs to Devonport will unavoidably introduce a new risk that an accidental ignition of one or all of a submarine's Trident D5 missiles could spread radioactive material over some of Plymouth's 260,000 inhabitants.¹⁷

The layers of protection that have been created to guard against such a catastrophe are such that its probability is negligible. Indeed, John Ainslie of the Scottish Campaign for Nuclear Disarmament has cited Ministry of Defence (MoD) sources that suggest that the probability of such an accident while an armed submarine undergoes maintenance in Faslane may be as low as once every 1,300,000 years.¹⁸

While the loading and unloading of Trident missiles is handled elsewhere, there is little reason to think that moving SSBNs to Devonport would increase this risk.¹⁹ However, because of the large population nearby, the consequences of such an event would be far more severe in Devonport than in Faslane. This would particularly be the case if minor repairs of missile-armed submarines were being carried out in a dry dock adjacent to other submarines undergoing major refuel and overhaul. Accounting for and addressing the compound risk of an accidental missile ignition in the former having serious knock-on effects for submarines in the latter will be an important new challenge for site safety and regulation.

and was previously used for nuclear work. See Malcolm Smith, 'The D154 Project: Redevelopment of the Submarine Support Facilities at Devonport Royal Dockyard', *Ingenia* (No. 13, August 2002), p. 28.

17. The three stages of a Trident D5 missile are fuelled with an extremely potent solid propellant which, despite being more robust than less potent propellants, is sensitive to extreme shocks or heat. See John R Harvey and Stefan Michalowski, 'Nuclear Weapons Safety: The Case of Trident', *Science and Global Security* (Vol. 4, 1994), p. 271.
18. However, the author has been unable to confirm this figure within the documents cited, which have all relevant probability figures redacted in the versions that are now publicly available through the Freedom of Information Act. See John Ainslie, 'Risk from Trident Missiles in Devonport', Scottish Campaign for Nuclear Disarmament, 4 January 2013, <<http://www.banthebomb.org/images/stories/pdfs/RiskfromTridentmissilesinDevonport.pdf>>, accessed 1 August 2014 and Ministry of Defence, 'Annex A', in 'Accident Probability Assessment of Faslane Shiplift for Vanguard Class Submarines with Strategic Weapon System Embarked', ES352/98/58, Ministry of Defence, August 2000, <<http://robedwards.typepad.com/files/shiplift-rapa-annex.pdf>>, accessed 7 August 2014.
19. It is more likely that the simplicity and robustness of a dry dock would reduce the probability of an accidental ignition of missiles when compared to the complex (yet sophisticated) mechanisms within a ship lift.

If this location were chosen, previous work undertaken to prepare Devonport and Faslane for *Vanguard*-class submarines suggests that, once a decision to do so had been made, the addition of licensed berths and the development of a repair dry dock could probably be carried out within a decade. Once contracts were placed for the refurbishment of berths numbers 1–4 at Faslane in 1989, all of the work relating to electrical supply and safety development was complete within four years.²⁰ Once contracts were awarded to develop the power supplies for the entirety of Faslane in 1987, construction was complete five years later in 1992.²¹ Furthermore, having chosen to refuel *Vanguard*-class submarines at Devonport in 1993, contracts were placed to develop the required infrastructure in 1997 and Devonport accepted its first submarine for refuelling in 2002.²²

Coulport

The nuclear and conventional munitions (such as torpedoes) for SSBNs are stored and handled at a separate facility: RNAD Coulport, approximately 2.5 miles from Faslane by land and 15 nautical miles by sea. Here, segregated magazines provide capacity to store and carry out limited maintenance on nuclear warheads, their re-entry bodies, and the US-supplied Trident D5 missiles that carry them.²³

Warheads are mated to their re-entry vehicles in the magazine area and are then transported one-by-one to a floating explosives-handling jetty anchored to the banks of Loch Long. As with the ship lift at Faslane, this jetty is designed to resist earthquakes, impacts, explosions and other similar hazards.²⁴ Dedicated cranes within the jetty can load and unload nuclear warheads, as well as Trident missiles, if there is any reason to doubt their safety or reliability. As with the Faslane submarine base, Coulport also hosts a number of support facilities for operational headquarters, power supplies, alarm systems and maintenance.²⁵

20. National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*, p. 38.

21. *Ibid.*, p. 40.

22. Smith, 'The D154 Project', p. 28.

23. Due to the nature of a submarine's lifecycle, these stores provide only limited capacity for warheads (the vast majority of which spend most of their lifecycle onboard the submarines themselves) and only one full submarine-loading of missiles (which are loaded onto submarines in the US and only removed at Coulport if emergency storage or maintenance is required).

24. J R Warmington et al., 'The Floating Explosives Handling Jetty', *Trident Facilities* (London: Thomas Telford Services, April 1994), p. 153. Published on behalf of the Institution of Civil Engineers.

25. National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*, p. 8.

However, there are no facilities similar to those of Coulport in the UK. The non-nuclear munitions for SSNs are far less sensitive than Trident missiles, and can be loaded alongside a regular berth. A replacement for Coulport would have to be developed from scratch if Trident were to be relocated from Scotland. This would of necessity require some form of loading and unloading platform,²⁶ and safe and secure storage for at least one boat-load of nuclear warheads and Trident D5 missiles, along with all relevant support facilities. Logistical links to and from the Atomic Weapons Establishment (AWE) at Aldermaston would also be required to allow for the longer-term repair and monitoring of nuclear warheads.

From an operational perspective, it would be advantageous to co-locate nuclear submarines with their munitions at Devonport, thereby reducing the time consumed loading and unloading munitions. However, from the perspective of safety, this option, and indeed most other options, looks less desirable. Whilst the worst-case scenario for a potential accident – namely, the simultaneous ignition of a boat-load of missiles – is the same as that considered for a submarine base, the loading and unloading of nuclear warheads and missiles makes such a scenario somewhat more likely (albeit still highly improbable) at a munitions facility.

