The UK and the nuclear ban treaty
A Nuclear Information Service briefing
July 2017

Executive summary

About this briefing

This briefing paper looks at elements of the draft treaty text in the light of one specific nuclear weapons state: the United Kingdom (UK).The UK is not participating in negotiations on the draft treaty, but this briefing will discuss the extent to which aspects of the UK's practice as a nuclear weapons state are covered by the measures in the draft treaty. It is hoped that an examination of the specific context of the UK can help to contextualise the legal measures in the draft text and provide a deeper understanding of some of its provisions.

The analysis is based on the draft text that was released on 3rd July,[1] and though there are unlikely to be major revisions, it should be noted that there may be differences between it and the final text. Any significant changes will be addressed in an updated version of this briefing.

Possession, development and stockpiling

The UK has an active programme to develop and manufacture nuclear warheads. Development and production takes place at two Atomic Weapons Establishment (AWE) sites in Berkshire. Assembled warheads are transported by road to Scotland, for storage and deployment on the UK's four nuclear-armed *Vanguard*-class submarines.

At the time of writing the UK is engaged in a long-term programme to upgrade its facilities for developing, producing and maintaining its stockpile of nuclear warheads. One element of the programme involves fitting a new type of fuse to the warhead that greatly increases its accuracy and therefore its ability to destroy hardened targets such as bunkers and silos.

In 2016 the UK Parliament voted to approve the programme to build four new nuclear-armed *Dreadnought* submarines to replace the *Vanguard*-class. A decision on building a new warhead for the new submarines is scheduled for 2019.

1 A/CONF.229/2017/L.X, https://s3.amazonaws.com/unoda-web/wp-content/uploads/2017/07/A-CONF-1.229-2017-L.X-E-tracked-from-Rev.1-03.07.17-1824-formatted.pdf. Accessed 4/7/2017

Under the draft treaty, almost all of these activities would be prohibited. The exception is the *Dreadnought* submarine programme, as the treaty does not explicitly ban states from producing delivery systems for nuclear weapons.

Use and threat of Use

In 1996 the International Court of Justice produced an advisory ruling on the legality of nuclear weapons. It found that the use and threat of use of nuclear weapons is generally in contravention of international law, but it could not definitively conclude that the use of nuclear weapons would be unlawful in “an extreme circumstance of self-defence, in which the very survival of the state would be at stake.”

The UK’s nuclear doctrine, leaves open the possibility that nuclear weapons could be used against states in breach of their Non-Proliferation Treaty (NPT) obligations, even if they don't possess nuclear weapons or threaten the very survival of the UK. In recent years, some UK government ministers have made a point of emphasising their willingness to use nuclear weapons in a way which suggests they conceive of their use in circumstances beyond the narrow confines of the ICJ ruling. In 2016 the Prime Minister, Theresa May, replied “Yes” when asked whether she would be willing to authorise a nuclear strike that could kill 100,000 innocent people, and in 2003, shortly before the start of the Iraq War, defence secretary Geoff Hoon stated that the UK would use nuclear weapons against Saddam Hussein “in the right conditions”, though it's now clear that even at that time the UK Government did not believe that Saddam Hussein threatened the survival of the British state.

Threats such as these may have prompted the inclusion of an explicit ban on threatening to use nuclear weapons. However it is not certain whether bellicose statements by government ministers would be covered.

The UK has never used nuclear weapons in war, so the clause prohibiting use is one of the few in the treaty of which it is not in breach. Since 1968, at least one nuclear-armed submarine has been at sea at all times, but since 1994 the missiles on the submarines are no longer pre-programmed with targeting data. However, the submarines almost certainly carry electronic attack plans when they go out on patrol. This activity is unlikely to count as threatening the use of nuclear weapons, unless it is accompanied by an explicit threat.

International movements of nuclear weapons

Although the UK was the third country in the world to develop nuclear weapons, it has not transferred any of its weapons into the control of other states, though in the past it has deployed nuclear weapons to bases in other countries. There are not currently nuclear weapons belonging to other nuclear states on UK territory.

The UK’s current situation in terms of receiving the transfer of nuclear weapons is more complex. The UK has not been the recipient of complete weapons, but it has been the recipient of many of the components for them, as well as much of the technology and knowledge, from the US.

The two countries signed a Mutual Defence Agreement (MDA) in 1958, which allowed information exchange on a range of issues and was later supplemented by other agreements allowing the transfer of nuclear materials and non-nuclear components from the US to the UK, and the sale of submarine-based missiles.

These arrangements now form the backbone of the UK's nuclear weapons programme, with US input into submarine design and US made Trident missiles from the US with nuclear warheads thought to be closely modelled on the US W-76 warhead, and containing many US-made components.

Testing and subcritical testing

The original draft text featured a separate clause with text that mirrored the wording of the Comprehensive Test Ban Treaty (CTBT), but this now has been removed and testing has instead been added to the list of prohibitions related to possessing nuclear weapons.

The UK has active experimental programmes that include some subcritical testing, meaning testing small quantities of nuclear materials that aren't large enough to form a critical mass and detonate. It has three main strands: computer modelling, laser implosion and hydrodynamics. Since 2010 the UK has cooperated with France on hydrodynamics research at a shared facility in France. This is said to "assist both countries in maintaining the safety and reliability of their respective nuclear stockpiles". However, it's clear from internal government documents that a major purpose of the research programme is to test warhead designs. The two countries also cooperate on laser research, and both also cooperate with the US in this field of research.

While the scope of the ban treaty will depend on how it is legally interpreted, the current framing of the ban on testing is more broad than in earlier drafts of the ban treaty, and may prohibit the UK's subcritical research programme.

Assisting with prohibited activities

Much of the cooperation between the UK, France and the US mentioned above would be prohibited by the clauses in the ban treaty preventing signatories from giving or receiving assistance to anyone engaging in activity that breaches the terms of the treaty.

Under the agreement whereby the UK acquires Trident missiles from the US, it is required to assign its current nuclear armed submarines to NATO and to be ready to use them as part of a joint NATO nuclear strike under joint nuclear targeting plans, which are a clear breach of the assistance clauses.

If the UK became a signatory to the ban treaty it might technically be possible to retain NATO membership, but this might be politically untenable. The Netherlands, the only NATO state participating in the ban treaty negotiations, has stated that they think some of the provisions in the draft text are incompatible with NATO membership

The other activity that might be prohibited under the assistance clauses is financing of nuclear weapons. From the UK's interpretation of other agreements, it seems likely that

this would be interpreted to mean that giving funds to a company which manufactures nuclear weapons would be legal, so long as they didn't spend that money on nuclear weapons.

Help for affected people and international cooperation

Under the draft ban treaty the responsibility for helping those affected by nuclear testing or nuclear weapons use falls on the state where the affected people live, rather than implementing a mechanism for apportioning blame and requiring restitution from the guilty party. However, assistance can be requested from other countries under Article 7 of the ban treaty, which could result in assistance being funded by the state that was responsible for causing the harm.

The UK's early nuclear testing programme was carried out in Australia, where authorities failed to ensure that no Aboriginal people were present at the testing site. An Australian Royal Commission said that "if Aboriginals were not injured or killed as a result of the explosions, this was a matter of luck".

The Australian government later negotiated a contribution from the UK towards compensation and decontamination on the basis of no admission of liability or responsibility. The UK government has also set up a £25m fund for projects to help British Nuclear Test veterans, but again this did not include individual compensation or any admission of liability.

The compensation fund established by the Australian government, with a contribution from the UK is the kind of assistance that could be provided under the treaty if both countries were signatories. However, the level of assistance provided for UK veterans would probably need to be improved as it is not of a sufficient scale to fully provide for their needs.

Safeguards, Verification & Disarmament

There are two pathways for states with nuclear weapons to join the treaty. The 'disarm then join' route requires a state to get rid of its nuclear weapons before it signs the treaty. It would then need to work with the treaty's verification authority in order to give assurances to other signatories and enter into a safeguards agreement with the IAEA.

