

The replacement of UK's Trident: Considerations for Parliament's 'Main Gate' decision in 2016

This leaflet argues that the UK should not proceed with the replacement of Trident. It has been produced by Medact, a UK-based public health charity of professionals concerned with the medical, psychological, social and economic causes and effects of warfare and other violent conflict. Medact is the UK affiliate of the 1985 Nobel peace laureate, the International Physicians for the Prevention of Nuclear War (IPPNW).

Nuclear weapons are the greatest immediate threat to global survival, health and sustainability. Hostile use could bring about extreme, catastrophic and indiscriminate devastation to the global ecosystem and a 'nuclear famine'¹, an opinion endorsed in 2015 by the World Medical Association² and the International Red Cross³.

During a full-scale nuclear exchange, in each city targeted by a UK Trident warhead many tens of thousands of people would be killed immediately⁴. Many more would be injured: some might survive with help, but the general devastation would cause them to die in unspeakable suffering, alone and with no human help at hand.¹

The UK's claim of right to launch a first strike⁵ using Trident or its replacement encourages proliferation by potential nuclear adversaries, making nuclear war more likely. The UK would not lose international status or its veto-casting seat on the UN Security Council if it rescinded this right and did not replace the aging Trident system⁶.

Key Facts

Trident, the UK's sole 'nuclear deterrent' based on four nuclear armed submarines designed to be as silent as possible, each with 8 missiles and 40 warheads, is getting obsolete⁷. One submarine is always deployed at sea (Continuous-at-sea-deterrence; CASD).

Underwater drones with Magnetic Anomaly Detectors are under development which would reveal and make redundant the planned replacement submarines, even if they were more silent.⁸

The full yield of one Trident warhead (100Kt) is seven times greater than the bomb on Hiroshima which killed over 50,000 on the first day. The full firepower of one Trident submarine could cause widespread famine and death through global cooling.⁹

The health impact of using nuclear weapons^{1, 10}

As well as the immediate effect of the blast, heat and firestorms, the complete disruption of local health services (including water and sewage) and the long-standing effects of radiation from the flash and the fallout add uniquely destructive consequences to what would already be the gravest of humanitarian crises.

Not only would any survivors risk trans-generational and persistent health-harm; any rescue teams, whose access in any case would be severely hampered, would be overwhelmed by the challenge and placed at extra risk by the radioactive fall-out.

The scale of the famine after a nuclear war has been investigated in well-modelled peer-reviewed reports. The world-wide disruption to crops following dimming of sunlight by stratospheric soot and dust raised by the multiple bombings would affect populations to an unimaginable degree. Over a billion could starve to death: full recovery, if ever achieved, could take many decades.

The fallacy of the nuclear deterrence hypothesis¹⁰

The key feature of the 'D' in CASD is convincing potential nuclear adversaries of the readiness to use nuclear weapons, thereby inviting mutually assured destruction ('MAD'). Near-use of nuclear weapons through error or accident has occurred many times, averted by luck or defiance of authorised procedures.¹¹

The hypothesis is untestable; nor can it be certain that it is ever working. Furthermore, it is undermined by pointless attempts on all sides to evade the consequences of MAD – e.g. by developing improved weapons, delivery systems and establishing missile defence systems (MDS), thereby encouraging 'first strike' use (ref 5) in vain attempts to ensure survival.

It is understandable that governments want to protect their citizens from MAD, but new weapons and MDS undermine deterrence so that it will eventually fail as current Nuclear Weapons States (NWS) race to improve armaments, anticipating competitors' developments. The UK is developing an improved warhead (Mk4A) and participates in NATO's MDS.¹² Some non-NWSs may even 'go nuclear' – i.e. proliferate, as predicted by the UK MoD in 2015 (Global Strategic Trends – out to 2045)¹³. Russia sees NATO's MDSs as particularly destabilising; so, far from improving global security, NATO's MDS increases the risks of a world-wide 'nuclear famine' affecting NATO countries and Russia alike.

Although the new warheads under development by the US and UK can be of very low-yield¹⁴, their greatly improved accuracy would enable first-strike use as ground-bursting 'nuclear bunker-busters' which would still release significant fall-out; and the risks of retaliation and escalation to all-out nuclear war would be even more increased.

