



# **US-UK Mutual Defence Agreement**

**A Nuclear Information Service  
Briefing**



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Nuclear Information Service (NIS) is an independent, not-for-profit research organisation, founded in 2000. We investigate the UK nuclear weapons programme and publish accurate and reliable information to stimulate informed debate on disarmament and related issues.

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# Introduction

This briefing gives an overview of the *Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes*, commonly known as the Mutual Defence Agreement (MDA).

The MDA is the treaty that governs the relationship between the nuclear weapons programmes of the United Kingdom (UK) and United States (US), which is unique amongst nuclear armed states for the level of dependency and technical integration involved.

The treaty allows for the exchange of information about nuclear technologies between the two states, and for the US to provide the UK with nuclear materials, such as uranium and plutonium, components of nuclear weapons, and submarine reactor technology. Staff from the nuclear enterprises in both countries coordinate activities through Joint Working Groups and are sometimes seconded to work in the other country for some time. Until 1992, cooperation under the MDA included use of each others' sites for nuclear testing, particularly the UK testing nuclear weapons in Nevada.

The UK currently operates a submarine-launched nuclear weapons system. The reactors that power the UK's four nuclear-armed submarines, and other submarine technologies on board, are based on US designs. The UK's warheads are believed to be very close in design to weapons in the US stockpile. US designed and manufactured Trident missiles carry the UK's warheads. The UK's use of the Trident system is governed by an updated version of the Polaris Sales Agreement, which is a separate treaty from the MDA.

In 2014 David Lidington, a UK Foreign Office Minister, said the treaty 'helps to provide the maintenance and servicing required to ensure the safety, security and reliability' of the UK's nuclear weapons 'at a substantial reduction on the costs that would otherwise be incurred'.<sup>1</sup> An amendment to the treaty, published in 2024, will extend sharing of nuclear material and other components under the MDA indefinitely. This edition of the briefing has been updated to take into account the proposed 2024 changes.

CREDIT: POA(PHOT) JULIAN MERRILL/OGL



*HMS Victorious, one of the UK's nuclear-armed submarines, alongside at Faslane in 2007.*

# History of the MDA<sup>2</sup>

The UK and US worked together on the Manhattan Project, which produced the first nuclear weapons. The basis for nuclear cooperation during the Second World War was the 1943 Quebec Agreements and the 1944 Hyde Park aide memoire. Both were executive agreements between Churchill and Roosevelt, rather than treaties, and were not subject to Congressional approval.

After the use of nuclear weapons in Hiroshima and Nagasaki, the US Congress, which was not aware of the extent of UK involvement in the Manhattan Project, passed the 1946 McMahon Act. The act prevented US citizens from sharing information about nuclear weapons with foreign nationals, immediately curtailing cooperation with the UK.<sup>3</sup>

Due to differing interpretations of the Act amongst US government agencies some collaboration on intelligence sharing and uranium supply continued to take place. As the Cold War began to take hold, US nuclear bombers were also deployed in the UK, and the practicalities of military cooperation would in time place a strain on the strict conditions of the McMahon Act.

The UK had responded to the Act by deciding to develop its own nuclear weapons. The US, at the time still the only nuclear-armed state, made a proposal in 1948 for a resumed integrated nuclear weapons programme which would have seen the UK having custody of a stockpile of 20 nuclear bombs. A similar proposal was floated in 1953, following the UK's first nuclear test in 1952, but the two states did not come to an agreement. The UK was the third state to develop its own nuclear weapons, the Soviet Union having carried out a nuclear test in 1949.

In 1954 the McMahon Act was replaced with the Atomic Energy Act, a compromise which allowed exchanges of knowledge for civil nuclear purposes and allowed some basic information about the yields and military characteristics of US nuclear weapons to be shared with NATO states. This would allow these states, including the UK, to field delivery systems for the weapons. A new UK-US agreement in 1955, brokered under the new regime, covered the supply of

uranium 235 for civil use, more intelligence sharing and joint nuclear war planning. Uranium 235 is the highly radioactive isotope used in reactor fuel and nuclear weapons. An agreement on the UK being supplied with nuclear submarine technology followed in 1956.

The UK's production capacity for aircraft capable of carrying nuclear weapons soon outstripped the speed at which it could produce nuclear material for the weapons themselves. Informal discussions began in 1957 on the US providing highly enriched uranium (HEU) to allow the UK to increase its stockpile faster, although the transfers were not permitted under the 1954 Act.

The UK's nuclear weapons at this time were all fission designs, utilising the destructive power of a critical mass of fissile material, compressed using explosives. Modern US and UK weapon designs are thermonuclear weapons where the energy from a fission weapon, made of uranium 235 or plutonium, is used as a 'primary' to implode a 'secondary': a fuel which undergoes nuclear fusion, releasing an even greater destructive power.

The UK producing its own independent thermonuclear weapons is often portrayed as the trigger for the US deciding that it was willing to resume nuclear cooperation,<sup>4</sup> but this is not the case. The UK carried out tests on thermonuclear weapons in May and June 1957, but the tests were not successful. At the time the US was publicly calling for an international ban on both nuclear testing and the further production of nuclear weapons, in response to domestic and international protests against atmospheric testing. The UK was keen to produce a working thermonuclear design before this happened. After the thermonuclear tests failed the UK told the US it would only support the proposed ban if it had independent access to a stockpile of modern weapon designs.

The launch of the Sputnik satellite in October 1957 changed the political environment, as it demonstrated that Soviet rocket technology could theoretically launch a nuclear weapon as far as the continental



CREDIT: IMPERIAL WAR MUSEUM

*Canadian Prime Minister Mackenzie King, President Franklin D Roosevelt and Winston Churchill during the Quebec Conference, 18 August 1943. Canada hosted the conference but was not party to the Quebec Agreement.*

US. A US-UK leaders' summit was quickly arranged, which resulted in the US National Security Council approving a full exchange of information and a commitment from the US to amend the 1954 Act. While discussions were ongoing about the shape of future cooperation, the UK carried out a successful test of a thermonuclear design in November 1957.

The MDA reflected the priorities of both states, but it more closely resembles the form envisaged by the US at the beginning of negotiations. Congressional hearings on amending the 1954 Act began in early 1958, but controversies around an exchange of plutonium and HEU, and a proposal for nuclear warheads under joint US-UK control, meant that these measures

were set aside to allow matters to progress. President Eisenhower eventually signed an updated Atomic Energy Act in July 1958 and the MDA was signed the following day.