There is also a 'join then disarm' pathway for states to sign the treaty before they get rid of their nuclear weapons. In this situation the state has to take all its nuclear weapons off operational status and then produce a plan for irreversibly eliminating its nuclear weapons programme. This plan has to be negotiated with the verification authority and then approved by a meeting of the treaty signatories, and would then be followed by entering into a safeguards agreement with the IAEA.

This approach defers any consideration of the details of disarmament and verification until a state with nuclear weapons signs the treaty and produces a disarmament plan. This shows clearly that the treaty is very much intended as a first step in a much longer process. The purpose of this first iteration is to establish a new international norm: to make

a clear, unequivocal statement that the possession of nuclear weapons and associated activities are contrary to existing international laws.

Should the UK come to join the treaty at some point in the future, it would actually bring a wealth of expertise on the question of verification, as it has been central to international efforts to develop techniques to verify nuclear disarmament. Since 2000 it has cooperated with Norway, the US and other states to develop verification methods and it also participates in work to monitor compliance with the CTBT.

Conclusion: what would UK disarmament look like under the draft treaty?

While some of the details of disarmament and verification have been intentionally set aside for consideration at some point in the future, it is worth reviewing what we know about what the 'end state' would be for a nuclear weapon state like the UK, if it were to join the ban treaty as presented in the draft text.

The UK would be required to dismantle its nuclear warheads and all of the development and manufacturing work on nuclear weapons would need to cease. The facilities previously used to manufacture warheads would need to be destroyed or irreversibly converted to civilian use, as would facilities used for storing the warheads.

The future of the nuclear-armed submarine programme is less certain. They might be considered to be outside the remit of the treaty, or included in an agreement under the 'join-then-disarm' pathway, in which case there could be a requirement to decommission them.

Much of its cooperation with France and the US on nuclear weapons would need to cease, The extent to which hydrodynamics, laser implosion research and other subcritical testing would have to be curtailed is not clear.

On paper the UK could remain a member of NATO, but if the rest of the alliance was resolved to maintain nuclear weapons as a key element of their military doctrine, the relationship would be fraught. Greater provision would need to be made to help UK nuclear test veterans.

Many of the uncertain details would depend on the disarmament process. If the UK decided to disarm and then join the treaty, it would determine the process itself, but the final result would need to be affirmed by the verification authority. In the join then disarm pathway, a plan would need to be negotiated with the verification authority and approved by the other signatories. The extent to which the ban treaty is able to achieve its stated goal of universal and complete nuclear disarmament will depend on its ability to satisfactorily resolve issues around verification and safeguards.

The priority of the states negotiating the treaty has been to finalise a text as soon as possible that establishes an international legal norm against the possession, and use of nuclear weapons. The states which currently possess nuclear weapons will be given a clear message about the acceptability of their ongoing possession and offered a

framework within which to carry out their obligation to disarm. It remains to be seen how they will respond.

About this briefing

On the 22nd May 2017, Ambassador Elayne Whyte Gomez of Costa Rica released the first draft text of a proposed treaty to ban nuclear weapons.[2] The draft was the outcome of a UN-mandated meeting between over 130 states in March 2017, and at the time of writing states are meeting again to refine the draft and they are expected to produce a final text by 7th July 2017. This would be the first legally binding treaty that explicitly prohibits the most destructive weapons of mass destruction.

This briefing paper looks at elements of the draft ban treaty text in the light of one specific state with nuclear weapons: the United Kingdom (UK). It is intended to be a brief exploration of some of the issues, rather than an in-depth study.

The UK is not participating in negotiations on the draft treaty, and has made its opposition to the ban treaty publicly known, to the extent that its only contribution to the first round of negotiations in March was to join a press conference outside the meeting denouncing the proceedings.[3] While the treaty will be legally binding for the states that sign and ratify it, it will not be binding on states that do not sign it, and there is no prospect of that changing in the foreseeable future.[4] However, the states who are participating have made it clear the intention is to clarify and strengthen international norms against nuclear weapons and they believe that by doing so they are advancing the cause of general and complete disarmament.

This briefing does not propose to discuss the UK's stance on the ban treaty, how it might come to be a signatory or the wider questions of whether the treaty will help or hinder global disarmament, which have been discussed at length elsewhere.[5] Instead, this briefing will discuss the extent to which aspects of the UK's practice as a state with nuclear weapons are covered by the measures in the draft ban treaty. As the treaty aims to reinforce international norms against the possession of nuclear weapons, we will examine whether those norms cover the the whole range of the UK's activities as a state with nuclear weapons.

As well as giving readers in the UK a better understanding of the proposed ban treaty and what it entails, it is hoped that an examination of the specific context of the UK can help to contextualise the legal measures in the draft text and provide a deeper understanding of some of its provisions.

The discussion of aspects of the UK's nuclear weapons programme which are not covered by the measures in the ban treaty is not intended as a criticism of the treaty. Like all international agreements the draft treaty text is a compromise between the priorities of the negotiating parties. The desire for an exhaustive ban treaty also has to be balanced with

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2 The draft ban treaty text is entitled 'Draft treaty on the prohibition of nuclear weapons'. For brevity, this briefing will use the shorter 'ban treaty' or just 'the treaty' instead.

3 Somini Sengupta, and Rick Gladstone. 'United States and Allies Protest U.N. Talks to Ban Nuclear Weapons'. The New York Times, 27 March 2017, sec. Americas. https://www.nytimes.com/2017/03/27/world/americas/un-nuclear-weapons-talks.html.

4 'Brixey-Williams on the Legal Implications of the Nuclear Ban'. 2017. Accessed June 25. http://www.armscontrolwonk.com/archive/1203288/brixey-williams-on-the-legal-implications-of-the-nuclear-ban/.

5 See, for example, Nick Ritchie, Matthew Harries. 'The Real "Problem" With a Ban Treaty? It Challenges the Status Quo'. Carnegie Endowment for International Peace. Accessed 7 June 2017. http://carnegieendowment.org/2017/04/03/real-problem-with-ban-treaty-it-challenges-status-quo-pub-68510.

the desire for the treaty to become universal over time, and the consequent need to frame it with the broadest possible acceptability in mind.

This paper aims to treat the draft ban treaty as what it is: a compromise text that is the product of negotiations involving over 130 countries. The analysis is based on the draft text that was released on 3rd July,[6] and though there are unlikely to be major revisions, it should be noted that there may be differences in the final text. Any significant changes will be addressed in an updated version of this briefing.[7]

The draft ban treaty includes a mechanism for the treaty to be amended, and some details, such as the body that will verify compliance with the treaty, will be dealt with in the future. As such, it is important to recognise that the final text that is agreed on July 7th is intended to be the foundation of an international legal regime to ban and eliminate nuclear weapons, rather than the final word.

Whatever your position on whether the ban treaty will help to bring about general and complete disarmament, it has to be acknowledged that it is a historic milestone and a significant achievement in disarmament diplomacy. The scope of the final treaty will be decided by the states negotiating it, but hopefully this paper will offer a useful perspective on the draft treaty and the provisions within it.

6 A/CONF.229/2017/L.X, https://s3.amazonaws.com/unoda-web/wp-content/uploads/2017/07/A-CONF-1.229-2017-L.X-E-tracked-from-Rev.1-03.07.17-1824-formatted.pdf. Accessed 4/7/2017

7 As this briefing was being finalised it was announced that the only major change to the July 3rd text prior to it going for translation was the reinstating the clause on the responsibility of user states to provide assistance to affected states. See note 53.

Possession, development and stockpiling

1. Each State Party undertakes never under any circumstances to:

(a) Develop, test, produce, manufacture, otherwise acquire, possess or stockpile nuclear weapons or other nuclear explosive devices;

The UK has an active programme to develop and manufacture nuclear warheads. Development and production takes place at two Atomic Weapons Establishment (AWE) sites in Berkshire. Design, experimentation and research takes place at AWE Aldermaston, along with production of highly enriched uranium and plutonium, as well as explosives. Assembly and disassembly of the warheads themselves takes place at AWE Burghfield, seven miles away.