The UK's nuclear status has not deterred significant military set-backs – from Suez to Iraq via the Falklands. Even supporters of Trident admit that renewal – at an extra-ordinary lifetime cost of over £150 billion – is not designed to deter terrorists although they agree that the **greatest threat** to UK security is **terrorism**.¹⁵

Fear and uncertainties often expressed by UK officials about future overseas governments would be best addressed through meaningful negotiations for global nuclear disarmament. So far, the UK and the other NWSs favour the out-worn gradualist and legally inadequate processes of the Nuclear Non-Proliferation Treaty (NPT). A majority in the UN General Assembly, now working in an 'Open Ended Working Group', support a new and legally stronger international treaty to ban nuclear weapons, as does the International Red Cross.¹⁶ The UK has boycotted the OEWG proceedings, favouring the NPT's processes which are controlled by the recognised NWSs but which will eventually fail to prevent the very proliferation they are meant to discourage.

Impact on UK employment

New industries (renewable power, modernising transport and housing, etc.) could replace the many thousands of jobs lost by not renewing Trident although government-supported re-training, which may not be easy, will be required.¹⁷ Nuclear expertise will still be needed to cope with the nuclear legacy.¹⁸

References and comments

- 1 *Devastation to the global ecosystem and a 'nuclear famine'*. These are well described in the 2013 publication 'Unspeakable Suffering' by Reaching Critical Will, edited by Beatrice Fihn. Of especial relevance here are the chapters by Tilman Ruff (The health consequences of nuclear explosions – which has 62 references) and by Ira Helfand (Nuclear Famine: a billion people at risk). The other chapters – Environmental consequences of a nuclear weapon explosion (Felicity Ruby); Impact on economy and development (Lloyd J. Dumas and Teresa D. Nelson, and Ray Acheson); Law and Order (John Burroughs and Magnus Lovold), case studies on Hiroshima and Nagasaki (Masao Tomonaga) Marshall Islands (Barbara Rose Johnston) and Bombay (M.V. Ramana) are also valuable. The most recent peer-reviewed article on the Nuclear Famine is Mills, M.J, O.B. Toon, J. Lee-Taylor, and A. Robock (2014), *Multidecadal global cooling and unprecedented ozone loss following a regional nuclear conflict*, *Earth's Future*, 2, 161–176, doi:10.1002/2013EF000205. See <http://www.reachingcriticalwill.org/images/documents/Publications/Unspeakable/Unspeakable.pdf>
2. World Medical Association statement on nuclear weapons, 2015: <http://www.wma.net/en/30publications/10policies/n7/>
"Advises all governments that even a limited nuclear war would bring about immense human suffering and substantial death toll together with catastrophic effects on the earth's ecosystem, which could subsequently decrease the world's food supply and would put a significant portion of the world's population at risk of famine;"
3. International Committee of the Red Cross, 1st May 2015 ; **Eliminating nuclear weapons**. Statement to the Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 27 April to 22 May 2015. <https://www.icrc.org/en/document/nuclear-weapons-conference>
4. **Humanitarian impacts from a single nuclear weapon detonation on Manchester**; Article 36, (February 25, 2013). "The detonation of a 100Kt-yield nuclear weapon over Manchester would create blast and thermal effects killing more than 81,000 directly, leaving more than 212,000 injured, devastating housing and commercial buildings, destroying vital infrastructure, causing massive population displacement and leaving the local emergency service capacity seriously degraded." See <http://www.article36.org/nuclear-weapons/humanitarian-impacts-from-a-single-nuclear-weapon-detonation-on-manchester/>
5. 'First use'. Geoff Hoon, 29 April, 2002. Hansard. *"The use of nuclear weapons is still a deterrent of last resort. However, for that to be a deterrent, a British Government must be able to express their view that, ultimately and in conditions of extreme self-defence, nuclear weapons would have to be used."* This statement has widely been interpreted as endorsing 'first use' and has never been denied.
6. As commented by Lord David Hannay, a former ambassador to the UN and currently Joint Convenor of the All Party Group on Global Security and Non-proliferation in the House of Lords: *"Trident replacement has no bearing on Britain's United Nations Security Council (UNSC) membership, which derived from the Allied victory in the Second World War. For the same reason there is no equivalence between nuclear weapons possession and permanent UNSC membership"* (International Institute for Strategic Studies; Panel Discussion Report; The Foreign Policy Implications of the Trident Replacement Debate. London, 13 March 2013. <http://www.iiss.org/en/events/events/archive/2013-5126/march-ea59/trident-replacement-debate-9b06>)

