

## Part 5 Conclusions & depleted uranium priorities for 2002

### Framework for analysis of DU weapons and hazards in Afghanistan

This report covers a wide range of technical, research and political issues. Where possible it includes factual evidence and direct sources of research and official statements. However some essential facts are currently military secrets and some official statements and reports about DU weapons and hazards are unreliable. These areas of uncertainty are expressed as questions that may have several answers. These options form the basis for alternative **DU scenarios** for others to test.

In this complex area a **systematic framework** is needed to separate facts from opinions and political processes from technical analysis e.g. risk assessment. This may speed up **the search to identify all DU weapons, their health hazards and implications for people exposed to the effects of bombing in Afghanistan.**

My central concern is the **health and safety of troops and civilians**, and to alert employers and governments to the risks they may face. This calls for **systematic risk assessments** identifying the potential hazards, the people at risk, precautions to minimise exposure, potential health effects, mitigation of risks plus reliable data from health and environmental assessments.

The potential hazards of DU contamination require an understanding of the **military context** e.g. warhead technology, weapons involved and their intended mission.

DU investigations are complicated by the **political context** that has led to secrecy about the mystery dense metal involved in new weapons and compromised research on the health and environmental effects of DU. Political, military and commercial issues have to be recognised. They can help or hinder the immediate task of ensuring human safety in Afghanistan.

### Suggested framework for DU analysis

Refer Table 2 (page 126)

Refer Table 3 (pages 127-8)

Factors	History & past use: 1973-98	Recent events 1999-2001	Immediate priorities	Outlook April 2002 >
<b>Political context</b>	Political agendas, Advocates Sceptics	Recent research & controversies	DU scenarios in Afghanistan. Key players	Political consequences & review
<b>Health, safety &amp; environment</b>	People at risk Health risks Environmental issues	DU use in the Balkans & suspected in Afghanistan	Health precautions Environmental assessments	Summer hazards. Review past DU cases
<b>Military context</b>	Weapon systems DU features Technology Strategic context	Suspected weapons & targets	Full disclosure of DU weapons targets & assessments	Replace DU weapons capability?

Each of these areas - **DU health & safety risks** and their **military** and **political context** can be considered in terms of its **early history** and **recent events** in the Balkans and in Afghanistan as the new weapons became operational. This is summarised in **Table 2**, based on evidence gathered in Parts 1-4. **Table 3** carries these three areas forward to identify **immediate priorities** (February - March 2002) and **consequences from April onwards** if more serious DU scenarios develop with warmer weather.

