



NUKES OF HAZARD

THE NUCLEAR BOMB CONVOYS ON OUR ROADS

by Rob Edwards

SUMMARY

Convoys carrying nuclear bombs are often on Britain's roads, thundering through cities and towns. Comprising up to 20 vehicles, they take Trident warheads between the south of England and central Scotland two to six times a year.

Although they are meant to be secret, they are tracked on social media and photographed en route. Yet most of the millions of people in the communities they pass by are unaware of what's happening – and of the risks they could be facing. An opinion poll by YouGov found that nearly two thirds of adults did not know that nuclear bomb convoys travelled via cities and towns.

The Ministry of Defence (MoD) says the convoys are safe. But there are good reasons to be concerned about the dangers.

Emergency exercises run by the MoD imagine disaster scenarios in which horrific multiple crashes lead to fires, explosions and the spread of radioactive contamination over cities. Post-mortems of seven exercises reveal that the MoD and the emergency services would have serious difficulties dealing with such disasters.

The MoD has confessed to eight real accidents involving nuclear weapons convoys between 1960 and 1991. In response to requests under freedom of information law, it has given outline details of a further 180 safety incidents that have plagued the convoy between 2000 and 2016.

The convoy has crashed, broken down and got lost. Its brakes have failed, it has leaked fuel and suffered a range of other mechanical failures. Bad luck, poor weather, human error and computer software glitches have all been to blame.

Bomb convoys are dogged by pressures that could increase accident risk. According to the MoD's internal safety watchdog, the UK's

nuclear weapons programme is suffering from a chronic shortage of skilled nuclear engineers that could threaten safety. It has been under pressure from government spending cutbacks.

The demands of secrecy and security could compromise safety. Local authorities and fire services are not forewarned about convoy movements, and are unforthcoming about their emergency plans. In an accident the MoD may initially be more concerned to ensure the security of its bombs than to protect the public.

There are a series of credible accident scenarios that could trigger fires, explosions and the breach of bomb containment. Plutonium and other radioactive materials could leak from the warheads and contaminate communities, increasing cancer risks.

Evidence from an MoD report suggests that in extreme circumstances an accident could trigger a nuclear reaction, known as "inadvertent yield", which would deliver lethal radiation doses. A terrorist attack on a nuclear convoy, according to the MoD, could cause "considerable loss of life and severe disruption both to the British people's way of life and to the UK's ability to function effectively as a sovereign state".

Convoy accidents could spread radioactive contamination over at least 10 kilometres, depending on the direction of the wind. Hundreds of thousands of people could find their lives seriously disrupted, as communities are evacuated, essential infrastructure disabled and emergency services overwhelmed. Contamination, and worries about cancer, would linger for decades.

Within 10 kilometres of five imagined accident sites in Birmingham, Preston, Wetherby, Newcastle and Glasgow there are a total of 2.8 million people who could be at risk. There are also 1,181 schools, 131 railway

stations, 56 hospitals, 47 major roads, 12 universities and three airports. They are all potentially vulnerable to the after-effects of a major convoy accident.

Up and down the country, hundreds more communities and millions more people along the convoy routes are also at risk, should there be a crash. Yet they get no warnings, and have never agreed to accept the dangers.

A serious accident resulting in radioactive contamination from the nuclear bomb convoy is credible. The MoD should be more open, and communities along convoy routes need to be more aware of the dangers.

The MoD says the risks are "tolerable when balanced against the strategic imperative to move nuclear weapons". But many may disagree. Accidents happen, and sooner or later there will be a serious crash.

Internationally, important moves are being made to ban nuclear bombs, and their movement. The majority of states in the United Nations have recommended that multilateral negotiations commence in 2017 on a nuclear ban treaty that will prohibit the use, deployment, transporting and manufacture of nuclear weapons.

If the UK chooses to keep deploying Trident - and to keep driving its warheads up and down the country - the risk of a catastrophic accident or attack will persist.

Whether the risk is tolerable is not a judgement that should be left to the MoD alone. It is one for the millions of people through whose towns and cities the convoys pass. They have the right to decide what's tolerable – and what's not.



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SPECIAL NUCLEAR MATERIALS CONVOY

1. NUCLEAR WARHEADS ON THE ROAD

They are meant to be secret, but it's difficult to miss them when they thunder through your town.

Huge, unmarked, dark green trucks with their headlights blazing, accompanied by a string of military land rovers, police cars, minibuses, a fire engine, a large support vehicle with trailer, a coach and sometimes motorcycle outriders - up to 20 vehicles in all.

Nuclear bomb convoys are a sinister, memorable sight – and they can be seen on busy roads up and down the UK. Although the Ministry of Defence (MoD) never confirms or denies their presence, they are tracked by campaigners, photographed and filmed for social media by the public and occasionally stopped by protesters.

The nuclear warheads are carried in up to five big articulated trucks. Known as TCHDs, short for Truck Cargo Heavy Duty, they are 44-tonnes, have seven axles and were specially made by Foden, a British company that was taken over by the US truck manufacturer, Paccar, in 1980. There is always a spare tractor – the cab and engine unit that pulls the truck – in case of breakdown.

The convoys often travel from the south of England to central Scotland and back, shuttling between the nuclear bomb factory at Burghfield in Berkshire and the Royal Naval Armaments Depot at Coulport on Loch Long, near Glasgow. The 900-mile round trips vary in frequency between two and six times a year, and usually take one or two days since a system of “continuous running” was introduced in 2005.

The convoys use a variety of west and east coast routes. From Burghfield, they can take the M40, go round Birmingham and head north past Preston on the M6 and then the M74 until they reach Glasgow. Or they can go round London on the M25, go north

HUGE, UNMARKED, DARK GREEN TRUCKS WITH THEIR HEADLIGHTS BLAZING, ACCOMPANIED BY A STRING OF MILITARY LAND ROVERS, POLICE CARS, MINIBUSES, A FIRE ENGINE, A LARGE SUPPORT VEHICLE WITH TRAILER, A COACH AND SOMETIMES MOTORCYCLE OUTRIDERS - UP TO 20 VEHICLES IN ALL.

CONVOYS TRAVEL UP TO **6** TIMES PER YEAR



EACH CONVOY MAKES A ROUND TRIP OF **900** MILES



on the M1 via Leeds and Newcastle, and then take the A1 or the A68 to Edinburgh and the M9 to Stirling.

The trips are deemed necessary to maintain the UK's Trident nuclear missile system, which comprises around 160-200 warheads based on US designs. The warheads are maintained, refurbished or dismantled at Burghfield, helped by the nearby Aldermaston complex, which designs and tests new warheads and technologies. The Aldermaston and Burghfield sites are run for the MoD by a private consortium called AWE Management Limited, which comprises US arms producers, Lockheed Martin and Jacobs Engineering, together with the UK public service company, Serco.

Warheads use three radioactive materials to make a nuclear explosion: plutonium, uranium and tritium. They also contain conventional high explosives, and the toxic metal, beryllium.

Components have to be periodically checked and replaced. These include the tritium, which has a radioactive half-life of 12.3 years and decays away over a few years, and the high explosives, which are tested for deterioration and reliability. Warheads are also upgraded, and sometimes dismantled.

The warheads are kept behind watchtowers and barbed wire in bunkers at Coulport. There, at the explosive handling jetty, they are attached to US-built Trident missiles and loaded onto one of the UK's four Vanguard-class submarines, which are stationed nearby at the Faslane naval base on the Gareloch. One submarine is meant to be on deep sea patrol, ready to fire its missiles, at all times.

Several bomb convoys have been tracked and filmed in recent years, and have become the focus of rising political concern, particularly in Scotland. According to Nukewatch, a civil society network that monitors

the convoys, one left Burghfield on 10 February 2016, stopped overnight in Yorkshire, and then travelled north on the A1 passing Edinburgh and Stirling before arriving at Coulport just before 7pm on 11 February.

Its return south began on the morning of 15 February 2016, again passing Stirling and pausing at Glencorse Barracks at Penicuik, near Edinburgh. It went south on the A1 past Newcastle, stopped overnight again in Yorkshire before arriving back in Burghfield early in the evening of 16 February.

Another convoy sparked alarm after it was followed on the M8 through the heart of Glasgow in the midst of a fierce storm just before midnight on 11 January 2015. It then crossed the exposed Erskine Bridge over the Clyde despite warnings of “high winds” on the approach roads.

As well as bomb convoys, there are also movements of “special nuclear materials”, including plutonium,

highly enriched uranium, depleted uranium and tritium. These are taken by road between Burghfield and Aldermaston, and from there to a Rolls Royce submarine reactor plant in Derby or to RAF Brize Norton in Oxfordshire, from where they have been flown to the United States. Submarine reactor fuel is also taken from Derby to the shipyard at Barrow-in-Furness in Cumbria and the naval base at Devonport in Plymouth.

In February 2016, the UK government said that nuclear materials had been flown 23 times between the UK and the US in

the previous five years. Though no details were given, the flights probably started or ended at Brize Norton.