The most desirable location for a replacement munitions facility would therefore be in a location where the consequences of such an accident could be mitigated by isolating it from vulnerable populations, and segregating stored missiles, warheads and loading platforms at safe distances from each other.²⁷ The option given most credence to date involves developing a munitions facility on the Fal estuary to the North of Falmouth,²⁸ which offers good shelter and a comparatively isolated location.

This option would certainly not be without its problems. Devonport and Falmouth are almost 50 nautical miles apart – over three times the distance between Faslane and Coulport. Travelling between the two to load and unload nuclear warheads would consume upwards of six hours that could otherwise be spent on patrol. Furthermore, displacing local services, houses and amenities in an area with a strong tourism industry will be very

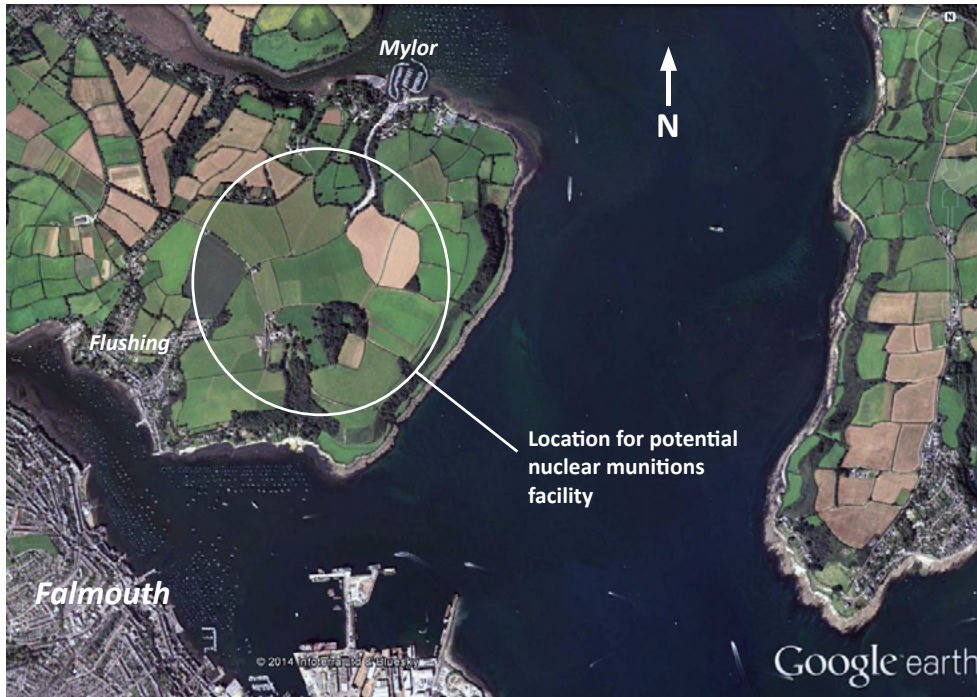
26. This need not be a floating jetty. The profile of the coastline at Falmouth may be more suited to a simpler, fixed jetty built into the seabed.

27. These requirements essentially rule out a munitions facility near Devonport, which has neither the space nor the isolation to make it desirable.

28. See Malcolm Chalmers and William Walker, *Uncharted Waters: The UK, Nuclear Weapons, and the Scottish Question* (East Lothian: Tuckwell Press, 2001), p. 113 and House of Commons Defence Committee, 'The Future of the UK's Strategic Nuclear Deterrent: the White Paper', Ninth Report of Session 2006–07, Vol.II, Oral and Written Evidence, HC 225-II, March 2007, p. 121.

unpopular.²⁹ However, it may be the best available option within the rUK should Scotland become independent.

Map 3: Falmouth



Other options for the home of the UK's nuclear submarines were considered in the 1960s, but today all seem more challenging than Devonport and Falmouth. Twenty-five per cent of the UK's liquefied natural gas now passes through terminals in Milford Haven, ruling it out as a potential alternative on safety grounds. Similarly, whilst the UK's SSBN construction yard at Barrow-in-Furness can host nuclear submarines, there are no suitable locations for an equivalent to Coulport nearby. Portland in Dorset – the final non-Scottish option considered in the 1960s – has similar problems.

It is difficult to assess how long it would take to construct a replacement for Coulport. While it initially only took about four years to build,³⁰ construction standards and processes are far more rigorous and safety-conscious today. The programme of work to develop new facilities at Coulport to accept the current *Vanguard*-class SSBN during the 1980s demonstrates this well: it took the government almost five years to translate draft briefs of work into a signed contract, and a further six to complete construction. It is prudent to

29. The damage caused to a vibrant local tourism industry would be particularly unpopular, and prompted the UK to overlook Falmouth as a potential base in the late 1960s. See Chalmers and Walker, *Uncharted Waters*, p. 20.

30. House of Commons Scottish Affairs Committee, 'The Referendum on Separation for Scotland', p. 17.

assume that, even after the rUK had secured a new site, developing it into a replacement for Coulport would take a similar amount of time.³¹

Home Sweet Home?

We estimate that the existing facilities at Devonport could, in principle, be upgraded and adjusted to host the rUK's SSBNs on a day-to-day basis within a decade at most. If land for a munitions facility near Falmouth could be acquired and cleared, constructing an alternative to Coulport would take somewhat longer: perhaps between ten to fifteen years after the initial site identification. However, carrying out such a plan in practice would involve overcoming significant political and financial barriers.

Costs

The government of the rUK would have to consider whether it was willing to meet the costs of replacing HMNB Clyde with facilities outside of Scotland.³² Concerns have already been raised about the £18-billion capital costs (at 2012/13 prices) associated with developing a new fleet of SSBNs, and substantially adding to these costs would heighten such concerns.

There may well be a certain financial threshold above which the benefits of retaining nuclear weapons in the event of Scottish independence are felt to be outweighed by their growing costs. However, there is no *a priori* means of determining where that threshold might lie. On the one hand, Scottish independence is expected to decrease the taxation revenues available to finance overall defence spending by the rUK by around 8 per cent.³³ Any significant increases in spending on the successor programme within such a financially constrained environment may be unpopular. On the other hand, the perceived strategic and political value of nuclear weapons within the

31. Most of the work at Coulport involved developing essentially greenfield sites. K Partington, 'Coulport and Faslane General Management', *Trident Facilities*, p. 59.