The treaty has been repeatedly amended since 1958, often to extend the time period for sharing nuclear material and non-nuclear components. Other changes show the treaty changing to reflect the realities of the working relationship. Regular 'stocktake' meetings are held to discuss and plan the functioning of the treaty.<sup>5</sup> The 2024 amendments suggest that future changes are likely to be managed through implementing agreements, rather than regular changes to the treaty.<sup>6</sup>



# The Treaty

The initial form of the treaty allowed for the sharing of intelligence and sale of a submarine reactor and fuel to the UK, covered in *Article II* and *Article III* of the treaty respectively. Despite its prominence in bilateral discussions leading up to the treaty, the transfer of complete nuclear weapons between the two states was explicitly prohibited in the treaty text. An amendment to the treaty in 1959 added *Article III bis*, which enabled the transfer of nuclear material and non-nuclear components of nuclear weapons, but initially only for a 10-year period. Most of the amendments to the treaty have extended this period, and between 1984 and 2024 the extensions have been for additional periods of 10 years.

Other amendments also made more substantial changes to the treaty. In 1984, the first amendment after the US sale of the Trident missile system to the UK had been agreed, text was added enlarging the scope of information sharing under the treaty and to allow for the transfer of enriched uranium for any purpose.<sup>7</sup> In 2014 the amendments added a reference to the dangers of proliferation in the preamble, and allowed for the UK to purchase more submarine reactors, reactor parts and fuel.<sup>8</sup>

Smaller amendments have also been made, for example in 1994 a change was made to allow the US to arrange uranium enrichment for the UK, rather than directly providing it,<sup>9</sup> and in 2014 a paragraph was amended to include evaluating the capabilities of enemy states as one of the permitted purposes for information sharing.<sup>10</sup>

The 2024 amendments are the most significant changes to the treaty since the 1950s. Of the 13 articles in the treaty, 12 have been amended in some way, with five being completely replaced with new versions. The most substantial change is the removal of the sunset clause for sharing of nuclear materials and non-nuclear components, but other changes allow the UK to supply reactors, parts and fuel to the US, and for any kind of naval reactor to be transferred. Many of the changes are relatively small, however, such as simplifying language, rectifying stylistic inconsistencies, and referencing modern information classification categories. The changes also explicitly rule out the use of external dispute settlement mechanisms and allow for implementing agreements, suggesting that these will be used instead of future treaty amendments.

An annotated text of the treaty, including the 2024 amendment can be found on page 16 of this briefing. The treaty is written using US English spellings.

*Facing page:  
Mushroom cloud from the  
US Dominic Truckee nuclear  
test, 9 June 1962, Kiritimati.*





# Activities under the MDA

## Nuclear Testing

Although one of the drivers for the treaty was concern about a ban on nuclear testing,<sup>11</sup> access to testing facilities was one of the UK's priorities in the original negotiations. After the 1958 moratorium on nuclear testing was breached by the USSR in 1961, the UK and US both resumed testing, with the UK carrying out tests at the Nevada Test Site (NTS), and the US carrying out most of their Dominic test series in Kiritimati (then known as 'Christmas Island'),<sup>12</sup> which was at that time a British colonial holding.

The UK carried out 24 underground tests at the NTS between 1962 and 1991. The final test, known as 'Julin/Bristol', is believed to have been testing the lower-yield variant of the UK Trident warhead.<sup>13</sup> The US Dominic test series involved 25 atmospheric nuclear tests at or near Kiritimati.<sup>14</sup> Indigenous people in both Nevada<sup>15</sup> and Kiritimati,<sup>16</sup> and armed forces veterans,<sup>17</sup> are still dealing with the consequences of nuclear tests.

Since 1992 both states have observed a moratorium on nuclear testing and have signed the Comprehensive Nuclear Test Ban Treaty, however the US has not ratified the treaty.

Both the UK and US have active development and research programmes and are upgrading their nuclear weapons systems. This work does not involve live testing of nuclear weapons, but instead research using high energy lasers, computer simulation and sub-critical tests, which only use smaller quantities of fissile material than the amount needed to reach a critical mass. Through the MDA the UK and US research programmes are deeply intertwined and many of their research facilities have been designed to be complementary.<sup>18</sup> The vast majority of countries worldwide have expressed concerns about countries upgrading their nuclear weapons.<sup>19</sup>



CREDIT: NNSA

Craters from underground nuclear tests at Yucca Flat, in the Nevada Test site.

**Figure A. Transfer of non-nuclear components under the MDA 2020–2023**

Calendar year	Transfers from US to UK (single items)	Transfers from UK to US (single items)
2020	128	14
2021	271	25
2022	302	31
2023	254	38
<b>Total</b>	<b>955</b>	<b>108</b>

### Transfer of nuclear material

The acquisition of nuclear material from the US was a major initial goal for the UK, and the purchase of HEU for submarine reactors and tritium for nuclear weapons took place soon after the treaty was signed. Subsequently, barter exchanges of nuclear material were carried out between 1960 and 1979, with the UK sending plutonium in exchange for HEU and tritium. The UK sent 0.5 tonne of plutonium to the US between 1960 and 1969 under Barter A, 4.1 tonnes between 1964 and 1969 under Barter B and 0.8 tonne between 1975 and 1979 under Barter C. In return, the UK received a total of 6.7kg of tritium and 7.5 tonnes of HEU from the US.<sup>20</sup>

Transfers of plutonium also took place outside of these disclosed barter arrangements, with a total of 0.47 tonne being sent from AWE Aldermaston to the US and received back prior to March 1999. The timing of these plutonium ‘loans’ and in which direction the initial transfer took place has not been disclosed.<sup>21</sup>

No information about plutonium transfers after March 1999 or transfers of HEU and tritium outside the three barter exchanges has been made public, and the MOD has rejected Freedom of Information Requests for information about more recent transfers. However, the 2014 amendments to the MDA and nuclear road convoy movements suggest that transfer of HEU fuel for UK submarines is ongoing. The UK and US also have a joint programme to calibrate their nuclear forensic laboratories by testing the same samples, and the transfer of nuclear material in these samples is likely also carried out under the MDA.

### Transfer of non-nuclear components

There is little information in the public domain about the quantity and nature of transfers of non-nuclear components under the MDA. It is known that the Mk4A upgrade to the UK’s nuclear warhead, completed in 2023, involved changing the arming, fusing and firing system, neutron initiators and the gas transfer system, with these components being imported from the US.<sup>22</sup> The submarine reactor used in the current Astute and Vanguard nuclear submarines is a UK-specific design and may only use domestically produced parts. However, the PWR3 reactor used in the forthcoming Dreadnought submarines is based on a US design<sup>23</sup> and it is possible that some parts for these reactors are being imported under the MDA.

