

# Leaflet 30

## Depleted Uranium

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### Scope

1 This Leaflet refers to equipment or materials fabricated from or incorporating depleted uranium (DU). The Leaflet gives a general description of the hazards associated with such items and the actions to be taken to ensure their safe keeping, use and disposal. However it should be noted that the construction of an item can significantly affect the hazard from the DU.

### Occurrence of Depleted Uranium in Service Items

2 DU is used primarily in some armour piercing discarding Sabot munitions which are not used in peacetime training and so only likely to be encountered in ammunition depots, during very occasional proof firing and in operational theatres. In addition, DU has applications as counterbalance weights in some aircraft, where its presence will be noted in maintenance manuals; in radiation shields for high activity radiography or radiotherapy sources and, in smaller quantities, in radioactive check sources.

### Statutory Requirements in Peacetime

3 In addition to the general requirements of the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations 1999, the following specific legislation applies directly or is applied indirectly through parallel arrangements designed to achieve equivalent standards:

- Ionising Radiations Regulations 1999 (IRR99) (apply directly);
- The Environmental Permitting (England & Wales) Regulations 2010 (EPR10) (as amended) (parallel arrangements)
- Radioactive Substances Act 1993 (Scotland & Northern Ireland) (as amended) (RSA93) (parallel arrangements);
- Carriage of Dangerous Goods and Transportable Pressure Equipment Regulations 2009 (apply directly).

## **Duties**

### **Commanding Officer and Head of Establishment (CO/HoE)**

4 The CO/HoE has a duty to the Secretary of State, and a personal responsibility, to protect the environment and secure the health, safety and welfare of their staff at work. The CO/HoE is also required to protect persons not in MOD employment (e.g. members of the public) against risks to their health and safety arising from the MOD work activities. This includes radiation safety. The CO/HoE's authority (but not responsibility) for radiation safety management arrangements may be delegated to appropriate personnel, such as a Radiation Safety Officer (RSO).

### **Radiation Safety Officer (RSO)**

5 RSOs are to ensure that they are familiar with the specific radiation hazards at their unit or establishment and that adequate radiation protection arrangements are made to minimise the radiation hazard, including the drawing up of local orders for radiation safety and the issue of local orders, instructions and procedures.

### **Radiation Protection Supervisor (RPS)**

6 Where sites and establishments have areas designated as controlled or supervised (see Leaflet 4), radiation employers must appoint an RPS for each designated area concerned. The prime duty of the RPS is to ensure compliance with the IRR99 in respect of work carried out in the designated area – in practice, the RPS will achieve this by ensuring that work is carried out in accordance with the local orders for radiation safety (see Leaflet 16) which are to include the requirements of this Leaflet.

### **Workplace Supervisor (WPS) (Radioactive Materials)**

7 In cases where designated areas are not required, a WPS (RAM) should be appointed with duties to ensure that work with DU is carried out in accordance with the local orders.

## **Employees**

8 It is the responsibility of all employees to ensure that material or equipment is handled correctly and not deliberately misused or interfered with. Any incidents are to be reported appropriately.

## Hazards

9 Significant external radiation dose rates (up to  $2 \text{ mSv h}^{-1}$  contact) can be found close to unshielded DU. Most DU in military use is shielded but the amount of shielding depends on the equipment type. Because of this variability, dose rates must be measured as part of the prior risk assessment for each equipment and use. Suitable shielding and handling techniques are to be employed to ensure that radiation exposure is kept as low as reasonably practicable (ALARP).

10 An internal hazard will only exist where DU materials have corroded, been machined without proper controls, been involved in a fire or explosion or where a DU round has impacted on a hard surface. In such circumstances, monitoring must be carried out to assess the significance of the contamination.