Assembled warheads are transported by road to Royal Navy Armaments Depot (RNAD) Coulport in Scotland, the main storage for the UK's nuclear warheads that are not deployed on submarines at sea. Coulport is two miles away from the Faslane Naval Base which lies in an adjacent sea loch and is home to the UK's submarine fleet, including four nuclear-armed *Vanguard*-class submarines.

Periodically, warheads are transported back from Coulport to Burghfield to be monitored and repaired, fitted with new components or upgraded. Even at times when there is no active upgrade or refurbishment programme, assembly and disassembly of warheads at Burghfield still takes place at regular intervals for surveillance purposes and to ensure that the capacity to undertake this work is not lost.

At the time of writing the UK is engaged in a long-term programme to upgrade its facilities for developing, producing and maintaining its stockpile of nuclear warheads, as well as the warheads themselves. The Nuclear Warhead Capability Sustainment Programme involves upgrading various buildings at these two AWE sites. Plans include a new warhead assembly/disassembly facility and ensuring that AWE retains adequate numbers of skilled personnel to develop and manufacture nuclear warheads.The programme also encompasses the UK Trident Mark 4A upgrade programme,[8] which involves fitting a new type of fuse to the warhead that greatly increases its accuracy and therefore its ability to destroy hardened targets such as bunkers and silos.[9]

In 2016 the UK Parliament voted to approve the programme to build four new nuclear-armed *Dreadnought* submarines to replace the *Vanguard*-class. A decision on building a new warhead for the new submarines is scheduled for 2019.

Under the draft ban treaty, almost all of these activities would be prohibited. The exception is the *Dreadnought* submarine programme. Although the submarines obviously could not

8 Peter Burt. 'AWE: Britain's Nuclear Weapons Factory; Past, Present, and Possibilities for the Future'. Nuclear Information Service, 2016. http://nuclearinfo.org/sites/default/files/AWE-Past%2C%20Present%2C%20Future%20Report%202016.pdf.

9 See Bob Ainsworth. 'Trident Missiles: 3 Dec 2009: Hansard Written Answers'. TheyWorkForYou, 3 December 2009. https://www.theyworkforyou.com/wrans/?id=2009-12-03b.303890.h&s=fuse+%22fusing%22+section%3Awrans; Hans M. Kristensen, Matthew McKinzie, and Theodore A. Postol. 'How US Nuclear Force Modernization Is Undermining Strategic Stability: The Burst-Height Compensating Super-Fuze'. Bulletin of the Atomic Scientists, 1 March 2017. http://thebulletin.org/how-us-nuclear-force-modernization-undermining-strategic-stability-burst-height-compensating-super10578;

be used for their intended purpose of deploying with nuclear weapons, the treaty does not explicitly ban states from producing delivery systems.

Use and Threat of Use

1. Each State Party undertakes never under any circumstances to:

(d) Use or threaten to use nuclear weapons or other nuclear explosive devices;

In 1996 the International Court of Justice produced an advisory ruling on the legality of nuclear weapons. While it found that the use and threat of use of nuclear weapons is generally in contravention of international law, and that there was an obligation on states with nuclear weapons to disarm, the court could not definitively conclude that the use of nuclear weapons would be unlawful in "an extreme circumstance of self-defence, in which the very survival of the state would be at stake."[10]

This small exception to the general principle that nuclear weapons are inherently inhumane and illegal has allowed states to claim that their possession of nuclear weapons is not prohibited as they would only be used in the 'extreme' circumstances where the ICJ was unable to provide a definitive ruling. This is somewhat contradicted by the UK's nuclear doctrine, which leaves open the possibility of use against states in breach of their NPT obligations, even if they don't possess nuclear weapons or threaten the very survival of the UK.[11]

In recent years, some UK government ministers have made a point of emphasising their willingness to use nuclear weapons in a way which suggests they conceive of their use in circumstances beyond the narrow confines of the ICJ ruling. The Prime Minister, Theresa May, during the 2016 parliamentary debate on building new nuclear-armed submarines to replace the Vanguard fleet, replied "Yes" when asked whether she would be willing to authorise a nuclear strike that could kill 100,000 innocent people.[12] In 2003, shortly before the start of the Iraq War, defence secretary Geoff Hoon stated that the UK would use nuclear weapons against Saddam Hussein "in the right conditions".[13] While he used the phrase "extreme self-defence" in the same interview, it is clear from information that has since emerged that at that time the UK Government did not in any way believe that Saddam Hussein threatened the survival of the British state. During the election campaign earlier this year the current defence secretary, Michael Fallon, stated that the UK would be willing to launch a nuclear first strike. While he made a point of stating that this would only be in "extreme circumstances", he refused to elaborate what those circumstances might be.[14]

Threats such as these, as well as the general principle of nuclear deterrence, may have prompted the inclusion of an explicit ban on threatening to use nuclear weapons. However it is not certain whether bellicose statements by government ministers would be covered.

10 'International Court of Justice - Legality of the Threat or Use of Nuclear Weapons - Advisory Opinion', 8 July 1996. http://www.icj-cij.org/files/case-related/95/7497.pdf.

11 Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review. London: HM Government, 2010. http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf.

12 Mason, Rowena, Anushka Asthana, and Rajeev Syal. 'Theresa May Would Authorise Nuclear Strike Causing Mass Loss of Life'. The Guardian, 18 July 2016, sec. UK news. https://www.theguardian.com/uk-news/2016/jul/18/theresa-may-takes-aim-at-jeremy-corbyn-over-trident-renewal.

13 'BBC NEWS | Politics | UK Restates Nuclear Threat'. Accessed 24 May 2017. http://news.bbc.co.uk/1/hi/uk_politics/2717939.stm.

14 PoliticsHome.com. 2017. 'Michael Fallon: Theresa May Willing to Launch Pre-Emptive Nuclear Strike'. April 24. https://www.politicshome.com/news/uk/political-parties/conservative-party/theresa-may/news/85324/michael-fallon-theresa-may.

Certainly the implicit deterrent threat of simply possessing nuclear weapons is unlikely to count as a breach of the prohibition on the threat of use. Possession is explicitly prohibited in a separate clause in the draft ban treaty and, as has been persuasively argued elsewhere, if possessing a weapon was considered to be an implicit threat of force, all countries with armies would be in breach of the UN charter.[15]

The UK has never used nuclear weapons in war, so the clause prohibiting use is one of the few in the ban treaty of which it is not in breach. Since 1968, at least one nuclear-armed submarine has been at sea at all times. Since 1994 the missiles on the submarines are no longer pre-programmed with targeting data, though the submarines almost certainly carry electronic attack plans when they go out on patrol, and it is presumed by analysts that Moscow is still the primary target in at least some of these plans.[16] This activity is unlikely to count as threatening the use of nuclear weapons, unless it is accompanied by an explicit threat. Some states have called for a prohibition on planning and preparing to use nuclear weapons, which would be more likely to cover these activities.[17] However, this measure is not currently included in the draft text.

15 Egel, Kjølv. 'To Ban Nuclear Deterrence, Ban Possession, Not Threat of Use'. Head of Mímir, 22 May 2017. https://headofmimir.org/2017/05/22/to-ban-deterrence-ban-possession-not-threats-of-use/.

16 Ian Davis. 'The British Bomb and Nato: Six Decades of Contributing to NATO's Strategic Nuclear Deterrent'. Stockholm International Peace Research Institute and Nuclear Education Trust, November 2015. http://nuclearedu cationtrust.org/sites/default/files/NATO%20Trident%20Report%2015_11.pdf. pp 18-19

17 'Nuclear Ban Daily Vol.2, No. 4'. 2017. Reaching Critical Will. http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/nuclear-weapon-ban/reports/NBD2.4.pdf.

