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This resulted in:

- Part 1 screening only completed (no direct discrimination or adverse impact identified).

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Section 1: Introduction

1.1 This document has been written by the Ministry of Defence (MOD) to provide information for the emergency services (Police, Fire and Rescue and Ambulance) and Local and Health Authorities on contingency arrangements to be implemented in the unlikely event of an emergency, including those arising out of terrorist acts, during the transportation of nuclear weapons and Special Nuclear Material¹ (SNM). Throughout this document these materials are referred to collectively as Defence Nuclear Material (DNM).

1.2 Her Majesty's Government possesses nuclear weapons to effect the policy of maintaining a minimum nuclear deterrent. The Royal Navy operates Trident, the United Kingdom's only nuclear weapon system, which is a submarine-launched ballistic missile. Provision exists for our United States (US) allies to have nuclear weapons based in the UK and/or to fly through UK airspace, and the Defence Nuclear Emergency Organisation (DNEO) will lead a joint response with the US in the unlikely event of an emergency involving a US nuclear weapon.

1.3 DNM movements are kept to the minimum necessary to meet operational requirements in support of the United Kingdom's fleet of nuclear powered submarines and the strategic deterrent, provided at all times by a Trident ballistic-missile equipped submarine (SSBN).



A Trident II D5 missile breaking the surface, having been fired from HMS Vanguard.

1.4 Rigorous safety procedures are implemented during all such operations. The limited movement of DNM together with inherent safety features and procedures lead to the conclusion that the probability of a transport emergency leading to a radiological hazard is highly unlikely. In accordance with the

requirements of UK domestic legislation and MOD policy, the MOD maintains a capability to respond in the event of an emergency during the transport of defence nuclear material.

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.

1.5 The response by the emergency services and local authorities to a transport emergency involving DNM will have much in common with the response to any major incident or emergency. The Police provide strategic direction of any multi-agency response through the Strategic Co-ordinating Group (SCG). The principles laid down in the Cabinet Office publication "Emergency Response and Recovery" and the Scottish Government publication "Preparing Scotland" form the basis of MOD's own arrangements which are fully integrated into the overall response.



HMS Victorious in the Clyde estuary in transit to HM Naval Base Clyde

¹ Special Nuclear Material (SNM) comprises: tritium, highly enriched uranium and plutonium (which are used in the production of nuclear weapons), as well as new and used submarine reactor fuel.

Section 2: Defence Nuclear Material Transport Operations

2.1 The safety procedures and operational aspects associated with the transport of these materials are summarised in this section.

2.2 All DNM movements are carried out by specially trained personnel.

2.3 A Joint Operations Centre (JOC), which is manned by Ministry of Defence Police (MDP) and convoy support personnel, monitors all DNM movements. Nuclear weapon and SNM road convoys maintain contact by radio and telephone with the JOC and with the civil Police force. [Annex B](#) provides further details of JOC procedures.

2.4 Police forces are always notified in advance of a convoy being routed through their area, enabling them to provide advice about any local traffic problems. Police forces may inform Fire and Rescue Services of the presence of the convoy if it is moving into the vicinity of a Fire and Rescue operation or shortly before it enters their area of responsibility.

2.5 [Annex A](#) provides a list of local authority areas that DNM may be transported through.

Nuclear Weapon Transport by Road

2.6 The road transport of UK nuclear weapons is the responsibility of Defence Equipment and Support (DE&S). When transported by road, nuclear weapons are moved in vehicles called Truck Cargo Heavy Duty (TCHD). The cargo bodies of these vehicles are designed to provide a high degree of protection to a weapon container and its contents, even in the environments likely to be experienced in a very severe road traffic accident.

2.7 The TCHDs containing the weapons are moved in a convoy of MOD vehicles with an escort provided by the MDP. The convoy is made up of a highly trained crew, consisting of a first aid team, fire fighters, mechanics to enable roadside repairs, and personnel equipped to monitor for radiological hazards.

Uranium, Plutonium & Tritium Transport by Road

2.8 The transportation of uranium, plutonium and tritium is the responsibility of DE&S. It is transported in the UK either by road or air, in containers designed in accordance with International Atomic Energy Agency (IAEA) standards. When transported by road these materials are moved in TCHDs in a convoy of MOD vehicles with an escort provided by the MDP. The convoy is made up of a highly trained crew, including a

first aid team and personnel equipped to monitor for radiological hazards.



TCHD Mark 3

New Reactor Fuel Transport by Road

2.9 Reactor fuel for nuclear powered submarines is manufactured at Rolls Royce in Derby. It is transported by road to Devonport Dockyard for installation into submarines undergoing refit. In addition, new reactor cores are transported to BAE Systems at Barrow-in-Furness for installation into new build submarines.

2.10 New fuel is transported in the form of separate modular units that are individually packaged into protective containers known as New Module Transport Storage Packages (NMTSPs) which are designed in accordance with IAEA standards. The movements comply with UK transport regulations and the NMTSPs are loaded onto standard road trailers moved by TCHD tractor units that travel in convoy. The MDP escorts these convoys, and specialists travelling in separate vehicles provide technical support in areas such as radiation monitoring.

Used Reactor Fuel Transport by Road

2.11 Used fuel can be transported by road. The used fuel is transported in protective purpose-built containers which are designed in accordance with IAEA standards. The containers are loaded onto transport frames configured for road use. Security and safety measures are equivalent to those provided during road transport of new fuel and transport arrangements comply with UK transport regulations.

2.12 All used fuel movements by road are escorted by the MDP. Specialists familiar with the load and capable of providing technical support during the journey travel with the MDP in the escort vehicles. The MDP regularly communicate their position to the JOC

Section 2: Defence Nuclear Material Transport Operations

and local Police are informed in advance of the scheduled movement. The Fire and Rescue Service would be informed by local agreement with the civil Police.

Nuclear Weapon, Uranium, Plutonium & Tritium Transport by Air

2.13 UK nuclear weapons are not transported by air. Occasional movements of US nuclear weapons are conducted by air under stringent safety procedures, which include careful route selection. These stringent procedures also apply to the air transport of uranium, plutonium and tritium. The Royal Air Force (RAF) maintains a response team and the JOC is at a state of readiness throughout the flight. Only multi-engined military transport aircraft are used. These aircraft are subject to an enhanced maintenance regime.

Used Reactor Fuel Transport by Rail

2.14 The MOD is responsible for the rail transport of used reactor fuel. It is transported directly by rail between Devonport and Sellafield. Occasionally, used reactor fuel is transported between the Naval Reactor Test Establishment (NRTE) Vulcan at Dounreay in Scotland and Sellafield, involving a short journey to the railhead by road. The used fuel is transported in protective purpose-built containers which are designed in accordance with IAEA standards. The train will carry one or two containers, each loaded onto a separate wagon.

2.15 All used fuel movements by rail are escorted by the MDP and British Transport Police. Specialists familiar with the load and capable of providing technical support are present. The MDP regularly communicate their position to the JOC and local Police are informed in advance of the scheduled movement. The Fire and Rescue Service would be informed by local agreement with the civil Police.