Table 1 Hazards associated with depleted uranium

Radiation type		Emitted	Comments
Alpha		✓	Alpha radiation arises from $^{234}\text{U}$ , $^{235}\text{U}$ and $^{238}\text{U}$ and some decay products. Alpha radiation does not present an external radiation hazard, but represents an internal hazard if alpha-emitting material enters the body.
Beta	Direct	✓	Beta radiations from the decay products $^{234}\text{Th}$ and $^{234\text{m}}\text{Pa}$ give rise to an external and internal radiation hazard.
	Bremsstrahlung	✓	Bremsstrahlung X-rays may be produced in appreciable quantities in close proximity to DU assemblies. X-ray emissions present a predominantly external radiation hazard.
Gamma		✓	A range of low level gamma emissions are associated with the alpha and beta decay of uranium isotopes and decay products. Gamma emissions present a predominantly external radiation hazard.
X-rays		✗	None of significance
Neutron		✗	None of significance

## Legal and MoD Mandatory Requirements

Table 2 Legal and MOD mandatory requirements

Requirement	Applicable	Comments	Related Leaflet*
HSE authorisation	✗		
HSE notification	✓	Keep a copy indefinitely. HSE will not provide acknowledgement of this.	3
EPR10/RSA93 notification	✓	Approval is required for shore establishments who wish to keep DU material or accumulate or dispose of DU waste.	3
Risk assessment	✓	<p>A risk assessment is to be carried out, in consultation with the RPA, on each new or existing activity employing equipment containing DU. Details regarding the form of the risk assessment and the actions to be taken arising from it are described in Leaflet 3.</p> <p>Where significant quantities of DU are held (in excess of 3GBq), a Hazard Identification and Risk Evaluation (HIRE) is required. Advice is to be sought from the RPA with regard to the need to make such assessments available to the HSE.</p> <p>Risk assessments are to be reviewed at least annually or when changes occur. Further advice is to be obtained from the RPA.</p>	2,3  R(EPPI)R 2001. Reg 4

Table 2 Legal and MOD mandatory requirements (continued)

Requirement	Applicable	Comments	Related Leaflet*
Restriction of exposure	✓	<p>Employers at MOD establishments undertaking work with DU are to take all necessary steps to restrict as far as is reasonably practical the extent to which employees and other persons are exposed to radiations arising from DU. General arrangements for the restriction of exposure are described in Leaflet 4.</p> <p>Where personnel necessarily work close to large components containing DU, monitoring is to be carried out as part of the risk assessment. When the assessment indicates a need for engineered controls to restrict exposure, Perspex shielding is usually adequate but advice should be obtained from the RPA.</p> <p>Where it is necessary to handle DU components for prolonged periods, gloves may need to be worn. The prior risk assessment will determine this requirement.</p> <p>Exceptionally, where significant radiation exposure to the lens of the eye is foreseen, consideration is to be given to making specific measurements of the dose to the eye. In these circumstances advice is to be sought from the RPA</p> <p>When handling DU munitions, the shot should be handled by the sabot and rear fin case.</p> <p>In the case of an armoured fighting vehicle (AFV) or store containing DU munitions, exposure may sometimes be restricted by limiting occupancy times. Limiting occupancy to 2000 hours per year (e.g. 80 periods of 24 hours) should ensure that personal dose does not exceed 6 mSv annually but monitoring must be carried out to verify this.</p> <p>Contamination control procedures are to be applied to processes that are liable to create DU dust, swarf, mist or fumes. Such procedures may include the use of specially designed areas with easily cleaned surfaces and measures to provide protection against spread of DU such as fume cupboards, glove boxes or vented areas.</p>	4
		<p>Local orders will describe arrangements for the restriction of exposure through regular review of DU holdings, working arrangements and monitoring data as described in Leaflet 16.</p>	16

Table 2 Legal and MOD mandatory requirements (continued)