International movements of nuclear weapons

> *1. Each State Party undertakes never under any circumstances to:*
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> *(b) Transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly or indirectly;*
>
> *(c) Receive the transfer or control over nuclear weapons or other nuclear explosive devices directly or indirectly;*
>
> *(g) Allow any stationing, installation or deployment of any nuclear weapons or other nuclear explosive devices in its territory or at any place under its jurisdiction or control*

Transfer, Transit and Hosting

Although the UK was the third country in the world to develop nuclear weapons, it has not transferred any of its weapons into the control of other states, so it would not be in breach of the article prohibiting this. In the past it has deployed nuclear weapons to bases in other countries, for example to Cyprus and Germany during the Cold War, and this practice would not be allowed in the future if the host countries were signatories to the ban treaty.

During the negotiations on the ban treaty, some states suggested the draft should prohibit states from allowing weapons to transit their territory. If this clause had been adopted by many states worldwide it could have caused significant problems for another historical UK practice. When UK ships did routinely carry *WE177* nuclear weapons for use as depth charges and nuclear bombs, these ships are known to have frequently transited the territorial waters and visited the ports of other countries.

Due to the MoD's policy of neither confirming nor denying the presence of nuclear weapons on particular ships, it is difficult to be certain about specific instances where this occurred, except for the occasions where something went wrong, for example when a ship carrying nuclear weapons was involved in a collision with two US ships in Hong Kong Harbour.[18]

Although the MoD does not seem to have sought permission from other states before transporting nuclear weapons into their territory, it does seem to have respected the international agreements establishing nuclear-weapon-free zones. When nuclear weapons were on board ships that were sent to the Falklands during the war in 1983, a complicated series of movements were undertaken to make sure that no ship containing nuclear weapons came close enough to the islands to breach the treaty of Tlatelolco, which established a nuclear-weapons-free zone in South America.[19]

Although the route of Trident submarines to the North Atlantic from Faslane passes relatively close to Ireland, they do not have to pass through Irish territorial waters, so

18 Peter Burt. 'Playing With Fire: Nuclear Weapons Incidents and Accidents in the United Kingdom'. Nuclear Information Service, 2017. http://nuclearinfo.org/sites/default/files/Playing%20With%20Fire%20Report-Web.pdf. p54

19 *Ibid* pp55-57

current UK practice would be unaffected by a ban on transit in the ban treaty and Ireland becoming a signatory.

There are not currently nuclear weapons belonging to other nuclear states on UK territory, but in the past US nuclear-armed Thor rockets, cruise missiles and tactical nuclear weapons have been stationed in the UK. This would be prohibited in the future if the UK became a signatory to the ban treaty.

US-UK Technology Transfer

The UK's current situation in terms of receiving the transfer of nuclear weapons is more complex. The draft ban treaty prohibits the transfer of nuclear weapons themselves, either directly or indirectly. The UK has not been the recipient of complete weapons, but it has been the recipient of many of the components for them, as well as much of the technology and knowledge, as the receiving partner in the most enduring arrangement of nuclear knowledge sharing, with the US.

The UK had been been a partner with the US in the Manhattan Project, and had initiated some of the research that fed into it, but after the war was excluded from participating in further research under the McMahon Act. However, after the UK developed their own nuclear weapons programme and produced a thermonuclear weapon, the US relented and the two countries signed a Mutual Defence Agreement (MDA) in 1958. The original agreement allowed information exchange on a range of issues including defence planning, delivery systems, test data and the development of military nuclear reactors. It also allowed for the sale of a nuclear submarine propulsion plant and a ten year supply of fuel.[20]

The MDA was supplemented by an additional article in 1959, Article III *bis*, which also permitted the transfer of nuclear materials and non-nuclear components from the US to the UK,[21] and the Nassau agreement and subsequent Polaris Sales Agreement which approved the sale of submarine-based Polaris missiles to the UK.[22]

These arrangements now form the backbone of the UK's nuclear weapons programme. The *Vanguard* submarines are the UK's only extant nuclear weapons platform, and they were designed with such close support from the US that the British Admiral in charge commented that the US regarded the project "almost as much as their own".[23]. The UK does not have its own missile programme and instead purchases *Trident II D5* missiles from the US. The individual missiles on a particular submarine are drawn at random from a common pool in the US when the submarines are being refitted after maintenance. The nuclear warheads they carry are also widely thought to be closely modelled on the US *W-76* warhead.[24] Although the plutonium and highly-enriched uranium used in the warheads comes primarily from British stocks, the tritium used to boost the power of the explosion is thought to be transferred from the US as the UK no longer has the capacity to produce tritium.

20 Claire Mills. 2014. 'UK - US Mutual Defence Agreement'. House of Commons Library.
21 *Ibid.*
22 Ian Davis, 2015. *Op cit.*
23 Peter Hennessy, and James Jinks. The Silent Deep: The Royal Submarine Service since 1945. Kindle Edition., 2015. Location 11110
24 Peter Burt, 2016. *Op cit.* p26

While some of these activities would be banned under the clauses prohibiting development and manufacturing of nuclear weapons, and most would fall under the prohibitions on receiving assistance, it should be noted that the bilateral transfer arrangements between the UK and US are would probably not be covered by the clauses on transfer in the draft text. It could be argued that the arrangements involve the 'indirect' transfer of nuclear weapons, even though no actual weapons change hands, but this is far from certain and there are strong indications that the UK would rely on a narrow interpretation of the ban treaty.

In 1995 Mexico's delegation to the Non-Proliferation Treaty Review Conference argued that the Mutual Defence Agreement was a de-facto breach of Article 1 of the non-proliferation treaty, which prohibits the transfer of nuclear weapons using almost identical language to the draft ban treaty. Successive UK governments have refuted this interpretation, with Lord Bach stating on behalf of the government in June 2004 that "[m]ovements under the MDA do not involve nuclear weapons or nuclear explosive devices, hence they do not contravene the [Non-Proliferation] treaty".[25]

There is no time limit to the MDA itself, which states that the arrangement will continue until both parties agree to terminate it. However, Article III *bis*, which allows for the transfer of nuclear materials and components, is time limited and has been regularly extended when it reaches the end of its life. Since the 1980s this has been at done at ten year intervals, with the last extension having been approved in 2014, meaning that the transfer arrangements are due to last until 2024 at least.[26]

25 Claire Mills, 2014. *Op cit.*
26 *Ibid.*

Testing and subcritical testing

> *1. Each State Party undertakes never under any circumstances to:*
>
> *(a) Develop, test, produce, manufacture, otherwise acquire, possess or stockpile nuclear weapons or other nuclear explosive devices;*

The prohibition on testing is one of the elements in the draft ban treaty that has been changed during the current negotiations. The original draft text featured a separate clause with text that intentionally mirrored the wording of the Comprehensive Test Ban Treaty (CTBT) which requires each state party "not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control, but this separate clause has been removed and testing has instead been added to the list of prohibitions related to possessing nuclear weapons.

The CTBT was negotiated in 1996, but has not to come into force because a number of states have not signed or ratified it.[27] Despite this, almost all the states in possession of nuclear weapons are currently complying with the principles of the CTBT. The exception is North Korea which has carried out several nuclear tests since 2006. India and Pakistan carried out test nuclear explosions in May 1998, but have not done so since then. The UK has signed and ratified the CTBT, and so current UK practice does not involve nuclear test explosions.

Subcritical testing

However, several of the states with nuclear weapons, including the UK, do have active experimental programmes that include some subcritical testing, meaning testing small quantities of nuclear materials that aren't large enough to form a critical mass and detonate.

The UK's experimental programme has three main strands: computer modelling, laser implosion and hydrodynamics. According to an internal government document "[a]ll three are interdependent as the data from one is required to feed into the others".[28] Hydrodynamics research uses explosives to test the behaviour of materials under high pressure & temperature conditions, monitoring the results using high power x-rays. Under these conditions solids behave like liquids & gasses, giving rise to the name.[29]

The UK used hydrodynamics experiments to supplement nuclear test data prior to the cessation of joint US-UK testing in 1992 and considers itself a leader in this area of research. Data from the UK's hydrodynamics programme has been routinely shared with the US under the MDA.[30]

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27 'Nuclear Disarmament Resource Collection | Analysis | NTI'. Accessed 22 May 2017. http://www.nti.org/analysis/reports/nuclear-disarmament/.