Section 3: Nuclear Weapon Design and Safety

3.1 Nuclear weapons function by compressing a sub-critical mass of fissile material to increase its density and cause it to become super-critical. A conventional chemical explosive is used to achieve this compression. To generate the shock wave necessary to achieve super-criticality the explosive must be detonated in a very precise manner by the simultaneous initiation of a number of detonators by an electrical firing signal. All electrical signals are prevented from reaching the detonators until such time as a number of internal safety breaks are closed by the weapon experiencing a unique sequence of environmental events. In a ballistic missile delivery system it is customary to use a prescribed sequence of missile acceleration and re-entry deceleration time histories. The firing signal, generated by the fuse at the correct time for detonation, can thus only reach the detonators once the weapon system has experienced the prescribed delivery flight. It is not possible to generate the series of environmental events in any other way.

3.2 Furthermore, to protect the warhead from initiation in an emergency situation, the safety breaks are purposely built and tested to be very strong and so remain safe under all credible abnormal environments. In contrast, parts of the firing chain are designed to be weak, in the sense that they will fail, thereby preventing the generation or transmission of a firing signal, before the safety breaks become unsafe.

3.3 As a further safety feature to cater for abnormal events all UK and US nuclear weapons are designed to be "single point safe". Under this concept, inadvertent initiation of high explosive at one point, by for example the intrusion of a spigot if the warhead were to fall from a great height on to a sharp spike, cannot produce the conditions necessary for super-criticality. An inadvertent nuclear yield greater than a few pounds of TNT equivalent is therefore not possible.

3.4 Before a warhead design enters service it is tested rigorously against both the normal environmental conditions it would be expected to meet during its operational lifetime and against a range of abnormal environments, under which it must remain safe. Each year, a UK weapon is withdrawn from the stockpile and stripped to its components. These are carefully examined to ensure not only that the weapon would function if so required but that all its design safety features remain intact.

3.5 The UK and US's nuclear weapons are highly robust and are specifically designed to withstand massive mechanical stress and high temperatures induced by launch and re-entry into the earth's atmosphere. The robust design and safety features offer excellent protection against accidental mechanical shock and damage in transport.

Section 4: Ionising Radiation, Hazards and Protection

4.1 Three main types of ionising radiation may emanate from DNM: alpha particles, beta particles, and gamma rays. Details on the properties of these types of radiation are published by Public Health England and can be found on the GOV.UK website along with further relevant information. The leaflets and web pages can be accessed via the [Useful Links](#) section at Annex G. For most DNM the main hazard will arise from alpha particles, principally from plutonium, with only a relatively small hazard presented by beta particles and gamma rays. For used fuel, the main hazard would be from the beta and gamma radiation.

4.2 Specific information relating to the hazards and protection of emergencies involving nuclear weapons, plutonium, uranium, tritium, new fuel and used fuel are as follows:

Nuclear Weapons

4.3 The hazards associated with a nuclear weapon emergency are related to the explosive, radioactive and toxic materials that the weapons contain. The explosive hazard is the same as that which is associated with any chemical high explosive. The main radioactive materials in a nuclear weapon are plutonium and uranium. Plutonium and uranium are both toxic and radioactive. The weapon may also contain other toxic (but not radioactive) materials such as beryllium and lithium.

Conventional hazards, which may arise in the event of an accident (i.e. fire, smoke and the remote possibility of explosively propelled debris), pose a much more immediate threat to life than any hazard possibly arising from radioactive or toxic materials.

4.4 In the event of a nuclear weapon emergency MOD will advise the 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. A summary of key emergency actions can be found at [Annex E](#).

4.5 Beyond the immediate hazard area, the potential dispersion of airborne plutonium particles represents the dominant radioactive hazard and MOD will advise the Police that members of the public should take shelter in order to provide protection. This advice and the extent of its application is derived from PHE (formerly National Radiological Protection Board - NRPB) guidelines "Emergency Reference Levels of Dose

(ERLs) for Early Countermeasures to Protect the Public". Documents of NRPB, Vol1, No4 (1990)²

Protective measures taken against the dispersion of airborne plutonium particles will ensure adequate protection against toxic and other radioactive hazards.

4.6 Alpha particles emitted from plutonium are unable to penetrate ordinary clothing or the unbroken outer layer of a person's skin. Simple decontamination techniques, such as showering and washing with soap and water, are effective in removing plutonium particles, and their presence on the skin should not compromise urgent medical treatment. Only if alpha emitting particles are taken into the body would any hazard to health result. The entry routes for this are inhalation (with particles lodging in the lungs), ingestion (particles in the digestive tract) or deep wounds. Entry by wounds should be minimised by deep-cleansing any potentially contaminated wounds. Plutonium and uranium in the particulate form which might be produced by a weapon emergency are highly insoluble. Even if taken into the body, the vast majority of the material will be excreted through the body's natural actions for passing particles through the digestive tract or dispelling inhaled particles from the lungs. Levels may be reduced still further by specialist medical techniques such as lung lavage to clear out the lungs.

4.7 Within the body, plutonium does not pose an immediate health hazard from either its radioactivity or toxicity, but may give rise to an increased long-term risk of developing cancer. In the unlikely event of a large lung intake, there is also a possibility of developing lung fibrosis though this would be countered using the techniques described above.

4.8 For those required to approach the emergency site, such as the emergency services, the most effective protection against the dispersed radioactive material is respiratory protection.

Protective masks of virtually any nature placed over the nose and mouth will significantly reduce the quantity of material inhaled. Members of the emergency services required to go into the 600 metre evacuation zone, for fire-fighting and life-saving should don appropriate personal protective equipment.

² More detailed guidance on how ERLs should be applied in the development of emergency plans can be found in "Intervention for Recovery after Accidents – Application of Emergency Reference Levels of Dose in Emergency Planning and Response". Documents of NRPB Vol 8, No 1, published in 1997.



Personal Protective Equipment as worn by military personnel

Uranium, Plutonium & Tritium

4.9 Uranium, plutonium and tritium are used in the defence nuclear programmes. In a severe emergency, the principal hazard would arise from their combustion and subsequent release into the environment. For fires involving plutonium and uranium consignments, the hazards and appropriate protective actions are as described above for nuclear weapons. As well as alpha particles uranium emits small quantities of beta and gamma radiation which can present a very low external hazard. The simple decontamination techniques described in Para 4.6 are effective in removing uranium particles and the presence on the skin should not compromise urgent medical treatment. In all cases advice on the need for sheltering and evacuation will be provided by convoy staff to the civil Police.

4.10 Tritium is a radioactive form of hydrogen. Tritium gas leaking from severely damaged containers could present a beta radiation hazard at an emergency involving a tritium consignment. However, owing to its rapid dispersion, the tritium hazard would only be significant in the immediate vicinity of breached containers. This hazard would be enhanced if the tritium gas were oxidised by exposure to fire. Fire and Rescue Service personnel are most likely to be exposed to this hazard and should don appropriate personal protective equipment (PPE). Respirators do not offer protection against tritium because it passes directly through the protective filters. However, Self-Contained Breathing Apparatus (SCBA) will provide an effective means of protection against tritium gas, oxidised or not.