According to the MoD, nuclear materials may be driven through or flown over 122 local authorities in the UK: 88 in England, 21 in Scotland and 13 in Wales. These include many densely populated areas such as Bristol, Birmingham, Cardiff, Edinburgh, Glasgow, Leeds,

Liverpool, Sheffield, Manchester, Newcastle, and York.

In its guide to emergency services and local councils, the MoD says these council areas will be crossed most often. “There may be occasions when routes need to be varied for operational reasons,” it adds. “It must be stressed that this list in no way precludes the use of alternative routes if the circumstances so demand.”

Despite the hundreds of communities and millions of people potentially affected by the nuclear convoys in the UK, most are unaware of the dangers. An opinion poll commissioned by the International Campaign to Abolish Nuclear Weapons UK and conducted by YouGov, found that 58 per cent of adults were not aware that nuclear weapons were transported on Britain’s roads.

Nearly two thirds of those surveyed - 64 per cent - said they did not know that nuclear bomb convoys went through or past many towns and cities. Nearly half - 47 per cent - said they were concerned about this, with higher proportions in Scotland and Wales.

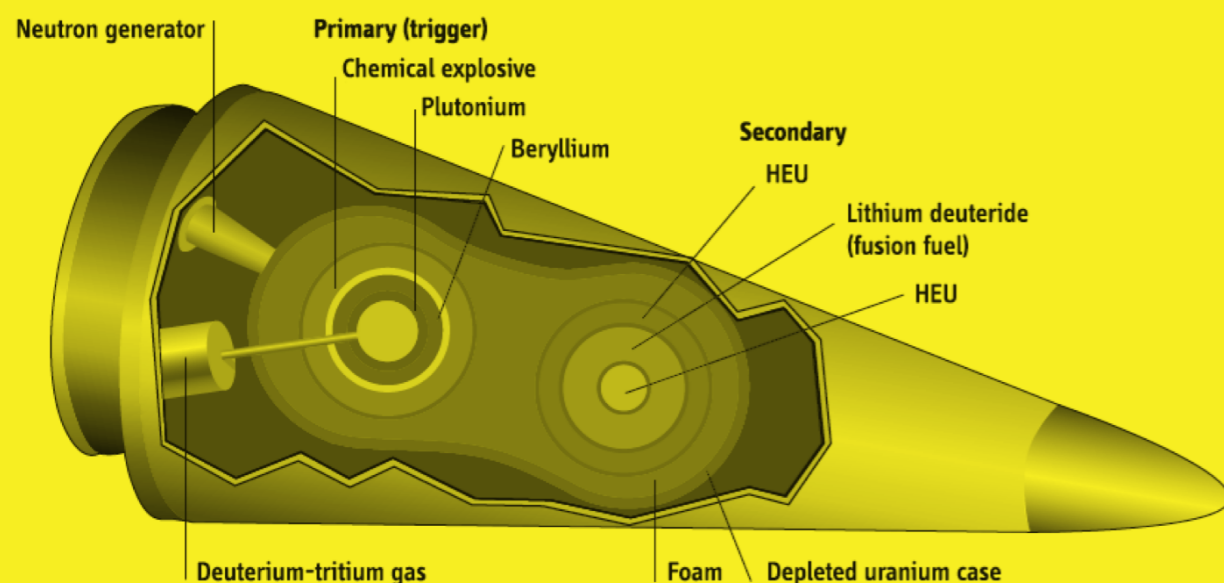
The MoD insists that the transports are safe, and it sometimes conducts journeys as training exercises. Movements are kept to the minimum necessary to support Trident, it says, and an accident leading to a leak of radioactivity is “highly unlikely”.

When challenged, the MoD often reiterates the same, unsubstantiated claim: “There has never been an accident 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.”

Whether that is true - or not - is a matter of trust and judgement. Whether it will remain true in the future is anyone’s guess. Readers can make up their own minds.

DESPITE THE HUNDREDS OF COMMUNITIES AND MILLIONS OF PEOPLE POTENTIALLY AFFECTED BY THE NUCLEAR CONVOYS IN THE UK, MOST ARE UNAWARE OF THE DANGERS.

TWO-STAGE THERMONUCLEAR WARHEAD SIMILAR TO UK WARHEAD ON TRIDENT (US LIBRARY PHOTO)



2. THE DANGERS

The headline was stark, the picture sinister and the story scary. “Nuke dust disaster,” it screamed. “Two feared dead and hundreds at risk as deadly cloud descends.”

This was not a real newspaper, but a mock-up produced by the MoD for an emergency exercise in 2011. It was trying to imagine how the media would report one of its worst nightmares: a motorway pile-up involving the nuclear bomb convoy.

The MoD’s emergency exercises are educative. They show the kind of accidents the MoD thinks it should prepare for - and how they can go wrong.

EXERCISES

The newspaper mock-up was one of a series of documents about an exercise codenamed Senator 2011, released by the MoD in response to requests under freedom of information law. The exercise envisaged a large goods lorry experiencing a blowout while travelling north on the M74, near the busy Raith interchange at Bellshill near Glasgow.

The lorry crashed through the central reservation and punched a hole in the side of a nuclear weapons truck, which swerved and toppled over. Leaking fuel burst into flames, and radioactivity leaked into the air from damaged warheads and started to spread over nearby communities. A second weapons carrier had to take evasive action and was involved in another collision with a lorry.

Up to 100 people were said to be contaminated with radioactivity at the scene, seven suffered serious injuries and two were killed. It was a “horror smash” that caused “nuclear carnage”, according to the fictional report in The News.



Thousands more people were at risk from a “deadly cloud of radioactive dust”, it said. “Hundreds of families have already been evacuated, and parents told to abandon their children in school - but the nightmare was set to escalate today as Met Office chiefs warned the lethal plutonium cloud would spread across Glasgow.”

An official post-mortem of the exercise revealed that the emergency services had faced “major difficulties” because of a prolonged lack of support from MoD experts. It took five and a half hours for weapons specialists from the MoD’s Military Coordinating Authority to get from their base at Abbey Wood in Bristol to the police’s emergency control centre in East Kilbride, near Glasgow.

This was “not acceptable”, said a report by the MoD’s internal watchdog, the Defence Nuclear Safety Regulator (DNSR), because it meant that other services “struggled to attain a meaningful understanding of the issues”.

The exercise also threw up other problems. The emergency response was at times “disorganised”, said the report. Heated disputes with ambulance staff over how to handle casualties contaminated with radioactivity at the crash site caused “considerable delay”, resulting in one victim being declared dead.

Other issues highlighted were out-dated, paper-based communications systems, poor mobile phone signals, conflicting scientific advice on health hazards and “confusion” over radiation monitoring.

The MoD often conducts training exercises for nuclear convoy accidents, and they often betray similar problems. Internal reports on earlier Senator exercises imagining road convoy crashes flagged up a string of familiar mishaps. Delays in issuing public warnings, poor monitoring of radiation and communication breakdowns could all have increased people’s exposure to radiation.

The Senator exercise in 1996 envisaged the conventional explosives in two warheads detonating after a media helicopter fell onto a bomb convoy. Safety advice on shelter and food was hampered by a “politically unacceptable” lack of data from radiation monitoring.

In the wake of the exercise, officials from AWE at Aldermaston warned that a real accident might be much harder to deal with. “We are possibly misleading ourselves into believing that we can manage the very real logistical problems of an actual response,” they said.

A year later, the 1997 Senator exercise featured a gas tanker that crashed into a weapons truck, destroying two warheads and scattering plutonium downwind. The advice given to the public on evacuation was “erroneous” and there were deficiencies in monitoring the spread of contamination.

An assessment of the exercise noted “a lot of confusion” between civil authorities, and ambulance crews were not warned of the risks before attending to

OPERATION SENATOR 2011:



casualties. Communications were often hampered by faulty equipment, inadequate facilities and confusion over the correct units of measurement for radiation.

In the 2000 Senator exercise a weapons truck smashed into a furniture van and a milk tanker. The police experienced “major frustration” because casualties were “poorly handled”, while the MoD was said to take only “piecemeal” account of new science when assessing radiation doses from plutonium.

A 90-minute delay by the police in evacuating people from a contaminated area in the exercise resulted in radiation exposures to the public that were “very much higher than they would have been if action had been taken promptly”, according to a report by the MoD’s [Nuclear Accident Response Organisation](#).

Another Senator exercise the following year, 2001, ended with the MoD accusing the police of “ineffective control” and criticising the “weak” initial response of the civil authorities. An official safety assessment of the nuclear warheads was delivered four hours late.

The [Senator exercise in 2005](#) imagined an aircraft engine falling out of the sky onto a weapons convoy.

The convoy then crashes into an oil tanker on the A720 bypass around Edinburgh. Official post-mortems paint a picture

of confusion, crossed wires and inadequate communications.

Mistakes made during the exercise left casualties trapped in vehicles and spread radioactive contamination. In its post-mortem, the then Lothian and Borders Fire and Rescue Service said

THE MOD ARGUES THAT THE WHOLE POINT OF THE EXERCISES IS TO LEARN FROM MISTAKES AND IMPROVE PROCEDURES. BUT MANY OF THE POST-MORTEMS MAKE THE SAME POINTS YEAR AFTER YEAR, BECAUSE MANY OF THE SAME PROBLEMS KEEP RECURRING.