In response to a Freedom of Information Request by NIS the MOD stated that transfers of non-nuclear parts of nuclear weapon systems under the MDA between 2020 and 2023 had amounted to 955 individual items being transferred from the US to the UK and 108 individual items being transferred from the UK to the US.<sup>24</sup> The breakdown of these transfers by year can be found in Figure A.



## Joint Working Groups and Secondment

The primary method for US-UK cooperation under the MDA is through Joint Working Groups (JOWOGs). These are thematic committees comprised of subject matter experts from the nuclear enterprises of both countries. Each JOWOG focusses on a particular research area that has been identified during stocktake meetings and meets periodically. JOWOG meetings include presentations on specific areas of research, but can also agree research priorities, review progress and determine how work should be divided between different agencies or laboratories.

Figure B shows the activity of JOWOGs since 1959. Initially 15 JOWOGs were created, but most of these have been retired as their remit was no longer deemed relevant. At least 48 JOWOGs have been created since 1959, and 15 are currently active, as of June 2024.<sup>25</sup> Some JOWOGs appear to have been retired and reactivated at a later date, but this seems to be comparatively rare. Some of the JOWOGs have subcommittees for further specialisation within the subject area. These are known as SUBWOGs.

Figure B shows the JOWOGs known to have been active at different times during the operation of the MDA. Of the original 15, only one is known to still be active: JOWOG 9, which coordinates research on 'Energetic Materials', meaning explosives. Some JOWOGs have undergone name changes over the years. The titles of two of the original 15 JOWOGs have been partially redacted. The full title of JOWOG 2 appears to have been '500 to 600-pound megaton warhead'.<sup>26</sup>

Of the 15 JOWOGs currently active, the MOD refused to disclose the names of six.<sup>27</sup> As a consequence it is not clear whether the JOWOGs looking into 'Radiation Simulation and Kinetic Effects', 'Warhead Electrical Components and Technologies', 'Nuclear Counter-Terrorism Technology', 'Aircraft, Missile and Space System Hardening', and 'Methodologies for Nuclear Weapon Safety Assurance' are still active.

The title of JOWOG 47 has not been made public,<sup>28</sup> and it can be surmised that at least one other new JOWOG has been created since 2009. One or more of these new groups are probably working on the planned



Warhead handling during the US W76-1 warhead upgrade, which involved many components used in the UK Mk4A upgrade.

new US W93 and UK Astrea warheads, which have been described as 'parallel' projects, and their re-entry bodies.

Aside from JOWOGs the two states also arrange Exchange of Information by Visit Report, which are one-off information exchange events and Channels, which are more often used for management coordination and the exchange of regular information.<sup>29</sup> Between 2007 and 2009 over 2,000 visits by AWE staff were made to US nuclear facilities.<sup>30</sup>

Secondment of staff from one state to the nuclear enterprise of the other also takes place, building up reciprocal knowledge and allowing for deployment of specific expertise. In response to a Freedom of Information request in June 2024 the Atomic Weapons Establishment (AWE) said that the numbers of its employees seconded to the US and of US employees seconded to AWE was 'very low', so disclosing the actual numbers risked identifying individuals.<sup>31</sup> In response to a parliamentary question in 2018 the government said that 43 employees of the US government and General Dynamics Electric Boat company were seconded with the Dreadnought programme and 20 UK government employees working on the Dreadnought programme were seconded to the US.<sup>32</sup>

# Legality

A 2004 legal advice prepared by Rabinder Singh QC and Professor Christine Chinkin said it was 'strongly arguable' that the role of the MDA in the UK's ongoing nuclear weapons programme was a breach of the country's obligations under the Nuclear Non-Proliferation Treaty (NPT), under which the nuclear-armed states agreed to eliminate their nuclear weapons.<sup>33</sup>

The position of the UK government, as stated in a 2014 parliamentary debate, is that the MDA does not breach the NPT because it prohibits transfer of complete nuclear weapons and only allows for the transfer of knowledge and weapon components between two nuclear-weapon states. At the time it was also stated that the UK was complying with its obligations under the NPT by reducing the numbers of its nuclear weapons.<sup>34</sup> However, since then government policy has changed and in 2021 a planned reduction in the UK's stockpile to 180 warheads was reversed and instead the stockpile size was increased to 260.<sup>35</sup>

# Future of the MDA

The 2014 amendment to the MDA extended the sunset clause for *Article III bis* until December 31 2024. The amendment published in July 2024<sup>36</sup> removes the sunset clause from Article III bis to extend sharing of non-nuclear components and nuclear materials indefinitely.

Under the 2010 Constitutional Reform and Governance Act the UK Government has to publish any treaty it plans to ratify, and Parliament has 21 days within which it can vote to block ratification, potentially indefinitely. This time limit only includes days when Parliament is sitting, so the deadline for passing a resolution objecting to the the amendment is 23rd October 2024.<sup>37</sup>

The amendment will also need to be approved by the US Congress before it can come into force. President Biden wrote to the House of Representatives in July endorsing the amendment.<sup>38</sup> In September, legislation was introduced to approve the amendment.<sup>39</sup> At the time of writing, in early October 2024, the amendment seems likely to gain legislative assent in both the US and UK.

The new provisions for implementing agreements in the 2024 amendment suggest that the two states plan to use this mechanism for future changes to the treaty, instead of amendments. These would be unlikely to be subject to the same level of legislative scrutiny.

Nuclear Information Service calls for full scrutiny of the amendment in both nations through select committee hearings and/or debates. The indefinite extension of US-UK nuclear sharing runs contrary to the disarmament commitments of both states under the Nuclear Non-Proliferation Treaty. The primary focus of the transatlantic nuclear relationship should be on fulfilling those commitments instead of avoiding them.