New Fuel

4.11 New, un-irradiated fuel consisting of highly enriched uranium (HEU), presents only a very small external radiation hazard, even when directly exposed. Dispersion of radioactive material is very unlikely even in a severe emergency, particularly as the risks from fire, the most likely dissemination mechanism, are very low. If such a release did occur, the principal hazard would be inhalation of uranium particles. Protective masks (of virtually any nature) placed over the nose and mouth would offer a high level of protection for those in the vicinity. Advice on the need for sheltering and evacuation will be provided by convoy staff to the civil Police.

4.12 In addition to alpha radiation HEU emits a small amount of beta and some gamma radiation. The hazard presented by contamination of the skin with HEU is extremely low. The simple decontamination techniques described in para 4.6 are effective in removing uranium particles and their presence on the skin should not compromise urgent medical treatment.

Used Fuel

4.13 The exposure of used fuel following a transport emergency is exceptionally unlikely. Direct contact with or close proximity to exposed used fuel following a severe emergency could present a high external gamma and beta radiation hazard and such exposure would present the dominant radioactive hazard. Significant dispersion of radioactive material is highly unlikely even in the event of a severe emergency but any release would present a possible inhalation hazard from gamma and beta emitters.

4.14 The external radiation dose depends on how long an individual is exposed, the distance from the radiation source, and the amount of shielding between the individual and the source. In order to minimise the dose, personnel should spend as little time as possible near the source, remain as far away from it as practicable, and make use of any available shielding (buildings, rail transporters, metal structures etc.). Contact with any water escaping from the container should be avoided. In the event of such contact, the areas of the body affected should be washed with soap and running water as soon as possible. Advice on the need for sheltering and evacuation will be provided by convoy staff to the civil Police.

Section 5: MOD Response Capabilities in the Event of a Transport Emergency Involving Defence Nuclear Material

Introduction

5.1 In the event of a Defence nuclear emergency in the UK the MOD is appointed, by the [Cabinet Office, as Lead Government Department \(LGD\)](#) for the co-ordination of the central government response. As owner and operator of defence nuclear assets, the MOD has specialists who, in the event of a transport emergency involving DNM, make assets safe, remove them from the emergency site, and support site remediation operations. Despite the fact that an emergency leading to a release of radioactive material is highly unlikely, the MOD maintains a Defence Nuclear Emergency Organisation (DNEO), and necessary contingency plans. The MOD response would be graduated depending upon the severity of the emergency. These plans recognise the leading roles of the emergency services and Local and Health Authorities in dealing with an emergency (in accordance with the guidelines in “Emergency Response & Recovery” and “Preparing Scotland”). The MOD also recognises that the responding Fire and Rescue Service may follow their CBRN protocols following a Defence nuclear emergency and deploy their Detection, Identification and Monitoring (DIM) capability to deal with it.

5.2 The MOD personnel who will respond in the area of a Defence nuclear emergency comprises of two elements: Immediate Response Forces (IRF) and Follow-on Forces (FoF). In addition, the HQ DNEO will form at the MOD in London to co-ordinate the central government response. In the event of an emergency involving US nuclear weapons, the response forces will include US personnel to support the MOD and Local Authorities and emergency services.

Immediate Response Forces

5.3 The IRF will be commanded by an MOD Incident Co-ordinator (IC). In the early phase of the response, the MOD IC will make themselves known to the Civil Emergency Services, and ensure that roles, responsibilities and chains of command are clear. The IC will liaise with the Police operational and/or tactical commander and, if appropriate, set up a joint Bronze Command Post. Details of the IRF for the different types of transport are detailed at [Annex B](#).

Follow-On Forces

5.4 The scale of the Follow-on Forces (FoF) will depend upon the severity of the emergency, with a full

deployment of the MOD resource only being required in the extremely unlikely event of an emergency leading to a release of radioactive contamination. In the event of a deployment on this scale, the FoF will be co-ordinated by a senior MOD official known as the Military (or MOD if civilian) Co-ordinating Authority (MCA). The MCA will be responsible for co-ordinating the military response to any emergency involving DNM and has at their disposal a large suite of FoF response capabilities which will be called to the emergency site as required. In response to a major incident multi-agency meetings will be convened at the local Strategic Co-ordinating Centre (SCC) to co-ordinate the involved agencies’ activities and where appropriate define strategy and objectives for the multi-agency response as a whole. The multi-agency meeting at GOLD/Strategic level is known as the Strategic Co-ordinating Group (SCG). The SCG will exercise overall co-ordination and strategic direction of the local emergency response phase until public safety can be assured. The MCA is the MOD’s senior representative at strategic level, and has responsibility for liaising with the Police and Local Authorities and attending the Strategic Co-ordinating Group (SCG). In addition, the MCA will keep MOD HQ DNEO apprised of the developing situation. In the event of a smaller deployment associated with an emergency that has not resulted in a release of radioactive material, a senior MOD official will be deployed to co-ordinate the MOD response on the ground if necessary or if requested by local emergency services.

5.5 The MOD response forces are at a specified state of readiness during road, rail and air movements. Arrival in the incident areas will depend on journey time. The following specialist capabilities would be deployed if appropriate:

- a. Radiological monitoring, radiation protection advisers and radiation medicine.
- b. Engineering support.
- c. Security.
- d. Communications, logistics, catering and administrative elements.
- e. Public and media relations.

5.6 [Annex C](#) provides a diagram of MOD forces at the scene of an emergency that has resulted in the release of radioactive material, and their recommended interaction with local response forces.

MOD Headquarters DNEO

5.7 Command of the IRF and FoF in the event of a DNM transport emergency rests with the Chief of Defence Staff (CDS) in London. The MCA or other MOD official will be responsible to CDS for military operations, and will discharge this through the operations cell of the MOD HQ DNEO. A secretariat cell in MOD HQ DNEO will provide advice to Ministers and the defence press office on the response as appropriate to the scale of the emergency.

Central Government

5.8 Where the scale or complexity of an emergency is such that some degree of government co-ordination or support becomes necessary, a designated Lead Government Department (LGD) is responsible for the overall management of the government response. The MOD has been designated as the LGD, by the Cabinet Office, for all Defence nuclear emergencies and will co-ordinate the central government response.

The government maintains dedicated crisis management facilities (COBR) and supporting arrangements which are only activated in the event of a national emergency. The Prime Minister, Home Secretary or another senior Minister will normally chair key meetings involving Ministers and officials from relevant departments as appropriate.

5.9 A diagram showing the relationship between the HQ DNEO, wider MOD forces, local organisations and the Central Government Organisation is at [Annex D](#).



Ministry of Defence Head Office

Section 6: Action in the Event of a Transport Emergency Involving Defence Nuclear Material

Introduction

6.1 This section describes the actions to be taken in the unlikely event of an emergency during the transportation of DNM that has resulted in the release of radioactive material.

6.2 The response has been split into three phases: immediate, medium and long-term. The exact activities in the medium and long-term phases (and indeed whether there is a long-term phase) will depend on the type of consignment involved, the severity of the emergency and any consequent hazard.