THE CONVOY HAS CRASHED, BROKEN DOWN AND GOT LOST. ITS BRAKES HAVE FAILED, IT HAS LEAKED FUEL AND SUFFERED A RANGE OF OTHER MECHANICAL FAILURES. BAD LUCK, POOR WEATHER, HUMAN ERROR AND COMPUTER SOFTWARE GLITCHES HAVE ALL BEEN TO BLAME.

casualties for 40 minutes. This was when their help was “critically required” and “may have contributed to the number of fatalities within the exercise.”

The MoD argues that the whole point of the exercises is to learn from mistakes and improve procedures. But many of the post-mortems make the same points year after year, because many of the same problems keep recurring.

This suggests that lessons are not being learnt, and that issues with delays, communications and co-ordination are rediscovered

every time. It does not bode well should there ever be a serious accident. It is difficult to believe that in a real-life disaster, everything would run smoothly.

The MoD may want people to believe that the scary scenarios they use for these exercises are unlikely to happen. But what we know of the nuclear convoy’s actual track record on safety does not inspire confidence.

it had failed in its aim of “mass decontamination” because of faulty information from the MoD.

“If this had been a real incident, casualties would have been allowed to go to hospital or rest centres contaminated,” the service observed. “The rescue of casualties that were meant to be trapped in vehicles was not achieved as the briefing of the MoD fire service on casualties was not carried out properly.”

Water used to wash the hands and faces of radioactively contaminated victims was poured on to the roadway.

“If this had been a real incident,” the fire service pointed out, “contaminated water would have been allowed to contaminate additional areas with no attempt made to contain it.”

Another nuclear convoy exercise called Astral Climb was played out in November 2012 at Albemarle barracks in Northumberland. The exercise’s [official post-mortem](#) reported that the bomb convoy prevented fire and ambulance services from accessing

convoy has crashed, broken down and got lost. Its brakes have failed, it has leaked fuel and suffered a range of other mechanical failures. Bad luck, poor weather, human error and computer software glitches have all been to blame.

Under pressure from MPs and an official inquiry, the MoD has admitted to eight convoy accidents between 1960 and 1991. In July 2001 it released information on three convoy accidents,

ACCIDENTS

The MoD has never wanted to say much about the accidents and incidents that have plagued the bomb convoys over the years. It may not have confessed to some events, or given full accounts of those to which it has admitted. But from reports to parliament, documents released under freedom of information law and assessments by [Nukewatch](#), we can glean something of what has happened.

There have been a long series of mishaps. The

THE EMERGENCY EXERCISES THAT WENT WRONG

PROPOSED INTERVENTION	DESCRIPTION
Senator 1996:	“unacceptable” lack of data on radiation monitoring
Senator 1997:	“a lot of confusion” between civil authorities
Senator 2000:	more radiation risk because of a 90-minute delay in evacuation
Senator 2001:	“ineffective control” by police
Senator 2005:	casualties trapped in vehicles and left contaminated
Senator 2011:	emergency services “struggled” because of five-hour MoD delay
Astral Climb 2012:	deaths because emergency services barred for 40 minutes

summarised in a [House of Commons briefing](#) in June 2016. The worst occurred at 3.45pm on 10 January 1987 during icy weather in Wiltshire.

A truck carrying two nuclear warheads on a narrow minor road near the village of West Dean skidded on slush while trying to pass a stationary car. “Both front and rear nearside wheels of the TCHD [Truck Cargo Heavy Duty] ran onto the verge, which gave way,” recounted the [declassified report of the MoD’s official board of inquiry](#) into the accident.

“The TCHD toppled to its left, coming to a halt on its side in a field three feet below the level of the road.” A second weapons carrier following behind was forced to brake and slid off the road “coming to rest with its nearside front wheel embedded in the soft verge.”

The board of inquiry concluded that no-one was to blame for the accident. But it recommended

THE VEHICLE “SUFFERED A SUDDEN AND DRAMATIC LOSS OF POWER AND WAS FORCED TO PULL ONTO THE HARD SHOULDER OF THE MOTORWAY TOGETHER WITH THE REST OF THE CONVOY ASSETS,” HE WROTE.

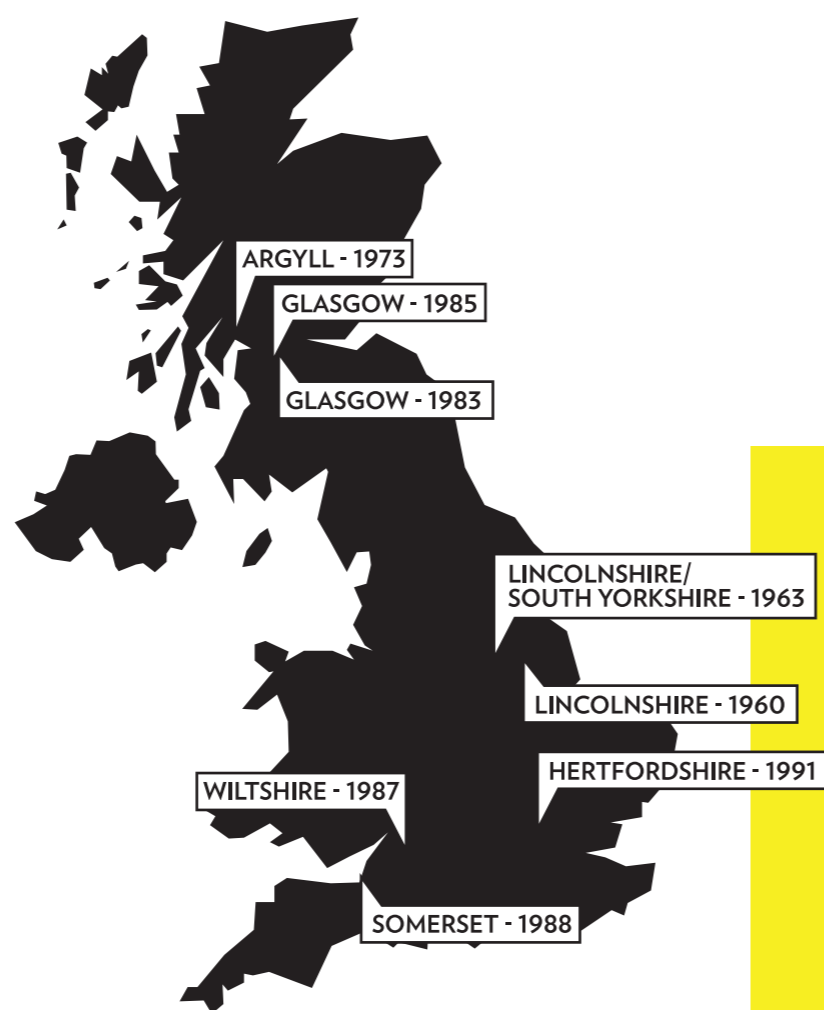
that convoy commanders should check in advance on local conditions, and that country roads on convoy routes should be resurveyed.

A second accident occurred in August 1983, when a weapons truck was involved in a crash with a car on the M8 near Glasgow. A third happened on April 1973, when an electricity board land rover reversed into a nuclear truck near the Royal Naval Armaments Depot at Coulport, in Argyll.

Five further incidents were briefly referred to in a report on nuclear safety written by Sir Ronald Oxburgh, the MoD’s chief scientific advisor in 1992. In 1960 in Lincolnshire, a bomb truck had a brake failure on a slope and overturned.

Some time in 1963, there was another brake failure near the border between Lincolnshire and South Yorkshire. In June 1985, there was a third brake failure when the convoy was in Helensburgh near Glasgow.

In September 1988 an unloaded weapons carrier was involved in a road traffic accident in Somerset. In December 1991 a truck suffered mechanical failure on the M25 in Hertfordshire.



In response to requests under freedom of information law, the MoD has also given outline details of 180 safety incidents that have afflicted the weapons convoy between 2000 and 2016. An initial list of [67 incidents between 2000 and 2007](#) included numerous fuel leaks, a series of broken valves and several instances of engine and brake overheating.

In October 2003, an axle began smoking due to “excessive use of wheel brakes” coming down a steep hill, said an [MoD report](#). In February 2003 a bomb carrier’s clutch “became inoperative”, and in January 2005 a fuse box started smoking when a heated windscreen was turned on.

Nine incidents listed in a [second MoD report](#) involved delays or diversions due to protests against the convoys. In July 2004, for example, the convoy was delayed 16 minutes by a protest at Balloch on Loch Lomond in Scotland.

On other occasions the convoy was delayed because of road traffic accidents. In March 2005 there was a “vehicle fire on hard shoulder”, and in July 2004 a major accident on the opposite carriageway caused a 39-minute delay.

In 2014 the MoD [released a second list](#) of 70 safety incidents between 2007 and 2012 to the monitoring group, Nukewatch. As with the first list, the locations of most of events were not specified.