7. The Blair Government's White paper of 2006 "The future of the United Kingdom's Nuclear Deterrent" stated "At the 2005 General Election our manifesto made a commitment to retain the UK's independent nuclear deterrent. Even with an extension to their lives, the Vanguard class submarines are likely to start leaving service from the early 2020s. We estimate that it will take around 17 years to design, manufacture and commission a replacement submarine. So we need to take decisions now on whether to retain this capability in the longer term."
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27378/DefenceWhitePaper2006_Cm6994.pdf

8. British Pugwash workshop: Emerging Undersea Technologies; report of a meeting of Monday 9th May 2016. See http://britishpugwash.org/wp/wp-content/uploads/2016/07/Pugwash_Workshop-Report.pdf
Also, Policy Briefing 27/2016 from Bristol University; Trident Renewal: future vulnerabilities must be taken seriously. http://bristol.ac.uk/media-library/sites/policybristol/documents/Briefing_27_Trident_renewal.pdf

Detecting magnetic anomaly patterns in the ocean caused by large metallic (steel) objects such as submarines is one of several methods of detection. Sonar and photon echo-location techniques using packs of small submersible unmanned drones connected by 'Big Data processing' using Artificial Intelligence techniques will reveal hitherto 'silent' submarines. Even though highly sophisticated countermeasures are also under development, it is unlikely that these will be sufficient to provide the degree of 'stealth' hitherto enjoyed by US and RN nuclear submarines. Even short periods of detectability will undermine the invulnerability provided by the cloak of undetectability.

To counter this concern, pro-Trident Labour MP **John Woodcock**, co-Chair of Labour's Backbench Defence Committee and MP for Barrow (where the UK Trident Successor submarines would be built) in a cogent and well-presented 'interim' report for the Labour Party 'Trident renewal vote: separating fact from fiction' (June 2016), wrote - (<https://www.scribd.com/doc/315159747/Trident-Renewal-Vote-Separating-Fact-From-Fiction>) "It is clear that the advance of new technologies, including cyber and drones, is changing the undersea warfare environment. These are threats that the UK should be aware of and there should be adequate provision made to protect against future advances in these areas. But these developments are not the 'game-changers' that they are often presented as." (p20.) One of his arguments is based on advice from Peter Hennessey that "the network on which submarines operate is 'air-gapped' meaning that it is not connected to the internet, which insulates the system against outside penetration. ... and the MOD are investing heavily in cyber defence with £700m spent recently upgrading their communication security." Unfortunately, as the website of the Medical Device and Diagnostic Industry says, "any device that speaks in 1's and 0's has a cyber-attack surface, not just devices that are connected to the internet". (<http://www.mddionline.com/blog/devicetalk/think-your-non-connected-device-safe-cyber-attacks-think-again-05-26-16>). It may be possible to counter such threats with 'symbiotes' - a 'protective code structure embedded in situ into the firmware of an embedded system' - which repairs malware effects in a way analogous to DNA-repairing enzymes. (Charles Q Choi, 2012; Scientific American <http://www.scientificamerican.com/article/auto-immune-symbiotes-could-be-deployed-to-thwart-cyber-attacks/>). But continuing development in Cyber-science makes every countermeasure induce yet further counter-counter-measures. Furthermore, it is possible that the long sonar arrays (to detect other submarines) deployed by UK Trident submarines could themselves be targets for cyber-attack – the report of a US Navy trial of surface ship sonar arrays in 2016 "Surveillance Towed Array Sensor System (SURTASS) and Compact Low Frequency Active (CLFA) Sonar" contains a cryptic sentence "Cybersecurity evaluation identified significant problems, which are classified". It seems most unlikely that permanent immunity from cyber-attacks can be guaranteed for any device, including nuclear powered submarines. (http://www.globalsecurity.org/military/library/budget/fy2015/dote/navy/2015surtass_clfa.pdf

9. Phil Webber, in the Winter 2008 Newsletter of the UK Scientists for Global Responsibility and following a publication that year from Alan Robock's group (see ref 1), wrote *"one UK Trident submarine could inject not 10Tg of soot into the atmosphere but possibly as much as 38Tg. Interpolating between the 5 and 50Tg scenarios, this magnitude of soot injection seems likely to produce a globally averaged cooling of some 1.5-3°C over at least five years and shortening of growing seasons by 10-30 days.*

http://www.sgr.org.uk/sites/sgr.org.uk/files/SGR_climatic_impacts_Trident_Feb2013.pdf

In 2008, a UK Trident submarine carried 48 warheads. But even 40 warheads – carried currently – at 100Kt-yielding power, each dropping on targeted cities and installations either as a first strike or in retaliation, could raise as much as 30 Tg (Tera-grams or thirty million tons) of soot – enough to obscure sunlight for several years. Were nuclear hostilities to escalate (however unlikely such a scenario seems at present), the discharge of one UK Trident submarine would not be the only nuclear exchange, so even more sunlight-obscuring detonations would accompany the action of one UK Trident submarine.

