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Nuclear convoys

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Summary

Nuclear convoys transport defence nuclear material, including nuclear warheads and nuclear fuel, by road, rail and air.

A number of MPs have raised concerns with the Government about the movement of nuclear convoys through their constituencies.

Of particular concern to Members and members of the public is the transportation of nuclear warheads between Scotland and England. These warheads form part of Trident, the UK's nuclear deterrent.

Members have questioned the Ministry of Defence about the safety of these convoys, risks to the public and the responses to any incidents involving these convoys.

The MOD is reluctant to give too much information about the transportation of nuclear material, citing national security concerns. However some information is in the public domain and some of the regulations governing their transportation are publicly available. An organisation called *Nukewatch* tracks and compiles data on convoys for the purpose of raising public awareness about this practice.

MPs debated this topic in Westminster Hall in July 2015, and an Early Day Motion (987) tabled in January 2016 called on the Government to stop nuclear weapon convoys.

1. Background

This paper is part of a wider Library briefing series on nuclear weapons:

- CBP7634, *Nuclear weapons: disarmament and non-proliferation regimes*
- CBP7353, *Replacing the UK's Nuclear Deterrent*
- CBP7566, *Nuclear weapons – country comparisons*
- CBP4079, *The French nuclear deterrent*
- SN07028, *Conference on the humanitarian impact of nuclear weapons* , December 2014
- SN03147, *UK-USA Mutual Defence Agreement*, October 2014

2. What are nuclear convoys?

Nuclear convoys transport defence nuclear material in the United Kingdom.

Nuclear material includes warheads, nuclear fuel and other nuclear material which may be transported by road, rail or air. Road convoys involve multiple vehicles, rail travel involves specialised purpose-built containers and air transport requires stringent safety procedures.

Of particular concern to Members is the transportation of nuclear warheads between Scotland and England. These warheads form part of Trident, the UK's nuclear deterrent. SNP Member Margaret Ferrier said "it may come as a shock to many, but nuclear weapons are regularly driven past the homes of millions of people as they snake their way across Britain."[1]

Box 1: Trident

The UK's strategic nuclear deterrent, known as Trident, is based in western Scotland at Her Majesty's Naval Base Clyde. It comprises three main elements: the submarine, the missile and the nuclear warhead. The submarines are based at Faslane and the warheads are stored and processed at the Royal Naval Armaments Depot, Coulport, eight miles from Faslane. The warheads are maintained by the Atomic Weapons Establishment (AWE) in Berkshire. The missiles are held separately in the United States.[2]

2.1 What is being transported?

Defence nuclear material is the collective term used by the Ministry of Defence for nuclear weapons and Special Nuclear Material. The latter term comprises: tritium, highly enriched uranium and plutonium (which are used in the production of nuclear weapons[3]); and new and used submarine nuclear fuel.[4]

2.2 Why is it being moved?

Operational nuclear warheads are stored at the Royal Naval Armaments Depot in Coulport. However the infrastructure for building, maintaining, decommissioning and disposing the UK's nuclear stockpile is located at two government-owned, contractor-operated Atomic Weapons Establishment (AWE) sites at Aldermaston and Burghfield in Berkshire.

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1 HC Deb 7 July 2015 c26WH

2 See Commons Library Briefing Paper Replacing the UK's nuclear deterrent, CBP7353, for further information on Trident and the Successor programme.

3 The main nuclear materials used in nuclear weapons are plutonium and highly enriched uranium. Tritium and depleted uranium (a by-product of enrichment) are also used in the production of nuclear weapons: POSTbrief, *Assessing the risk of terrorist attacks on nuclear facilities*, 1 July 2004 Post-Report-8

4 Local Authority and Emergency Services Information document, edition 10, October 2014. Note this document erroneously includes depleted uranium in the definition of special nuclear material, according to correspondence between the Ministry of Defence and the Library briefing paper author, 5 April 2016.

Warheads are therefore transported between Scotland and Berkshire for regular maintenance, refurbishment and decommissioning.[5]

Deep maintenance, refuelling, defueling and refits for the Navy's submarine fleet takes place at HM Naval Base Devonport, in southwest England.[6] Reactor nuclear fuel is manufactured at Rolls Royce in Derby. It is transported by road to Devonport for installation on submarines undergoing refit. In addition, new reactor cores are transported to Bae Systems at Barrow-in-Furness, in northwest England, for installation into new build submarines. There is also the Naval Reactor Test establishment in Dounreay in Scotland. Used reactor fuel is transported by rail from Devonport (and occasionally Dounreay) to Sellafield in Cumbria.[7]

The UK Government has cited national security in refusing to comment on the transfer of tritium and other nuclear fissile material between the UK and the United States, except for historical information.[8]

A map of the various nuclear sites, including civilian nuclear power stations, is available on CND UK's website. The map has not been verified by the House of Commons Library.