Figure B. Active Joint Working Groups 1959–2024<sup>40</sup>

JOWOG	1959	1973	1995	1997
1	Antimissile missile defence systems			
2	500 to 600-pound [redacted] warhead			
3	150-pound [redacted] warhead			
4	Methods of predicting one-point detonation yields			
5	External neutron sources	Neutron sources		
6	Irradiation effects on materials and components		Irradiation effects on materials and components	
7	Mixing in gas-boosted weapons			
8	Shock-initiation of explosives			
9	Safety of HMX explosives			
10	Nonnuclear and hydrodynamic testing			
11	Analysis and specification of materials*			
12	Compatability of materials		Chemistry and Compatability of materials	
13	Underground and outer space testing			
14	Weapons effects for future tests			
15	Joint test facilities			
16?		Test Diagnostics		
17?			Test monitoring	
18?			Metallurgy of Weapons Materials	
19?			Non-Nuclear Components	
20?			Underground Effects Testing	
21?			Non-Metallic Materials	
22				
23				
?			Weapons Material Management	
28				
29				
30				
31				
32			Physics Design	
33			Weapons Hydrodynamics	
34				
35			Penetration Aid Technology	
36			Aircraft Hardening	
37			Nuclear Weapons Physics	
38			Nuclear Forces and Counter Proliferation Studies	
39				
40			Experimental Activities	
41				
42			Nuclear Weapon Computer Code Development	
43				
44				
45				
46				
47				
48				
?				

1998	2002	2009	2024
Radiation Simulation and Kinetic Effects Technology			
Energetic Materials			
Nuclear Materials			
Warhead Electrical Components and Technologies			
Non-Nuclear Materials			
Nuclear Counter-Terrorism Technology			
Facilities			Infrastructure and Operational Support
Nuclear Weapons Engineering			
Nuclear Warhead Physics			
Computational Technology			
Aircraft, Missile and Space System Hardening			
Laboratory Plasma Physics			
Manufacturing Technology			
Nuclear Warhead Accident Response Technology			
Nuclear Weapon Code Development			
Nuclear Weapon Environment and Damage Effects			
		Methodologies for Nuclear Weapon Safety Assurance	
			Defense Penetrability
			Knowledge, Information Management and Classification
			Radiochemistry and Nuclear Data





Treaty Series No. 41 (1958)

## Agreement

between the Government of the  
United Kingdom of Great Britain and Northern Ireland  
and the Government of the United States of America  
for Co-operation on the Uses of Atomic  
Energy for Mutual Defence Purposes

Washington, July 3, 1958

[The Agreement entered into force on August 4, 1958]

The Government of the **United Kingdom of Great Britain and Northern Ireland** and the Government of the United States of America, **(collectively, the “Parties”)**,

Considering that their mutual security and defense require that they be prepared to meet the contingencies of atomic warfare;

Considering that both countries have made substantial progress in the development of atomic weapons;

**Reaffirming that the spread of atomic weapons technology, potentially including State and sub-State actors, imperils the defense and security of both nations;**

Considering that they are participating together in international arrangements pursuant to which they are making substantial and material contributions to their mutual defense and security;

Recognizing that: their common defense and security will be advanced by the exchange of information concerning atomic energy and by the transfer of equipment and materials for use therein;

Believing that such exchange and transfer can be undertaken without risk to the defense and security of either country; and

Taking into consideration the United States Atomic Energy Act of 1954, as amended, which was enacted with these purposes in mind,

Have agreed as follows:

Reference to the United Kingdom Atomic Energy Authority (UKAEA) removed in 1974.

‘The Parties’ was used in the treaty but not specified before this 2024 addition.

Text added to preamble in 2014 referencing proliferation risks.

## ARTICLE I

### General Provision

While the United States and the United Kingdom are participating in an international arrangement for their mutual defense and security and making substantial and material contributions thereto, each Party will communicate to and exchange with the other Party information, and transfer materials and equipment to the other Party, in accordance with the provisions of this Agreement provided that the **originating Party** determines that such cooperation will promote and will not constitute an unreasonable risk to its defense and security.

Terminology simplified in 2024.

## ARTICLE II

### Exchange of Information

A. Each Party will communicate to or exchange with the other Party such Atomic Information and other related: Classified Information, Controlled Unclassified Information, technical data and technology subject to either Party's export control requirements, Sensitive Nuclear Technology and Controlled Nuclear Information, as is jointly determined to be necessary to:

1. the development of defense plans;
2. the training of personnel in the employment of and defense against atomic weapons and other military applications of atomic energy;
3. the evaluation of the capabilities of potential enemies in the employment of atomic weapons and other military applications of atomic energy;
4. the development of delivery systems compatible with the atomic weapons which they carry; and
5. research, development or design of military reactors.

For the avoidance of doubt, the Parties understand the above-mentioned purposes to incorporate security of the nuclear security enterprise and support of nuclear threat reduction capabilities.

B. In addition to the cooperation provided for in paragraph A of this Article, each Party will exchange with the other Party Atomic Information concerning atomic weapons and other related: Classified Information, Controlled Unclassified Information, technical data and technology subject to either Party's export control requirements, Sensitive Nuclear Technology, Controlled Nuclear Information, and special nuclear materials properties and production or processing technology, when, after consultation with the recipient Party, the originating Party determines that the communication of such information is necessary to improve the recipient Party's atomic weapon design, development or fabrication capability.

C. In addition to the provisions of this Agreement, the originating Party shall apply its internal processes to the communication or exchange of information to the recipient Party.

New 2024 version of Article II includes more detailed language on information classification categories, the clarification about nuclear security and threat reduction, and paragraph C. Previous changes in 1984 increased the scope of sharing and the types of information shared.

### ARTICLE III

#### **Naval Nuclear Propulsion Plants and Related Equipment, Information and Materials**

A. Subject to terms and conditions acceptable to it, an originating Party may directly, or may authorize persons to:

1. transfer by sale to the recipient Party or persons designated by the recipient Party naval nuclear propulsion plants or parts thereof, including spare parts, naval reactor cores, fuel elements and other related equipment, as may be agreed by the Parties; and
2. communicate to or exchange with the recipient Party or persons designated by the recipient Party information, including information designated as Naval Nuclear Propulsion Information (“NNPI”), as is necessary for the research, development or design of naval nuclear propulsion plants or parts thereof, including their manufacture, operation, maintenance, regulation and disposal.

B. Each Party may transfer to the other Party agreed amounts of materials, including U-235 contained in uranium enriched in the isotope U-235, as needed for use in any naval nuclear propulsion plant on such terms and conditions as may be agreed. If the Parties mutually agree to do so, the originating Party may reprocess any material transferred under this paragraph in facilities of the originating Party, on terms and conditions to be agreed, or may authorize such reprocessing in private facilities in the territory of the originating Party. Enriched uranium recovered in reprocessing such materials by either Party may be purchased by the originating Party under terms and conditions to be agreed. Special nuclear material recovered in reprocessing such materials and not purchased by the originating Party may be returned to or retained by the recipient Party.

C. Each Party shall be compensated for enriched uranium sold by it pursuant to this Article at a price based on the fair market price of comparable enriched uranium at the time of the sale. For types of enriched uranium that do not have a commercial market, compensation for sale will be made at a price to be agreed by both Parties.