10 The following passage summarises the idea of nuclear deterrence and argues its fallacies. For his 1980 Presidential election campaign, Ronald Reagan engaged Lt Gen Daniel. O Graham as military advisor. Graham was a proponent of the 'Strategic Defense Initiative' (SDI) which proposed systems to intercept and destroy incoming missiles bearing nuclear warheads. His advice was based on the reasonable premise that Mutually Assured Destruction (in which all sides understand that their enemies really intend to retaliate with nuclear weapons) was inherently unstable but (unreasonably) US National security required a SDI to make the US populace more secure: this disregarded the implication that the security of the enemy's (I.e. USSR's) populace would be reduced with the inevitable consequence that the Soviets would object (which they did) and also develop their own SDI. Nevertheless and in spite of the fall of the USSR, and also expert opinion that no SDI system could guarantee security however many millions of \$US were invested in it, the Clinton administration (which renamed SDI the 'Ballistic Missile Defense Organisation') continued to develop and deploy BMD systems, to which Russia and China still object while also developing their own countermeasures. This is another example of the continually complex military postures and arms races, with inevitable international inflation of the Military-Industrial Complexes, while global insecurity, nevertheless, remains high. This is a classic undermining of the principle of 'Deterrence'.

11. Deterrence theory is also undermined by the repeated 'near-misses' whereby deployed nuclear weapons so nearly came to be detonated. Some of these were described in 2014 by Eric Schlosser ("Command and Control") -

<http://www.penguinrandomhouse.com/books/303337/command-and-control-by-eric-schlosser/9780143125785/> and by Chatham House (Too Close for Comfort) –

https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20140428TooCloseforComfortNuclearUseLewisWilliamsPelopidasAghlani.pdf

Two episodes, closely linked in time (autumn 1983) illustrate risks during a period of high political tension, as was applying at that time to US/Soviet relations.

a). In September, a misinterpretation by the Soviet warning system of apparent radar images of five Minuteman missiles launched by the US. As reported by Lt Col Petrov, the Soviet shift supervisor who on his own initiative delayed reporting the incident until its false alarm nature became clear, *"The satellite can give false reports if it is at a certain location relative to the Earth under specific atmospheric conditions. It can mean that the American territory functions as a mirror, reflecting the sun's beams. This is extremely difficult to calculate, since the satellite is at least 36,000 kilometres distant from the observation post, and it is moving, and so is the Earth, which is not round but slightly pear-shaped. This also has to be taken into consideration."*

b). In November, a major NATO military exercise which involved Margaret Thatcher (but, fortunately, not Reagan) called 'Able Archer' led to a significant potential for ambiguity to Soviet analysts who were eventually convinced by Oleg Gordievsky – a double agent working for MI6 – who also informed US/NATO of Soviet interpretations and impending actions.

It is to be hoped that all such episodes, including any which are still classified, (much secrecy remains over Soviet/Russian 'near miss' episodes but several must have occurred) have been closely analysed and safety measures enhanced, but the hazard caused by human frailty remains, as illustrated so clearly by the servicemen's misconduct revealed by the 'whistle-blower' R.N. Able seaman William McNeilly (Nuclear Information Service, 2015 - <http://nuclearinfo.org/article/uk-trident/submariner-trident-%E2%80%9Cso-broken-it-cant-even-do-tests-prove-it-works%E2%80%9D>) Such impressions are, sadly, reinforced by the fatal shooting of a RN Astute-class submarine Commander by a disaffected seaman during a courtesy visit to Southampton in April 2011 (see '**Police alarm at 'routine' binge-drinking on nuclear submarine where murderer shot officer**' – Daily Telegraph 9 Jan 2013 - <http://www.telegraph.co.uk/news/uknews/defence/9791024/Police-alarm-at-routine-binge-drinking-on-nuclear-submarine-where-murderer-shot-officer.html>). This is not to deny the dedication of RN submariners described in Peter Hennessey's informative book 'The Silent Deep' (2015) which however gives a somewhat rose-tinted account of submariners' life.

