

UK depleted uranium (DU) munitions policy and development

UK policy is that depleted uranium (DU) munitions can be used in weapons because it would be wrong to deny our armed forces a legitimate and effective capability that can help them achieve their objectives as quickly and safely as possible. Claims of serious health and environmental effects by a very small number of people attract media attention but are disputed by most scientists and international agencies. Whether other countries use DU munitions or not is a matter for them.

DU is a heavy metal 70% more dense than lead and with the ability to self-sharpen on impact with armour. This makes it ideal for use in armour-piercing ammunition and reduces the combat risk to UK tank crews as it allows them to engage an enemy from greater distances. It was always recognised that the risks and benefits from using DU munitions needed to take account of the fact that DU is toxic in high doses and weakly radioactive. Risk assessments show very little or no chemical or radiation risk to most troops and civilians and instructions are provided to reduce the already low risk as far as is reasonably practicable.

One of the earliest assessments of the risks of using DU munitions was by the US in 1974. The UK benefited from this work when they began their own DU munitions development in 1979. Since then the US have completed a major piece of research (known as Capstone) and many other independent organisations have published their findings.

Reports by the Royal Society, European Commission, United Nations Environment Programme, International Atomic Energy Agency and World Health Organisation are on the world wide web. Although some of these were produced some time ago, more recent work shows their conclusions are still valid. MOD and European Commission summaries were published in 2009 and 2010 respectively.

UK development was at Eskmeals in Cumbria and Kirkcudbright in Dumfries and Galloway. Safety arrangements were discussed with health and safety and environmental protection regulators before test firing began. Personal and environmental monitoring confirms that the original development work and subsequent small-scale firings to ensure the continuing safety and serviceability of the ammunition do not present a hazard to anyone.

None of the highly publicised European Parliament or UN resolutions calling for more research or a ban on DU munitions affect the information provided above. The UK opposes such resolutions because DU has not been shown to have, and indeed is very unlikely to have, any significant impact on the local population or veterans.

Use of DU munitions is not prohibited under current or likely future international agreements and international concern is not as great as some suggest. Only 15 countries contributed to a UN report published in 2008 and only 4 suggested the possibility of widespread or extreme health risks. Canada and the Netherlands opposed a DU munitions ban. A review carried out in accordance with Article 36 of the First Protocol of 1977 Additional to the Geneva Conventions of 1949 (Additional Protocol I) concluded that the UK's only DU munition (CHARM 3) is capable of being used lawfully in international armed conflict.

Allegations about 'increasing evidence' of extreme health risks are untrue. There has been nothing to affect the most recent (2008) International Commission on Radiological Protection conclusion that, although the body of information on the health effects of radiation has expanded since 1990, there are few significant changes to our understanding.

Misunderstandings or misinterpretations of the significance of various resolutions, legal processes and research have been used to suggest that the UK government position is flawed. The Ministry of Defence (MOD)'s response to the outcome of a recent Coroner's Inquest into a death alleged to have been caused by DU exposure is in the National Archive. This explains that the weight of independent scientific opinion supports the MOD position rather than the Jury's verdict and why, having examined the Coroner's recommendations, inquest transcript and scientific evidence, MOD does not accept the recommendations arising from the Inquest.

Suggestions that doses from the 'photoelectric effect' are important and being ignored are shown to be in error by recent peer-reviewed work which shows that 'photoelectric effect' doses are broadly comparable with natural background radiation levels and hence of no practical significance in the calculation of radiation risk.