This programme of work was delayed by at least fifteen months, primarily due to the premature placement of contracts before the design of the submarine was sufficiently advanced. With a design maturity of at least 70 per cent expected for successor submarines at Main Gate, these delays might be avoidable. See National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*, p. 2.

32. It is assumed here that the vast majority of the costs associated with relocating nuclear forces from an independent Scotland would be shouldered by the rUK. In the event of Scottish independence, there may be some scope for cost trade-offs between the two parties on this issue and others. Importantly, sharing financial burdens typically involves also sharing some level of control as well. The rUK may be reluctant to accept any cost trade-off on relocation that would give uncomfortable levels of control or oversight to an independent Scotland.

33. House of Lords Select Committee on Economic Affairs, 'The Economic Implications for the United Kingdom of Scottish Independence, Oral and Written Evidence', Second Report of Session 2012-13, HL Paper 152, April 2013, pp. 78–81, <<http://www.publications.parliament.uk/pa/ld201213/ldselect/ldeconaf/152/152.pdf>>, accessed 1 August 2014.

rUK might increase after the breakdown of the Union.³⁴ This could make any additional expenditure required for their upkeep seem like a high priority.

It is difficult to give an accurate assessment of the costs associated with relocating nuclear weapons from an independent Scotland, and predictions of this cost have ranged from the low billions up to £50 billion.³⁵ The Trident Works Programme, carried out within the late 1980s and early 1990s to upgrade infrastructure at HMNB Clyde, may give some indication as to possible costs. This package of work involved developing an entirely new ship lift at Faslane, as well as utility supply buildings, licensed berths, support areas and earthworks. The Trident Works Programme also had to redevelop most of Coulport from scratch, with the construction of a new explosives handling jetty, munitions storage and management areas, support facilities and access roads to accommodate the increase in size between the *Vanguard*- and their predecessor *Resolution*-class boats, as well as the new Trident D5 missile.³⁶ (For a detailed breakdown of the twenty most expensive projects within the Trident Works Programme, see Annex 1.)

The Trident Works Programme therefore involved most of the tasks that would be associated with a move from Faslane to Devonport and developing a new munitions facility at Falmouth.³⁷ In total, the cost of this programme came to approximately £1.9 billion in 1993/94 prices – which equates to around £2.8 billion at 2012/13 prices.³⁸ It might be reasonable to assume that the cost of generating a two-site replacement to HMNB Clyde would cost around the same, perhaps between £2.5 and £3.5 billion at 2012/13 prices. Some allowance should be made for construction cost inflation (over and above general inflation), which could take the total cost up to £3–4 billion. Importantly, a significant sum would also have to be added to allow for the additional costs of acquiring and clearing the land for a new munitions-handling facility.

The UK has already budgeted between £2.3 and £3.4 billion (at 2012/13 prices) to upgrade existing infrastructure at HMNB Clyde and Devonport for a

34. In particular, whilst the rUK seeks to maintain the position in world politics enjoyed by the UK, it may feel particularly attached to weapons which symbolise its special position in relation to the US and NATO.

35. House of Commons Scottish Affairs Committee, 'The Referendum on Separation for Scotland: Terminating Trident – Days or Decades?', p. 16.

36. National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*, p. 8.

37. However, the Trident Works Programme did not have to acquire as much land as would be needed for a replacement of Coulport.

38. It is worth noting that this figure represents a 72 per cent increase on the anticipated costs when the Works Programme began. National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*.

fleet of successor submarines, as well as to make adjustments to the current command-and-control infrastructure.³⁹ The portion of this figure reserved for upgrades at HMNB Clyde would no longer be needed if a successor fleet were to be based at Devonport. Assuming that only approximately £500 million of this figure relates to work at HMNB Clyde,⁴⁰ the net cost of relocation, if conducted in parallel with the introduction of successor submarines, could therefore be between £2.5 and £3.5 billion, not including the additional costs involved in land acquisition and clearance. If the final design of a successor submarine would require more drastic alteration of the existing infrastructure at HMNB Clyde (to accommodate a larger submarine for instance), then the net increase generated by relocation may be further reduced.

In addition to relocation expenses, there will also be costs involved in cleaning up HMNB Clyde once the Royal Navy leaves. The extent of these costs may be affected by whether an independent Scotland decides to maintain Faslane as a conventional naval base. It is unlikely that an alternative military use would be available for Coulport. So some provision would have to be made for clean up (and/or ongoing security) at this site, as well as an arrangement over how these costs will be shared by the rUK and an independent Scotland.⁴¹

Safety Regulations and Local Politics

As discussed above, introducing nuclear-armed submarines and weapon-handling facilities near significant population centres would raise very serious questions of safety. Military regulators would have to work very closely with civilian regulators to answer these questions satisfactorily. The relationships between these regulators are complex, and demonstrating effective co-ordination to a concerned public may not be easy.

As military assets under the control of the Crown, nuclear submarines are exempt from some aspects of health, safety and environmental protection legislation, but remain subject to others.⁴² The MoD must convince the Office for Nuclear Regulation that it has properly prepared and briefed the public for a radiological emergency as required by the Radiation (Emergency

39. HM Government, *The Future of the United Kingdom's Nuclear Deterrent*, p. 38.

40. Suggestions have emerged that the infrastructure costs at HMNB Clyde relating to a successor submarine could be lower than initially anticipated. See Malcolm Chalmers, 'Towards the UK's Nuclear Century', *RUSI Journal* (Vol. 158, No. 6, December 2013), p. 21.

41. Current arrangements have all radioactive wastes at these sites (either low-level or very low-level) shipped to the UK's repository or discharged into the atmosphere. As such, little radioactive contamination should be left on-site in the event of Scottish independence.