It again [revealed](#) that bomb convoy vehicles had suffered numerous breakdowns, fuel leaks, and overheating brakes. The convoys also went the wrong way, were delayed, diverted and lost communications. Incidents happened on average more than once a month, with by far the highest number – 23 – logged in 2012.

One of the most dangerous mechanical failures recorded by the MoD happened late in the afternoon of Monday 25 July 2011. A convoy command vehicle broke down on the northbound carriageway of the M6 motorway near junction 20 in Cheshire.

The [commander’s official report](#) of the incident, released by the MoD, gave a vivid description. The vehicle “suffered a sudden and dramatic loss of power and was forced to pull onto the hard shoulder of the motorway together with the rest of the convoy assets,” he wrote.

LOCATIONS OF 8 MAJOR NUCLEAR CONVOY ACCIDENTS

265
FATAL ACCIDENTS
INVOLVING HGVS
IN 2014



180 SAFETY INCIDENTS INVOLVING
NUCLEAR CONVOYS OCCURRED
BETWEEN 2000 AND 2016

40 NUCLEAR CONVOY INCIDENTS

March 2002:	wheel of load carrier showed signs of overheating	December 2009:	convoy off route due to commander error
August 2002:	engineering fault on convoy support vehicle	December 2009:	escort vehicle transmission failure
January 2003:	bomb carrier engine brake became inoperative	July 2011:	command vehicle fuel system failure
February 2003:	bomb carrier clutch became inoperative	January 2012:	fire tender brake fault
May 2003:	bomb carrier engine overheating	January 2012:	escort vehicle gun port flap opened inadvertently
May 2003:	fuel leak from rear of bomb carrier engine.	January 2012:	command vehicle experienced reduced braking
September 2003:	leak of coolant from bomb carrier radiator	March 2012:	diversion due to low flying at MoD establishment
October 2003:	smoke after excessive use of brakes during descent	March 2012:	load-securing system damaged during offload
May 2004:	bomb carrier brake not working	June 2012:	manhole cover collapsed under escort vehicle
July 2004:	bomb carrier axle brake running hot	September 2012:	escort vehicle reported smoke and fumes in cab
December 2004:	oil leak from engine on bomb carrier	May 2013:	road traffic collision involving two convoy vehicles
January 2005:	smoke issued from bomb carrier fuse box	May 2013:	collision with a parked civilian vehicle
July 2006:	fault on quick release valve	January 2014:	collision with a car at an MoD base
September 2006:	starter motor fault on bomb carrier	January 2014:	delay caused by slush and snow
September 2006:	gear fault on bomb carrier	July 2014:	protestor glued to roof of bomb carrier
September 2007:	command vehicle lost communications	November 2014:	bomb carrier breakdown
January 2008:	escort vehicle brakes locked	July 2015:	two escort vehicles unserviceable after breakdowns
April 2008:	anti-nuclear protest	November 2015:	dogs loose on the carriageway
September 2008:	escort vehicle brakes overheating	January 2016:	command vehicle clutch problem
January 2009:	bomb carrier fuse box failure	May 2016:	electrical equipment failure on support vehicle

This caused an obstruction on the busy road, closed two lanes and resulted in 10-mile tailbacks. The MoD said the vehicle had suffered a “fuel system failure” that turned out to be a “manufacturing fault”, which had to be rectified across the whole fleet.

During a convoy journey in January 2012 five incidents were reported by the MoD, including a “fuse box failure” and “security system air leak” on the nuclear warhead carrier, a “fire tender brake fault”, and “reduced braking” on a command vehicle. The gun port flap of an escort vehicle also “opened inadvertently”.

A June 2012 convoy ran into a series of problems after it was halted because of a “suspension system defect” in an armoured escort vehicle. “During unplanned stop to investigate above incident,” the MoD reported, “a manhole cover collapsed under a further escort vehicle.”

In January 2009 a bomb carrier suffered an “unrepairable” fuse box failure, meaning a spare truck had to be brought into use. On another occasion in November 2010 the spare truck itself suffered an “unspecified break down”.

In July 2010 a convoy strayed “unintentionally off route” due to a “commander error”. The convoy was delayed by 45 minutes while it stopped and identified an approved route to bring it back on course.

In March 2012 the convoy had to be diverted because of the “proximity of low flying at MoD establishment”. According to an MoD log, it was often diverted or delayed because of bad weather, traffic congestion, road works or accidents.

Computer software also had to be upgraded after four false alarms wrongly suggested that the warhead carrier was overheating. In 2010

and 2011 the convoy’s blue lights, speed sensors, sirens and warning lights failed 11 times.

As this report was going to press, the MoD released new lists outlining 43 safety incidents that occurred between January 2013 and July 2016. They revealed that there have been three previously unknown vehicle collisions involving the convoy, though the locations are not disclosed.

Two collisions occurred in May 2013. One was described by the MoD as a “minor road traffic collision involving two convoy vehicles” that left “marks to bumper on one vehicle”. The other happened when a convoy escort vehicle was leaving a rest break at an unnamed MoD base and resulted in “contact with a parked civilian vehicle”.

In January 2014 an escort vehicle was involved in another “minor road traffic collision” with a car at an MoD base. In the same month slush and snow on the convoy route necessitated a “rolling road block” and caused a 21-minute delay.

In November 2014 the MoD reported that a warhead-carrying TCHD suffered a “defective interlock” which caused the convoy to be halted. Another TCHD broke down and lost power when it was leaving an MoD site in September 2015, and had to return to the site.

TCHDs also had “cab tilt warning” lights come on three times in May 2013, November 2014 and January 2015. High security vehicles used to carry nuclear materials experienced a battery failure in October 2013, and a temperature gauge registering 110 degrees centigrade in March 2014.

Two convoy escort vehicles were taken out of action in November 2013 after one broke down and another displayed a warning light.

In July 2015 two more escort vehicles broke down and were rendered “unserviceable”.

The convoy fire engine “developed an automatic transmission leak” in December 2015. A convoy command vehicle “developed a clutch problem on route” in January 2016, and had to be replaced. In May 2016 a support vehicle “suffered equipment electrical failure”, said the MoD.

Motorcycle escorts also had punctured tyres, and there were other warning lights, problems and mishaps. Traffic accidents, roadworks, road closures and a lubricant spillage caused the convoy to be delayed or rerouted.

In November 2013 the convoy departure was delayed and the route changed when the Erskine Bridge over the river Clyde near Glasgow was closed during bad weather. In July 2014 the convoy was delayed by 30 minutes “due to civilian vehicle on fire on Erskine Bridge”.

In July 2014 the convoy was forced to stop for an hour because a protestor was glued to the roof of a TCHD. According to the MoD, protests also caused delays in January and March 2016.

In November 2015 there were “dogs loose on the carriageway on route”. The convoy’s departure was delayed in January 2016 as it had been “programmed for the same time as the end of a local football match with fans leaving ground.”

The MoD argues that the 180 safety incidents were all minor, and a measure of how well its reporting systems function. But Nukewatch points that “had bad luck caused events to play out in a different way” many of the incidents could have developed into serious accidents.

NIGHTMARE SCENARIOS

Bomb convoys are dogged by pressures that could increase accident risk. For a decade the MoD's entire nuclear programme has suffered from an acute shortage of skilled engineers, which could get worse.

The 2014-15 annual report from the MoD's internal watchdog, the Defence Nuclear Safety Regulator (DNSR), warned that the persisting shortfall was "the principal threat to the delivery of nuclear safety". The problem required "sustained attention to ensure continued safe delivery of the defence nuclear programme over the medium to long term."

DNSR has been expressing concern about the skills shortage since 2006. Part of the problem is the "ageing demographic" of the existing workforce, which means that key specialists are getting closer to retirement.

Plans to replace Trident and to develop the civil nuclear power industry also put nuclear skills "increasingly at a premium", DNSR warned. Experts point out that these pressures are only going to increase as nuclear activities expand.

An earlier DNSR report covering 2011 warned that there was a "lack of adequate resource to deliver the defence nuclear programmes safely". Government imposed austerity measures and the "difficult backdrop" of plans to reduce MoD staff by a quarter over three years meant the problem was getting worse.

"Inadequacy of resources, both money and staff

complement, and the difficulties in maintaining a sustainable cadre of suitably competent staff (Royal Navy, MoD civilians and in industry partners) are the principal threats to safety in the defence nuclear programme in the medium term," DNSR concluded.

Security pressures can also threaten safety. The MoD decided to introduce "continuous running" of the convoy in 2005 in the wake of the 9/11 terrorist attacks on the twin towers in New York City. This has cut the time it usually takes to travel from Burghfield to Coulport from three to one or two days.

But MoD reports released under freedom of information law in 2005 flagged up potential risks. If inadequately conceived or implemented, the change "would have the potential to create a significant hazard to the operation", one warned. The dangers cited included poor

visibility at night, tiredness and getting lost.

The MoD's insistence on secrecy doesn't help safety either. An official manual on the movement of nuclear warheads released under freedom of information law in 2009 spelt out the policy.

"It is UK policy to neither confirm nor deny the presence or absence of nuclear weapons at any particular place or time," it said. "To be effective it must be consistently applied, even on occasions where the presence or absence of nuclear weapons may be thought to be obvious."