2.3 Transport methods

UK nuclear materials are moved by various transport methods including road, rail (for used fuel) or by air.

Nuclear weapons are transported by road. Used fuel is mainly transported by rail. Tritium, both types of uranium and plutonium are also transported by air. UK nuclear weapons are not transported by air but occasionally US nuclear weapons are transported by air.[9]

2.4 Routes

The Ministry of Defence does not comment on the routes used to transport nuclear weapons because, it says, to do so would prejudice national security.[10]

The MOD does list all the local authorities that defence nuclear material, including both nuclear weapons and special nuclear material, may travel through or fly over. This can be found in Annex A of the Local authority and emergency services information (LAESI) booklet. The MOD has ruled

5 The Atomic Weapons Establishment is a government-owned, contractor operated entity. It comprises three shareholders: Jacobs Engineering Group, Lockheed Martin Corporation and Serco Group. AWE also manages the Royal Naval Armament Depot at Coulport and Faslane in partnership with Babcock and Lockheed Martin UK.

6 HMS Vanguard, for example, entered a 3½ year deep maintenance period in 2015 which will involve refuelling its nuclear reactor core [HC Deb 6 March 2014 1078].

7 Local Authority and Emergency Services Information document, edition 10, October 2014

8 HC Deb 10 July 2014 c359W and HC Deb 24 March 2009 c277W

9 Local Authority and Emergency Services Information document, edition 10, October 2014

10 PQ 223997, 23 February 2015

out giving a list of constituencies because, it says, to do so would incur a disproportionate cost.[11]

The organisation *Nukewatch,* which campaigns against nuclear weapons and in particular seeks to raise public awareness of nuclear convoys, tracks and compiles data on convoys and routes. It states there are two main routes: an eastern route, mainly relying on the A1(M), and a western route using the M6/M74.

Individuals associated with *Nukewatch* have been able to anticipate a convoy in order to protest. An anti-nuclear weapon protestor briefly halted a convoy on 10 March 2016 by lying on the road in front of the convoy. The *Nukewatch* report includes a photo of the convoy and details of the route taken: nuclear weapons convoy March 2016: stopped!

Guidance on the selection of convoy routes is set out in a Joint Service Publication which is not publicly available. This is JSP 483: Nuclear Weapon Logistic Movement and Associated Nuclear Accident Response.

The MOD has said that factors in the assessment of routes include "the type of road, its surroundings and its proximity to hazards. All potential routes for nuclear warhead convoys are assessed by a qualified team to ensure the safety and security of the operation and the public."[12] More recently, Armed Forces Minister Penny Mordaunt said "the routes are carefully selected as part of a rigorous risk assessment process and are regularly reassessed for their continued suitability."[13]

2.5 Frequency of convoy travel

This information is not known as the Ministry of Defence does not provide this level of detail. When asked, Ministers have said "it is Ministry of Defence policy not to comment upon the frequency or routes used by nuclear material convoys, as to do so would, or would be likely to, prejudice national security."[14]

However *Nukewatch* provides on its website an annual summary of warhead convoy movements that it has observed. *Nukewatch* considers that during 2014 at least three loaded convoys travelled between the Coulport nuclear arms depot in Scotland and the Atomic Weapons Establishment (AWE) at Burghfield in Berkshire, and two loaded convoys travelled in the opposite direction. *Nukewatch* says this is an estimate as convoy journeys may have occurred that *Nukewatch* was unable to monitor.[15]

2.6 Convoys

Convoys differ slightly depending on whether they are transporting nuclear warheads or special nuclear material.

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11 PQ 223997, 23 February 2015
12 HC Deb 4 November 2008 c307W
13 HC Deb 7 July 2015 c32WH
14 PQ 23385, 25 January 2016
15 Annual convoy movements, *Nukewatch* website, accessed 24 March 2016

According to *Nukewatch* a convoy contains multiple escort vehicles including the warhead carriers (green Truck Cargo Heavy Duty trucks), Ministry of Defence police escort vehicles and MOD support vehicles to deal with accidents or breakdowns. The entire convoy may include a fire engine, mobile workshop, breakdown truck, motorbike outriders, spare tractor and other vehicles.[16]

Special nuclear materials are carried in blue rather than green carriers, according to *Nukewatch*, and have a smaller escort and travel at faster speeds.