42. Defence Nuclear Safety Regulator, DNSR Annual Report 2012/2013, Ministry of Defence, p. 3.

Preparedness and Public Information) Regulations, or REPIR.⁴³ However, the safety of operating nuclear submarines and warheads is only bound by internal MoD policy. This policy states that, wherever the MoD is exempt from civilian regulation, it should achieve standards of safety at least as good as those required by UK civil legislation.

Most of the structures and mechanisms used to enforce these standards do indeed mirror those adopted in civilian regulators. However, MoD policy also states that these standards should be pursued only 'so far as is reasonably practicable', and it is up to the chairman of the Defence Nuclear Safety Regulator to authorise nuclear activities conducted by or for the MoD.⁴⁴ Whilst pro-disarmament campaign groups state that the risks of introducing armed submarines to Devonport would stretch the MoD's own definition of tolerable risk,⁴⁵ this definition is flexible to what is considered by the ministry to be reasonably practicable in any particular circumstance.

Criteria for 'tolerable' risks of individual and societal fatalities, as well as broader societal contamination, have been developed by the Nuclear Weapon Safety Committee (now part of the independent Defence Nuclear Safety Committee that reports directly to the secretary of state for defence). While details as to what is considered tolerable and intolerable are classified, it is clear that compliance with numerical targets for the likelihood of nuclear accidents is not mandatory, and serve only as a guide as to what is expected.⁴⁶ Indeed, there are indications that the MoD waived some safety requirements at Coulport in the 1970s to allow its continued operation.⁴⁷

43. For an example of an exercise undertaken to demonstrate compliance with this regulation, see HM Government, 'Exercise Short Sermon 12, HMNB Clyde, Argyll & Bute, All Agency Report', 2012, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/85885/exercise_short_sermon_12_all_agency_report.pdf>, accessed 1 August 2014.

44. Emphasis not added. See Defence Nuclear Safety Regulator, DNSR Annual Report 2012/2013, pp. 3, 28.

45. Ainslie, 'Risk from Trident Missiles at Devonport'.

46. MoD safety policy on nuclear warheads suggests that the chances of any accident which could deliver a total effective dose of radiation at 1 km of 10,000-10,000 mSv should be kept below 0.000001. For a complete breakdown of the MoD's safety policy on nuclear propulsion reactors and nuclear warheads, see Ministry of Defence, 'JSP518: Regulation of the Naval Nuclear Propulsion Programme', Issue 3.10, September 2010, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34239/JSP_518_Issue_310_September_2010.pdf>, accessed 1 August 2014 and Ministry of Defence, 'JSP538: Regulation of the Nuclear Weapons Programme', Issue 2.10, September 2010, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34238/20101004JSP_538_Issue_210_September_2010.pdf>, accessed 1 August 2014.

47. John Ainslie, 'Trident: Nowhere to Go', Campaign for Nuclear Disarmament and the Scottish Campaign for Nuclear Disarmament, February 2012, p. 5.

Given this flexibility, and the potential consequences of an accident (no matter how remote), the MoD and the government of the rUK would have to develop a sophisticated strategy to reassure regulators and the general public that new submarine and munitions base facilities do not place the populace at intolerable risk.

The longstanding presence of nuclear-powered vessels at Devonport, in addition to the prospect of up to 8,000 jobs being transferred from Scotland,⁴⁸ may make the Plymouth public less averse to hosting Trident-armed submarines. However, the same cannot be said for a replacement for Coulport. Few members of the public have had the same experience with nuclear vessels as Devonport, and locations such as Falmouth are likely to be more concerned with the adverse impact that a nuclear-munitions facility would be bound to have on the area's substantial tourism and sailing industry, rather than with the jobs such a facility might bring. The prospect of large numbers of new workers, both military and civilian, moving into the area may be a source of further concern amongst local residents.

Local opposition to new nuclear facilities could therefore be significant, and the rUK would have to demonstrate not only that such facilities would be safe and secure, but also that they would make a worthwhile contribution to the rUK as a whole. There are many opportunities for local opposition to be expressed in planning, legal and regulatory bodies, and such opposition could seriously disrupt the relocation of nuclear forces to the rUK. However, despite losing its general exemption to local planning processes in June 2006, the Crown (and therefore the MoD) is still afforded some leeway to avoid these processes. The secretary of state has the power to restrict the examination of plans to only those with suitable clearance in a case that 'may involve the interests of national security'.⁴⁹ Furthermore, if a planning application is likely to be refused, any urgent development 'of national importance' can be submitted directly to the secretary of state for communities and local government for planning approval.

While the secretary of state would still have to consult local authorities and allow a public hearing in this case, he or she would ultimately be able to make a final and unilateral decision.⁵⁰ The power of political will to overcome local opposition and procedural blockades is well demonstrated

48. HM Government, *Scotland Analysis: Defence*, Cm 8714 (London: The Stationery Office, October 2013), para 1.30.

49. In this instance, those excluded from the planning process would be represented by a special advocate appointed by the attorney general. This decision could only be overturned by judicial review. See Department for Communities and Local Government, 'Crown Application of the Planning Acts', DCLG Circular, 02/2006, June 2006, pp. 3–6, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7672/150982.pdf>, accessed 1 August 2014.

50. *Ibid.*, pp. 7–9.

by the development of new access roads to Coulport in the 1980s. British Telecommunications (BT) swiftly removed an anticipated two-year delay to necessary diversion work after the MoD was informed by the project manager, and work continued uninterrupted on the roads despite a public inquiry into their acceptability initiated by Strathclyde Regional Council's objection on anti-nuclear grounds.⁵¹

The rUK would therefore need to be confident that the technical and strategic benefits of relocation outweighed the political costs, and that it could convince the general public and Parliament to support its judgement. Given the additional costs described above, this support may not be automatic.