Immediate Actions

6.3 Immediate actions by their very nature have to be pre-planned and thus are prescribed in detail. It would be inappropriate to prescribe too closely the longer term actions, as they will be largely dependent upon the actions needed to arrange recovery and remediation. It is anticipated that the civilian and MOD response forces will work together to formulate plans bearing in mind the circumstances of the emergency and the principles outlined below. The immediate actions can be summarised as follows:

a. Alerting:

- (1) **Road transport** – Initial alerts are passed to the control rooms of the Police, Fire and Rescue and Ambulance services by both the convoy team and the JOC. This alert is passed in clear speech with details of the load and suggested precautionary countermeasures and public protection advice. This information is also sent by fax or e-mail to the control rooms of the emergency services in the area.
- (2) **Air transport** – The JOC will notify by telephone and fax/e-mail the Police, Fire and Rescue, and Ambulance services in the crash area. This alert is passed in clear speech with details of the load and suggested precautionary countermeasures and public protection advice.
- (3) **Rail transport** – For rail emergencies involving used reactor fuel, the MDP Commander will immediately notify the JOC. The JOC will notify by telephone and fax/email the Police, Fire and Rescue and Ambulance Services in the crash area. This alert is passed in clear

speech with details of the load and suggested precautionary countermeasures and public protection advice. In the very unlikely event that all escort personnel are incapacitated during the emergency, alerting will be via rail personnel through Network Rail Services Production Control.

b. Public Protection Advice

While the MOD will pass precautionary public protection advice to the emergency services, the Police will be responsible for co-ordinating the provision of public safety information to the media (e.g. evacuation and sheltering). In all cases the public protection advice will be passed in clear speech by the MOD alerting authorities. The advice is detailed at [Annexe E](#) and [Annex F](#). Information actually issued by the emergency services could also include additional information specific to the area.

If it is necessary for Police or other members of the emergency services to enter a downwind shelter zone to provide information to the public they should wear PPE.

c. Role of Public Health England

Public Health England is an Executive Agency of the Department of Health and was established in 2013 to protect and improve the nation's health and to address health inequalities. In a radiological emergency, PHE's Centre for Radiation, Chemical and Environmental Hazards (CRCE) provides expert public health advice to Government, emergency responders and the NHS as part of a co-ordinated response to the emergency. PHE also publishes guidance on radiological protection. PHE CRCE works in co-operation with the devolved administrations to provide them with radiological protection advice relating to public health. PHE also has responsibility for national co-ordination of radiological monitoring during an emergency.

d. Casualty Handling

It is expected that the management of casualties will be undertaken in accordance with extant Ambulance and/or local authority Fire and Rescue Service policy and guidance which should include arrangements for decontamination as appropriate. Ambulance trusts now have embedded Radiation Protection Supervisors and the PHE CRCE provides a dedicated Radiation Protection Adviser service at all times. The following extract is from The Ambulance Service Guidance on Dealing with Radiological Incidents and Emergencies **“Priority 1 patients with life threatening injuries should not have their treatment and transfer delayed for decontamination. However, it is recognised that the removal of clothing, to assist in diagnosis and to provide clinical access, constitutes a form of decontamination. Clothing that has been removed should be treated as contaminated waste. Treatment at the scene and whilst in transit should be in accordance with the protocols surrounding the wearing of Electronic Personal Dosimeters and the advice given by the trust Radiation Protection Supervisors. The receiving hospital should be notified of the patient’s contamination status prior to arrival.”**

Priority 2 and 3 contaminated or potentially contaminated casualties should, if possible, be decontaminated at the scene before transfer by ambulance to hospital. The receiving hospital should be notified that the patients have been decontaminated, even if the decontamination is believed to have been successful.

e. Radio and Mobile Telephones

In the event of an emergency involving nuclear weapons, it is recommended that all radio frequency transmitters (including personal and vehicle radios, and portable cellular telephones) should be switched off within a radius of 10 metres of a weapon or any of its components, which have been scattered by the emergency. Radio frequency transmitters with an Effective Radiated Power output of greater than 5 watts should be switched off within a radius of 50 metres of a weapon or any of its components which have been scattered by the emergency. This can be taken to apply to all vehicle-mounted transmitters.

f. Debris

In the event of a nuclear weapon emergency and if there has been an explosion, there is the potential for weapon debris to be scattered in the vicinity of the damaged weapon. In addition to pieces of radioactive and toxic material, this might include pieces of explosive, possibly sensitised, which might have the appearance of wax, chalk or gravel. The FoF will undertake removal of debris. Only if it is essential, for example to provide access to the emergency location for the Fire and Rescue Service, should non-specialist personnel move such debris and then with extreme care. In the event of a severe emergency involving SNM, contaminated debris may be scattered around the emergency site. In the event of an aircraft crash the emergency site could cover a large area.

g. Media Liaison

The Police will lead in co-ordinating the provision of information to the media. MOD personnel in the IRF carry pre-scripted press statements, including public safety information, which will be offered to the Police to assist in their initial media briefing. At the request of the Police, an MOD spokesperson from the IRF will attend press conferences.

Medium Term Actions

6.4 These actions lead naturally from those undertaken in the immediate phase and can be summarised as follows:

a. Radiation Monitoring and Review of Protection

The primary aim of the MOD will be to refine the public protection advice. To achieve this, monitoring for the release of radioactive contamination in the immediate vicinity of the emergency will take place. Additionally, as resources become available monitoring by MOD personnel will be extended. Any monitoring will be undertaken in consultation with the appropriate civil authorities.

b. Hospital Actions

The treatment of contaminated casualties should be undertaken as detailed in the [Strategic National Guidance](#). The MOD FoF, if requested, will deploy radiation medicine specialists to provide specialist advice.

c. Fatalities

If the emergency has resulted in fatalities the Police (together with the coroner, or the procurator fiscal in Scotland) will consider setting up facilities equipped to accept contaminated bodies. The principles for dealing with casualties set out in “*Emergency Response & Recovery*” and “*Preparing Scotland*” would apply.

d. Information for the Public, Media and Parliament

The Police will continue to be responsible for co-ordinating instructions relating to public safety, with the MOD continuing to proffer advice. Public health advice will be co-ordinated through the Science and Technical Advice Cell (STAC). The MOD recognises the role of the media in reporting an emergency involving DNM and will provide information to the media to enable them to report comprehensively and informatively. The MCA’s Strategic Media Advisory Cell representative will be responsible for co-ordinating the MOD input into any media cell put in place locally. The MOD will manage defence policy issues in London. Ministers may also wish to issue statements to Parliament (if in session) and to the media during this phase. Depending on the location of the emergency, the Welsh Government or the Scottish Government, as appropriate, will invoke their respective briefing and media handling arrangements.

e. Department for Communities and Local Government (DCLG)

In England DCLG will provide a representative to support the MCA in the delivery of their duties, facilitating co-ordination between Government and local bodies.

f. Central Government

Central Government support will continue in the medium and long- term phases.