28 Mark Welland. 'Hydrodynamics - Cooperation with France', 7 July 2010. http://nuclearinfo.org/sites/default/files/04%20Mark%20Welland%20Hydrodynamics%20paper%20070710.pdf.

29 Peter Burt. 'UK – France Nuclear Co-Operation: The "Teutates" Project. Presentation at Non-Proliferation Treaty PrepCom Meeting'. 23 April 2013. http://nuclearinfo.org/sites/default/files/01%20NIS%20NPT%20presentation%20on%20Teutates%20project%20230413_0.pdf.

Hydrodynamics cooperation with France

Since 2010, AWE has cooperated with the French agency Commissariat à l'Énergie Atomique - Direction des Applications Militaires (CEA-DAM) on hydrodynamics research.[31] The arrangement, which is known as the Teutates programme, began in 2010 with an agreement that presented the joint research as necessary to "assist both countries in maintaining the safety and reliability of their respective nuclear stockpiles".[32] However, it's clear from internal government documents that a major purpose of the research programme is to test warhead designs,[33] and it can safely be assumed that this includes designs for new or updated warheads.

As a result of the Teutates agreement, the UK cancelled plans to build a new Hydrodynamics facility at AWE Aldermaston, and instead conducts research at a French Hydrodynamics facility at Valduc called EPURE, as well as at its existing research facilities at Aldermaston.[34] Part of the UK's contribution was to build a Technology Development Centre, which will build radiographic machines for the EPURE facility.[35]

In January 2014, UK and France agreed to extend their cooperation. The increased cooperation is likely to include peer review and joint research on warhead design, which may allow the UK to benefit from recent design work on the French TNO warhead when planning future upgrades to the UK warhead. The two countries also agreed to work together on developing explosives and to cooperate on some aspects nuclear submarine design, such as sonar and electrical power systems.[36]

The Teutates agreement gives reciprocal use of EPURE and the TDC over the 50 years they are planned to be in operation. The states are allowed to withdraw from the agreement, but they have to give ten years notice, unless they are under conflicting treaty obligations, in which case they only need to give one year's notice. A withdrawing party would need to make payments to the remaining state, who would then get sole use of the facility in their own nation.[37]

The two countries also cooperate on laser research. The Orion laser facility at AWE Aldermaston and the French Laser Mégajoule operate under different temperature regimes, so together they can cover a wider range of experimental conditions than

30 Jon Day. 'UK-France Nuclear Hydrodynamics Co-Operation', 2 June 2010. http://nuclearinfo.org/sites/default/files/03%20Memo%20from%20Jon%20Day%20020610.pdf.

31 Peter Burt, 2013. *Op cit.*

32 *Ibid.*

33 Mark Welland, 2010. *Op cit.*

34 'NIS Update: February 2011 | Nuclear Information Service'. Accessed 6 July 2017. http://nuclearinfo.org/article/nis-updates/nis-update-february-2011.

35 'Treaty between the United Kingdom of Great Britain and Northern Ireland and the French Republic Relating to Joint Radiographic Hydrodynamics Facilities', 2 November 2010. http://nuclearinfo.org/sites/default/files/02%20UK%20-%20France%20Treaty%20on%20Joint%20Radiographic%20Hydrodynamics%20Facilities%202010.pdf; Bruno Tertrais. 'Entente Nucleaire Options for UK-French Nuclear Cooperation'. British American Security Information Council (BASIC), June 2012. http://www.basicint.org/sites/default/files/entente_nucleaire_basic_trident_commission.pdf.

36 'UK and France Extend Warhead Research Collaboration into New Areas | Nuclear Information Service'. Accessed 6 July 2017. http://nuclearinfo.org/article/government-development-awe-aldermaston/uk-and-france-extend-warhead-research-collaboration.

37 'Treaty between the United Kingdom of Great Britain and Northern Ireland and the French Republic Relating to Joint Radiographic Hydrodynamics Facilities', 2 November 2010. *Op cit.*

individually. Both countries also cooperate with the US Lawrence Livermore National Laboratory and its 'National Ignition Facility' superlaser.[38]

Although much of this activity would be banned under the prohibitions on development and manufacturing, and the international cooperation and data-sharing would be covered by the clauses discussed above, this programme of subcritical testing was not explicitly prohibited in earlier drafts of the treaty. Including testing alongside development and possession, and removing the reference to nuclear explosions, has certainly broadened the scope of the ban treaty, compared to the language in earlier drafts and the CTBT. While the scope of the ban on testing will depend on how it is legally interpreted, the changes may mean that some or all of the UK's subcritical research programme would be prohibited.

It remains to be seen what constitutes acceptable research under the current wording. Would any research into the properties of plutonium as a material be prohibited due to its utility in nuclear weapons design? Where should the line be drawn? Of the three "interdependent"[39] domains of research in the UK programme, it may be that computer modelling involves less grey areas than hydrodynamics and laser implosion and is the most likely to be prohibited under the new wording.

38 'UK – France Co-Operation on Nuclear Weapons Set to Deepen as France's Laser Mégajoule Becomes Operational | Nuclear Information Service'. Accessed 7 June 2017. http://nuclearinfo.org/article/development/uk-%E2%80%93-france-co-operation-nuclear-weapons-set-deepen-frances-laser-m%C3%A9gajoule.

39 Mark Welland, 2010. *Op cit.*

Assisting with prohibited activities

> *1. Each State Party undertakes never under any circumstances to:*
>
> *(f) Assist, encourage, or induce, in any way, anyone to engage in any activity prohibited to a State Party under this Convention;*
>
> *(g) Seek or receive any assistance, in any way, from anyone to engage in any activity prohibited to a State Party under this Convention.*

Much of the cooperation between the UK, France and the US mentioned above would be prohibited by these clauses, though cooperation on activity that did not count as assisting, encouraging or inducing development or possession of nuclear weapons themselves would not.

In the bilateral relationship between the UK and US, much of the exchange of information and expertise is done through visits and joint working groups. AWE staff made over 2,000 visits to US nuclear facilities between 2007 & 2009. In 2012 there were 33 active working groups bringing staff from the two nations together, though it should be noted that some of these included issues such as “nuclear counter terrorism technologies”, which would not be prohibited under the ban treaty.[40]

Many of those that oppose the ban treaty see these clauses as specifically targeting NATO and the security agreements between the US and other nations such as Australia, South Korea and Japan. In the case of the UK, there are certainly NATO-related practices that would be prohibited under these clauses.

Joint Targeting with the US

During the Cold War, UK nuclear weapons featured in joint targeting plans drawn up with the US. The Polaris Sales Agreement in 1962 allowed the UK to purchase submarine-based Polaris missiles from the US so long as they were assigned as part of NATO’s nuclear force and targeted in accordance with NATO plans. The UK retained an exception in the agreement for situations where the UK government “may decide that supreme national interests are at stake”.[41] It is this wording that allows the UK government to claim their nuclear weapons are independent from the US, despite their heavy reliance on US technology.

Accordingly, UK Polaris submarines were part of joint NATO nuclear war plans, alongside US nuclear weapons.[42] NATO targeting during the Cold War was essentially carried out bilaterally by the US and UK process, with input from the US official with the dual role of heading US European Command and being NATO’s Supreme Allied Commander Europe (SACEUR). In a war, the order to fire UK nuclear weapons would have come from SACEUR, but authorisation would also be needed from the UK Prime Minister and another senior UK official before the submarine commander would fire the missiles.[43]

40 Claire Mills, 2014. *Op cit.*
41 Ian Davis, 2015. *Op cit.* p12.
42 *Ibid.* p15-16
43 *Ibid.* p13-14

This joint planning and integrated operations would count as assisting and encouraging deployment, stockpiling and possession. There is also a strong case to be made that it also counts as encouraging the use of nuclear weapons, so it would clearly be prohibited by the measures in the draft ban treaty. Although less is known about targeting arrangements since the end of the Cold War, there is an assumption amongst analysts that joint war and targeting plans do still exist.[44] Certainly the UK acquired its current stock of Trident missiles under an updated version of the Polaris agreement, so it is required to assign its current nuclear armed submarines to NATO and to be ready to use them as part of a joint NATO nuclear strike.