D. The Parties may communicate or exchange information, including NNPI, on methods of reprocessing fuel elements of the type utilized in any naval nuclear propulsion plant, including information on the design, construction or operation of facilities for the reprocessing of such fuel elements.

### ARTICLE III BIS

#### **Transfer of Materials and Equipment**

A. The Government of the United States shall transfer to the Government of the United Kingdom the following in such quantities, at such times, and on such terms and conditions as may be agreed:

1. non-nuclear parts of atomic weapons which parts are for the purpose of improving the United Kingdom’s state of training and operational readiness;
2. other non-nuclear parts of atomic weapons systems involving Restricted Data which parts are for the purpose of improving the United Kingdom’s state of training and operational readiness when in accordance with appropriate requirements of applicable laws;

New 2024 version of Article III allows for reciprocal transfer of reactors, parts and fuel, and allows transfer of any naval reactor, not just submarine reactors. A previous change in 2014 amended the 1958 text allowing sale of a single submarine reactor to allow sale of multiple reactors or parts of reactors. The 2024 version keeps most of the 2014 changes, but removes a paragraph on legal indemnification and adds reactor regulation and disposal, plus new grounds for information sharing.

Article III bis was added to the treaty in 1959 and contains the operative text for the transfer of non-nuclear components and nuclear material.

Amendments in 2024 removed the sunset clause from Article III bis

3. source, by-product and special nuclear material, and other material, for research on, development of, or use in atomic weapons when, after consultation with the Government of the United Kingdom, the Government of the United States determines that the transfer of such material is necessary to improve the United Kingdom's atomic weapon design, development or fabrication capability.

In 1968 the reference to 'other material' was added, and this text moved to a separate paragraph. 'Utilization facility' is a technical term for a nuclear reactor.

B. The Government of the United States shall transfer to the Government of the United Kingdom special nuclear material, and authorize the transfer of other material, for research on, development of, production of, or use in utilization facilities for military applications, in such quantities, at such times, and on such terms and conditions as may be agreed.

C. The Government of the United States shall transfer enriched uranium to the Government of the United Kingdom, and shall arrange enrichment and other uranium services for the Government of the United Kingdom, for military purposes, in such quantities, at such times, and on such terms and conditions as may be agreed.

New paragraph in 1984 allowed for enriched uranium transfers for any purpose, instead of just improving weapon design or fabrication.

D. The Government of the United Kingdom shall transfer to the Government of the United States for military purposes such source, by-product, other material and special nuclear material, and equipment of such types, in such quantities, at such times, and on such terms and conditions as may be agreed.

Text amended in 1994 to allow for the US to arrange enrichment for the UK as well as providing it directly.

E. 1. With respect to by-product material, special nuclear material and other material transferred from one Party to the other under this Article, the recipient Party agrees not to use any such material for purposes other than those for which it was received, provided that material which has lost its identity as a result of commingling with other material of the recipient Party may be put to other uses if the recipient Party retains an equivalent amount of its own material for the purpose for which the originating Party's material was received.

Several minor textual changes made in 2024

2. For material or equipment transferred from one Party to the other Party, the recipient Party shall pay or reimburse, as may be agreed, all packaging, transportation and related costs. Packaging, shipping containers and methods of shipment shall be as may be agreed.

3. Should either Party desire to acquire materials or components for use in the manufacture or in preparation for manufacture of atomic weapons from any source within the jurisdiction of the other Party, the procuring Party shall inform the other Party of the proposed procurement in order that such other Party may determine whether the proposed procurement involves information communicated or exchanged pursuant to this Agreement and if so whether the proposed procurement is in compliance with its applicable laws and regulations.

#### ARTICLE IV

##### **Responsibility for Use of Information, Material and Equipment and Waiver of Claims**

Article updated in 2024 with some minor textual changes and adding the waiver in the title.

A. The application or use of any information (including design drawings and specifications), material or equipment communicated, exchanged or transferred under this Agreement shall be the responsibility of the recipient Party, and the originating Party does not provide any indemnity, and does not warrant the accuracy or completeness of such information and does not warrant the suitability or completeness of such information, material or equipment for any particular use or application.

B. The recipient Party waives all of its claims, except contract claims, against the originating Party and its employees, arising out of or connected with the use or application of this information, material or equipment, including any claim arising out of or connected with the design, manufacture, assembly, transfer or utilization of naval nuclear propulsion plants, spare parts, naval reactor cores or fuel elements transferred pursuant to this Agreement.

Paragraph B added in 2024.

## ARTICLE V

### Conditions

A. Cooperation under this Agreement will be carried out by each of the Parties in accordance with its applicable laws and regulations.

Several minor edits were made in 2024 to clarify the text of Article V.

B. Under this Agreement there will be no transfer by either Party of atomic weapons.

Paragraph C rewritten in 1979 to allow other uses under the agreement.

C. Except where specifically authorized by this Agreement or as may be agreed for civil uses, the recipient Party agrees not to use the information communicated or exchanged, or the materials or equipment transferred, pursuant to this Agreement for other than the preparation or implementation of defense plans, including the evaluation of potential enemy capabilities, in the mutual interests of the two countries.

Text including evaluation of enemy capabilities added in 2014

D. Nothing in this Agreement shall preclude the communication or exchange of Classified Information, Controlled Unclassified Information, technical data and technology subject to either Party's export control requirements, Sensitive Nuclear Technology or Controlled Nuclear Information, which may be transmitted under other arrangements between the Parties.

Updated paragraph D in 2024 includes greater detail on information classification categories, and mention of export control requirements. A 1984 amendment had previously added information categories.

## ARTICLE VI

### Guaranties

A. Classified Information communicated or exchanged, as well as materials and equipment transferred, pursuant to this Agreement shall be accorded full security protection under applicable security arrangements between the Parties and applicable laws and regulations of the Parties. In no case shall either Party maintain security standards for safeguarding Classified Information, materials or equipment made available pursuant to this Agreement less restrictive than those set forth in the applicable security arrangements in effect on the date this Agreement comes into force.

Amendments in 2024 to clarify text and add greater detail on information classification categories

B. Controlled Unclassified Information, technical data and technology subject to either Party's export control requirements, Sensitive Nuclear Technology and Controlled Nuclear Information communicated or exchanged pursuant to this Agreement shall be accorded at least the same level of protection by the recipient Party as that accorded to such information by the originating Party. The Parties shall consult with each other regarding the appropriate protections for such information.

Additions in 1984 including protections for nuclear technology, nuclear material and controlled information, alongside the original protection for classified information.