12. The 'MK-4A' development does not directly involve the nuclear-fuelled explosive, but of the 'firing and fusing' mechanism which controls the flight of the missile and the moment of detonation. This joint US/UK enterprise was referred to in the Blair government's Defence plans of 2006. It may become operational by 2018, if not before. It will increase the accuracy and therefore military effectiveness of each warhead, making them more 'usable' thereby enhancing the delusion of nuclear war survivability and further undermining the Deterrence hypothesis. The prospects of Mk-4A fusing may have encouraged the UK's reduction of the *per submarine* warhead capacity to 40 from the former 48. (*AWE: Britain's nuclear weapons factory past, present, and possibilities for the future*: Nuclear Information Service June 2016: <http://nuclearinfo.org/sites/default/files/AWE-Past%2C%20Present%2C%20Future%20Report%202016.pdf>)

13 "Growing use of nuclear energy raises the possibility of fissile material being obtained by non-state actors as well as states operating outside international laws, potentially causing security threats." MoD Strategic Trends Programme, Global Strategic Trends - Out to 2045. Fifth Edition, 2014; p 24. This is precisely what the Nuclear Non-Proliferation Treaty (NPT) of 1968 was supposed to control; were this to happen, the NPT will have failed.

14. UK Trident's warheads have 'dial-a-yeild' facilities so that yields can be selected from a range of under a kiloton up to the full 100 kt (this apparently differs from U.S. SLBM warheads). Yields are probably 0.3 kt, 5-10 kt and 100 kt. This is to enable the UK to play a 'substrategic' role in the conduct of nuclear war in which a limited 'warning' strike on an enemy's territory is enabled. (This apparently is also different from the NATO's planned deployment in Europe of B61-12 weapons, which have similar 'dial-a-yeild facilities and are meant for 'tactical' use. (*Britain's Nuclear Weapons. History of the British Nuclear Arsenal*, 2002. <http://nuclearweaponarchive.org/Uk/UKArsenalDev.html>)

Nevertheless, even a low-yield weapon delivered with accuracy represents an advance which also undermines the theory of deterrence.

15. The interim report from Labour's Backbench Defence Committee (ref 8 above) wrote "We live in an unstable and unpredictable world. The threats we currently face are mainly from non-state actors, especially terrorists" (p8); and later "The nuclear deterrent isn't intended to deter terrorists. The UK has an extensive counter-terrorism strategy, which is not an alternative to nuclear deterrence. The two are intended to meet different threats" (p11 and p31). However the report under-emphasises the threat from cyber-terrorism and over-emphasises that from Russian (and N Korean) aggression although these are of deep concern.

16. See the closing brief from the Chair of the OEWG which met in Geneva in May 2015 http://www.icanw.org/wp-content/uploads/2016/05/OEWG_summary_130516.pdf

17. See Ben Chu - ***This is what Philip Hammond should promise in his first post-Brexit autumn statement as Chancellor***. Independent 24 July 2016, which presents a positive plan of internal investment to benefit the UK economy. <http://www.independent.co.uk/voices/philip-hammond-chancellor-brexit-autumn-statement-infrastructure-fiscal-stimulus-a7153136.html>

18. In 2002, the Secretary of State for Trade and Industry (Patricia Hewitt) presented “**Managing the Nuclear Legacy, A strategy for action**’ (<http://webarchive.nationalarchives.gov.uk/+http://www.dti.gov.uk/nuclearcleanup/ach/whitepaper.pdf>) in which was stated (pp 11 and 12)

“Nuclear clean up requires the same sense of commitment and purpose which drove the programme of nuclear build. It needs to be recognised for what it is - one of the most important and demanding managerial, technical and environmental challenges facing the UK over the next century and one offering major opportunities for those who are involved in it”. This will include the decommissioning and dismantlement of nuclear powered and armed submarines – a problem which is accumulating – see **Devonport: Living next to a nuclear submarine graveyard** by Jonathan Morris BBC News, Plymouth, 2 October 2014; <http://www.bbc.co.uk/news/uk-england-devon-28157707>

Although much has changed (and will change even more drastically if the planned ‘new nuclear build starting at Hinkley point C goes ahead) the central message remains: there will be significant opportunities for skilled and useful work in this sector alone.