Long Term Actions

6.5 Much of the detail of the long term response will be worked out and agreed by the responding services and forces taking into account the emergency circumstances and principles stated below:

a. Management of Incident at Local Level

It is expected that at some stage during the long-term response the co-ordinating role will transfer from the Police to the Local Authority. The MOD will continue to support and work with the local authority in the same manner as they had with the Police. MOD personnel will remain until it is agreed that their role has ceased.

b. Reassurance Monitoring and Follow Up

MOD can provide advisers to assist in establishing monitoring priorities should assistance with additional monitoring of those who have been de-contaminated during evacuation be required. Additionally MOD can assist with monitoring of members of the public who think they may have been contaminated.

c. Remediation

MOD will assist other authorities with remediation.

d. Compensation

The MOD will generally be liable to meet personal injury or property damage claims where the injury or loss is attributable to a Defence nuclear emergency involving the release of radioactive material from MOD owned nuclear assets or facilities.

e. Formal Inquiry

A formal inquiry is likely to be held following a Defence nuclear emergency. The Inquiries Act 2005 provides a comprehensive statutory framework for inquiries set up by Ministers. MOD would seek advice from the Ministry of Justice as to whether such an inquiry would be conducted under the Act.

6.6 The actions (immediate, medium and long-term) described, cover an extremely unlikely emergency that has resulted in a release of radioactive material. Where no release has occurred, this would obviate the need for some actions. A summary of key actions for emergencies involving nuclear weapons and SNM is provided at [Annex E](#).

6.7. It is MOD policy to neither confirm nor deny (NCND)¹ the presence or absence of nuclear weapons at any particular time or place. The Convoy Commander, the MCA or the Senior Operations Officer (SOO) in the JOC will set aside this policy in the interests of public protection in the following circumstances:

- Where not disclosing the presence of nuclear weapons would cause an unacceptable risk to the public or emergency services.
- To ensure the continued safety and/or security of any weapon present.

¹ NCND does not apply to SNM.

Section 7: DNM Transport Exercises and Training

MOD Exercises

7.1 As Lead Government Department (LGD) for the response to a defence nuclear emergency, the MOD organises regular exercises to test the effectiveness of its emergency response planning and arrangements. A key aspect of these exercises is the co-operation of the different agencies that would contribute to the response. There is at least one Defence nuclear emergency exercise per year that requires the emergency services, other government departments and local agencies to participate as appropriate.

MOD Participation in Emergency Service or Local Authority Exercises

7.2 In addition to the above MOD-led exercises, elements of the Defence Emergency Response Organisation may be available to participate in table top or small command-post exercises at the invitation of individual emergency services or local authorities. Initial contact on exercises of this nature should be made through the Assistant Head of Nuclear Emergency Planning, see para 7.4 for contact details.

MOD Training

7.3 The MOD recognises the knowledge and expertise of emergency services personnel in responding, as part of a multi-agency response to a defence nuclear and/or radiological safety incident. In maintaining and developing its engagement with the emergency services, as well as providing an overview of what the MOD's response will be to this highly unlikely event, the MOD organises training and can provide briefings supplementary to this document as follows:

a. Radioactive Materials Emergency Response Course

This is a two day course delivered by DE&S & Director Defence Academy College of Management & Technology (DDACMT) in Beckett House, Shrivenham & the Clyde Off-Site Centre, Helensburgh; it covers the arrangements for the safe transport of DNM. The aim of the course is to enable personnel (both military and civilian) with a management role in planning for and responding to a DNM incident to be better prepared to discharge their responsibilities in a manner consistent with an integrated all agencies response and provide the optimum level of safety for

workers and the general public. Personnel from the emergency services and local authorities with emergency planning responsibilities may apply to attend the course. 2 courses are run per year, one in Shrivenham and one in Helensburgh; nominations should be forwarded to:

Dr Ian Holloway,
Rutherford Building,
HMS Sultan,
Military Road,
Gosport, PO12 3BY.

b. Regional and Local Forums

A member of the DE&S Emergency Response Organisation is available to speak at relevant forums to give a short brief on DNM operations and the DNEO response.

c. Police Headquarters on Convoy and other DNM routes

A MDP Convoy Commander and DE&S NM Operations Officer visit Police HQs and brief selective audiences of Police and other members of the emergency services. This will cover both convoy operational matters as well as the DNEO response.

MOD Participation in Other Training

7.4 In addition to members of the DE&S Emergency Response Organisation being available, the Assistant Head Nuclear Emergency Planning is also available to give lectures or talks on the MOD's defence nuclear emergency response arrangements. This will include where appropriate, Brigade level Study Days or any other similar forum. Initial contact should be made as follows:

Head of Strategic Weapons
Threat Reduction Manager
Rowan # 8005
MOD Abbey Wood
Bristol BS34 8JH

or

Assistant Head of Nuclear Emergency Planning
6-F
MOD Main Building
Whitehall
London SW1A 2HB

Annex A: Routes Used during the Transportation of Defence Nuclear Material in the UK

Local Authorities which Defence Nuclear Material may Travel Through or Fly Over

1. Defence Nuclear Material may pass through or fly over the following Local Authorities. It is not intended to imply the authorities included are the lead in the production of response plans. The attribution of such responsibilities is a matter for decision at local level between the agencies involved. Although the following list indicates the areas that will be transited most often, there may be occasions when routes need to be varied for operational reasons. **It must be stressed that this list in no way precludes the use of alternative routes if the circumstances so demand.**

England

Barnsley	Hertfordshire	Sandwell
Bath & North East Somerset	Kingston upon Hull District	Sheffield
Bedfordshire	Kirklees	Slough
Birmingham	Knowsley	Solihull
Blackburn	Lancashire	Somerset
Bolton	Leeds	South Gloucestershire
Bracknell Forest	Leicester City	South Tyneside
Bristol	Leicestershire	St Helens
Buckinghamshire	Lincolnshire	Staffordshire
Bury	Liverpool	Stockton-on-Tees Borough
Calderdale	Manchester	Stoke-on-Trent
Cheshire	Middlesbrough	Suffolk
Coventry	Milton Keynes	Sunderland
Cumbria	Newcastle-upon-Tyne	Surrey
Darlington	Norfolk	Swindon
Derby City	North Lincolnshire District	Trafford
Derbyshire	North Somerset	Wakefield
Devon	North Tyneside	Walsall
Doncaster	North Yorkshire	Warrington
Dudley	Northamptonshire	Warwickshire
Durham	Northumberland	West Berkshire
East Riding of Yorkshire District	Nottinghamshire	Wigan
Essex	Oldham	Wiltshire
Exeter	Oxfordshire	Windsor & Maidenhead
Gateshead	Plymouth	Wokingham
Gloucestershire	Reading	Wolverhampton
Halton	Redcar & Cleveland	Worcestershire
Hampshire	Rochdale	York
Hartlepool	Rotherham	
Herefordshire	Salford	

Wales

Blaenau Gwent	Monmouthshire	Swansea
Bridgend	Neath Port Talbot	Torfaen
Caerphilly	Newport	Vale of Glamorgan
Cardiff	Powys	
Merthyr Tydfil	Rhondda Cynon Taff	