C. Classified Information designated by the United Kingdom as "OFFICIAL-SENSITIVE" shall be protected by the United States in accordance with the procedures identified in an implementing instrument or instruments entered into by the Parties.

New paragraph added in 2024.

D. Adequate physical security shall be maintained with respect to any source material, special nuclear material and equipment transferred pursuant to the Agreement, and with respect to any special nuclear material used in or produced through the use of any material or reactor so transferred. Each Party shall provide protection commensurate with both Parties' laws, regulations and policies.

Amendment in 2024 replaced previous wording that linked protections to the importance of material or equipment.

E. Information communicated or exchanged pursuant to this Agreement will be made available through channels existing or hereafter agreed for the communication or exchange of such information between the Parties.

Amendments in 2024 substituted this catch-all term for a longer list of information types. Several of these had been added in 1984.

F. Information communicated or exchanged, and any materials or equipment transferred, pursuant to this Agreement shall not be communicated, exchanged or transferred by the recipient Party or persons under its jurisdiction to any unauthorized persons, or, except as provided in Article VII of this Agreement, beyond the jurisdiction of that Party. Each Party may stipulate the degree to which any of the information, materials or equipment communicated, exchanged or transferred by it or persons under its jurisdiction pursuant to this Agreement may be disseminated or distributed; may specify the categories of persons who may have access to such information, materials or equipment; and may impose such other restrictions on the dissemination or distribution of such information, materials or equipment as it deems necessary.

G. Adequate materials control and accountability shall be maintained with respect to any nuclear material (including source material and special nuclear material) transferred pursuant to the Agreement, and with respect to any nuclear material used in or produced through the use of any nuclear material or equipment transferred pursuant to the Agreement. Each Party guarantees adequate materials control and accountability shall be maintained so long as such nuclear material or equipment remains under its jurisdiction or control. As may be mutually agreed, the Parties shall consult with each other regarding methods and technology for providing such materials control and accountability.

Paragraph on controlling and accounting for nuclear materials added in 1994.

## ARTICLE VII

### Dissemination of Information, Materials and Equipment

Nothing in this Agreement shall be interpreted or shall operate as a bar or restriction to consultation or cooperation in any field of defense by either Party with other nations or international organizations. Neither Party, however, shall communicate or exchange information or transfer or permit access to or use of materials or equipment made available by the originating Party pursuant to this Agreement to any nation or international organization unless:

New 2024 version of Article VII retains the meaning of the previous version but uses updated terminology commensurate with other 2024 changes. Previously, more detail on sharing with other states and international organizations had been added in 1959 and additional information categories in 1984.

A. it is notified by the originating Party that all appropriate provisions and requirements of the originating Party's applicable laws and regulations, including authorization by competent bodies of the originating Party, have been complied with as necessary to authorize the originating Party directly so to communicate to, transfer to or permit access to or use by such other nation or international organization; and further that the originating Party authorizes the recipient Party so to communicate to, transfer to or permit access to or use by such other nation or international organization; or



B. in the case of communication or exchange of information or access to materials or equipment, the originating Party has informed the recipient Party that the originating Party has so communicated or exchanged such information to, or permitted access to such materials or equipment by, such other nation or international organization; or

C. in the case of material which has lost its identity as a result of commingling with other material of the recipient Party, the recipient Party retains an amount under its jurisdiction equivalent to that made available to it by the originating Party under this Agreement.

## ARTICLE VIII

### Information-Security Policies

A. Agreed information-security policies shall be maintained with respect to all information, materials or equipment communicated, exchanged or transferred under this Agreement. The Parties intend to continue the present practice of consultation with each other on these matters.

B. In the event that either Party updates its national information-security terminology referred to in Article XI, it shall notify the other Party in writing and, upon mutual written determination, the relevant definition(s) shall be read using the updated terminology for the purposes of this Agreement.

## ARTICLE IX

### Intellectual Property

A. The Parties shall ensure adequate and effective protection of intellectual property created or furnished under this Agreement and relevant implementing instruments. Rights to such intellectual property shall be allocated as provided in this Article.

B. With respect to any invention or discovery employing or derived from information, material or equipment which has been communicated, exchanged or transferred pursuant to this Agreement and made or conceived by the recipient Party, or any agency or corporation owned or controlled thereby, or any of their agents or contractors, or any employee of any of the foregoing, after the date of such communication, exchange or transfer but during the period of this Agreement:

1. in the case of any such invention or discovery in which rights are owned by the recipient Party, or any agency or corporation owned or controlled thereby, and not included in subparagraph 2 of this paragraph, the recipient Party shall, to the extent owned by any of them:

(a) transfer and assign to the originating Party all right, title and interest in and to the invention or discovery, including any patent application or patent thereon, in the country of the originating Party, subject to the retention of a royalty-free, non-exclusive, irrevocable license for the governmental purposes of the recipient Party and for the purposes of mutual defense; and

(b) grant to the originating Party a royalty-free, non-exclusive, irrevocable license for the governmental purposes of the originating Party and for purposes of mutual defense worldwide, including use in the production of material for sale to the recipient Party by a contractor of the originating Party;

New 2024 version of Article VIII adds paragraph B, allowing for the treaty to encompass new information classification categories without needing to update the treaty text. Paragraph A includes updated terminology.

Updated 2024 version of Article IX contains similar provisions to the previous text, using updated and expanded terminology, commensurate with other 2024 changes. New paragraphs A, E and F (3) set out some general principles, provision for implementing agreements, and rules about publishing information.



2. in the case of any such invention or discovery which is primarily useful in the production or utilization of special nuclear material or atomic energy and made or conceived prior to the time that the information it employs is made available for civil uses, the recipient Party shall:

(a) obtain, by appropriate means, sufficient right, title and interest in and to the invention or discovery, including any patent application or patent thereon, as may be necessary to fulfill its obligations under the following two subparagraphs;

(b) transfer and assign to the originating Party all right, title and interest in and to the invention or discovery, including any patent application or patent thereon, in the country of the originating Party, subject to the retention of a royalty-free, non-exclusive, irrevocable license, with the right to grant sublicenses, for all purposes; and

(c) grant to the originating Party a royalty-free, non-exclusive, irrevocable license, with the right to grant sublicenses, for all purposes worldwide.

#### C.

1. Each Party shall, to the extent owned by it, or any agency or corporation owned or controlled thereby, grant to the other Party a royalty-free, non-exclusive, irrevocable license to manufacture and use the subject matter covered by any patent and incorporated in any material or equipment transferred pursuant to this Agreement for use by the licensed Party for the purposes set forth in paragraph C of Article V.