Other NATO activities

If the UK were to get rid of its nuclear weapons, could it continue to participate in NATO as a state without nuclear weapons and still be in compliance with the ban treaty? Opinions differ, though as mentioned above there is a widespread perception that these clauses are intended to prevent signatories from participating in NATO and other 'nuclear umbrella' security arrangements. Certainly the prohibitions on receiving nuclear weapons or hosting another state's weapons would prevent the NATO practice of 'nuclear sharing', where US nuclear weapons are based in European countries, but not all NATO states participate in nuclear sharing.

A more interesting question is whether signatories could participate in NATO's Nuclear Planning Group (NPG). The NPG is a meeting of 27 defence ministers from NATO, chaired by the NATO Secretary General[45] which sets the alliance's nuclear policy, rather than having a direct input on targeting.[46] While it might technically be possible to participate in the NPG and other NATO structures without assisting, encouraging or inducing other states to break provisions in the ban treaty, for example by urging that the alliance renounce the use of nuclear weapons, such a stance might make ongoing NATO membership politically untenable. The Netherlands, the only NATO state participating in the ban treaty negotiations, has stated that they think some of the provisions in the draft text are incompatible with NATO membership.[47]

The other activity that might be prohibited under the assistance clauses is financing of nuclear weapons. Although financing is not explicitly prohibited in the draft ban treaty one of the states leading the ban treaty process, Austria, stated in the March meeting that the assistance clauses would also prohibit financing of nuclear weapons.[48]

In the case of the UK there is actually precedent for how such a provision would be interpreted by government lawyers. The Convention on Cluster Munitions has an almost identical wording on assisting, encouraging or inducing others to do anything which is

44 *Ibid.* p18
45 *Ibid.* p6
46 NATO. 'Nuclear Planning Group (NPG)'. NATO. Accessed 3 July 2017. http://www.nato.int/cps/en/natohq/topics_50069.htm.
47 'Nuclear Ban Daily Vol.2, No. 2'. Reaching Critical Will, 16 June 2017. http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/nuclear-weapon-ban/reports/NBD2.2.pdf. p3
48 'Nuclear Ban Daily Vol.1, No. 4'. Reaching Critical Will, 30 March 2017. http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/nuclear-weapon-ban/reports/NBD1.4.pdf. p12

contrary to the treaty. In 2008 the UK stated that when that treaty was ratified into UK law the “provision of funds directly contributing to the manufacture of these weapons would therefore become illegal”.[49] If applied to the nuclear ban treaty, this would mean that giving funds to a company which manufactures nuclear weapons would be legal, so long as they didn’t spend that money on nuclear weapons.

49 ‘Written Ministerial Statement - The Financing of Cluster Munitions Production’. Foreign & Commonwealth Office, 7 December 2009. http://www.stopexplosiveinvestments.org/uploads/pdf/UK%20Ministerial%20statement.pdf.

Help for affected people and international cooperation

Article 6 – Victim assistance and environmental remediation

1. Each State Party shall, with respect to individuals under its jurisdiction who are affected by the use or testing of nuclear weapons, in accordance with applicable international humanitarian and human rights law, adequately provide age and gender sensitive assistance, without discrimination, including medical care, rehabilitation and psychological support, as well as provide for social and economic inclusion.

2. Each State Party, with respect to areas under its jurisdiction or control contaminated as a result of activities related to the testing or use of nuclear weapons or other nuclear explosive devices, shall take necessary and appropriate measures towards the environmental remediation of areas so contaminated.

Article 7 - International cooperation and assistance

1. Each State Party shall cooperate with other States Parties to facilitate the implementation of this Treaty.

2. In fulfilling its obligations under this Treaty, each State Party shall have the right to seek and receive assistance, where feasible, from other States Parties.

3. Each State Party in a position to do so shall provide technical, material and financial assistance to States Parties affected by nuclear weapons use or testing, to further the implementation of this Treaty.

4. Each State Party in a position to do so shall provide assistance for the victims of the use or testing of nuclear weapons or other nuclear explosive devices.

5. Assistance under this article may be provided, inter alia, through the United Nations system, international, regional or national organizations or institutions, non-governmental organizations or institutions, or the International Committee of the Red Cross, the International Federation of Red Cross and Red Crescent Societies, national Red Cross and Red Crescent Societies or on a bilateral basis.

The language in the articles dealing with assistance to those affected by nuclear testing or nuclear weapons use is very similar to the language in the treaties banning cluster munitions[50] and landmines.[51] In common with those treaties, the approach in the draft ban treaty is that the responsibility falls on the state where the affected people live, rather than implementing a mechanism for apportioning blame and requiring restitution from the guilty party.

50 'Convention on Cluster Munitions', 30 May 2008. http://www.clusterconvention.org/files/2011/01/Convention-ENG.pdf. See articles 5 and 6.

51 'Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction', 1997. https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/assets/media/8DF9CC31A4CA8B32C12571C7002E3F3E/file/APLC%2BEnglish.pdf. See articles 5 and 6.

However, assistance can be requested from other countries under Article 7 of the ban treaty, which could result in assistance being funded by the state that was responsible for causing the harm. External assistance could also help to fund the remediation of environmental contamination from nuclear weapons, which states are required to undertake.

Interestingly, a draft of Article 8 that was released on 30th June did explicitly say that states that have used or tested nuclear weapons do have a particular responsibility for providing assistance with helping affected people or environmental remediation, and this language may be re-inserted in the final text. While highlighting the special responsibility of these states is an important moral signifier, the proposed wording still left a lot of discretion in the extent of assistance given and left the state where affected people are living or where the environmental contamination is located responsible for dealing with the problem in the first instance.[52]

The rationale for this approach is that under a system where assistance would be provided by the states that were responsible for the original harm, there would be such a disincentive for those states to join the ban treaty that they would never join and there would be no mechanism for addressing the problem. The example of the UK bears out this approach to some extent.

UK nuclear testing in Australia

The UK's early nuclear testing programme was carried out in Australia, with the majority of the tests being carried out in Maralinga in the Southern interior of the country. The nuclear explosion tests at Maralinga consisted of seven device tests, spread across two series.[53] In 1952, in order to establish the Maralinga range, the local Pitjantjatjara Anangu people were forcibly relocated.[54] However the authorities failed to ensure that no Aboriginal people were present at the testing site.

In one incident an Aboriginal family were found at the site of the crater made by one of the test explosions. They were given a shower and their dogs were shot in case they were contaminated, but the incident was hushed up and there was no further follow-up to monitor- their wellbeing. A woman in the group was pregnant at the time, but later miscarried .[55] In 1960 patrols found other Aboriginal people living in the prohibited zone, and it was thought that they had probably been there throughout the previous six years of testing.[56]

Commenting on one series of tests, an Australian Royal Commission said that the attempts to ensure Aboriginal safety "demonstrate ignorance, incompetence and cynicism on the part of those responsible for that safety. The inescapable conclusion is that if

52 As this briefing was being finalised, it was confirmed that this clause was being reinstated in the treaty text. See http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/nuclear-weapon-ban/documents/CRP3.pdf

53 'History – Black Mist Burnt Country'. Accessed 22 May 2017. http://blackmistburntcountry.com.au/index.php/resources/history/.