A Home Away from Home

This support would be harder to obtain unless the rUK could show that the direct relocation of existing facilities, from the Clyde to new bases in England, was indeed the safest, cheapest and least disruptive means of retaining its nuclear forces after a separation vote. More elaborate basing solutions, such as the use of large, well-protected resupply and docking vessels, might avoid the local hurdles erected by traditional land-based options, but would represent a dramatic break in operational procedures and practices. It would also raise a range of practical questions in relation to safety, security and costs, as a result of which we have not considered it further here as a long-term option.

Taking advantage of existing bases on the territory of the rUK's allies could also be considered. Assuming Scotland were to remain a close ally, for example, one possibility could be for the rUK to arrange to maintain HMNB Clyde on a long-term basis, either through a leasing arrangement or as a sovereign base, even after independence. Alternatively, the rUK might seek a similar arrangement that would allow it to share submarine basing in the US or France.

The continued use of HMNB Clyde after Scottish independence would certainly be the simplest option from a financial and operational perspective; submarines could continue operating as before in exchange for some form of quid pro quo for Scotland.⁵² The submarines would also enjoy fast access to the safety of deep waters, giving it an operational advantage over other

51. Ronald T Hunter, 'Return to Engineering', Chairman's Address 2011/2012, Institute for Civil Engineers, Glasgow and West of Scotland, p. 10, <http://www.ice.org.uk/ICE_Web_Portal/media/scotland/GWoS_ChairAddress11_12.pdf>, accessed 1 August 2014.

52. It has been suggested that the rUK could guarantee its support to Scotland's membership of the EU and NATO in return for such an arrangement. See McIntosh, 'No 10 Denies Plot to Keep Faslane in UK after Independence'.

possible locations in the rUK.⁵³ Such an arrangement, at least in the short term, seems inevitable. The Scottish government currently aims to declare formal independence in 2016, but only hopes to see nuclear weapons removed from its soil by 2020. It will therefore be necessary to develop arrangements that would allow the rUK to supply, manage and deploy its nuclear forces from an independent Scotland within this transition period.

However, the obstacles to extending such an arrangement indefinitely could be considerable. Whilst a recent survey suggests that the majority of Scots would be prepared to see Trident remain in an independent Scotland,⁵⁴ the same survey suggested more Scots reject the UK's nuclear weapons as a whole than support them.⁵⁵ Moreover, such an arrangement would require Scotland to permanently cede some elements of its newly found sovereignty to guarantee the rUK's access and control over HMNB Clyde, whilst also sacrificing what little influence its political representatives had over nuclear-weapons policy when it was part of the Union. Sustaining political support within an independent Scotland for such an arrangement could become increasingly challenging over time. There might also be a risk that future accidents (or near-accidents) could suddenly undermine Scottish political support for rUK basing on its territory, forcing the rUK to abandon HMNB Clyde before an alternative could be made available.⁵⁶

The rUK would be similarly sensitive to any sign that it could not rely upon an independent Scotland to facilitate the robust and effective operation of its nuclear forces out of the Clyde. The UK already relies upon the US for a continued supply of Trident D5 missiles, and exacerbating the UK's nuclear reliance on other states might be seen as jeopardising the operational

53. The Firth of Clyde was originally chosen on the basis of this proximity to deep water, along with the opportunities to evade adversary submarines around the Isle of Arran and Mull of Kintyre. Whilst the intensity of adversarial anti-submarine operations off the coast of the UK may have subsided after the Cold War, they could become more important and challenging in future. Advances in anti-submarine technology also suggest that these operational factors will still be important in any relocation decision. See Chalmers and Walker, *Uncharted Waters*, p. 20.

54. Katrine Bussey, 'Scots Keener than English to Keep Trident on Clyde', *Scotsman*, 17 June 2014.

55. Scottish National Party Media Centre, 'Majority Remain Opposed to Nuclear Weapons', press release, 17 June 2014, <<http://www.snp.org/media-centre/news/2014/jun/majority-remain-opposed-nuclear-weapons>>, accessed 1 August 2014.

56. Indications have already emerged that co-ordination between the UK and Scotland on these roles is far from perfect. See Rob Edwards, 'Nuclear Convoy Disaster Exercise Reveals Weakness in Emergency Response', *Guardian*, 12 June 2013. See The Scottish Government, 'MoD Radiation Exemption to be Removed', press release, 11 March 2014. See Rob Edwards, 'Salmond Accuses UK Defence Secretary of Deception over Dounreay Radioactive Leak', *Herald Scotland*, 9 March 2014.

independence of the UK's nuclear forces; a capability deemed essential for its credibility as a deterrent.⁵⁷

The key to modelling such a scenario, from a rUK point of view, would be to ask how long it would take to create an alternative to Scottish basing if, at some future date, Scotland decided that it no longer wanted to host the force. It might be possible, at relatively short notice, to use Devonport as an emergency operating base. But, for the reasons explained above, it would take much longer to recreate the loading capabilities that are essential for maintaining an operational force. Even if Scotland and the rUK were to sign a long-term basing agreement, the rUK would have to factor in the risk that, in times of international tension or crisis, Scotland might decide it was in its security interest to ask for the nuclear forces to be removed. Without such a capability at home or abroad, the rUK could find itself in the difficult position of operating unreliable nuclear forces without any straightforward means of disarming them.

With this in mind, some in the rUK may be tempted to place their trust in the US, which has been faithfully allowing UK submarines to enter and exit its Kings Bay Naval Base in Georgia to load and unload unarmed Trident D5 missiles for more than twenty years. However, basing in the US is not a credible long-term option. One of the primary purposes of the UK nuclear force is to provide some insurance against a scenario where, for whatever reason, the US is not willing to come to the UK's defence against a nuclear threat. A decision to rely on a US operating base would clearly undermine the credibility of the UK nuclear force in this scenario.

Furthermore, both parties' membership of the NPT would complicate the shared use of a nuclear base. The NPT bans nuclear-armed states from directly or indirectly transferring control of nuclear weapons to any recipient. As such, any capacity to load and unload UK nuclear warheads in the US would have to convincingly isolate those warheads from US control in order to avoid raising serious questions in relation to the NPT compliance of both states.⁵⁸ This would exacerbate the already significant logistical challenges to constructing a secure, national chain of custody that allows for the transport of UK-based warheads, equipment and personnel across the Atlantic.