Requirement	Applicable	Comments	Related Leaflet*
PPE	✓	<p>For most situations likely to be encountered, it is not expected that the risk assessment will identify a need for the use of protective clothing or equipment other than gloves to reduce the external radiation dose to the skin.</p> <p>Protective clothing provided as a safeguard against personal contamination is to be marked and kept for this purpose unless it has been monitored and found to be free from contamination. For items used over prolonged periods, regular examination and monitoring is to be carried out to ensure that the items remain fit for purpose and are not contaminated.</p> <p>Contamination is to be assumed if clothing or equipment has, or is suspected of having, come into contact with DU in a dispersed form.</p>	4
Maintenance of radiation engineering controls	✗		
Contingency plans	✓	<p>A contingency plan will be produced where this is identified as necessary within the risk assessment.</p> <p>In the event of an accident involving DU ammunition, the elimination of the immediate explosive hazard is to take precedence over the elimination of radiation hazards arising from DU material.</p> <p>Where significant quantities of DU are held (in excess of 3 GBq), an operator's emergency plan is required and the advice of the RPA is to be sought.</p> <p>In addition to the information provided within this leaflet, further general instructions on the contingency arrangements for DU munitions are included in ESTC Prescriptions and in Guidance Note No. 5.</p>	40  R(EPPI)R 2001. Reg 7
Designation of areas	✓	<p>The RPA must be consulted with respect to the designation of controlled or supervised areas.</p> <p>Where large quantities of DU are held, it may be necessary to designate controlled or supervised radiation areas. In general, a controlled radiation area will need to be designated if radiation dose rates exceed <math>7.5 \mu\text{Sv h}^{-1}</math> averaged over the working day. It is very likely that the interior of an AFV containing DU munitions will need to be designated as a controlled area.</p> <p>Where DU contamination is present, controlled or supervised contamination areas are to be</p>	4

Requirement	Applicable	Comments	Related Leaflet*
		designated in accordance with the requirements described in Leaflet 4 following consultation with the RPA.	
Monitoring	✓	<p>Radiation and contamination monitoring as described in Leaflets 8 – 10 will be required in storage and working areas. The operator is required to seek advice from the RPA on the form of this programme.</p> <p>Gun barrels and targets used with DU projectiles are to be regularly monitored, to determine whether they have become contaminated. Until such monitoring results are obtained, the barrels and targets are to be treated as being contaminated. Advice on monitoring should be sought from the RPA.</p> <p>Contamination monitoring is to be carried out in any areas likely to have been affected by any accident or unexpected event involving DU munitions. The RPA should be consulted on the form of this monitoring.</p> <p>Details of monitoring programmes are to be included in local orders and survey records are to be kept indefinitely.</p>	<p>8 - 10</p> <p>12</p>
Training for users	✓	All personnel involved in working with DU are to be adequately instructed in the hazards associated with DU, the precautions to be taken and methods of protection. They are to have read, understood and implemented local orders.	15
Local orders	✓	Local orders are required which describe arrangements for the safe management of DU materials and the restriction of radiation exposure.	16
RPS/WPS	✓	An RPS will be appointed where designated areas are required. The RPS is to be formally trained as described in accordance with Leaflet 15. In cases where designated areas are not required, a WPS (Radioactive Materials) should be appointed to ensure that work is carried out in accordance with local orders.	15
Storage	✓	<p>Where small quantities of DU (less than 2 MBq (about 150 g)) is held, it is to be segregated from non-radioactive materials and stored in a locked metal container displaying a radiation warning sign.</p> <p>Quantities in excess of 2 MBq are to be stored in containers, or on racks of fire resistant materials in a purpose built store, as detailed in Leaflet 9.</p> <p>In addition to the information provided within this leaflet, further instructions on DU munitions storage are included in ESTC Prescription No. 4.</p>	9

Table 2 Legal and MOD mandatory requirements (continued)