If there was an accident the MoD might not tell the police, fire and ambulance services that nuclear weapons were present. According to the manual, the convoy commander would have to consult MoD headquarters before confirming their presence.

Local authorities and fire brigades have confirmed that they are not told about bomb convoys. In responses to freedom of information requests from the International Campaign to Abolish Nuclear Weapons UK, Birmingham, Preston, Leeds, Newcastle and Glasgow city councils all said they were not forewarned about convoy movements in their areas.

West Midlands Fire Service pointed out that no warnings were given for "many hazardous materials". Tyne and Wear Fire Rescue Service and Lancashire Fire and Rescue refused to say on the grounds that it would prejudice national security.

Secrecy has also been blamed for an MoD decision in 2012 to dispense with radiation warning signs on lorries that carry bomb materials like plutonium or highly enriched uranium. MoD policy changed when they decided to use the same trucks for "special nuclear materials" as those used to transport the actual warheads.

The change "was needed in order to maintain the policy to neither confirm nor deny the presence of nuclear weapons," the MoD said. This prompted accusations from critics that it was putting secrecy ahead of safety.

If there is a serious risk of a nuclear warhead being stolen, or malevolently detonated, there could be good reasons for secrecy. But there are suspicions that sometimes the MoD may be more concerned to secure its bombs than to safeguard the health and well being of emergency responders or the general public.

Some of the delays in the Senator and Astral Climb emergency exercises recounted earlier could be attributable to military insistence on retrieving the weapons before allowing access to the civil emergency services. It is impossible to be sure whether this is a real or imagined need, however, as reasons often aren't given or are redacted from the reports that are released.

The exercises also suggest that the MoD implicitly accepts that serious accidents can happen. Figures from the Department of Transport show that in 2014 all kinds of heavy goods vehicles (HGVs) were involved in 6,873 road accidents, of which 265 were fatal and 982 were serious. Some 559 HGVs skidded, 245 overturned and 75 jack-knifed.

It is possible to imagine every kind of accident with a nuclear bomb convoy, including head-on crashes, multiple pile-ups, fires and explosions. Perhaps the most worrying is an accident serious enough to breach nuclear warhead containment.

A fire or, worse, the detonation of some of the conventional high explosives packed around the cores of nuclear bombs, could breach the containers and loft large clouds of contaminants into the air. This could result in the spread of radioactive plutonium, uranium and tritium from the warhead.

Depending on which way the wind was blowing, many thousands of people could risk being contaminated. Plutonium, if it gets into the body via breathing, eating or cuts, is very toxic, and increases the risk of cancer.

When he studied the risks of a convoy accident in 1990, the independent nuclear engineer, John Large, came to the conclusion that the most serious hazard was the detonation of high explosives. This would result in the disintegration of the warhead and the release of plutonium, he warned.

“This accident could result in the entire plutonium core being dispersed to atmosphere in aerosolised form of which approximately 20 per cent would be at or below the respirable particulate size of 10 microns,” Large said.

“If the accident involved severe fire with the warhead engulfed in the flames, then the high explosives could detonate, burn or melt and/or flow out of the warhead casing. Fierce burning of the high explosive, which I consider to be the most likely of these outcomes, could serve to aerosolise the plutonium and other materials within the warhead.”

Large believes that the dangers are still as great today. “The real problem is if the convoy is involved in a multiple crash and fire,” he said. “The inclusion of a flammable chemical tanker in the pile-up would add to the ferocity and, particularly if the incident occurred in a longish bridge underpass or similar, fire temperatures would be very demanding on the containment of the warhead carriers.”

If the containment is breached, high explosives could catch fire or explode, he warned. “Once that happens then the enriched uranium and plutonium components will also be consumed by fire and, without effective containment, liberate some very fine plutonium dioxide particles.”

The consequences of that would be very hard to mitigate and very long lasting, Large argued. Once inside the body, plutonium stays there for many decades, irradiating tissue and increasing cancer risks. Warheads can also contain other highly toxic materials such as beryllium, he pointed out.

It’s possible to imagine worse nuclear accidents. In a technical report declassified in 2005, the MoD admitted that bombs damaged in a vehicle pile-up or air crash could partially detonate and deliver lethal radiation doses. It’s called an “inadvertent yield”.

A nuclear explosion is designed to occur when the plutonium core is compressed symmetrically by conventional explosions wrapped around it. Bombs are meant to be “single point safe” so a knock at a single point should not be able to trigger all the explosives around the core and cause a nuclear explosion.

But according to the declassified report, multiple failures caused by extreme accidents could result in the loss of single point safety, and an “inadvertent yield”. The chances of this happening were said by the MoD to be extremely low, though its assumptions were far from clear. It didn’t factor in deliberate acts.

The MoD has judged the risk to be “tolerable when balanced against the strategic imperative to move nuclear weapons”. But an inadvertent yield - or nuclear “fizzle” - could prove deadly. It had “potentially high off-site consequences”, said the MoD report, with radiation doses ranging from one to 10 sieverts.

According to the UK’s former Health Protection Agency, people exposed to around a sievert could suffer nausea, diarrhoea and hair loss. The risk rises with exposure, so that four sieverts gives people a 50 per cent chance of dying from acute radiation poisoning and six sieverts will kill everyone exposed.

Then there’s the ultimate risk of a terrorist attack, which for understandable reasons, the MoD has said very

little about. But it has sounded a dramatic alarm. In 2006 a Scottish anti-nuclear activist, David Mackenzie, was concerned about the convoy’s use of weight-restricted bridges and so filed a freedom of information request asking about routes and tonnages.

But the MoD refused to provide any information in response. “Of particular concern is that disclosure by MoD of information identifying the roads which form the convoy route network and details of the abnormal load’s axle weights would provide valuable information to terrorists and could assist in the planning and carrying out of an attack against a convoy,” wrote the MoD’s director of information, David Wray, on 4 May 2006.

“This is an issue of national security given that such an attack has the potential to lead to damage or destruction of a nuclear weapon within the UK and that the consequences of such an incident are likely to be considerable loss of life and severe disruption both to the British people’s way of life and to the UK’s ability to function effectively as a sovereign state.”

In other words, the MoD accepts that the ultimate nightmare is possible. A terrorist group could attack a nuclear convoy and cause a catastrophe unlike any ever seen in the UK. The prospect should give us all pause for thought.

“THIS IS AN ISSUE OF NATIONAL SECURITY GIVEN THAT SUCH AN ATTACK HAS THE POTENTIAL TO LEAD TO DAMAGE OR DESTRUCTION OF A NUCLEAR WEAPON WITHIN THE UK AND THAT THE CONSEQUENCES OF SUCH AN INCIDENT ARE LIKELY TO BE CONSIDERABLE LOSS OF LIFE AND SEVERE DISRUPTION BOTH TO THE BRITISH PEOPLE’S WAY OF LIFE AND TO THE UK’S ABILITY TO FUNCTION EFFECTIVELY AS A SOVEREIGN STATE.”

POTENTIAL ACCIDENTS INVOLVING A CONVOY:

LIKELIHOOD	EVENT	OUTCOME
1	Crash and radiation leak	Local casualties and contamination
2	Crash, fire, radiation leak	Local casualties, spreading cloud of contamination
3	Crash, fire, explosion, radiation leak	Local casualties, widespread contamination, cancer risks, disruption
4	Multiple pile-up, fire, explosions, nuclear reaction	Major casualties, widespread contamination, cancer risks, major disruption
5	Terrorist attack	Considerable loss of life, mass contamination and severe disruption

3. FIVE POTENTIAL ACCIDENTS

To help understand the impact of an accident, we have looked at what could happen in five places through which the bomb convoy often travels: Birmingham, Preston, Wetherby, Newcastle and Glasgow. In each case we have imagined an accident site, and assumed that leaking radioactivity could spread up to 10 kilometres in any direction.

That is a reasonable, and conservative assumption. It is farther than the MoD assumes, but not as far as others fear. If an accident were to happen, the spread of the contamination would be determined by the weather. The radioactive cloud would be blown by the wind, and brought to earth by rain. If the wind is consistent, contamination may only be carried in one direction.

It is unlikely that everyone within a 10-kilometre radius of an accident would be contaminated. But many would find their lives seriously disrupted, as communities were evacuated, essential infrastructure disabled and emergency services overwhelmed. The knock-on consequences would be major, and they would last.

The MoD's [official guide to local authorities and emergency services](#) on nuclear transports has an annex setting out the zones it thinks an accident could impact. "Precautionary public protection advice" would be offered "where either radioactive material is released or the severity of the occurrence is such that possibility of a release cannot be excluded", it says.

For accidents involving nuclear weapons, the MoD suggests a 360-degree "evacuation zone" out to 600 metres from the site of the accident. In addition it suggests a "downwind shelter zone" covering 45 degrees out to five kilometres, in which

people would be advised to take shelter indoors to reduce the risk of radioactive contamination.

But, given the right conditions, contamination could spread further than five kilometres. That is what seems to have been imagined in some of the MoD's emergency exercises recounted earlier, and it's the view of an independent expert who specialises in examining nuclear risk scenarios.