57. HM Government, *The Future of the United Kingdom's Nuclear Deterrent*, p. 22.

58. Isolating the rUK's nuclear forces from US control may not by itself require the development of significant new facilities in the US. If there is sufficient capacity to simultaneously operate both US and rUK forces out of US bases, the rUK could develop security and logistical arrangements such that its nuclear weapons are never willingly subjected to US control. Similar arrangements currently isolate US non-strategic nuclear weapons in Europe from their host nations during peacetime.

While a similar arrangement with France might be somewhat easier logistically (because of the shorter distances involved), it would encounter other difficulties in addition to those discussed above. The UK would have to demonstrate the segregation of its nuclear forces from French access or control to worried members of the NPT. It would also have to reassure the US that it was not inadvertently transferring sensitive (or proprietary) information regarding US missiles or US nuclear-warhead components to its hosts.⁵⁹ This would place even greater emphasis on the segregation of French and UK nuclear activities – something that may not be easy to accomplish within the extremely tight confines of France's only nuclear naval base at Île Longue.⁶⁰

Negotiating with Scotland

In the immediate aftermath of a Yes vote, it would be in the broader political interests of both sides to come to a mutually acceptable agreement on the future of nuclear basing in Scotland. Given technical uncertainties about the feasibility and likely cost of relocation options, a jointly commissioned study of possible relocation options within the rUK – which could start within months of a Yes vote, and produce interim findings relatively quickly – could provide an important component in such an agreement.⁶¹

In order to reach such an agreement, the Scottish government would have to make clear that it had no intention of forcibly denuclearising the rUK. As a result, it would need to be willing in principle to give the rUK the opportunity and time that it needed to relocate its nuclear force to alternative operating bases. The rUK, for its part, would probably have to accept in principle that it had a strong incentive to relocate its nuclear forces to its own territory, even if it could not commit to doing so until it could be assured that this was feasible and affordable.

As discussed above, UK historical experience appears to suggest that the net financial costs of relocation might amount to £2.5 to £3.5 billion, spread over a decade or so. Given previous experience with major works and procurement programmes, this could end up being significantly higher in practice. In the context of a total nuclear deterrent programme worth around £80 billion

59. The UK's longstanding arrangements for warhead collaboration and missile transfer with the US contain provisions forbidding the onward transfer of such information without prior permission from the US. For a more detailed discussion of these arrangements, see Hugh Chalmers and Malcolm Chalmers, 'The Future of the UK's Co-operative Nuclear Relationships', RUSI Occasional Paper, June 2013.

60. House of Commons Scottish Affairs Committee, 'The Referendum on Separation for Scotland', p. 20.

61. Malcolm Chalmers, 'Dissolution and Defence: Scotland's Armed Forces after a Yes Vote', *RUSI Journal* (Vol. 159, No. 2, April 2014), p. 33.

over twenty-five years, however, it is hard to see the costs of relocation (in themselves) being a primary factor in shaping the decision.

Public discussion of relocation options as part of consultations conducted within a feasibility study should also help to establish whether there is a political appetite in the rUK for the construction of new nuclear facilities on its territory. Such caution could not, in itself, be an obstacle to relocation. An independent Scotland could not be expected to be a permanent host if the main argument against relocation was English domestic politics. But it would help to establish whether the rUK government had the support, both at national and local level, necessary for the construction of new nuclear weapons facilities.

A feasibility study might also help the two governments reach agreement on the likely timescale for relocation. The Scottish government has already accepted that there will be a period of up to four years during which the Trident force would have to operate out of an independent Scotland. A feasibility study should be able to provide some pointers as to how far beyond this period it would be necessary for Trident to remain.

In principle, both the rUK and Scotland would wish this period to be as short as possible. However, setting a concrete date for the relocation of nuclear forces would be problematic. Many of the problems that plagued the development of HMNB Clyde in preparation for the *Vanguard*-class submarine stemmed from forcing complicated design and development work into a tight timetable with a hard deadline.⁶² Repeating this mistake would likely hinder, not help, the relocation of forces. Furthermore, Scotland could not easily enforce such a deadline: whilst it could exert political pressure upon the rUK if timetables slipped, suspending its co-operation with the rUK at HMNB Clyde could endanger the safety or security of nuclear forces on its own territory.

Yet an independent Scotland could be reassured that it would be difficult for the rUK to use the absence of a clear deadline as an excuse for permanent Trident basing. Once a decision had been made on alternative locations, and plans had begun to develop them for this purpose, it would be difficult to stop the momentum towards relocation. The continuing development of successor submarines would provide additional assurance in this regard. It would be very complicated, and perhaps dangerous, to operate a successor submarine out of HMNB Clyde without the infrastructure upgrades that are currently being planned. The deployment of the first successor to the *Vanguard*-class submarine – currently due in 2028 – would therefore provide a natural target date for relocation.

62. National Audit Office, *Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General*.

If the rUK were both willing and able to relocate its nuclear forces to its own territory, a commitment not to prepare HMNB Clyde for a successor would send Scotland a clear signal in this regard. The infrastructure required to support a successor submarine could also be built to support the *Vanguard* class, allowing the rUK to relocate its force from Scotland once such infrastructure is complete.⁶³

While the current timetable suggests the first successor submarine should be brought into service in 2028, this deadline – and therefore the deadline for supporting infrastructure to be available – could slip. Until a credible basing solution has been agreed, both the MoD and the rUK Parliament would be uncomfortable approving the Main Gate decision to begin the construction of a successor submarine. Furthermore, the planned refuelling of the oldest *Vanguard*-class submarine (and the anticipated refuelling of its fellow boats) may give the rUK more confidence in its longevity than it has had to date. The Main Gate decision might therefore slip somewhat, in turn delaying the in-service date for a successor submarine.