2.7 Safety of nuclear convoys

The Ministry of Defence states:

> The safety of the general public and the security of nuclear weapons convoys are our first priority at all times. Safety is paramount during the transportation of defence material, and all appropriate measures are taken to ensure that such weapon convoys can operate safely.
>
> […]
>
> The transportation of nuclear and other hazardous materials is governed by international and national regulations, including the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009, as amended in 2013. Although there are exemptions for certain defence-related activities, Government policy is to comply with the principles of those exemptions.[17]

All movements of defence nuclear material are monitored by a Joint Operations Centre.

Anti-nuclear weapon campaigners suggest the convoys present a threat to the public. *Nukewatch* states:

> The warheads in these lorries contain plutonium and other deadly radioactive materials. With each lorry carrying up to 8kg of plutonium, any accident involving an explosion or fire could lead to a radioactive plume spreading for miles, poisoning a huge area for thousands of years. U.S. and British government research has been unable to rule out the risk of a catastrophic nuclear explosion. The risk of a major accident is growing as traffic on British roads increases.[18]

Several Members of Parliament have raised safety concerns with the Ministry of Defence, including during the Westminster Hall debate in July 2015. SNP Member Margaret Ferrier, who called the debate, raised concerns about the potential for accidents during transport, noting that the convoys often travel at night with infrequent stops. Fellow SNP Member Gavin Newlands also raised concerns about convoys using the Erskine Bridge across the Clyde in high winds and poor weather.

Margaret Ferrier also cited a newspaper report from 2005 revealing an internal MOD report that, she said, warned:

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16 How to spot a nuclear convoy, *Nukewatch* website, accessed 24 March 2016
17 HC Deb 7 July 2015 c32WH
18 These lorries carry the most deadly load on British roads…, *Nukewatch* website, accessed 24 March 2016

> nuclear warheads could accidentally explode if involved in a major crash, because a bomb's key safety feature could be disabled, leading to what the MOD terms an "inadvertent yield". That is a rather abstract way of saying that a burst of incredibly lethal radiation would be unleashed. The consequences of an accident could be catastrophic. If there were a major fire or explosion, lethal plutonium would be scattered downwind. Plutonium-241 has a half-life of 24,000 years and is difficult to detect. An accident in my constituency could leave it and neighbouring constituencies a wasteland.[19]

Margaret Ferrier suggested convoys could be a target for terrorists, saying "the MOD is deluding itself if it thinks it can keep secret 20-vehicle nuclear convoys travelling on our main roads" noting that they are well documented and easily recognisable: "nuclear weapons cannot deter terrorism; instead, they pose a potential threat from terrorism."

Kirsten Oswald also spoke of the potential risks of an accident:

> One of the worst types of accident that could happen is a collision between a tanker and a lorry carrying Trident nuclear weapons. The intense heat that would follow a fuel fire could engulf a nuclear warhead. The smoke drifting downwind would be contaminated with lethal plutonium. A severe fire could also cause the high explosive in the weapon to detonate. Although a nuclear explosion is unlikely, a conventional explosion in a Trident warhead would still have a devastating effect, dispersing plutonium for miles around.[20]

Armed Forces Minister Penny Mordaunt responded for the Government in the Westminster Hall debate and her comments given below are taken from the debate, unless otherwise stated. In response to the safety concerns identified above, she said: "the limited movement of nuclear defence material together with inherent safety and security features and procedures mean that the probability of an accident leading to a release of radiation is extremely low."

Safety regulations

Penny Mordaunt explained the safety regulations in place governing the transport of nuclear materials:

> The transportation of nuclear and other hazardous materials is governed by international and national regulations, including the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009, as amended in 2013. Although there are exemptions for certain defence-related activities, Government policy is to comply with the principles of those exemptions.[21]

Four Joint Service Publications are relevant to the transportation of nuclear material. JSP 483 and JSP 440 have not been made publicly available:

- JSP 483, Nuclear Weapon Logistic Movement and Associated Nuclear Accident Response
- JSP 471: defence nuclear emergency response

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19 HC Deb 7 July 2015 c 27WH
20 HC Deb 7 July 2015 c30WH
21 HC Deb 7 July 2015 c32WH

- JSP 538, regulation of the nuclear weapon programme
- JSP 440 Supplement 1: The Defence Manual of Security, Directive for the Security of Nuclear Weapons and Special Nuclear Materials.