2. The originating Party neither warrants nor represents that any information, material or equipment transferred under this Agreement does not infringe any patent owned or controlled by other persons and assumes no liability or obligation with respect thereto, and the recipient Party waives all of its claims against the originating Party and its employees, for any and all liability arising out of any infringement of any such patent.

D. With respect to any invention or discovery, including any patent application or patent thereon, or license or sublicense therein, covered by paragraph B of this Article, each Party:

1. may, to the extent of its right, title and interest therein, deal with the same worldwide (other than in the country of the other Party) as it may desire, but shall in no event discriminate against citizens of the other Party in respect of granting any license or sublicense under the patents owned by it worldwide; and

2. hereby waives all of its claims against the other Party for compensation, royalty or award.

E. The Parties may conclude an implementing agreement or agreements for the purpose of allocating intellectual property rights arising under this Agreement other than those allocated in paragraphs B through D of this Article. Any implementing agreement shall be consistent with this Agreement.

F. Notwithstanding anything to the contrary in this Article or in any implementing agreement concluded pursuant to paragraph E of this Article:

1. No patent application with respect to any invention or discovery employing or derived from information, material or equipment communicated, exchanged or transferred pursuant to this Agreement that includes Classified Information, Controlled Unclassified Information, technical data or technology subject to either Party's export control requirements, Sensitive Nuclear Technology, or Controlled Nuclear Information, may be filed:

(a) by either Party or any person in the country of the other Party except in accordance with agreed conditions and procedures; or

(b) in any jurisdiction not of a party to this Agreement except as may be agreed and subject to Articles VI and VII.

2. Appropriate secrecy or prohibition orders shall be issued for the purpose of giving effect to paragraph F(1) of this Article.

3. Any intended publication of information employing or derived from information communicated or exchanged under the Agreement or related to material or equipment transferred under this Agreement shall be subject to both Parties' respective review processes for: Classified Information, Controlled Unclassified Information, technical data or technology subject to export control requirements, Sensitive Nuclear Technology, and Controlled Nuclear Information. Classified Information, Controlled Unclassified Information, technical data or technology subject to export control requirements, or Controlled Nuclear Information communicated or exchanged pursuant to this Agreement, or derived from information so communicated or exchanged, may not be published except in accordance with both Parties' applicable laws and regulations and only following such review by the Parties.

## ARTICLE X

### **Previous Agreements for Cooperation**

Effective from the date on which the present Agreement enters into force, the cooperation between the Parties being carried out under or envisaged by the Agreement for Cooperation Regarding Atomic Information for Mutual Defence Purposes, which was signed at Washington on June 15, 1955,<sup>I</sup> and by paragraph B of Article I bis of the Agreement for Cooperation on Civil Uses of Atomic Energy, which was signed at Washington on June 15, 1955,<sup>II</sup> as amended by the Amendment signed at Washington on June 13, 1956,<sup>III</sup> shall be carried out in accordance with the provisions of the present Agreement.

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I. United Nations, Treaty Series, Vol. 214, p. 301.

II. United Nations, Treaty Series, Vol. 229, p. 73.

III. United Nations, Treaty Series, Vol. 252, p. 394.

## ARTICLE XI

### Definitions

#### For the purposes of this Agreement:

A. 'Atomic weapon' means any device utilizing atomic energy, exclusive of the means for transporting or propelling the device (where such means is a separable and divisible part of the device), the principal purpose of which is for use as, or for development of, a weapon, a weapon prototype, or a weapon test device.

B. "Classified Information" means information, data, materials, services or any other matter within the scope of this Agreement with the security designation of United States "Confidential" or higher or, with respect to the United Kingdom, a security designation of "OFFICIAL-SENSITIVE" or higher, as applied under the laws or regulations of either the United States or the United Kingdom, respectively. "Classified Information" includes Atomic Information and that designated by the United States as National Security Information.

2024 version of paragraph uses updated information classification categories. A reference to additional UK categories had been added in 2014.

C. "Controlled Unclassified Information" means information created or possessed by either Party that requires safeguarding or dissemination controls pursuant to and consistent with applicable law, regulations and government-wide policies but is not Classified Information. For the United States, this means information designated as (U.S.) Controlled Unclassified Information.

Definitions of sensitive nuclear technology and controlled information added in 1984.

D. "Sensitive Nuclear Technology" means any information (including information incorporated in a production or utilization facility or important component part thereof) which is not available to the public and which is important to the design, construction, fabrication, operation or maintenance of a uranium enrichment or nuclear fuel reprocessing facility or a facility for the production of heavy water, but shall not include Classified Information.

E. "Controlled Nuclear Information" means unclassified information protected by the Government of the United States from unauthorized dissemination pursuant to sections 57.b. or 148 of the United States Atomic Energy Act of 1954, as amended.

F. "Equipment" means any instrument, apparatus or facility and includes any facility, except an atomic weapon, capable of making use of or producing special nuclear material, and component parts thereof, and includes naval nuclear propulsion plants or parts thereof, reactors, and military reactors. "Equipment" also includes non-nuclear parts of atomic weapons and other non-nuclear parts of atomic weapons systems involving Restricted Data.

Definition of 'equipment' enlarged to include non-nuclear weapon components in 1959.

G. 'Military reactor' means a reactor for the propulsion of naval vessels, aircraft or land vehicles and military package power reactors.

H. 'Person' means:

1. any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, government agency or government corporation other than the United Kingdom Ministry of Defence and the United States Department of Energy and
2. any legal successor, representative, agent or agency of the foregoing

Agency names removed in 1979 and replaced with government departments.

I. “Reactor” means an apparatus, other than an atomic weapon, in which a self-supporting fission chain reaction is maintained and controlled by utilizing uranium, plutonium or thorium, or any combination of uranium, plutonium or thorium.

Paragraph referring to the UKAEA deleted in 1974.

J. “Naval nuclear propulsion plant” means a propulsion plant and includes the reactor, and such control, primary, auxiliary, steam and electric systems as may be necessary for propulsion of **naval vessels**.

Amended in 2024 for treaty to allow for transfer of any type of naval reactor under the treaty, not just submarines.

K. “Non-nuclear parts of atomic weapons” means parts of atomic weapons which are specially designed for them and are not in general use in other end products and which are not made, in whole or in part, of special nuclear material; and “other non-nuclear parts of atomic weapons systems involving Restricted Data” means parts of atomic weapons systems, other than non-nuclear parts of atomic weapons, which contain or reveal Atomic Information and which are not made, in whole or in part, of special nuclear material.