Yet a significant further extension in the lifespan of the *Vanguard*-class submarine could be risky. Any indication that the rUK was operating potentially unreliable and unsafe submarines out of an independent Scotland could derail the Scottish consent that would be necessary to make continuing operation from the Clyde possible.⁶⁴

A joint study over relocation options would not be without its problems. As some technical aspects of relocation might reveal sensitive or classified aspects of the rUK's nuclear-armed submarines, some information would have to be held back from Scottish interlocutors. At the same time, any accusations of bias or lack of transparency could undermine political support in an independent Scotland for the continued hosting of the rUK's nuclear forces. It would be particularly important to avoid this in the event that the study paints a pessimistic picture of relocation prospects.

63. As discussed above, it is likely that the rUK would be able to develop a replacement for Faslane faster than they could for Coulport. With this in mind, it has been suggested that Scotland could be offered a phased relocation plan, in which Faslane is vacated before Coulport. While this would allow Scotland to at least celebrate the end to submarine basing on its territory, these would likely be muted by the continued presence of nuclear weapons at Coulport – and thus need for warhead convoys and other protective measures. Furthermore, the rUK may be uncomfortable basing its submarines so far from an emergency capability to remove nuclear warheads or missiles if they showed any signs of being unsafe. Nevertheless, such an option could be considered if political circumstances require and technical realities oblige. See Malcolm Chalmers and William Walker, 'Will Scotland Sink the United Kingdom's Nuclear Deterrent?', *Washington Quarterly* (Vol. 36, No. 3, Summer 2013), p. 114.

64. While the anticipated refuel of *Vanguard*-class submarines will reduce the risk of a reactor fuel rod failure, refuelling will not address any other age defects that might emerge in other elements of the nuclear propulsion reactor.

Despite the provisional conclusions of this paper, detailed study could find that relocation would be so difficult that many in the rUK would want to give serious credence to the option of permanent basing in Scotland, or perhaps even the US. This would not be an easy decision to make; relying upon another state – be they nuclear-armed themselves or otherwise – for the operation of nuclear forces would draw uncomfortable questions about the rUK’s nuclear independence, and therefore its credibility. These questions would have to be answered if the rUK wished to base its nuclear forces abroad.

Given its importance and sensitivity, a joint relocation study would be an important initial test of confidence between the two negotiating teams. If completed within the first few months after a Yes vote, it could have a positive impact on the two sides’ ability to agree a mutually agreeable solution to the future of HMNB Clyde. This in turn could have a positive impact on the broader negotiations about the post-separation settlement. If such a solution was not possible, by contrast, ‘the prospects for a smooth transition to independence ... are likely to be much reduced’.⁶⁵

Conclusions

If Scotland votes for independence in September, its relationship with the rUK (and subsequently NATO, and to an extent the rest of the world) will be shaped by its approach to nuclear weapons. The Scottish government’s official position on this matter seems antithetical to that which the rUK would be likely to adopt. However, this contradiction, heightened by the politics of the referendum campaign, may understate the potential for a more co-operative post-separation relationship, given the stakes that both sides would have in avoiding deterioration in their wider security relationship.

Despite its opposition to nuclear weapons in Scotland, agencies of the Scottish government already work effectively with the UK to co-ordinate a number of services vital to the continued operation of nuclear forces from the Clyde.

This tradition of co-operation would be likely to continue if Scotland were to transition to independence. The Scottish government acknowledges that nuclear forces are likely to remain in an independent Scotland for at least four years, and possibly (if not probably) longer. During this time, neither Scotland nor the rUK would want to see these forces become unsafe or insecure.

65. Chalmers, ‘Dissolution and Defence’, p. 33.

This is not to say that nuclear forces would not be removed from an independent Scotland. Both the rUK and its new neighbour would have incentives to relocate Trident from Scotland in the long term, provided that alternative bases could be made available safely and at reasonable cost. The permanent basing of Trident in an independent Scotland would carry significant political risks for both states, as well as potentially undermining the credibility of the rUK's claim to be operating an independent deterrent. Such an option is only likely to be seriously considered, by either side, if relocation is shown to be so expensive or unacceptable that the UK was prepared to accept the vulnerabilities of Scottish basing.

A potential alternative to HMNB Clyde would involve relocating the submarine support functions of Faslane to HMNB Devonport and replicating the munitions-support functions of Coulport from scratch on a greenfield site north of Falmouth. Previous work undertaken at HMNB Clyde in preparation for the current *Vanguard*-class submarine suggests that this relocation plan could cost between £3 billion and £4 billion (gross, at 2012/13 prices), not including any costs associated with land purchase and clearance of existing buildings at the new munitions-support facility.

Some of these relocation costs could be funded by the cancellation of planned upgrades to HMNB Clyde to prepare it for a successor to *Vanguard*. The UK currently anticipates investing £2.3–3.4 billion (at 2012/13 prices) in new infrastructure for a successor submarine. Even if only £500 million of this were dedicated to HMNB Clyde, the net costs of relocating HMNB Clyde may therefore amount to between £2.5 billion and £3.5 billion (at 2012/13 prices), together with any costs associated with land purchase and clearance.

This relocation programme could not be completed by the 2020 target date currently envisioned by the Scottish government, and linking relocation to a specific date would likely hinder rather than help its completion. Instead, it would be preferable for the timescales for relocation to be linked to the rUK's transition from *Vanguard*- to successor-class submarines, currently due to begin in 2028. While this transition might be delayed, both Scotland and the rUK would have to be wary of any signs that the age of the *Vanguard* submarines was risking their reliability or safety. It is possible that the functions of Faslane (and perhaps even RNAD Coulport) could be replicated in the rUK prior to this date, and HMNB Clyde may be vacated before a successor enters service.

The political costs of relocating functions of HMNB Clyde to the rUK would be significant. These may be less important at Devonport, which already hosts Royal Navy submarines and would derive significant further economic benefit from the transfer of as many as 8,000 jobs from Scotland. The main locus of political resistance, therefore, would likely be in and around the

greenfield site for the new munitions-loading facility. With little familiarity and economic reliance to date upon the rUK's nuclear weapons, the public around greenfield sites (such as those north of Falmouth) are much more likely to resist the societal and economic changes that a large, new nuclear facility would bring.