Requirement	Applicable	Comments	Related Leaflet*
Accounting	✓	<p>All holdings of DU are to be recorded on a radioactive source list and the accountancy procedures indicated in Leaflet 9 are to be followed.</p> <p>Information relating to the holdings of DU munitions is classified and is not to be recorded on the Dstl Annual Holdings Return.</p>	9
Leak testing	✓	<p>Any requirement to monitor for leakage of radioactive material or loose contamination is to be identified during the prior risk assessment.</p>	2
Personal dosimetry	✓ (but see comment)	<p>Dose rates near most DU items are low and in most cases personal monitoring is not required. However, personnel who handle DU munitions on a regular basis or are likely to find themselves in close proximity to 'unboxed' DU munitions (e.g. tank and recovery crews, some stores and ATO/EOD personnel) will require monitoring. This will usually be by the issue of dosimeters, but, with the agreement of the RPA, recording of occupancy times may suffice. Dosimetry is to be issued if occupancy or exposure times are uncertain.</p> <p>Personnel who are likely to receive an effective radiation dose of 6 mSv (as described in Leaflet 6) are to be designated as classified persons and are required to have their radiation doses formally assessed. For external radiation exposure, personal dosimeters issued by the approved dosimetry service are to be worn and biological monitoring programmes will be employed, where appropriate, to measure any radiation dose due to internal contamination.</p> <p>In addition, unclassified persons (as described in Leaflet 6) may be issued with personal dosimetry for reassurance and medico-legal purposes.</p>	6
Transport	✓	<p>For manufactured articles containing natural or depleted uranium in which the dose rate on the outside of the package is less than 5 <math>\mu\text{Sv h}^{-1}</math>, the articles may be transported as excepted packages as described in Leaflet 10 and JSP 800 Vol. 4b.</p> <p>Where DU cannot be transported as an excepted package, it can usually be transported as low specific activity material group I (LSA-I) as defined in IAEA Transport Regulations. Further guidance is to be sought from the Dangerous Goods Safety Adviser (DGSA) or RPA.</p> <p>DU transported by road as LSA-I is to be transported as described in Leaflet 10 and JSP 800. Advice is to be sought from the RPA for radiation protection issues and/or DGSA should transport by other modes be required.</p>	10



Table 2 Legal and MOD mandatory requirements (continued)

<b>Requirement</b>	<b>Applicable</b>	<b>Comments</b>	<b>Related Leaflet*</b>
Transport (continued)		In addition to the information provided within this Leaflet, further instructions on DU munitions transport are included in ESTC Prescription No. 4.	
Sale/Transfer	✓	See Leaflet 11	11
Disposal	✓	Advice on the disposal of DU is to be sought from the RPA at which time any Safeguards issues will also be considered. Advice is also to be sought on the disposal of items that may be contaminated by DU. Such items include gun barrels, targets, discarded sabots and other equipment used in DU munitions firing and trials.	12

\*JSP 392, unless otherwise stated

## Leaflet 30 Annex A

### Depleted Uranium Munitions – Requirements during Operations

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#### Introduction

1 The present assessment is that the threat from DU munitions and any associated contamination equates to a low level radiological risk from environmental pollution.

2 A small number of individuals in or on vehicles at the time they are attacked by DU munitions, or are carrying such munitions that become damaged, could experience an individual medical threat from the acute toxic effects of uranium on the kidney. This could result from embedded DU shrapnel or inhalation of DU aerosol. The vast majority of deployed troops will suffer no health threat. Between these two extremes, there are a small number of scenarios, likely to involve a few hundred troops that could give rise to a health threat from the long term chronic effects of low level radiation exposure. The main risk is that inhalation of DU aerosol and subsequent irradiation of the lungs will give an increased risk of lung cancer amongst those carrying out battlefield clearance or similar operations.

3 The information below provides guidance to allow the Joint Force Commander (JFC) to make an informed assessment of any health consequences from the use of DU munitions as part of the decision-making process. It addresses the risks to UK Armed Forces personnel, and to essential civilians, including contractors operating in support of UK Armed Forces, who may be exposed to DU during military operations. The aim is not to avoid risks, but to manage them responsibly, on the basis of impact and likelihood and with the support of appropriate guidance.