In his [1990 report on convoy accidents](#), the nuclear engineer [John Large](#) argued that contamination could spread at least 40 kilometres. He pointed out that test burnings of plutonium in the early 1960s at the Maralinga nuclear testing range in Australia had caused an inhalation hazard between 27 and 56 kilometres away.

According to Large, the US military assumes that radioactivity from an accident could spread over 40 or 50 kilometres.

Depending on the severity of the accident and the prevailing weather conditions, he thought emergency counter-

measures in the UK would extend to tens of kilometres from the accident site.

"In the aftermath of an accident these zones might extend 40 kilometres or so downwind of the accident site and, by virtue of this, involve many thousands of individuals," concluded his report. He still thinks this is a reasonable assumption to make.

The disruption that could be caused by a nuclear convoy accident is difficult to exaggerate. The minutes of official debriefing meetings on major gas and chemical road accidents obtained under freedom

of information law [by the Liverpool Echo](#) give an initial idea of the scope of the potential problems.

A propane gas tanker that caught fire on the hard shoulder near junction 14 of the M56 between Runcorn and Chester on 10 August 2015 led to the complete closure of the motorway between junctions 12 and 15 and a 1.6 kilometre exclusion zone, banning flights and stopping train services. There were seven-hour traffic jams, confusion over which railway lines were affected and crossed wires between different police organisations.

Another accident on 20 October 2015 saw a tanker containing toxic chemicals overturn on the same stretch of the M56. It leaked its load onto the road, causing casualties and efforts to prevent toxins from contaminating watercourses and farm milk.

A lorry diverted from the motorway hit a bridge in the nearby town of Frodsham, causing further traffic chaos and access problems. Coaches sent to evacuate trapped road users could not reach the scene.

Accidents involving radiation create different hazards. According to a [United Nations report](#), communities around the Chernobyl nuclear accident in Ukraine in 1986 still had to deal with problems 30 years later. "The Chernobyl-affected areas continue to face numerous socioeconomic challenges, such as the lack of economic opportunities and stigma associated with Chernobyl and the effects of radiation," it said. "Young people and skilled workers tend to move away, investors shun the region, and joblessness is high."

Coping with the long-term consequences of Chernobyl has put a serious strain on Ukraine. The government is still spending between five and seven per cent of its national budget dealing with the health and economic aftermath of the disaster.

After a tsunami smashed four nuclear reactors at Fukushima in Japan in 2011, more than 80,000 people were forcibly evacuated, and another 80,000 chose to leave. At least 25,000 of them will [never be allowed home](#) because the levels of radioactive contamination will remain too high for more than 100 years.

More than 30,000 square kilometres of northern Japan were contaminated and the country's economy has been deeply damaged. All its nuclear power stations were closed down, and there were 2.2 million compensation claims, an £8 billion decontamination bill and dozens of legal suits.

A [report on the impact of nuclear explosions](#) by the UN Institute for Disarmament Research highlighted the economic cost of the Al-Qaeda passenger jet attacks on the twin towers in New York on 11 September 2001. As well as killing over 3,000 people, the attacks were estimated to have cost a total of \$3.3 trillion.

None of these accidents and disasters is quite like a nuclear convoy crash. It would play out differently, depending on where it happened, how serious it was and what the circumstances were. But there can be little doubting that the impacts on the public and on the vital health, education and transport systems on which we all depend could be severe.

To illustrate the issue, we have counted the number of people, hospitals, schools, universities, major roads, railways and airports within 10 kilometres of five possible accident sites. The resulting totals represent those that could be at risk from contamination or disruption.

In total there are 2.8 million people at risk within 10 kilometres of imagined accident sites in Birmingham, Preston, Wetherby, Newcastle and Glasgow. There are also 1,181 schools, 131 railway stations,

56 hospitals, 47 major roads, 12 universities and three airports. They are all potentially vulnerable to the after-effects of a major convoy accident.

Up and down the country, hundreds more communities and millions more people along convoys routes are also at risk, should there be a crash. But they get no notification, no preparation and no warning. Those that live around military and civil nuclear sites are given

anti-radiation pills and leaflets that advise them what to do in the event of an accident. But those that live alongside bomb convoy routes are given nothing.

A major accident, such as a motorway pile-up or a head-on crash at speed, could cause fires, explosions, and the leakage of radioactivity contaminating hundreds of thousands of people. It could also cause massive disruption to the functioning infrastructure of communities, triggering the closure of transport, education, health and other vital services.

Communities along the routes of the convoys should be aware of the risks they run. They should be asking questions about the measures taken to protect them by the authorities.

A MAJOR ACCIDENT, SUCH AS A MOTORWAY PILE-UP OR A HEAD-ON CRASH AT SPEED, COULD CAUSE FIRES, EXPLOSIONS, AND THE LEAKAGE OF RADIOACTIVITY CONTAMINATING HUNDREDS OF THOUSANDS OF PEOPLE. IT COULD ALSO CAUSE MASSIVE DISRUPTION TO THE FUNCTIONING INFRASTRUCTURE OF COMMUNITIES, TRIGGERING THE CLOSURE OF TRANSPORT, EDUCATION, HEALTH AND OTHER VITAL SERVICES.

BIRMINGHAM



A serious nuclear convoy crash on the M6 at Spaghetti Junction near Birmingham could put more than 1.3 million people at risk of radioactive contamination. Within a 10-kilometre radius there are over 500 schools, 38 railway stations and 18 hospitals that could be disrupted.

In response to a freedom of information request, Birmingham City Council said it had an emergency plan for dealing with nuclear accidents. But this was an “officially sensitive document” and so could not be released.

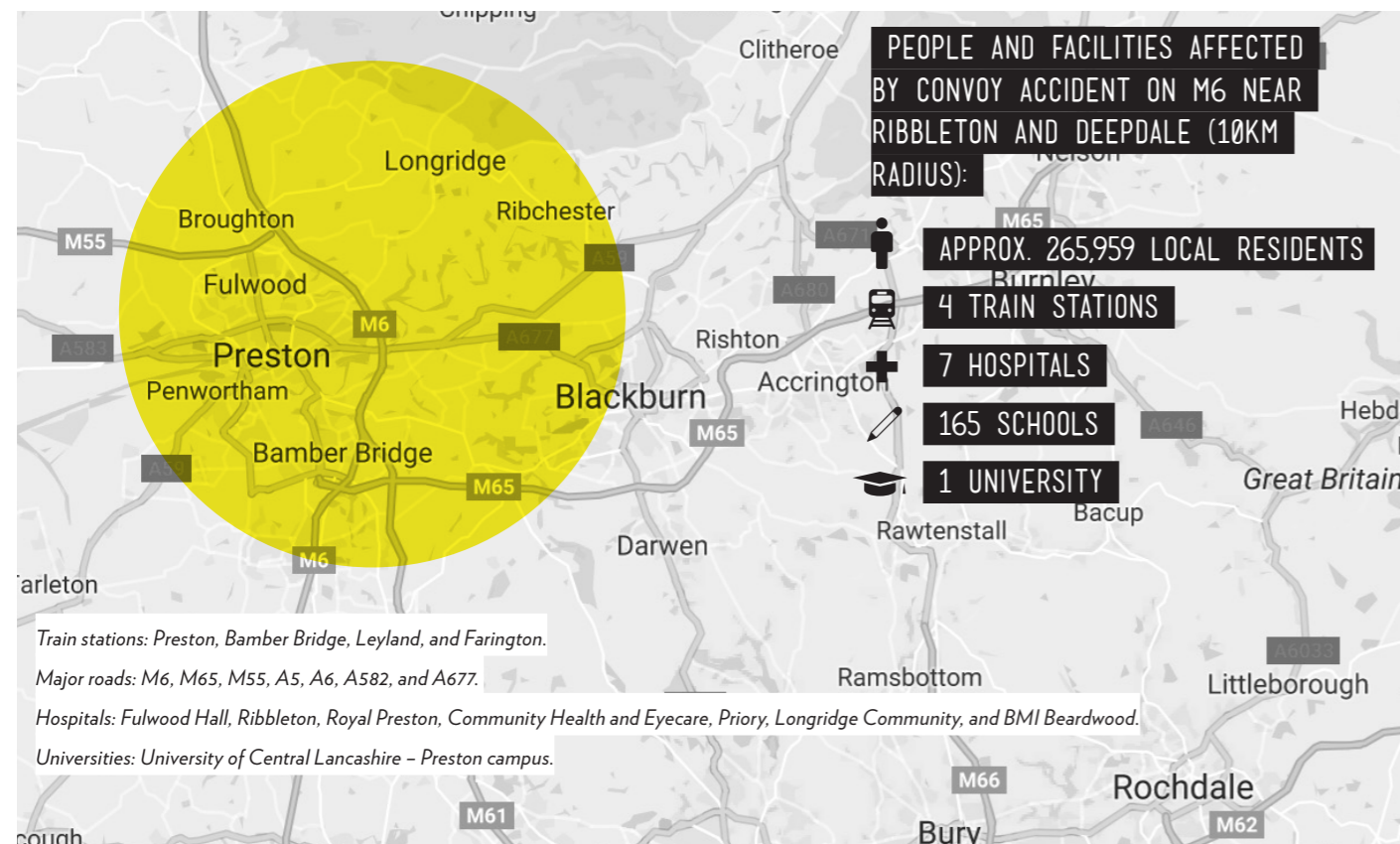
When asked what warning was given of nuclear convoys coming, the council said: “No information or warning is provided to the council.” When asked

what analysis had been carried out on the areas that might be affected by radiation leaks or explosions, the council replied: “No analysis has been carried out.”