This briefing concerns itself solely with the transportation of defence nuclear material. For reference, the civilian transportation of radioactive material is regulated by the Office for Nuclear Regulation. A range of national and international regulations and agreements apply to the transportation of such material which are ultimately underpinned by the International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Material, SSR-6.[22]

Design of the nuclear material container

The containers used for transporting nuclear weapons are tested against International Atomic Energy Agency (IAEA) standards and are designed to provide protection from impact, high levels of mechanical stress and fire. The Ministry of Defence says intact containers will, in all cases, prevent any significant radiological hazard to personnel even if in close proximity.[23]

A significant upgrade programme to the vehicle fleet was completed in 2014.

Used fuel is transported by rail in protective purpose-built containers (Used Fuel Flasks), which are loaded onto special wagons configured for rail and road use. Used reactor fuel is similarly transported from Devonport to Sellafield. All used fuel movements are escorted by the Ministry of Defence Police.

UK nuclear weapons are not transported by air but occasionally US nuclear weapons are.[24]

Nuclear weapon safety

Penny Mordaunt told MPs in the Westminster Hall debate:

> The weapon is by its very nature an extremely robust device, designed to withstand launch and re-entry into the Earth's atmosphere. It is transported in a benign configuration and secured in a custom-designed container that is tested in accordance with International Atomic Energy Agency standards to protect against a range of scenarios, including impact on a motorway at speed, a drop from height and a fuel fire, among others.

The Ministry of Defence has separately said the robust design and safety features built into a warhead "offer excellent protection against accidental mechanical shock and damage in transport."[25]

Risks from an accident caused by bad weather

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22 Library specialist Grahame Danby can provide information on the regulations concerning the transportation of non-defence radioactive material.
23 Local Authority and Emergency Services Information document, edition 10
24 Local Authority and Emergency Services Information document, edition 10
25 Local Authority and Emergency Services Information document, edition 10

The Ministry of Defence says "there has never been an incident involving Defence Nuclear Material in the UK that has led to, or come anywhere near leading to, the release of radioactive material to the environment."[26]

Penny Mordaunt explained in the Westminster Hall debate that operational planning always takes into account road and weather conditions and that the MOD consults with "all relevant local agencies" before undertaking a convoy move. She added contingencies are planned for and the convoy includes firefighters, a first-aid team, mechanics to enable roadside repairs and personnel equipped to monitor for radiological hazards.

However there have been accidents involving convoys. Information on these has been released by the MOD in response to Freedom of Information requests.

On 21 July 2001 the Government released information on seven accidents relating to nuclear warheads both on land and at sea. Three of these occurred during transportation:

- April 1973 - Near the Royal Navy Armaments Depot in Coulport a Scottish Electricity Board Land Rover reversed into a nuclear warhead transporter (carrying nuclear warheads). There was minor damage to the carrier; however, no damage was done to the warheads themselves.
- August 1983 - On the M8 near Glasgow a nuclear warhead carrier was involved in a collision with a privately owned vehicle. There was minor damage to the car and no damage was done to the warheads.
- January 1987 - In the county of Wiltshire, a nuclear warhead carrier carrying two nuclear warheads sought to avoid a stationary privately owned vehicle and came off the road after skidding on ice and subsequently rolled on its side. A second carrier (also carrying two warheads) skidded off the road and came to a halt partly of the road. The first carrier received minor damage; however, the containerised weapons were not damaged. Details of this incident were also provided in a December 2014 Parliamentary Question (PQ 217319, 15 December 2014) which included links to the board of inquiry report.

The Sunday Herald published an exclusive report in August 2014 about 70 safety lapses over a five and a half year period, between July 2007 and December 2012, based on information provided in a Freedom of Information request.

Penny Mordaunt responded to these reports during the Westminster Hall debate. She said the number of incidents mentioned were "very low-level" and included putting the wrong fuel in a support vehicle. She said "they have not in any way threatened the safety or security of the material in transit." Responding to the specific concerns raised by SNP MPs about convoy travel over the Erskine Bridge, Penny Mordaunt said

[26] Local Authority and Emergency Services Information document, edition 10

Traffic Scotland and the police in Scotland were consulted and the convoy did not cross the bridge until the weather had moved on.

Risk from terrorist activity

Penny Mordaunt explained that the risks to the convoys associated with terrorist attack are mitigated by a range of counter-measures, including the vehicle itself, specific warhead protection measures, intelligence, monitoring and an armed escort. These security arrangements are frequently tested and kept under review.