4 The decision to adopt any particular protection measure is dependent on the commander's informed assessment of the risks, but there is a mandatory requirement for:

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- a) Warfighting and rescue operations to take precedence over concerns about DU munitions risks;
- b) Risk assessments to be prepared before and updated during any operation;
- c) Personnel to be given appropriate information through the chain of command on the assessed risk from DU munitions and on any measures needed to reduce exposure;
- d) Assessing the external radiation dose to personnel (such as tank crews and REME personnel) who may spend prolonged periods in close proximity to unboxed DU munitions;
- e) Assessing the internal dose to personnel who are in or on vehicles at the time they are struck by DU munitions or to personnel who rescue casualties from such incidents;
- f) Assessing the internal dose to personnel (such as those involved in battlefield clearance or battle damage assessment) who might spend prolonged periods in, on or near vehicles hit by DU munitions;
- g) Advising all personnel leaving theatres where DU munitions have been used of their right to request an internal dose assessment on their return to the UK. This will normally be done by issue of the F Med 1018.

## Appointments

5 The JFC is responsible for deploying all appropriate force protection methods, including those relating to radiation safety. Assistance will be available through their staff and also from an RPA, usually the Dstl Environmental Sciences RPA Body (Dstl ESD), who will be contacted via JFC.

6 Supervision is required to ensure that any force protection instructions are followed. For warfighting, this may be achieved through the normal command structure. For more mature operations, RPSs and/or WPSs (RAM) should be appointed after consultation with the RPA. For RAC Regiments and other units with personnel who may spend prolonged periods close to unpackaged DU munitions, a Regimental RPS (usually the QM(T)) and an RPS for each squadron should be appointed as soon as any deployment orders are received. All RPS and WPS (RAM) appointments should be published in Regimental Orders.

## Risk Assessments

7 Prior to any operation where intelligence indicates that DU is likely to be used or that there might be a hazard from previously fired DU, a risk assessment is to be prepared in consultation with the RPA.

8 Whenever possible, the JFC is to arrange for the initial DU risk assessment to be validated, and, if necessary, updated during the course of an operation. As a minimum and whenever practicable, monitoring should be carried out and records of known or suspected areas of contamination maintained.

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## Hazards

9 DU presents both a radiological and toxic hazard. Radiation dose rates are detectable when measured close to DU munitions, but the dose rate reduces very quickly with increasing distance. Trials indicate that there is unlikely to be any appreciable risk from external radiation exposure other than from keeping a small DU round or fragment in a pocket.

10 There is a potential hazard from inhalation, ingestion or contamination of open wounds by DU dust. The main hazard is inhalation of the dust formed during a fire or explosion involving DU munitions or when DU munitions hit an AFV (as described in paragraph 2).

11 No contamination has been found in tanks during or after test firing of in-service DU munitions although there is a slight risk that barrels and fume extractors will have some localised low levels of fixed contamination after DU munitions have been fired.

## Personal Dosimetry

12 Sufficient personal dosimeters (TLDs) should be requested to allow one TLD and holder to be issued to each individual. This request to Dstl Environmental Sciences Approved Dosimetry Service (Dstl ADS) should be done through the chain of command. Note that TLD availability depends on operational circumstances. A delivery address must be provided - taking account of the likely transit time (a week to 10 days) for the TLDs.

13 TLDs will be labelled and issued by the RPSs. When sufficient TLDs are available, one will be issued to each individual e.g. to Challenger tank crewmen and REME support personnel. The appropriate name, rank and service number is to be written against the TLD number in the Dosimeter Issue List that comes with the TLDs.

14 If operational requirements prevent the issue of one TLD per individual, a TLD will be issued to the individual likely to receive the largest radiation dose i.e. the loader in a Challenger tank. The name, rank and serial number of this individual and other personnel without dosimetry but working with this individual will be recorded against the TLD number in the Issue List.