West Midland Fire Service said it had “operational procedure notes” on dealing with radiation incidents. Though it aimed to arrive within five minutes when life was at risk, it said it would be “impossible to say” how long it would take to stop a radiation leak.

When asked what warnings it was given about nuclear convoy movements, the fire service said: “There are many hazardous materials that are carried on the transport system in the country without pre-warnings being given.”

PRESTON



An accident involving the nuclear convoy on the M6 near Ribbleton and Deepdale would put more than a quarter of a million people in Preston at risk of radioactive contamination. Within a 10-kilometre radius there are 165 schools, seven hospitals and four railway stations that could be disrupted.

In response to a freedom of information request, Preston City Council said it had “no plans to respond to any radiation leak from a nuclear weapons convoy.” The council did not have the assets to deal with such an incident.

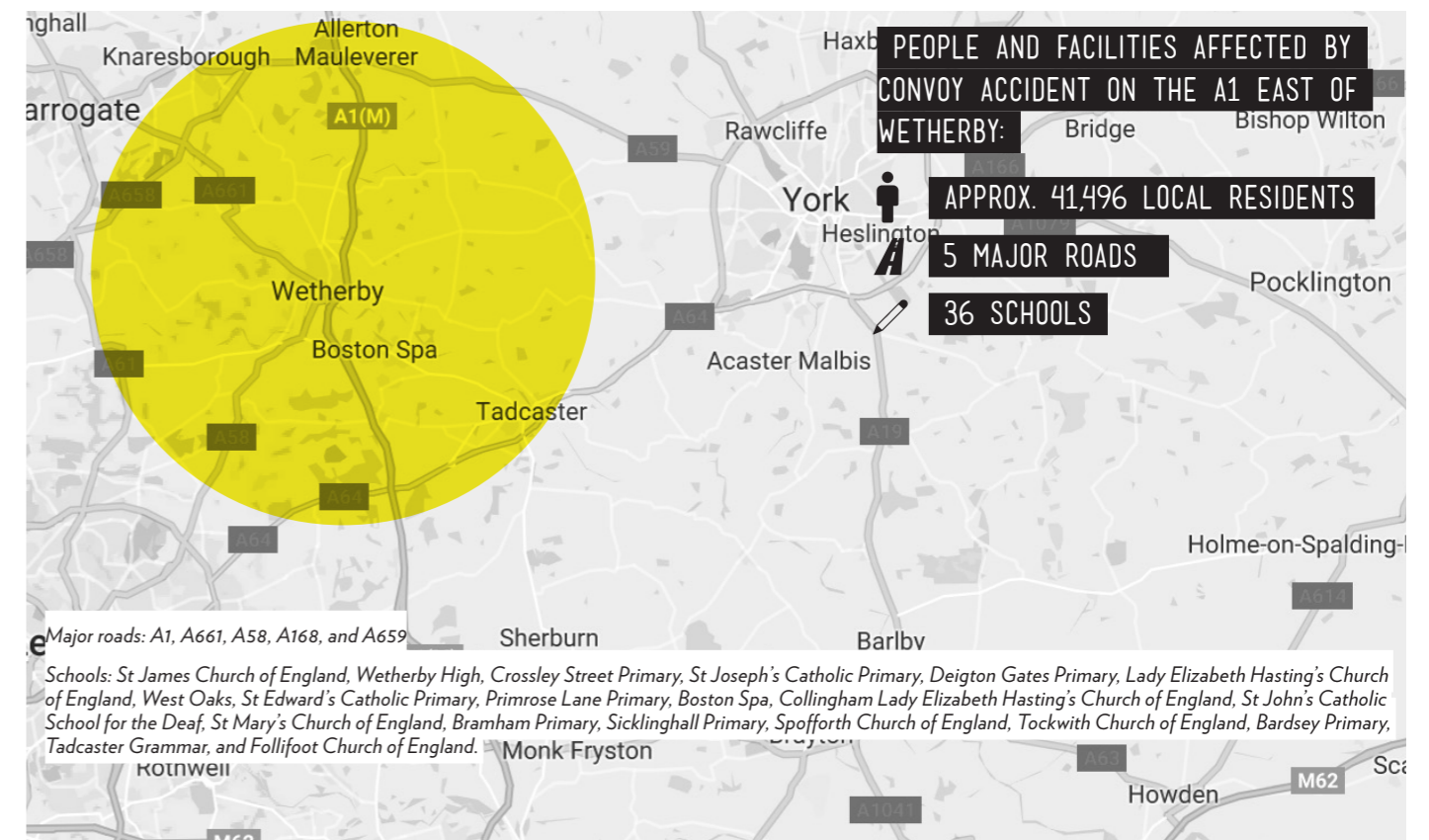
The council said it was given “no warnings” of convoy movements. When asked what analysis had been carried out on the areas that might be

affected by radiation leaks or explosions, the council replied: “No analysis has been carried out.”

Lancashire Fire and Rescue Service refused to answer questions about how it would respond to a convoy accident. “Lancashire Fire and Rescue Service neither confirms nor denies that it holds information that you have requested,” it said.

The service argued that it was not obliged to respond because of an exemption in freedom of information law for “safeguarding national security”. It added: “This should not be taken as an indication that the information you requested is or is not held by the service.”

WETHERBY



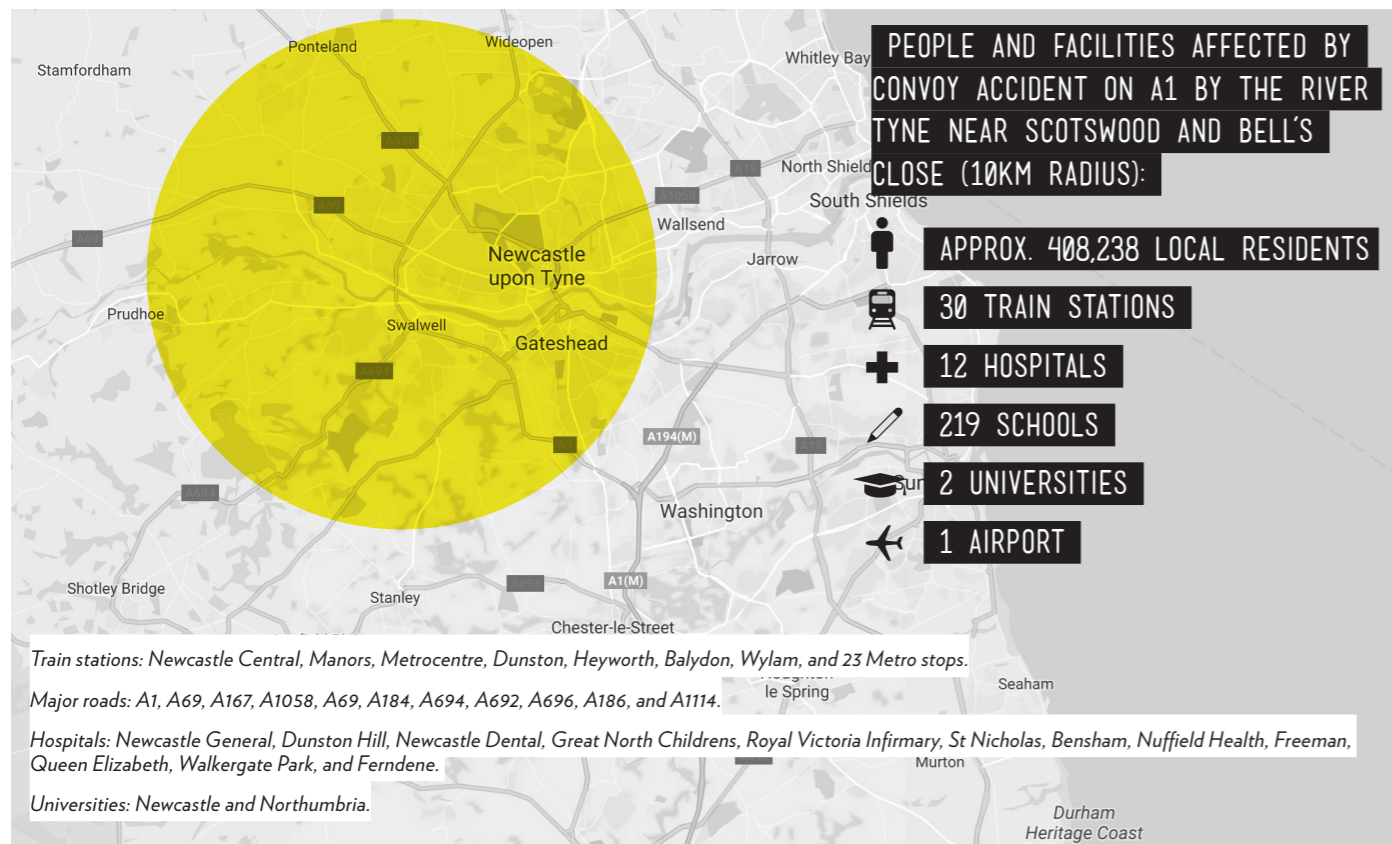
A convoy accident on the A1 east of Wetherby near Leeds would put 41,500 people at risk of radioactive contamination. Within a 10-kilometre radius there are 32 schools and five major roads that could be disrupted.