Scotland

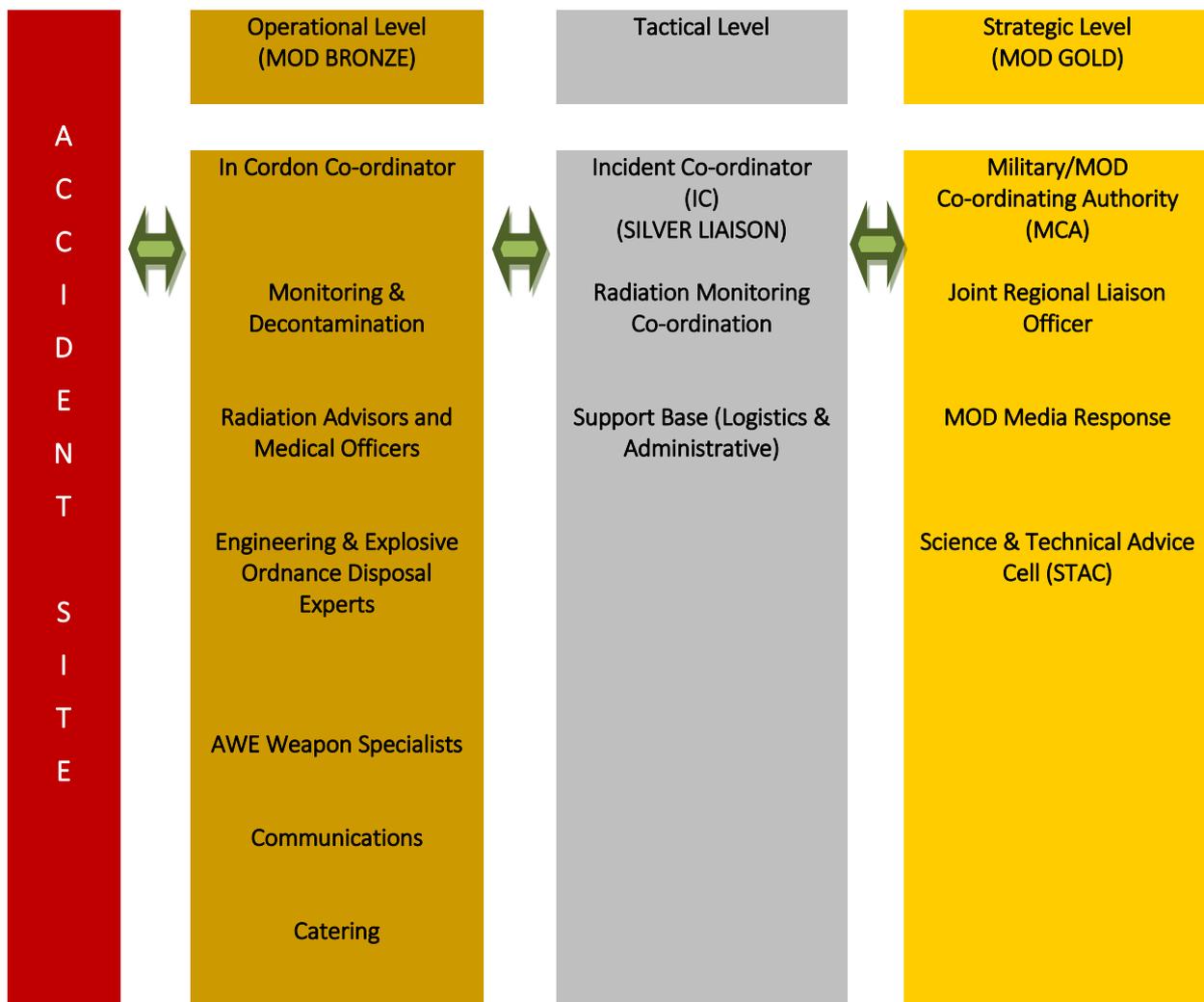
Argyll & Bute	East Lothian	Perth & Kinross
City of Edinburgh	East Renfrewshire	Renfrewshire
City of Glasgow	Falkirk	Scottish Borders
Clackmannanshire	Fife	South Lanarkshire
Dumfries & Galloway	Highland	Stirling
East Ayrshire	Midlothian	West Dunbartonshire
East Dunbartonshire	North Lanarkshire	West Lothian

Annex B: Immediate Response Forces - Organisation

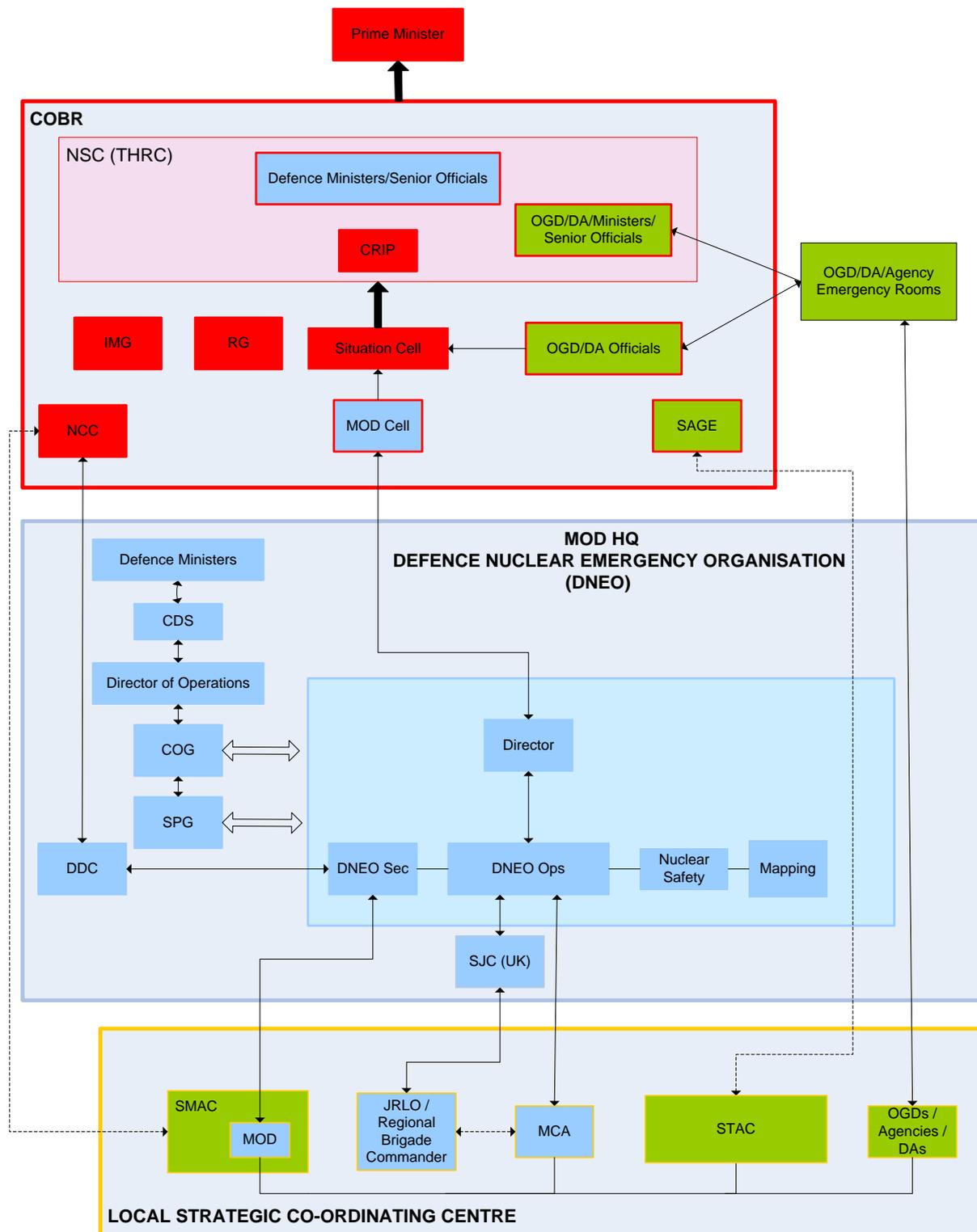
<p>Road</p>	<p>The IRF is embedded within the convoy and the convoy commander will act as MOD Incident Co-ordinator (IC). There will be sufficient equipment and trained personnel to alert and brief the Police, Fire and Ambulance services, to assess whether or not there has been a release of radioactive material, and to assist the Police in establishing an initial safety and security zone*. Additionally, trained personnel will co-ordinate with the Police in providing information for the media. Convoy personnel are cross-trained to enable them to undertake other roles should the designated personnel be incapacitated in the emergency.</p> <p>A Joint Operations Cell (JOC) monitors all road movements of DNM and will activate any additional response needed to support the IRF. The JOC will contact the Police immediately to inform them of an emergency that has or may have resulted in a release of radioactive material and to provide them with precautionary public protection advice on sheltering and evacuation. In the event of a serious road traffic crash that has no release of radioactive material, the JOC will also contact the Police to discuss any additional support requirements.</p>
<p>Air</p>	<p>The RAF maintains a Station NEO Team (SNT) at immediate readiness during the flight of aircraft carrying nuclear weapons, uranium, plutonium or tritium. This team will form the IRF for an air crash. Its Commanding Officer will become the MOD IC. The team is equipped and trained to identify any radiological hazard and provide advice and support to local emergency responders. The JOC monitors all air movements of DNM and will activate the SNT in the event of this type of emergency. The JOC will also contact the Police immediately to inform them of the emergency and to provide them with precautionary public protection advice on sheltering and evacuation* if appropriate.</p>
<p>Rail</p>	<p>The rail convoy, like its road equivalent, has embedded within it all the necessary equipment and personnel to alert and brief the emergency services, determine whether there has been a release of radioactive material, and assist the British Transport Police and /or local Police to set up and manage a safety cordon*. The convoy commander, a Ministry of Defence Police (MDP) Inspector, would be the MOD IC.</p> <p>A Joint Operations Cell (JOC) monitors all rail movements of DNM and will activate any additional response needed to support the IRF. The JOC will contact the Police immediately to inform them of an emergency that has or may have resulted in a release of radioactive material and to provide them with precautionary public protection advice on sheltering and evacuation. In the event of a serious rail crash that has no release of radioactive material, the JOC will also contact the Police to discuss any additional support requirements.</p>