15 The person appointed to co-ordinate the dosimetry issue will retain the original Issue List and a copy will be sent to the Dstl ADS when the dosimeters are returned after use. The chain of command should be made aware of when this has taken place and paperwork retained by administrative control until results are received.

16 If no dosimetry is available, estimates of the time spent by each person in DU-loaded AFVs should be made by the RPS after essential military activities have been completed. This information is to be forwarded to the Dstl ADS.

17 TLDs should be worn or carried at all times in a secure manner that does not interfere with essential duties. It is preferable that TLDs are worn on the chest or at the waist, but they will function if carried in a pocket. Only the TLD issued to an individual is to be worn by that individual. The loss of a TLD is to be reported to the RPS as soon as practicable.

18 The RPS will consider the practicality of exchanging TLDs in Theatre and will issue appropriate instructions. TLDs are usually issued for a maximum of 3 months but they will function over longer periods. Operational tasks and considerations will take precedence.

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19 TLDs and holders that are no longer required should be collected by the RPS and returned to the Dstl ADS with the Dosimeter Issue List.

## Information, Instruction and Training

20 Based on the risk assessments, JFC will provide instructions on deployment which will outline the precautions to be taken against the hazards of DU ammunition. This will include advice on arrangements for biological monitoring. Unit commanders will receive this information through their chain of command. For single-Service operations, the lead will be taken by the relevant single-Service planning and safety organisation.

## Contractors in Support of Military Operations

21 JSP 567 covers the policy for contractors on deployed operations (CONDO). If there is a risk from DU this will be included as part of the arrival brief. The sponsor who is deploying the contractor is responsible for the funding, organisation of training and provision of any equipment and for obtaining advice on the location of areas of contamination from the JFC. Although each contractor is responsible for recording the actions of their staff and possible exposure to a DU risk, CONDO J1 (Personnel) in the deployed theatre will also maintain a record of all contractor's personnel and their known or potential exposures and this will be archived at DSDC Llangennech for the MOD records.

## Restriction of Exposure

22 Radiation exposures are to be kept ALARP and within any dose limit set by the JFC or the Chiefs of Staff who will receive recommendations from Directorate Joint Warfare NBC and RPA.

23 There is a spectrum of personal protective equipment and measures that may be employed against DU contamination. When no precautions are practicable, personnel should wash their hands and face as soon as possible after leaving a known or potentially contaminated area. Outer clothing should be changed at the first convenient opportunity and laundered in the normal way before being worn again. A higher degree of protection can be obtained by a handkerchief, shemagh, sweat rag (wet better than dry) or mask such as the Mask, Air Filtering Disposable (NSN 4240-99-156-3608) being used to cover the nose and mouth and wearing disposable coveralls over battledress or other outer clothing. Protection equivalent to full NBC IPE is not necessary unless prolonged dust-raising activities, such as extensive repair or vehicle recovery, are to be carried out in known or potentially contaminated areas. If respiratory protection and/or gloves but no coveralls are worn, personnel should brush off their clothing before removing their respiratory protection and gloves. DU exposures can also be reduced by minimising dust-raising activities, washing down or using damp cloths to decontaminate surfaces, covering contaminated equipment with a tarpaulin or sealing the contamination in place with paint.

24 The radiation dose to the skin can be reduced by avoiding direct contact between skin and the DU penetrator. This may be achieved by wearing gloves or handling the DU shot by the sabot and rear fin case. However, in all reasonably foreseeable circumstances the risk to the skin is likely to be very low and in warfighting loading efficiency is most important.

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25 Personnel are not to touch, pick up or retain items from struck AFVs or DU fragments, unless ordered to do so as part of an authorised clean-up operation. When doing so, they must use a shovel or similar implement as fragments can be very sharp. Note that the discarded sabots from DU rounds may occasionally be very slightly contaminated. There is no significant health risk, but hands should be washed as soon as possible after handling sabot fragments.