More information

[Written Answers, Woodall/Mulley, Depleted Uranium Ammunition, Hansard Official Record, Column 777, 8 March 1979, Her Majesty's Stationery Office, London](#)

[The Royal Society, The health effects of depleted uranium munitions - Summary, Document 6/02, ISBN 0 85403 5753, March 2002](#)

[Scientific Committee on Health and Environmental Risks \(SCHER\), Opinion on the Environmental and health risks posed by depleted uranium 18th May 2010](#)

[Effects of the use of armaments and ammunitions containing depleted uranium, Report of the Secretary General, A/63/170, United Nations General Assembly \(2008\)](#)

UK depleted uranium use

When a DU round impacts on a hard surface, some dust is released. This can be a health hazard in some circumstances. However, all the research to date indicates that these circumstances are extremely unlikely to occur, and, if they do, will only affect very small groups who will be at much greater risk from the other hazards associated with armed conflict. Recent work - including the monitoring of veterans and battlefields - confirms this. The UK used very limited quantities (less than 2.9 tonnes) of DU in two armed conflicts in 1991 and 2003.

The only use of DU munitions in peacetime is in test firings. In conflict, 120 mm anti-tank DU munitions (known as CHARM) and 20 mm DU rounds used in the Royal Navy's PHALANX Close-In Weapon System (a system for defending against missile attacks) were fired in the Gulf in 1991 and 2003. The total weight of DU in the munitions was less than 2.9 tonnes. Use of DU in PHALANX ended in 2005, leaving the anti-tank round as the UK's only DU munition.

Clean up after a conflict is a matter for a country's civilian administration but UK Forces provide information through signs and leaflets of the explosive or other risks associated with touching any battlefield debris. They also assist with ordnance disposal which includes removal of surface-lying DU fragments.

The UK has, and will continue to, provide help and advice to assist the civilian administration and relief agencies in carrying out any monitoring they want to undertake. MOD has provided information on its use of DU munitions and on its monitoring in Iraq in 2003. MOD officials participated at a UNEP seminar at which DU matters, including environmental monitoring and sampling techniques, were discussed with Iraqi scientists.

More recently, MOD provided Iraqi scientists with protective equipment to carry out DU contamination surveys and with information on the composition of the DU used in UK munitions. Both the World Health Organisation and International Atomic Energy Agency state that DU risks can be controlled with simple countermeasures conducted by national authorities.

DU munitions personal monitoring

Of the thousands of troops monitored worldwide, very few have had any detectable DU exposure and the vast majority of these were in or on vehicles when they were attacked with DU. Monitoring is also available for personnel concerned about possible DU exposures.

No DU has been detected in the vast majority (more than 99.5%) of the almost 1000 UK veterans tested by collection and analysis of urine samples. DU was only detected in a very small number of veterans who were in or on vehicles when they were attacked with DU munitions and this DU is at levels at which no adverse health effects are expected. Similar results have been obtained by other countries.

UK monitoring is based on independent advice from the DU Oversight Board (DUOB) who state that their testing is sufficiently sensitive to detect a DU exposure that would have 'material implications for health'. The DUOB comprised expert members from a variety of medical and scientific institutions and lay members. Veterans and MOD were represented and nominated their own scientific advisors.

A report of the work can be accessed below. Some key points of test result interpretation and risk modelling were disputed by a small minority of DUOB members who produced a minority statement within the main report. MOD accept the majority view that this statement is 'seriously flawed scientifically'. The care needed to obtain meaningful analysis results was shown by DUOB work and is the subject of a peer-reviewed scientific article.

More information

[Final report of the DUOB submitted to the Under-Secretary of State for Defence - February 2007](#)

[Hooper FJ, Squibb KS, Siegel EL, McPhaul K and Keogh JP, Elevated Urine Uranium Excretion by Soldiers with Retained Uranium Shrapnel, Health Physics, Volume 77, Number 5, 512-519, November 1999](#)

[Ejnik JW, Carmichael AJ, Hamilton M, McDiarmid M, Squibb K, Boyd P, and Tartiff W, Determination of the isotopic composition of uranium in urine by Inductively Coupled Plasma Mass Spectrometry, Health Physics, Volume 78, Number 2, 143-146, February 2000](#)

[McDiarmid MA, Engelhardt SM, Oliver M, Urinary uranium concentrations in an enlarged Gulf War veteran cohort, Health Physics, Volume 80, 270 - 273, 2001](#)
[Ough EA et al, An Examination of Uranium Levels in Canadian Forces Personnel who served in the Gulf War and Kosovo, Health Physics, 527-532, Volume 82, Number 4, April 2002](#)