* Annex F provides further information on responsibility for cordons.

Annex C: MOD Forces at the Scene of an Emergency Involving the Release of Radioactive Material and their Recommended Interaction with Local Response Forces



Annex D: Central Government Organisation and Interaction with the Local Strategic Co-ordinating Centre



NSC THRC = National Security Council - Threats, Hazards, Resilience and Countermeasures
 COG = Current Operations Group
 SAGE = Scientific Advisory Group for Emergencies
 SPG = Strategic Planning Group
 SMAC = Strategic Media Advisory Cell
 JRLO = Joint Regional Liaison Officer

STAC = Science & Technical Advice Cell
 NCC = News Co-ordination Centre
 IMG = Impact Management Group
 RG = Recovery Group
 MCA = Military/MOD Co-ordinating Authority

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Annex E: Summary of Key Emergency Actions

Annex E1 Summary of Key Emergency Actions for a Nuclear Weapon Emergency

1. Immediate actions in the event of:
 - a) detonation of HE in the weapon thought to be imminent
 - b) fire was engulfing the weapon
 - c) the IRF so advised:
 - Evacuate non-essential personnel to 600 metres
 - Shelter public to 5 kilometres downwind in a 45° arc centred on the wind direction
 - Approach from upwind if possible
 - Protect the nose and mouth
 - Extinguish any fires
2. Continue to operate as follows:
 - Cool weapons/containers by water spray
 - Do not move weapon or container
 - Restrict radio frequency transmissions within 50 metres
 - Restrict use of mobile telephones within 10 metres
3. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved a nuclear weapon.
 - There is no risk of an "atomic bomb" type of explosion.
 - There is a risk of radioactive particles being carried downwind.
 - The area immediately around the scene of the emergency is being evacuated for safety reasons.
 - People in the following areas (...name locations....) should take these precautions to minimise the hazard from inhaling or ingesting radioactive particles.
 - Go indoors and stay there.
 - Close all doors, windows and ventilators. Switch off any ventilation or air conditioning systems drawing air from outside the building.
 - Do not leave the shelter of a building until advised that you may do so by the Police.
 - Do not try to collect children from school unless told to do so. The school authorities will look after them.
 - Keep tuned to local radio/TV (names stations, frequencies). Emergency services and MOD forces are responding to the emergency. You will be informed when these precautions are no longer necessary.

Annex E2 Summary of Key Emergency Actions for a Tritium Emergency during Transport by Air

1. At all times:
 - Evacuate non-essential personnel to 100 metres
 - Extend evacuation zone to 600 metres downwind from the hazard over a 45° arc
 - Approach from upwind if possible
 - Only personnel wearing self-contained breathing apparatus should enter the evacuation zone
 - Extinguish any fires
 - Do not touch damaged containers or spilt material
 - Remove undamaged containers from heat source
2. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved Special Nuclear Material.
 - There is no risk of an "atomic bomb" type of explosion.
 - There is a risk of a plume of radioactive gas being carried downwind.
 - The area immediately around the scene of the emergency and downwind from it is being evacuated for safety reasons.
 - Keep tuned to local radio/TV (names stations, frequencies). Emergency services and MOD forces are responding to the emergency. You will be informed when these precautions are no longer necessary.

Annex E3 Summary of Key Emergency Actions for a Tritium Emergency during Transport by Road

1. At all times:
 - Evacuate non-essential personnel to 100 metres
 - Shelter public to 1 kilometre downwind in a 45° arc centred on the wind direction
 - Approach from upwind if possible
 - Only personnel wearing self-contained breathing apparatus should enter the evacuation zone
 - Do not touch damaged containers or spilt material
 - Remove undamaged containers from heat source
2. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved Special Nuclear Material.
 - There is no risk of an "atomic bomb" type of explosion.
 - There is a risk of a plume of radioactive gas being carried downwind.
 - The area immediately around the scene of the emergency is being evacuated for safety reasons.
 - People in the following areas (....name locations....) should take these precautions to minimise the hazard.
 - Go indoors and stay there.
 - Close all doors, windows and ventilators. Switch off any ventilation or air conditioning systems drawing air from outside the building.
 - Do not try to collect children from school unless told to do so. The school authorities will look after them.
 - Keep tuned to local radio/TV (names stations, frequencies). Emergency services and MOD forces are responding to the emergency. You will be informed when these precautions are no longer necessary.