26 DU exposures can be reduced or prevented by avoiding areas of known or suspected DU contamination or by minimising the time spent in such areas. Exposures can also be reduced by contamination control procedures (such as not cooking, eating, drinking or smoking and wearing personal protective equipment) within 50m of any site or vehicle known or suspected of being contaminated. However the practicability of adopting these measures depends on the nature and tempo of operations and competing needs such as retaining protective equipment for use against more severe and immediate NBC or toxic hazards.

27 Whenever possible, vehicles suspected of being contaminated with DU should be quarantined, monitored for contamination and, if necessary, decontaminated. Advice should be sought from the RPA whenever UK vehicles or allied or enemy vehicles that will be returned to the UK are involved. Records of the results of the monitoring surveys and of the decontamination should be maintained and copied to the RPA.

28 Food and water is to be consumed only in accordance with the direction given on basic food and water safety measures given as part of standard deployment instructions (CJO's Directions for Specific Operations).

## Firing of DU Ammunition

29 Whenever possible, the use, or suspected use, of DU by friendly and enemy forces is to be recorded in order to identify areas which may be contaminated with DU. Records are to include the weapon platform, calibre of round, number fired, location of the target, and target characteristics, or as much of this information as can be obtained. JFC are to seek such information from friendly forces.

## Monitoring

30 Radiation and contamination monitoring will provide information on the known or suspected presence of DU contamination. However the information gained needs to be balanced against the manpower requirements, the need for security for the monitoring team and the known or potential presence of other and more immediate risks such as those from mines and/or unexploded ordnance.

31 Advice on monitoring techniques and equipment is to be obtained from the RPA as some techniques and monitors are not sufficiently sensitive for confirming whether DU is present. It is likely that visual inspections will be supplemented by the use of hand-held monitoring equipment and that this will be supplemented by specialist soil, air and water sampling as warfighting gives way to more mature operations. Anyone found to be contaminated is to have their medical records annotated and records of contaminated equipment or ground should be maintained whenever practicable.

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## Marking of DU Damaged Vehicles and Buildings

32 Where practicable, vehicles and buildings suspected of being damaged by DU munitions are to be clearly, permanently and indelibly marked to warn of the hazard and secured to prevent entry, e.g. using a bright spray paint marking "DU".

## Contaminated Casualties or other Personnel

33 Guidance on procedures for handling known or potentially contaminated casualties, including those injured by DU fragments, have been issued by the Defence Medical Services Department in JSP 950. Further guidance on the treatment and counselling of contaminated casualties may be sought from the duty Radiation Medical Specialist at the Institute of Naval Medicine (INM) on 023 9276 8026/8020.

34 Personnel who are not injured but have been in situations where DU contamination appears likely, such as unprotected personnel entering a platform immediately after impact to save life, are to have their personal details recorded and the incident noted in their medical records.

## Biological monitoring

35 After a platform is known or suspected to have been struck by a DU penetrator, crew members and rescue and recovery personnel, whether casualties or not, are to be notified by commanders to in-theatre medical staff. It is the responsibility of the medical personnel to ensure that details of those who may have been affected are collected and passed via JFC to the relevant single-Service chain of command. Biological monitoring for these personnel is to be arranged through Dstl ESD ADS by parent unit medical staff in accordance with MOD's DU biological monitoring policy and JSP 950. As a minimum, biological monitoring will take the form of the collection and analysis of urine samples, but occasionally other techniques such as whole body monitoring may also be used. Additionally, anyone who is present in operational theatres where DU munitions have been used and is concerned about potential DU exposures can request biological monitoring on their return to the UK as described on the F Med 1018. Retired or TA personnel who have returned to civilian life before deciding that they wish to receive biological monitoring should contact the MOD Veterans Policy Unit Helpline on 0800 169 2277/[www.veterans-uk.info](http://www.veterans-uk.info).