Past experience (including at Faslane and Coulport) suggests that local political opposition, by itself, is not enough to prevent such projects from going ahead. The MoD possesses considerable levers that it can use where local opposition threatens to introduce unacceptable delays into important defence-related infrastructural projects. However, overruling local opposition would be very unpopular if it were not backed up by national support.

Even if a relocation programme along the lines described above were technically feasible, it would not go ahead if it were not also politically feasible. The UK public's current ambivalence to its own nuclear forces would be tested if it had to confront the financial and political hurdles required for their retention. If support for the UK's current nuclear policy remained after Scottish independence, the need to overcome local opposition and demonstrate compliance with safety regulations would be likely only to delay rather than prevent the relocation of the rUK's nuclear forces to its territory.

If this were found to be the case, it is therefore likely that both Scotland and the rUK would be able to identify a mutually agreeable relocation plan, and with it a smooth pathway to an amicable relationship. If not, the rUK may be feel compelled to pursue alternative and untraditional basing solutions (in the US or at sea, for instance), which might seem incredible to the states it wished to deter.

The relocation programme outlined above would confront the current Scottish government with two interesting ironies. First, despite its current opposition to nuclear forces, the government of an independent Scotland would play a significant and vital role in supporting the rUK's nuclear forces for at least a decade after independence. No nuclear-weapon state has ever placed such reliance on another state for the maintenance of its nuclear capability. Second, if relocation were tied to the completion of a successor to the *Vanguard* submarine, an independent Scotland would have a strong incentive to support, or even accelerate, the acquisition of a new generation of nuclear submarines which it had previously opposed.

Hugh Chalmers is a Research Analyst within RUSI's Nuclear Analysis Programme. Hugh has previously worked at the Verification Research, Training and Information Centre (VERTIC), IHS Jane's, and the King's College London Centre for Science and Security Studies. His recent publications on UK nuclear policy include, 'The Bang Behind the Buck: Replacing the UK's

Nuclear Warheads', RUSI Occasional Paper, March 2014; 'A Disturbance in the Force: Debating Continuous At-Sea Deterrence', RUSI Occasional Paper, January 2014; 'The Future of the UK's Co-operative Nuclear Relationships', RUSI Occasional Paper, June 2013.

Professor Malcolm Chalmers is Research Director at RUSI, and leads its work on nuclear policy issues. His recent, relevant publications on this issue include 'Dissolution and Defence: Scotland's Armed Forces After A Yes Vote', RUSI Journal (Vol. 159, No. 2, April/May 2014); 'Towards the UK's Nuclear Century', RUSI Journal (Vol. 158, No. 6, December 2013); 'Will Scotland Sink the United Kingdom's Nuclear Deterrent?', Washington Quarterly (Vol. 36, No. 3, Summer 2013) (with William Walker). He has given evidence on the defence implications of Scotland's independence to the House of Commons Defence, Foreign Affairs and Scottish Affairs Committees.

Annex 1: Top Twenty Packages/Projects of the Trident Works Programme, by Value

This table shows the top twenty Trident Works projects by value banding, location and main function. The total cost of these twenty projects, at 1994 prices, was £1.371 billion. The remaining £503 million, making up the full cost of the programme, consisted of smaller, non-complex projects under £10 million in value and consultants' costs. The total expected cost in 1994 was £1.9 billion, the equivalent of around £2.8 billion at 2012/13 prices.

Table 1: Faslane.

Project	Price (1994/95, £m)	Function
Faslane Shiplift	>£200	To lift <i>Vanguard</i> and other classes of submarine clear of the water for maintenance
Northern Utilities Building	£100–200	Generation and distribution of water, fuel and other utilities at the depot
Finger Jetty	£50–100	Provides berthing for servicing of <i>Vanguard</i> and other classes of submarine
Asbestos Decontamination Phase II	£20–50	A major decontamination project to prepare the Northern Development Area Site
General Service and Strategic Weapon Support Buildings	£20–50	Offices and facilities for Trident crews; storage and weapon support
Naval Technical Department	£20–50	To provide engineering support to <i>Vanguard</i> and other submarine classes
Berths 1–4 Refurbishment Phase 1	£20–50	Modernisation of berths
Trident Training Facility	£10–20	New building now part of the Royal Navy Strategic System School
North Entrance Works	£10–20	Roads, security and infrastructure for new entrance to the base
Berths 5–6 and Infill	£10–20	Modernisation and infill of lagoons
Senior Rates Mess and Single Sleeping Quarters	£10–20	New buildings and accommodate increased numbers

Table 2: Coulport.

Project	Price (1994/95, £m)	Function
Explosives Handling Jetty	>£200	A covered floating jetty for berthing <i>Vanguard</i> -class submarines and transferring warheads and missiles
Jetty Access Road and Support Area	£100–200	Roads and infrastructure in support of the Explosives Handling Jetty and Explosives Area Main Works
Explosives Area Main Works	£100–200	A facility for the storage and handling of missiles and their warheads
Power Station and Distribution System	£50–100	Generation of power and distribution of water, fuel and other utilities at the depot
Advance Works I & II	£20–50	Initial works on roads, drainage, sewerage, fencing and excavation for the Jetty Access Road and Explosive Main Area Works
Non-Explosives Area Phases I & II	£20–50	New technical, maintenance and control facilities

Table 3: External.

Project	Price (1994/95, £m)	Function
Northern Access Road	£10–20	To improve access to RNAD Coulport and reduce congestion on local roads
Grid Supply Point and Power Distribution System	£10–20	Interface with national grid providing power for both Coulport and Faslane
Garelochhead Bypass	£10–20	To improve access between RNAD Coulport and Faslane and reduce congestion on local roads

Source: National Audit Office, Ministry of Defence: Management of the Trident Works Programme, Report by the Comptroller and Auditor General (London: The Stationery Office, July 1994).