**Table 2: Historical context of DU - Military, Human and Political factors**

<b>Factors</b>	<b>1973-1998</b>		<b>1999-2001</b>
<b>Political Agendas</b>	National arms industries/exports-US, UK, FR, IS, RU Nuclear waste marketing - military & civilian. DU military uses vs. Geneva Conventions - secrecy, deny or conceal health risks, reject bans. Gulf veterans compensation & environmental claims. Hide effects. Keep enemies as demons not martyrs		Post-Balkans Leukaemia deaths EU/NATO anxiety Balkans DU cover-up DU Bill in US Congress UK MPs question DU
<b>DU advocates</b>	Military & governments, NATO; arms manufacturers, Nuclear industry (& IAEA?) Government sponsored/dependent research (RAND)		Balkans DU studies: UNEP, WHO, Royal Society, Nato, DoD
<b>DU Sceptics</b>	Radiation & industrial safety agencies e.g. FAA Gulf veterans; victim communities, DU campaigns, independent medical & epidemiological researchers		Military Toxics Project Low Level Radiation C. WISE, LAKA, UK Vets
<b>People at Risk</b>	Enemy troops & civilians; own troops in friendly fire incidents, cleanup & recovery teams; training & plane crash locations; expatriates; refugees		+ troops investigating hard targets; Aid teams & Peacekeepers.
<b>Health Risks</b>	DU metal: External - low; Shrapnel - medium DU oxide aerosols: Internal exposure inhaled or ingested - medium to high due to toxicity & alpha radiation + dirty DU U236, Pu239 leading to renal, immune & nervous systems and carcinogenic effects Risks subject to dose level & brief or ongoing exposure to contamination. Few acute doses monitored. Gulf War Syndrome. Birth defects. Slow onset pathologies e.g. lymphomas, leukaemia		Suspected acute exposure in vicinity of high load DU warheads (up to 1.5 tons each) Indirect exposure through airborne dust, water supply & soil contamination over large areas in Afg.
<b>Environment issues</b>	Localised hazards for known penetrators. But cumulative area hazards from 300+ tons in Iraq	Suspected wider contamination but not assessed (Iraq)	Suspected 100x more DU per target. Heavy bombing in Afghanistan 500-1000 tons of DU?
<b>DU Weapon systems</b>	<b>Known:</b> 25 & 30mm API 120 mm tank rounds	<b>Suspected:</b> AGM-65, TOW 2, AGM-142, JDAM	<b>Suspected:</b> BGM-109 GBU-15,-27,-28,-31,-32 AGM-86D,-130C,-158 +
<b>DU features</b>	High density (18.6) for kinetic energy weapons Very hard alloyed with Titanium, Nb or Mo. Melting point (1132°C) suitable for shaped charges Pyrophoric - burns at high temperature - incendiary.		Less use of anti-tank DU than Gulf. DU use suspected in US guided weapons & by Al Qaeda
<b>Weapons technology using DU or mystery dense metal</b>	DU anti-armour penetrators - 25mm, 30mm, 120mm DU Phalanx sea to air rounds - 25 mm Advanced penetrator warheads (AUP) BROACH multiple warheads (MWS) Shaped charge warheads: A/T & hard target Shaped charge cluster bombs & A/T mines		1999: new & prototype warhead evaluation in Balkans - JDAMs & AUP vs. BROACH. 2001: New systems in tested in Afghanistan.
<b>Strategic context</b>	70's - 80's: Anti-Tank capability 80's-90's: hard & deeply buried targets: e.g. radar, command & control centres (HDBTDC) 90's+ underground NBC & terrorist bases		Command bunkers, suspected NBC targets in Balkans plus caves & tunnels in Afghanistan

**Table 3: DU issues in 2002 - Military, Human and Political factors**

<b>Factors</b>	<b>Immediate issues: January-March 2002</b>	<b>April 2002 &gt;</b>
<b>Political Agendas</b>	Apply & refine <b>DU Scenarios</b> in Afghanistan Precautions & strategic review for international aid, UN peacekeeping & refugee programmes. UNEP/WHO assessments, UNHCR co-ordination Monitor and deter political interference in UN roles. US / UK / EU political response to DU scenarios? Military response to DU scenarios & troop welfare? Political accountability of military & arms industry?	Consequences of DU assessments in Afghanistan, Pakistan, European & other states? Re-open DU history in Iraq, Balkans & more Legal / financial liabilities? DU proliferation control?
<b>DU advocates</b>	Mystery metal disclosure: denial or facts? Scale & location of DU use in recent bombing? The Al Qaeda paradox: whose bombs? - all DU weapons are "dirty". Cover-up or co-operation?	Reviews of past DU use, dirty DU, health research, & environmental impacts. DU a liability, not asset?
<b>DU Sceptics</b>	Update health & environmental models for high load DU weapons. Fast, practical advice for health & environmental assessments in Afghanistan. Fast, practical advice for health & safety precautions and summer re-contamination scenarios.	Re-assess past DU conflict areas. Re-construct case for Veterans & other claims. Increase LLR awareness.
<b>People at Risk</b>	All troops, civilians & expatriates exposed during bombing: a) still in Afghanistan and b) elsewhere. Children and pregnant mothers at highest risk plus new arrivals - refugees, aid, military, commercial.	People in all contaminated areas in summer heat & wind. Risk zones spread. Early onset DU disorders.
<b>Health risks &amp; effects</b>	a) Assess, monitor, isolate immediate risks e.g. water and high contamination target zones. b) Acute exposures: respiratory, nervous & immune system and renal damage (see Figure 2, page 106) Severely reduced immunity to winter conditions including death. DU monitoring & intensive care. Need for rigorous diagnosis & DU autopsies. c) Moderate exposures: Minimise further exposure. Health care includes DU monitoring. d) New arrivals or low exposure: Minimise any DU exposure - water, rigorous dust/food hygiene.	Depend on DU scenarios: Water supplies & irrigation at risk from snow-melt and surface run-off. Airborne dust re-contamination in hot weather and in haze, wind & vehicle movement. Expect contamination to spread during summer. Ongoing health monitoring & support in Afg, Iraq etc..
<b>Environment issues</b>	Rigorous, fast environmental assessments needed. Priorities include all water supplies and known hard target bombing zones in populated areas. UNEP PCAU may require 20x more resources than in Balkans study for Al Qaeda & / or US DU sources. Vigilance for deception & interference. Disclosure of bombing target maps & military NBC assessments.	Extended monitoring required for air, water, sand and soil throughout summer & in trans-border risk areas. Balkans, Iraq re-assessments needed. Data is legal evidence.
<b>DU Weapon systems</b>	UK Govt deny any DU weapons use in Afghanistan. US Govt report Al Qaeda DU & radiation from DU warheads. Rigorous investigation of suspected DU weapons used in Afghanistan and other countries to enable immediate risk assessments. Mystery metal(s) involved must be identified fast. Disclose plume & risk assessments from weapons tests.	Further investigation and historical verification required of all suspected & planned DU weapons. International moratorium on all identified & suspected DU weapons.  / Table 3 continued >>