2.8 Notifying first responders and local authorities

Police forces are always notified in advance of any convoys travelling through their area. The police can then advise of any local traffic problems. The police may advise fire and rescue services of the presence of the convoy. The Scottish Government and local authorities are not given advance notice of convoys.[27]

2.9 Notifying members of the public

It is the policy of the Ministry of Defence not to comment on the routes used by nuclear material convoys because to do so "would, or would be likely to, prejudice national security."[28] Penny Mordaunt said during the Westminster Hall debate "the safety of the general public and the security of nuclear weapons convoys are our first priority at all times."

When asked what guidance is issued under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 to homes along the route of convoys transporting nuclear weapons, the Minister responded that the aforementioned Regulations apply to areas surrounding nuclear sites and do not apply to road transport.[29]

2.10 Response to an incident involving Defence Nuclear Materials

The Ministry of Defence provides a guidance document for local authorities and emergency services containing the contingency arrangements to be implemented in the event of an emergency involving defence nuclear material. The document is: Local authority and emergency services information (LAESI) edition 10, October 2014.

The MOD has also given information about emergency response in Parliamentary questions and during the Westminster Hall debate. The following is a collation of information provided.

The MOD is designated as the lead Government department in the event of an incident involving defence nuclear material.

The Defence Nuclear Emergency Organisation (DNEO) is responsible for taking the lead in responding to a nuclear incident involving defence

27 Local Authority and Emergency Services Information document, edition 10
28 PQ 23385, 25 January 2016
29 PQ 29773, 8 March 2016

material.[30] In the event of an emergency involving a defence nuclear asset the DNEO will coordinate the central Government response.

During transit, an MOD Incident Commander travels with the convoy as the senior MOD police officer. That person is responsible for directing events and working with emergency services.

The Joint Regional Liaison Officer for the geographical area in which an incident occurred would deploy immediately to undertake the MOD liaison duties at the strategic response centre (GOLD). In addition, a team of appropriately qualified MOD personnel, led by the MOD coordinating authority, would deploy to GOLD as soon as possible.[31]

The MOD personnel who respond comprise two elements:

- Immediate Response Forces: commanded by an MOD Incident Coordinator
- Follow-on Forces: depends on the severity of the incident, with a full deployment only in the event of an emergency leading to a release of radioactive material.

Defence Minister Philip Dunne explained in 2013:

> Each convoy is commanded by a senior MOD Police Officer who would therefore be on the scene to direct events in the unlikely event of an accident. In that event he would become the MOD Incident Commander. Appropriately qualified MOD personnel from DE&S headquarters in Bristol would be dispatched to the accident location by helicopter. Experts from other organisations would also provide support, including the Atomic Weapons Establishment, Institute of Naval Medicine and Defence Science and Technology Laboratory.
>
> The aim of appropriately qualified MOD personnel is to arrive on the scene as soon as possible. Due to the range of possible locations involved, the target of four hours applies to the time within which they should be ready to deploy from Bristol. This was achieved in Exercise Senator 2011.[32]

The Local authority and emergency services information (LAESI) booklet provides more detail of the procedures that are in place if there is an emergency involving the release of radioactive material.

In the event of a nuclear weapon emergency the MOD will advise police that any persons within 600m should be evacuated as an immediate action to provide protection from the conventional effect of the emergency, in particular from the potential for a conventional explosion. Further details of Key Emergency Actions can be found in Annex E of the LAESI document.

30 This is the new name for the Nuclear Accident Response Organisation.
31 HC Deb 24 June 2013 c44W
32 HC Deb 20 June 2013 c790W

3. Parliamentary oversight

The specific issue of nuclear convoys was raised on 7 July 2015 in a Westminster Hall debate secured by Margaret Ferrier.[33]

Owen Thompson sponsored an Early Day Motion that at the time of writing has been sponsored by 55 Members. EDM 987 states:

> That this House notes with concern reports that nuclear convoys are regularly driven through the UK; understands that according to *Nukewatch* the convoys regularly travel through towns and cities close to schools, homes and businesses; condemns what it sees as an unacceptable risk to public safety; calls on the Government to immediately clarify what safety measures it has put in place; further calls on the Government to put a stop to nuclear weapons convoys; and hopes that public awareness of this ongoing and dangerous practice will strengthen the calls to rid the UK of nuclear weapons once and for all.[34]

33 HC Deb 7 July 2015 c26-35WH
34 EDM 987 2015-16, accessed 23 March 2016

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