Definitions of non-nuclear parts and atomic information added in 1959.

L. “Atomic Information” means information designated as Restricted Data or Formerly Restricted Data by the United States and information designated as ATOMIC by the United Kingdom.

Amended in 2024 for stylistic consistency.

M. “Nuclear security enterprise” means, for the United States, the physical infrastructure, technology and workforce at the national security laboratories and atomic weapons production sites, as well as the Nevada National Security Site and the National Nuclear Security Administration’s Office of Secure Transportation, and for the United Kingdom, the equivalent physical infrastructure, technology and workforce associated with the defence nuclear enterprise.

New definitions added in 2024.

N. “Naval Nuclear Propulsion Information” or “NNPI” means information concerning the design, arrangement, development, manufacture, testing, operation, administration, training, maintenance or repair of the naval nuclear propulsion plants of naval nuclear-powered vessels and prototypes, including the associated shipboard and shore-based nuclear support facilities, and consists of Classified Information and Controlled Unclassified Information.

O. “National Security Information” means information that has been determined pursuant to U.S. Executive Order No. 13526 or any predecessor or successor order to require protection against unauthorised disclosure and is marked to indicate its classified status when in documentary form.

P. “Originating Party” means the Party that originally communicates, exchanges or transfers information, material or equipment, as applicable.

Q. “Recipient Party” means the Party that originally receives the communication, exchange or transfer of information, material or equipment, as applicable.

## ARTICLE XII

### Final Provisions

A. This Agreement shall enter into force on the date on which each Government shall have received from the other Government written notification that it has complied with all statutory and constitutional requirements for the entry into force of this Agreement, and shall remain in force until terminated by agreement of both Parties, except that, if not so terminated, Article II may be terminated by agreement of both Parties, or by either Party on one year's notice to the other to take effect on December 31, 1969, or thereafter on one year's notice to take effect at the end of any succeeding term of five years.

B. Following termination of this Agreement, information, material or equipment communicated, exchanged or transferred pursuant to this Agreement prior to the effective date of termination shall continue to be treated in accordance with Articles IV, V(C), VI(A, B, C, D, F and G), VII, VIII and IX. Additionally, termination of this Agreement shall not affect rights or obligations under Article IX.

C. The Parties may enter into implementing instruments to implement the provisions of the Agreement. In case of any inconsistency between an implementing instrument and this Agreement, this Agreement shall prevail.

D. The Parties shall settle any disagreements arising in the implementation or interpretation of this Agreement through mutual consultations without recourse to any dispute settlement mechanisms.

In 2024 the article on duration was renamed.

Some more complex wording on terminating the agreement was removed in 1984.

In 1959 a specific date was given for the earliest termination of Article II sharing.

Paragraphs added in 2024 to specify that some conditions persist after the end of the agreement, prevent external dispute settlement mechanisms being used, and allow for implementing instruments.

# Endnotes

1. 'US-UK Mutual Defence Agreement'. Hansard Vol. 587 Col. 312WH, 6 November 2014. <https://hansard.parliament.uk/Commons/2014-11-06/debates/14110640000001/US-UKMutualDefenceAgreement>.
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5. As of 2014, stocktake meetings were held approximately every 18 months. See: Claire Mills. 'UK-US Mutual Defence Agreement'. Standard Note. House of Commons, 20 October 2014. SN/IA/3147. <https://researchbriefings.files.parliament.uk/documents/SN03147/SN03147.pdf>
6. 'Amendment to the Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Co-Operation on the Uses of Atomic Energy for Mutual Defense Purposes of July 3, 1958'. Her Majesty's Stationery Office, 25 July 2024. [https://assets.publishing.service.gov.uk/media/66a35cd9fc8e12ac3edb051f/CS\\_USA\\_1.2024\\_UK\\_USA\\_Amendment\\_Agreement\\_Atomic\\_Energy\\_Mutual\\_Defense\\_Purposes.pdf](https://assets.publishing.service.gov.uk/media/66a35cd9fc8e12ac3edb051f/CS_USA_1.2024_UK_USA_Amendment_Agreement_Atomic_Energy_Mutual_Defense_Purposes.pdf).
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9. 'Amendment to the Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Cooperation on the Uses of Atomic Energy for Mutual Defense Purposes'. Her Majesty's Stationery Office, 23 May 1994. Cm 2785. <https://treaties.fcdo.gov.uk/data/Library2/pdf/1995-TS0022.pdf>.
10. 'Amendment to the Agreement', 2014. *Op. Cit.*
11. Mackby and Simpson, 2008. *Op. Cit.* p11.
12. *Ibid.* p14–15.
13. See David Cullen. 'Extreme Circumstances: The UK's New Nuclear Warhead in Context.' *Nuclear Information Service*, August 2022. p28–30; 34–37. <https://www.nuclearinfo.org/wp-content/uploads/2022/08/ExtremeCircumstances-print-version.pdf>.
14. 'Operation DOMINIC I – Fact Sheet'. Defense Threat Reduction Agency, September 2021. <https://www.dtra.mil/Portals/125/Documents/NTPR/newDocs/18-DOMINIC%20I%20-%202021.pdf>.
15. Ian Zabarte. 'A Message from the Most Bombed Nation on Earth'. *Al Jazeera*. Accessed 11 July 2024. <https://www.aljazeera.com/opinions/2020/8/29/a-message-from-the-most-bombed-nation-on-earth>.
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17. John Lax and Ceri McDade. 'Buckets of Sunshine in a Broken Paradise – the Operation Dominic Nuclear Test Series, 1962, Christmas Island.' *The British Nuclear Test Veterans Association*, 25 April 2021. <https://www.bntva.com/buckets-of-sunshine-in-a-broken-paradise-the-operation-dominic-nuclear-test-series-1962-christmas-island>.
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21. *Ibid.*
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36. 'Amendment to the Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America for Co-Operation on the Uses of Atomic Energy for Mutual Defense Purposes of July 3, 1958'. Her Majesty's Stationery Office, 25 July 2024. [https://assets.publishing.service.gov.uk/media/66a35cd9fc8e12ac3edb051f/CS\\_USA\\_1.2024\\_UK\\_USA\\_Amendment\\_Agreement\\_Atomic\\_Energy\\_Mutual\\_Defense\\_Purposes.pdf](https://assets.publishing.service.gov.uk/media/66a35cd9fc8e12ac3edb051f/CS_USA_1.2024_UK_USA_Amendment_Agreement_Atomic_Energy_Mutual_Defense_Purposes.pdf).
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