<b>Table 3 (continued): DU issues in 2002 - Military, Human and Political factors</b>		
<b>Factors</b>	<b>Immediate issues: January-March</b>	<b>April onwards</b>
<b>DU features</b>	Exact Isotopic mix analysis required for all DU contamination to identify sources. Legal evidence.	Historical study required for DU Isotopic database.
<b>Weapons technology</b>	All suspected DU weapons to be identified for health / environmental risk assessments. Models required for environmental dispersion of high load DU warheads and all other suspected DU applications e.g. cluster bombs and mines.	Disclosure and historical analysis of earlier DU weapons. DU substitution e.g. in shaped charge warheads.
<b>Strategic context</b>	Surviving terrorists. Suspected hideouts or weapons stores. Acute and progressive DU health effects on Taliban / Al Qaeda personnel in hard target locations? Environmental hazards of bombing suspected NBC targets including DU? International reaction to DU weapons?	Strategic and legal review of bombing with DU warheads and sub-munitions. Credibility of war on terrorism? Alternatives?

It is hoped that this framework will help managers, medical advisers and others involved in aid planning or health and safety risk assessments who may be unfamiliar with DU weapons and hazards to familiarise themselves quickly with essential factors, and to be prepared for military explanations and political interference.

This report finds that powerful vested interests are involved in the sale and use of DU weapons with strong justifications for their own actions e.g. believing "DU is safe". Secrecy, mis-information and deception appear to be normal in the politics of DU. This may be to deter interference in the multi-billion dollar arms industry, or to avoid equally high stakes for injury compensation or criminal indictment. Aid organisations are familiar with some of this political environment and do the best they can despite it.

The seven **DU Scenarios** provide a framework for further investigations while much key data are kept secret by the US and allied governments and military. A key priority is to persuade these governments to fully disclose the facts about suspected DU weapons and their use in Afghanistan.

Prospects for DU disclosure are another unknown factor. They may need debate in the United Nations Assembly or action by the International Court. Options range from continuing secrecy, through partial but unreliable information to full and verifiable facts.

Until full disclosure is available the UN and other Aid organisations will need independent plans and precautions. **The DU scenarios can be updated and narrowed down** as facts emerge from governments or from independent environmental and medical monitoring.

**The US and UK governments may have been working on their own DU scenarios for weeks - fully aware of the weapons involved.** However they have not previously acknowledged the potentially fatal health hazards of inhaling or ingesting depleted uranium oxides, including dirty DU contamination. They may have seriously underestimated the potential health and environmental effects from using large numbers of high load DU warheads in Afghanistan.

The issues raised in this report have **wider implications** e.g. for re-viewing the use and effects of previously undisclosed DU weapons in other conflict zones including Iraq, the Balkans and Israel and in military testing and training areas around the world. They also have political, legal and commercial implications.

**These wider implications need to be registered now but may distract from the immediate priority to minimise potential DU hazards in Afghanistan, which are likely to worsen in the summer.** They may become major issues later in the year once the situation in Afghanistan has been fully and independently assessed. It would be better to pursue them when more facts are available about DU weapons and contamination in Afghanistan.