Annex E4 Summary of Key Emergency Actions for a Uranium/Plutonium Emergency

1. At all times:
 - Evacuate non-essential personnel to 100 metres
 - Shelter public to 1 kilometre downwind in a 45° arc centred on the wind direction
 - Approach from upwind if possible
 - Protect the nose and mouth
 - Remove undamaged containers from heat source
 - Do not touch damaged containers or spilt material
2. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved a Special Nuclear Material consignment.
 - There is no risk of an "atomic bomb" type of explosion.
 - There is a risk of a plume of radioactive particles being carried downwind.
 - The area immediately around the scene of the emergency is being evacuated for safety reasons.
 - People in the following areas (...name locations...) should take these precautions to minimise the hazard from inhaling or ingesting radioactive particles.
 - Go indoors and stay there.
 - Close all doors, windows and ventilators. Switch off any ventilation or air conditioning systems drawing air from outside the building.
 - Do not leave the shelter of a building until advised that you may do so by the Police.
 - Do not try to collect children from school unless told to do so. The school authorities will look after them.
 - Keep tuned to local radio/TV (names stations, frequencies). Emergency services and MOD forces are responding to the emergency. You will be informed when these precautions are no longer necessary.

Annex E5 Summary of Key Emergency Actions for a New Reactor Fuel Emergency

1. At all times:
 - Evacuate non-essential personnel to 100 metres
 - Approach from upwind if possible
 - Protect the nose and mouth
 - The use of water to cool flasks is strictly prohibited
 - Heed MOD advice on other necessary protective countermeasures
2. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved Special Nuclear Material.
 - There is no risk of an “atomic bomb” type explosion.
 - The area immediately around the scene of the emergency is being evacuated for safety reasons.

Annex E6 Summary of Key Emergency Actions for a Used Reactor Fuel Emergency

1. At all times:
 - Evacuate non-essential personnel to 100 metres
 - Heed MOD advice on likely radiation hazard before approaching flask
 - If a flask is severely damaged and fuel modules are exposed evacuate to 500 metres
 - Approach from upwind if possible
 - Protect the nose and mouth
 - Make use of available shielding (buildings, rail cars etc.) when approaching flask
 - The use of water to cool flasks is strictly prohibited
2. Key points for the public announcement are:
 - An emergency occurred at (TIME) (PLACE) which involved Special Nuclear Material.
 - There is no risk of an “atomic bomb” type of explosion.
 - The area immediately around the scene of the emergency is being evacuated for safety reasons.

Annex F: Summary of Precautionary Public Protection Advice

This table summarises the precautionary public protection advice that will be provided to the civil Police by voice and information in writing by MOD response forces for road, air and rail emergencies involving Defence Nuclear Materials where either radioactive material is released or the severity of the occurrence is such the possibility of a release cannot be excluded.

Overall responsibility for the outer cordon is vested with the civil Police forces. The MOD Immediate Response Force (IRF) will provide support, commensurate with its resources, as required to comply with MOD requirements for inner cordons.

	Transport Details	Evacuation Zone (360°)	Downwind Shelter Zone (45°)
Road	Weapon	600 metres	5 kilometres
	SNM shipments of plutonium, uranium or tritium	100 metres	1 kilometre
	New fuel*	100 metres	
	Used fuel In case of severe damage to flask such that fuel modules are exposed*	100 metres 500 metres	
Air	Weapon	600 metres	5 kilometres
	Shipments of uranium and plutonium	100 metres	1 kilometre
	Shipments of tritium	100 metres plus downwind evacuation to 600 metres over a 45° arc	
Rail	Used fuel	100 metres	
	In case of severe damage to flask such that fuel modules are exposed*	500 metres	

* Cooling of the containers with water is strictly prohibited.

Annex G: Abbreviations and Useful Links

Abbreviations

CDS	Chief Defence Staff
COBR	Cabinet Office Briefing Room
COG	Current Operations Group
CRIP	Common Recognised Information Picture
CRCE	Centre for Radiation, Chemical & Environmental Hazards
DA	Devolved Administration
DE&S	Defence Equipment & Support
DNEO	Defence Nuclear Emergency Organisation
DCLG	Department for Communities and Local Government
DNM	Defence Nuclear Material
ERLs	Emergency Reference Levels
FoF	Follow on Forces
FRS	Fire and Rescue Service
HEU	Highly Enriched Uranium
HQ	Headquarters
HQ DNEO Sec	HQ Defence Nuclear Emergency Organisation Secretariat
HSV	High Security Vehicle
IAEA	International Atomic Energy Agency
IC	MOD Incident Co-ordinator
IMG	Impact Management Group
IRF	Immediate Response Force
JOC	Joint Operations Centre
JRLO	Joint Regional Liaison Officer
LA	Local Authority
LAESI	Local Authority and Emergency Service Information on Defence Nuclear Material Transport Contingency Arrangements
LGD	Lead Government Department
MCA	Military/MOD Co-ordinating Authority
MDP	Ministry of Defence Police
MOD	Ministry of Defence
NCC	News Co-ordination Centre
NCND	Neither Confirm Nor Deny
NHS	National Health Service
NMTSPs	New Module Transport and Storage Packages
NRPB	National Radiological Protection Board

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NRTE	Naval Reactor Test Establishment
NSC THRC	National Security Council – Threats, Hazards, Resilience and Countermeasures
OGD	Other Government Department
PHE	Public Health England
PPE	Personal Protective Equipment
RAF	Royal Air Force
RG	Recovery Group
SAGE	Science Advisory Group for Emergencies
SCBA	Self-Contained Breathing Apparatus
SCG	Strategic Co-ordinating Group
SMAC	Strategic Media Advice Cell
SNM	Special Nuclear Material
SNT	Station Nuclear Emergency Organisation Team
SPG	Strategic Planning Group
SOO	Senior Operations Officer
SSBN	Ship Submersible Ballistic Nuclear
STAC	Science & Technical Advice Cell
TCHD	Truck Cargo Heavy Duty
UK	United Kingdom
US	United States

Useful Links

Dose Comparisons

<https://www.gov.uk/government/publications/ionising-radiation-dose-comparisons/ionising-radiation-dose-comparisons>

Radiation Emergency Leaflets

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/467205/Basic_concepts_of_radiation_October_2015.pdf

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/467198/Nuclear_emergencies_-_information_for_the_public_October_2015.pdf

Lead Government Departments Responsibilities for Planning, Response & Recovery from Emergencies

<https://www.gov.uk/government/publications/list-of-lead-government-departments-responsibilities-for-planning-response-and-recovery-from-emergencies>

Cabinet Office Lexicon of Terminology

<https://www.gov.uk/government/publications/emergency-responder-interopability-lexicon>

Government Departments & Agencies

Public Health England: <https://www.gov.uk/government/organisations/public-health-england>

Environment Agency: <https://www.gov.uk/government/organisations/environment-agency>

Department for the Environment, Food & Rural Affairs: <https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs>

Food Standards Agency: <https://www.food.gov.uk/>