54 *Ibid.*

55 The Report of the Royal Commission into British Nuclear Tests in Australia. Vol. 2. Canberra: Australian Government Publishing Service, 1985. https://industry.gov.au/resource/Documents/radioactive_waste/RoyalCommissioninToBritishNucleartestsinAustraliaVol%202.pdf. p319

56 *Ibid.* p378-379

Aboriginals were not injured or killed as a result of the explosions, this was a matter of luck rather than adequate organization, management and resources."[57]

Attitudes towards the safety of the military and civilian personnel who worked at the site were also incredibly callous. The procedures for some of the tests required Australian troops to run, walk & crawl across contaminated test sites after the detonations. One group of 24 individuals were used to test the radiation protection qualities of different types of clothing, although the UK MoD insists they weren't being used as guinea pigs because what was being tested was the effects of radiation on clothing, not on people.[58]

The 1958 UK-US MDA gave the UK access to the Nevada Test Site, which meant there were no more nuclear explosions at Maralinga. However over 600 subcritical tests were carried out at Maralinga before the Partial Test Ban Treaty was signed in 1963.[59] One series of tests involved setting a live warhead on fire to see what the outcome would be, and resulted in an estimated 20kg of plutonium being dispersed into the environment.[60]

Aftermath

After testing had ended at Maralinga the UK carried out two clean-ups[61] that were later deemed insufficient. In the 1980s, after growing public awareness of what had occurred at Maralinga the Australian government set up a Royal Commission which made wide-ranging criticism of many aspects of the testing programme. On the subject of radioactive contamination it said "[i]t is certain that no thought was given to the problem of establishing the safety of the land over many thousands of years" and that the UK would be "grossly irresponsible" if they did not accept that they had an obligation to properly clean up the area and provide compensation.[62]

Following the Royal Commission, the Australian government negotiated a contribution from the UK towards compensation and decontamination. Government papers later showed that they did not elect for the most thorough clean-up of the area, because they hoped to get the UK to contribute 50% of the costs and they thought the cost of the clean-up would be too high. During the negotiations the UK told the Australian government they wouldn't accept a scheme that included personal compensation to those affected as they didn't want set a precedent for their own veterans.[63] Eventually the UK made a contribution to a $13.5 million (AU) compensation fund for the Maralinga Tjarutja people and a $100 million (AU) clean-up fund, on the basis of no admission of liability or responsibility.[64]

UK citizens who participated in the tests at Maralinga and elsewhere and suffered ill effects have struggled to get recognition and compensation from the government. According to the British Nuclear Test Veterans Association, the tests left a "legacy of cancers, rare medical conditions and repeated denials of wrongdoing by the MoD", the

57 *Ibid.* p323
58 'BBC News | ASIA-PACIFIC | Australia Confronts UK over N-Tests'. Accessed 23 May 2017. http://news.bbc.co.uk/1/hi/world/asia-pacific/1326580.stm.
59 'History – Black Mist Burnt Country'. *Op cit.*
60 *Ibid.*
61 *Ibid.*
62 The Report of the Royal Commission into British Nuclear Tests in Australia. Vol. 2., 1985. *Op cit.* p592.
63 Chadwick, Paul. 'Why Cabinet Sought Only a Partial Clean-up of British Nuclear Test Site'. The Guardian, 31 December 2013, sec. World news. https://www.theguardian.com/world/2013/dec/31/why-cabinet-sought-only-partial-clean-up-of-british-nuclear-test-site.
64 'History – Black Mist Burnt Country'. *Op cit.*

wives of veterans miscarried at three times the normal rate and their children were ten times more likely to suffer from birth defects.[65] The impact of radioactive contamination on reproductive health is the reason that gender is specifically mentioned in the clauses on assistance.

In 2012 the UK Supreme Court disallowed a claim by over 1,000 test veterans because the claim hadn't been made within three years of health effects first appearing, even though the veterans argued they didn't have enough information to do so until the publication of research in 2007. Responding to the ruling, the veterans' solicitor said "[e]very other nuclear power has established ways to recognise and compensate victims".[66] In 2015 the government announced a £25m fund for projects to help veterans, but again this did not include individual compensation or any admission of liability.[67]

The ongoing reluctance of the UK government to accept any liability, even for harm it has caused its own citizens, illustrates the dangers of pursuing a path to assistance based on culpability and restitution, as opposed to the route taken in the draft ban treaty text. The compensation fund established by the Australian government, with a financial contribution from the UK is the kind of assistance that could be provided under the ban treaty if both countries were signatories. However, the level of assistance provided for UK veterans would probably need to be improved as it is not of a sufficient scale to fully provide for the "rehabilitation and psychological support, as well as provide for their social and economic inclusion" of all affected veterans.

65 Admin, BNTVA. 'Nuclear Test Veterans and Families Set for £25MILLION in Aid to Help with Their Care'. BNTVA, 1 June 2015. https://bntva.com/2015/06/nuclear-test-veterans-and-families-set-for-25million-in-aid-to-help-with-their-care/.

66 'Pacific Atomic Test Survivors Cannot Sue Ministry of Defence | Law | The Guardian'. Accessed 6 June 2017. https://www.theguardian.com/law/2012/mar/14/pacific-atomic-test-survivors-mod.

67 BNTVA, 2015. *Op cit.*

Safeguards, Verification & Disarmament

Article 4 – Towards the total elimination of nuclear weapons

1. Each State Party that after 7 July 2017 owned, possessed or controlled nuclear weapons or other nuclear explosive devices and eliminated its nuclear weapons programme, including the elimination or irreversible conversion of all nuclear weapons-related facilities, prior to the entry into force of this Treaty for that State Party, shall cooperate with the competent international authority...for the purpose of verifying the irreversible elimination of its nuclear weapons programme…Such a State Party shall conclude a safeguards agreement with the International Atomic Energy Agency sufficient to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or activities in that State Party as a whole...

2. Notwithstanding Article 1 (a), each State Party that owns, possesses or controls any nuclear weapons or other nuclear explosive devices shall immediately remove them from operational status and destroy them...in accordance with a legally-binding, time-bound plan for the verified and irreversible elimination of that State Party's nuclear weapons programme, including the elimination or irreversible conversion of all nuclear weapons-related facilities…This plan shall ...be negotiated with the competent international authority...

3. A State Party to which paragraph 2 applies shall conclude a safeguards agreement with the International Atomic Energy Agency sufficient to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or activities in the State as a whole...

The sections of the draft ban treaty that deal with disarmament verification and safeguards have undergone some of the most significant changes since the first draft was released by Ambassador Whyte Gomez in May. There are still two pathways for states with nuclear weapons to join the ban treaty. Under the 'disarm then join' route, a state which gets rid of its nuclear weapons before it signs the treaty has to work with the treaty's verification authority in order to give assurances to other signatories that its nuclear weapons programme has been irreversibly eliminated. The state then has to enter into a safeguards agreement with the IAEA so that it can show it is not diverting nuclear materials from any civilian nuclear facilities into a clandestine nuclear programme.

There is also a 'join then disarm' pathway for states to sign the ban treaty before they get rid of their nuclear weapons. In this situation the state has to take all its nuclear weapons off operational status and then produce a plan for irreversibly eliminating its nuclear weapons programme, which includes destroying, or converting, its nuclear weapons facilities in a way that is irreversible. This plan has to be negotiated with the verification authority and then approved by a meeting of the treaty signatories. Successful completion of the plan again needs to be followed with entering into a safeguards agreement with the IAEA.

The first draft of the ban treaty text included no details at all in the 'join then disarm' pathway and instead suggested that signatories could negotiate these details at a future date and include them as a protocol to the treaty. This was due to the different circumstances of the states that possess nuclear weapons and the uncertainty about the context in which they might come to join the treaty. As each state that possesses nuclear weapons might need specific arrangements and many of the issues that arise will require the input of states with nuclear weapons, it was not thought possible to devise a detailed disarmament pathway for them at this juncture.[68]

The current draft text provides a basic framework for the pathway, but defers any consideration of the details of disarmament and verification until a state with nuclear weapons signs the ban treaty and produces a disarmament plan. This approach has the benefit of not tying the ban treaty to a particular disarmament process and providing flexibility in the future, but means that in the event of a state with nuclear weapons joining the treaty, the details of the disarmament process will be primarily determined by that state and the verification authority, with other signatories being asked to approve it at a later stage.

In these clauses on verification and disarmament we can see clearly that the ban treaty is very much intended as a first step in a much longer process. The purpose of this first iteration is to establish a new international norm: to make a clear, unequivocal statement that the possession of nuclear weapons and associated activities are contrary to existing international laws. The details of how the states that do possess nuclear weapons might come to disarm, and how signatories can have confidence that disarmament has occurred, have been put aside for later consideration.