On 16 January Donald Rumsfeld's report of elevated radiation in one location due to depleted uranium in missile warheads means that **DU has been used in Afghanistan. The question now is not if DU has been used, but how much, where and by whom.** Scenario 1 is now less likely.

## Interim conclusions and priorities

The human, environmental and political consequences of the war in Afghanistan are moving fast. This report is the input of a concerned citizen without access to full data about the weapons used or their targets. The suspected use of DU in some or many of the weapons identified in Part 3, plus any used by Al Qaeda or Taliban forces is a hypothesis until full and verifiable data are available.

The report contains many deductions or conclusions in each section. The following **Interim Conclusions** highlight concern the most important issues for the current situation in Afghanistan. Several also have wider implications for re-evaluating other DU combat zones and for political and military issues that may follow if DU has been used extensively in Afghanistan. They can be updated when more facts are known.

They are sceptical about the actions and intentions of the US and UK governments and military who have led the war and control post-conflict operations in Afghanistan. But they affect many countries. They highlight the importance impartial operation by UN agencies. They raise issues for national investigation and international vigilance.

## DU Weapons Identification

- 1. Based on developments in warhead technology and properties of DU, I conclude that Depleted Uranium is most likely to be the mystery 'dense metal' involved in a new generation of guided weapons and some sub-munitions.**

These new and upgraded weapons were proposed in the **USAF Mission Plan 1997** quoted in **Part 1**. These were researched and are included in the **known and suspected DU weapons** identified in **Part 3**. They are illustrated in **Figure 1** (page 89). **Table 4** (page 131) lists the weapons and their known or suspected combat use. In **advanced penetrator warheads** the only economic alternative, Tungsten, may be used for the point of impact (the tip) but for physical properties and cost DU is the logical material for the main ballast and, in different alloys, possibly for the casing. Jane's reported that DU is used in liners for **shaped charge warheads**. Its density, moderate melting point and pyrophoric qualities are suitable in explosively formed penetrators. These are used in some hard target and anti-armour missile warheads including BROACH MWS, and in some anti-armour sub-munitions.

2. **Positive identification of suspected DU weapons systems is difficult because the 'dense metal' in penetrator warheads is not identified in any public domain sources found to date.** According to the USA Today illustration of the GBU-28 it is classified i.e. **a military secret**. Despite Jane's quote that DU is used for liners in shaped charge warheads no specific weapons are identified. Unofficially versions of the TOW and Milan anti-tank missiles have been reported to use DU warheads. The metal in shaped charge liners is rarely identified in weapon descriptions. Sometimes copper is used. DU is interchangeable with copper. The photograph of DU products on page 79 look very like the shaped charge casings and liners in the two previous illustrations.
3. **Many of the suspected DU weapons in Table 4 have been used in the Afghan War. It is vital that any use of DU in these weapons should be identified without delay.** These facts are needed to enable full environmental impact assessments to be conducted by the UNEP PCAU, for full health and safety risk assessments to be conducted and for suitable precautions to be taken for expatriates and local citizens. in Afghanistan.
4. **The fastest solution to DU weapon identification and DU risk assessments in Afghanistan is for the US and UK governments or military to give full and verifiable disclosure of all high-density metals used in all the suspected systems including DU and DU alloys.** Recent requests for disclosure of DU weapon systems and of DU use in Afghanistan by UK MP's have been met with repeated denials by UK Government spokesmen except for known anti-armour weapons (see Part 2). Similar requests have been made to the US Government in Bill HR 3155 submitted to the US Congress on 17 October 2001 (link on page 138).
5. **Past government action in the US and UK on many aspects of DU use and health hazards has been characterised by delay, denial or deception.** Parts 2 and 4 of this report indicate continuing denial or deception about DU weapons or their use in Afghanistan. For example:

On 6 December 2001 UK Government Defence spokesmen Mr Ingram stated that " a variant of the **GBU-24** and a variant of the **AGM-65** are in service with UK armed forces. Neither use depleted uranium or any other "dense metal" in their warheads."

Readers can compare this statement with the FAS descriptions of the GBU-24 warhead on page 77 and the AGM-65G warhead on page 88.