In response to a freedom of information request, Wetherby Town Council said it was “not usually given any warning by the British Government before a convoy travels past Wetherby town.”

It pointed out that emergency planning was the responsibility of Leeds City Council, which said that it was not informed of convoy movements by West Yorkshire Police.

Leeds City Council maintained “plans that could be activated in the event of an incident”, reported Wetherby council. “All response and subsequent recovery arrangements would be coordinated with emergency services and other partner agencies.”

NEWCASTLE



A nuclear convoy crash on the A1 near Scotswood and Bell's Close would put over 400,000 people in Newcastle at risk of radioactive contamination. Within a 10-kilometre radius there are 219 schools, 30 railway stations and 12 hospitals that could be disrupted.

In response to a freedom of information request, Newcastle City Council said it did “not hold any of the information you are requesting.” It suggested contacting Highways England, the emergency services and the Ministry of Defence instead.

Tyne and Wear Fire and Rescue Service pointed out that its fire stations were “strategically located” in line with an integrated risk management plan. “Major incidents will be responded to in line with our mobilising policy,” it said.

But the service refused to answer other questions. “This type of information could be of particular interest to individuals wishing to cause harm and disruption to the lives of the residents of Tyne and Wear,” it said.

The release of information would “prejudice national security”, the service argued. “Releasing information relating to the capabilities to respond to emergency situations during the transportation of nuclear warheads into the public domain could be misused by those with malicious intent,” it said.

“This information could be viewed as hampering the effectiveness of Tyne and Wear Fire and Rescue Service’s ability to carry out its responsibilities effectively in the event of a major incident, placing a real threat to national security.”

GLASGOW



An accident involving the nuclear convoy on the M8 in the centre of Glasgow would put over three quarters of a million people at risk of radioactive contamination. Within a 10-kilometre radius there are 265 schools, 59 railway stations and 19 hospitals that could be disrupted.

In response to a freedom of information request, Glasgow City Council said it was given no warnings of nuclear convoys. “For security reasons, the UK Government does not advise local authorities of the details of timings of individual convoys,” it stated.

The council said it had not carried out its own analysis of how far radiation might spread, but that it had been involved with “relevant worst case scenario preparedness exercising”. It had “a series of robust generic emergency response and recovery

plans” that included radiation risks, it added.

The Scottish Fire and Rescue Service has not so far responded to a freedom of information request about its plans for dealing with convoy accidents. Analysis by the [Scottish Campaign for Nuclear Disarmament \(SCND\)](#) suggests that an accident could lead to many residents of Glasgow receiving significant radiation doses, and risking cancers.

A convoy crash at the junction between the M74 and the M8 or on the M8 near Govan would cause major disruption, according to SCND. Several major hospitals and many schools would be contaminated, and restrictions could be imposed on agricultural production in some areas.

4. TOLERABLE RISKS?

Can you imagine the moment? You're half-listening to the travel news on the radio. It's something about major delays being caused by an accident involving a military convoy.

Over the following hours, days and months, the memory of that moment will become unforgettably etched in your brain. It was the beginning of one of the biggest scares Britain has ever had.

A cloud of radioactive plutonium from the burning wreck of a nuclear weapons truck contaminated a large swathe of a city. There was panic and confusion, public services became paralysed, and hundreds of thousands were left fearing that they, or their children, will get cancer.

It was never clear whether the accident involving a

SUFFOCATED BY OFFICIAL SECRECY AND A POLICY OF NEITHER CONFIRMING NOR DENYING WHAT HAPPENS WITH NUCLEAR WEAPONS, THERE ARE LIKELY TO HAVE BEEN PROBLEMS WE'VE NOT HEARD ABOUT.

petrol tanker was extreme bad luck, or the result of some perverted malevolence. Either way, the country was never going to be quite the same again.

The evacuation of hospitals, schools, shops and workplaces resulted in tens of thousands of people being displaced, unemployed and homeless. Farmland was rendered unusable, the economy took a nose-dive, and standards of living fell. Some places were too contaminated to be inhabited for years.

Such a disaster may never happen. We hope it never will. But no-one can be sure - and only a fool would rule it out.

It is the kind of scenario that the MoD regularly rehearses in emergency exercises. It is the kind of accident that officials dread, experts predict, and for which the emergency services prepare. It is foreseeable, and not far fetched.

It could happen in any of the hundreds of places across England and central Scotland that the nuclear bomb convoy drives by. Birmingham, Preston, Newcastle, Glasgow and scores of other major conurbations and communities risk radioactive pollution, and could suffer major disruptions to their essential services and economies.

And it's not as if the 20-vehicle convoys that drive up and down the UK have been accident-free these past years. Even the MoD has acknowledged at least eight accidents between 1960 and 1991, and 180 safety incidents between 2000 and 2016.

That's just what we know. Suffocated by official secrecy and a policy of neither confirming nor denying

what happens with nuclear weapons, there are likely to have been problems we've not heard about.

That's why it's important that the MoD be encouraged to become more open, more transparent and more accountable about nuclear convoys. It shouldn't take repeated requests under freedom of information law for officials to come clean. They should do it automatically.

The risks created by the transports - which even extend to the possibility of a nuclear reaction emitting lethal radiation - were judged by one MoD report to be "tolerable when balanced against the strategic imperative to move nuclear weapons".

But what is tolerable to the MoD may not be tolerable for the rest of us. Risks are very difficult to judge, and depend on assessments of probability and consequences. Though the probability

THE RISKS CREATED BY THE TRANSPORTS - WHICH EVEN EXTEND TO THE POSSIBILITY OF A NUCLEAR REACTION EMITTING LETHAL RADIATION - WERE JUDGED BY ONE MOD REPORT TO BE "TOLERABLE WHEN BALANCED AGAINST THE STRATEGIC IMPERATIVE TO MOVE NUCLEAR WEAPONS".

of a major nuclear convoy accident spewing radioactivity into the environment may not be very high, its consequences could be catastrophic.

We all know that accidents happen. Common sense suggests that, sooner or later, no matter what precautions are taken, a convoy will crash or be attacked, and communities will be contaminated and disrupted. The question is not if, but when.

The MoD, backed by the government in London, says that nuclear weapons are necessary for the UK's security. Somehow, the argument goes, the country would not be safe without a nuclear submarine constantly on patrol at sea, ready and willing to fire multiple weapons of mass destruction on potential enemies.

In order to make that possible, the MoD says, nuclear bomb convoys have to keep crossing the country. The warheads need to be maintained.

But most of the world disagrees. Internationally, important moves are being made to ban nuclear bombs, and their movement. The majority of UN member states have recommended that multilateral

negotiations commence in 2017 on a nuclear ban treaty that will prohibit the use, deployment, transporting and manufacture of nuclear weapons.

The UK can choose whether to join these multilateral negotiations and disarm, or to unilaterally keep deploying Trident - and keep driving its

warheads up and down the country. If it keeps Trident, the risk of a horrific nuclear convoy accident will persist.

Whether the risk is "tolerable" is not a judgement that should be left to the MoD alone. It is one for the millions of people through whose towns and cities the convoys pass. They have the right to decide what's tolerable - and what's not.

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THE FIVE CASE STUDIES

The figures used to illustrate possible nuclear convoy accidents in five places in England and Scotland were researched by Matt Hawkins and [International Campaign to Abolish Nuclear Weapons UK](#) staff in consultation with representatives from [Nukewatch](#), the [Scottish Campaign for Nuclear Disarmament](#), and [Scientists for Global Responsibility](#).

To calculate the numbers for each area a 10-kilometre radius was drawn around a given point on a motorway that could be used by nuclear convoys. Then data was taken from [gov.uk](#), NHS Choices, and the Office of National Statistics to estimate the size of the populations and the number of services such as schools and hospitals in that area. The spreadsheets used in the calculations can be made available on request.

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INTERNATIONAL CAMPAIGN TO ABOLISH NUCLEAR WEAPONS UK

The [International Campaign to Abolish Nuclear Weapons](#) (ICAN) is an international coalition that brings together humanitarian, environmental, human rights, peace, and development organisations in nearly 100 countries, working with parliamentarians and governments to achieve a global treaty to prohibit nuclear weapons, leading to their total elimination. ICAN UK is a collaborative project hosted by [Medact](#), to support ICAN's goals with information, analysis, advocacy, training and outreach.

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