[Roth P, Werner E and Paretzke HG, Research Into urinary Excretion of Uranium, Verification of Protective Measures in the German KFOR Army Contingent, GSF - Forschungszentrum fur Umwelt und Gesundheit, Institut fur Strahlenschutz, Neuherberg, GSF Report 3/01 January 2001](#)

[Roth P, Hollriegel V, Werner E and Schramel P, Assessment of Exposure to Depleted Uranium, Radiation Protection Dosimetry, Vol 105, No 1-4, 157-161, 2003](#)

DU munitions environmental monitoring

UK surveys in areas where DU munitions were used have not shown DU at levels likely to have any detectable health impact. There are only some very limited and localised areas, such as in armoured vehicles hit by DU munitions, where precautions to prevent DU inhalation would be sensible if long-term exposures were likely. Similar results have been found by independent international bodies.

MOD carries out terrestrial and marine environmental monitoring surveys on and around the firing ranges where DU munitions were developed. Air sampling is also carried out when firing is in progress. The survey methods are agreed with environmental regulators. A summary of the terrestrial and marine results was published in 2002. Subsequent results are in complete agreement with the early findings.

There have been MOD surveys in Kosovo, Bosnia and southern Iraq. The results and conclusions are consistent with work by the UN Environment Programme in the Balkans and by the International Atomic Energy Agency in Kuwait. Information has been provided to assist the civilian administration and international relief agencies in carrying out any monitoring they might wish to undertake.

More information

[Report of a reconnaissance visit to develop an Enhanced Environmental Monitoring Programme in the British led sector in Kosovo](#)

[Smith D and Brown R, Radiological Assessment of Depleted Uranium Impact Locations in Iraq, Session TA6 - Radiation Protection of the Public and the](#)

[Environment, Second European International Radiation Protection Association Congress, Paris \(2006\)](#)

[UK MOD environmental monitoring in Bosnia August 2002 survey report](#)

[Comparison of Kirkcudbright and Eskmeals environmental monitoring data with generalised derived limits for Uranium](#)

[Smith DM, Environmental Surveillance in Kosovo, DRPS Report 240/2001, UK Ministry of Defence, DERA Radiation Protection Services, 28 July 2001](#)

[National Radiological Protection Board, Generalised Derived Limits for Radioisotopes of Polonium, Lead, Radium and Uranium, Documents of the NRPB, Volume 11 Number 2, 2000](#)

DU munitions health monitoring

There is no reliable scientific or medical evidence to suggest that DU has been responsible for ill-health in UK Forces' personnel or civilians. However the government will carefully consider any emerging data. Epidemiological studies suggesting DU-induced cancers and birth defects have flaws and the people proven to have the highest DU exposures, ie those in or on vehicles when they were hit by DU munitions, do not have any DU-related health effects.

There are ongoing studies of the health of a group of US veterans known to have been exposed to DU during the 1991 Gulf conflict. The most recent report of this work was published in 2011.

Veterans with embedded DU fragments excrete elevated concentrations of uranium but no significant evidence of clinically important changes are observed in kidney or bone. These are the two principal target organs for any form of uranium. Continued surveillance is recommended due to ongoing mobilization of DU from the embedded DU fragments.

More information

[Research Advisory Committee on Gulf War Veterans' Illnesses, Gulf War Illness and the Health of Gulf War Veterans: Scientific Findings and Recommendations, U.S. Government Printing Office, Washington DC \(2008\)](#)

[McDiarmid MA, Engelhardt SM, Dorsey CD et al, Longitudinal Health Surveillance in a Cohort of Gulf War Veterans 18 Years After First Exposure to Depleted Uranium, Journal of Toxicology and Environmental Health-Part A-Current Issues, Volume 74, Issue 10, Pages 678-691, 2011](#)