UK research on verification

Should the UK come to join the ban treaty at some point in the future, it would actually bring a wealth of expertise on the question of verification, as it has been central to international efforts to develop techniques to verify nuclear disarmament. The 1998 UK Strategic Defence Review tasked AWE with dismantling the UK's last 50 *WE177* nuclear bombs in such a way as to work out the practicalities of how disarmament could be verified.[69]

The UK and US technical cooperation programme on verification, which began in 2000,[70] was an outgrowth of AWE's verification research programme(p13-14).[71] The existence of the MDA created a 'low risk' environment where the two nations could experiment with verification methods. An inadvertent transfer of sensitive information that could be useful for building nuclear weapons would not be considered a proliferation risk as both countries were already committed to sharing this information.(p13)

68 Ambassador Elayne Whyte Gomez. 'Letter from the Chair', 24 May 2017. https://s3.amazonaws.com/unoda-web/wp-content/uploads/2017/05/Letter-from-the-Chair_May-24-2017.pdf.

69 Ian Davis, 2015. *Op cit.* p22.

70 Tim Caughley. 'Nuclear Disarmament Verification: Survey of Verification Mechanisms'. UNIDIR, 2016. http://www.unidir.org/files/publications/pdfs/survey-of-verification-mechanisms-en-657.pdf.

71 'Joint U.S.-U.K. Report on Technical Cooperation for Arms Control'. United States Department of Energy, National Nuclear Security Administration, Defense Nuclear Nonproliferation, Office of Nonproliferation and Arms Control, n.d. https://nnsa.energy.gov/sites/default/files/Joint_USUK_Report_FINAL.PDF.

Following this the UK launched a joint project on verification with Norway, which was pioneering as a cooperation between a nuclear-weapon state and a non-nuclear-weapon state.[72] In a paper the two nations stated that they believed a verification process involving both types of states was possible with them fulfilling their respective obligations under the NPT.[73]

One of the key initiatives developed by the UK and Norway was an 'Information Barrier', a combination of procedures and technology, which could confirm the presence of weapons grade plutonium, but not more sensitive information such as the exact ratio of plutonium isotopes.[74]

Although the CTBT has not yet come into force due to ratification issues, much of the functioning of the Comprehensive Test Ban Treaty Organisation (CTBTO), which was established in Vienna in 1997 to oversee compliance with the CTBT, has already set up an international monitoring system, and other verification technologies and tools to verify the CTBT, which would also be very helpful in monitoring compliance with the ban treaty.

One of the international monitoring systems is a network of seismic monitoring stations that are able to detect the signature of a nuclear explosion.[75] AWE Blacknest undertakes seismic research and monitoring work, and manages the Eskdalemuir seismic monitoring array in Dumfries and Galloway which detects seismological signals. Blacknest also undertakes radiochemical analysis in support of the CTBT. The current draft ban treaty doesn't specify any role for the CTBTO, but there presumably is an assumption that the CTBTO can monitor compliance with the prohibition on testing in the ban treaty. If so, AWE's expertise and the UK's work in this field suggests another way in which the UK could potentially contribute to the ban treaty regime in the future.

72 Under the NPT certain states are designated as nuclear-weapon states and others as non-nuclear-weapon states. The two categories of state are under different sets of obligations designed to prevent the spread of nuclear weapon technology. In this paper the terms 'nuclear-weapon state' and 'non-nuclear-weapon state' are used to refer to states that fall into these two categories in the NPT. Several states with nuclear weapons are not signatories to the NPT, and where terms such as 'states possessing nuclear weapons' or 'states without nuclear weapons' are used in this paper, this refers to all states that are or are not possession of nuclear weapons, regardless of their status within the NPT.

73 Tim Caughley, 2016 *Op cit.* p11.

74 *Ibid.*; 'The United Kingdom – Norway Initiative: Further Research into the Verification of Nuclear Warhead Dismantlement: Working Paper Submitted by the Kingdom of Norway and the United Kingdom of Great Britain and Northern Ireland', 22 April 2015. http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/npt/revcon2015/documents/WP31.pdf.

75 Tim Caughley, 2016 *Op cit.* p19-20.

Conclusion: what would UK disarmament look like under the draft treaty?

While some of the details of disarmament and verification have been intentionally set aside for consideration at some point in the future, it is worth reviewing what we know about what the ‘end state’ would be for a state with nuclear weapons like the UK, if it were to join the ban treaty as presented in the draft text.

The UK would be required to dismantle its nuclear warheads and much of the development and manufacturing work at the AWE sites would need to cease, though work on the production of fuel for nuclear-powered submarines could continue. The facilities previously used to manufacture warheads would need to be destroyed or irreversibly converted to civilian use, as would facilities used for storing the warheads, such as RNAD Coulport.

The future of the nuclear-armed submarine programme is less certain. The submarines might be considered to be outside the remit of the ban treaty, as there is no explicit ban on delivery systems, or they could be included in an agreement under the ‘join-then-disarm’ pathway might, in which case there could be a requirement to decommission them or to alter them in such a way that they could no longer be used to fire nuclear weapons.

Much of the UK’s cooperation with France and the US on nuclear weapons would need to cease, but some elements could continue, notably disarmament verification research and threat reduction work - if they were not classed as developing nuclear weapons or assisting, encouraging or inducing a breach of the terms of the ban treaty. The extent to which hydrodynamics, laser implosion research and other subcritical testing would have to be curtailed is not clear – research which could not be characterised as developing, maintaining a stockpile or testing nuclear weapons might be allowed to continue.

The UK's current safeguarding arrangements take place under the Euratom Treaty. As the UK is currently planning to leave the Euratom regime as a result of the 2016 referendum decision to leave the European Union, new safeguarding arrangements will need to be agreed with either Euratom or the IAE directly if it is to comply with international standards. If the UK then joined the ban treaty these safeguards agreements would likely be extended to cover sites which are currently part of the nuclear weapons programme, such as AWE Aldermaston. While the draft ban treaty does not stipulate what should happen to the fissile material currently in nuclear weapons, or set aside for use in weapons, the fate of this material would also presumably be addressed either by the verification authority or the safeguards agreement.

Theoretically he UK could remain a member of NATO, but if the rest of the alliance was resolved to maintain nuclear weapons as a key element of their military doctrine, the relationship would be fraught. The UK would not be under a hard obligation to help Australia deal with the legacy of British nuclear testing, but the financial contribution that has already been provided is definitely in keeping with the spirit of the ban treaty. However, more would need to be done to help UK nuclear test veterans.

Many of the uncertain details would depend on the disarmament process. If the UK decided to disarm and then join the ban treaty, it would determine the process itself, though the final result would need to be affirmed by the verification authority. In the join

then disarm pathway, a plan would need to be negotiated with the verification authority and approved by the other signatories. Will identical standards be applied to all states who join, regardless of which disarmament pathway they choose, and what will those standards be?

The extent to which the ban treaty is able to achieve its stated goal of universal and complete nuclear disarmament will depend on its ability to satisfactorily resolve these verification issues so that each signatory can have confidence that all of them are fulfilling their treaty obligations. If states which currently have nuclear weapons, such as the UK, join the ban treaty, the need for a robust verification and safeguards regime would be even more acute, as they would face much lower barriers in terms of knowledge and expertise if they decided to re-acquire nuclear weapons.

The sensitivity and complexity of these issues lend support to the decision to defer consideration of the details to a later date. The priority of the states negotiating the ban treaty has been to finalise a text as soon as possible that establishes an international legal norm against the possession and use of nuclear weapons. This is an entirely legitimate goal, and whatever your position on the desirability of the treaty, it will be a significant development in diplomacy and disarmament. The states which currently possess nuclear weapons will be given a clear message about the acceptability of their ongoing possession and offered a framework within which they can carry out their legally binding obligation to disarm. It remains to be seen how they will respond.

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