36 For serving personnel the analysis results and an interpretation of their significance will be sent to the individual's MO or Civilian Medical Practitioner. The ADS will establish parallel arrangements for other groups.

## Transport and Storage of DU Ammunition

37 DU ammunition is to be transported into theatre in compliance with Leaflet 10. In theatre, DU ammunition is to be stored and transported in accordance with operational requirements, but, whenever practicable, DU munitions should be stored in their Ammunition Container Assemblies (ACAs) until loaded into the AFV. The ACAs are retained for re-packaging rounds not used during work-up training/operations. Radiation dose rates from packaged DU ammunition are so low that they do not need to be considered in theatre.

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38 After completion of training/operations, remaining DU rounds must be inspected and replaced in ACAs prior to redeployment or back-loading. Technical ammunition staff are to be informed of damaged DU munitions. DU ammunition is to be back-loaded from theatre in compliance with Leaflet 10 unless operational conditions make this impractical.

39 The practicability of marking and restricting entry to any ground within 50m of the location where a DU munitions accident has occurred should be considered on a case by case basis.

## Identification of DU

40 Monitoring is the preferred method for searching for and confirming the presence of DU. However, the following visual clues may also be useful.

40.1 Tank projectiles: These will take the form of a long thin rod about 30-60 cm long. The rod may be pointed at one end and have short stubby fins on the other (although both the point and the fins may be detached during an impact). The rod may also break up into fragments which can look like lumps of charcoal. Large quantities of DU dust can have a sooty appearance. DU fragments and dust may, over time, develop a green and/or yellow colour.

40.2 Other (generally 25 – 30 mm) projectiles: These are typically DU rods about 10 cm long and 2 cm in diameter, pointed at one end. They may be in their windshield, with the pointed end of the DU visible.

## Battlefield Clearance

41 It is MOD policy that surface-lying DU fragments should be recovered for controlled disposal during wider battlefield clearance activities. DU fragments may have razor sharp edges and should be collected with a shovel or by personnel wearing heavy gloves. They are to be placed in a box marked with a radiation warning trefoil and kept in secure storage until they can be passed to the local civilian authorities for disposal.

## Cleaning of MBT Barrels that have Fired DU Munitions

42 While no contamination has been found inside the tank during the firing of DU munitions, very low levels of fixed DU contamination have sometimes been found in gun barrels and fume extractors. This is of no relevance during operations. During repatriation and subsequent use of the equipment, only non-abrasive cleaning techniques should be used until the barrels and fume extractors have been monitored under arrangements made by the Tank Systems Support (TSS) Project Team (PT). Gloves should be worn; barrels and fume extractors wiped with a damp or oily cloth before maintenance and barrel brushes and bore staves wiped after use. All waste cleaning materials should be disposed of with other refuse and hands washed before eating, drinking or smoking. To facilitate this, the TSS PT is to issue pre-printed self-stick labels that are to be affixed to the Gun Documents after DU munitions have been fired. If the pre-printed labels are not available, the following statement is to be written in the Gun Documents:



## Part 2

- There may be traces of depleted uranium within this barrel. This does not present a significant risk if wet non-abrasive cleaning techniques are used and hands are washed after work on the bore or fume extractor. Precautions must be taken to prevent inhalation of dust during work that might abrade the bore.

## Return of DU Ammunition

43 Unused DU ammunition, once removed from tanks, is to be loaded back into DU ACAs for return to the UK. Transport back to the UK is to be in accordance with MOD and international regulations. Where this cannot be achieved the unit are to seek advice from Chief Environment and Safety Officer (Army).

## Record Keeping

44 Records including unit logs, deployment records, risk assessments, radiation and contamination surveys and all other information relating to potential and actual exposure to DU hazards, are to be retained. The above records are to be supplied to the appropriate Service Historical Branch. Information concerning people entering and leaving theatre is to eventually be transferred to the appropriate Forward Logistics Control Headquarters for safe-keeping.