He also said that "The only dense metal contained in the BROACH MWS [Multiple Warhead System, see page 80] is a tungsten-based alloy. No other dense metal is or has been used in its development or testing. The BROACH MWS is not forecast to enter service before August 2002". (see page 69)

Regarding the BROACH warhead:

- a) BROACH stage 1 is a large, shaped charge warhead, unlikely to use a tungsten liner because of its high melting point. It may use a tungsten case and DU liner.
- b) BROACH was developed to meet US HDBTDC requirements that are understood to include incendiary capability to neutralise chemical or biological targets. The stage 2 warhead is an explosive, dense metal penetrator, expected to use the same dense metal ballast as other advanced penetrators in US systems with the same capability. DU has incendiary potential. Tungsten does not.
- c) The UK Storm Shadow missile was due for operation in December 2001 so could have been used or tested in Afghanistan. It has a BROACH warhead. Is it 8 months behind schedule? Did it miss combat testing?

Table 4: Combat use of known and suspected DU weapon systems with dense metal penetrator or shaped charge warhead technology

Weapon	Gulf War 1993	Bosnia 1995	Desert Fox 1998	Balkans War 1999	Iraq no-fly zone 1992>	Afghan-istan 2001	New 2002 /2003
<b>Guided Bombs</b> (AUP upgraded versions)							
GBU-15	e	P	?	Y	?	Y	
GBU-24	e	P	?	Y	?	Y	
GBU-27	e	P	?	?	?	Y	
GBU-28 B/B	P	P	Y	Y	?	Y	
GBU-31 JDAM	e	e	P	Y	?	Y	
GBU-32 JDAM	e	e	P	Y	?	Y	
GBU-37 B/B			?	Y	?	Y	
SSB					P	P	D
<b>Guided missiles</b>							
TOW 2 A/B A/tank	Y	?					
AGM-65 G Maverick	Y	?	?	?	?	?	
Hellfire II / Brimstone	e	e	e	?	?	?	
AGM-84 SLAM-ER			?	?	?	?	
AGM-86D CALCM			P	P		Y	
AGM-130C				?	?	Y	
AGM-142 Hav Nap		?	?	Y	?	Y	
AGM-154C JSOW					154 A	P	D
AGM-158 JASSM						P	D
BGM-109 Tactical Tomahawk	e		e	E		P	D
Storm Shadow / SCALP ER						P	D
<b>Sub-munitions</b>							
BLU-108/B A/Tank cb				?		?	
BLU-97B cluster bomb				Y		Y	
<b>Armor-piercing ammunition</b> (DU confirmed)							
20mm Phalanx sea-to air							
25mm M791						?	
30mm PGU-14/B	Y	Y		Y		?	
120mm-US & Charm-UK	Y	?					
<b>Key:</b> Y = reported use. ? = operational, not reported. P = prototype testing expected. D = due delivery Blank = not operational, not appropriate to combat situation. e = earlier versions not suspected of DU							
<b>Note:</b> Data on warhead technology, operational status and combat use taken from: Federation of American Scientists; Jane's Defence; Center for Defense Information; Hansard.							

The fundamental errors in Dr Moonie's letter (pages 52-5) and the anomalies in Mr Ingram's statements above suggest that **UK Government statements on hard target weapons cannot be trusted without full, independent and public verification**. Their answers are too short, too vague or contain serious errors of fact. They seem intended to divert the attention of UK Members of Parliament away from the suspected DU use in Afghanistan and previous conflict zones. A version of the AGM-65 injured some UK Gulf War Veterans who are now suffering serious health problems, denied as DU-related by the MoD. Dr Moonie denied knowledge of US warhead materials but also denied use of DU in Afghanistan. If he doesn't know the systems how can he give assurances that troops and civilians currently assigned to Afghanistan are not at risk of severe DU contamination?

**DU disclosure requests to the US and UK governments need to be repeated urgently, preferably in public sessions in Congress and the House of Commons and with full media coverage.** Similar disclosure requests should be made to governments of all countries sending troops or civilians to Afghanistan. Requests should include past as well as present weapons and specific versions. The MPs who asked these questions may wish to pursue their questions again with the facts in this report, possibly in a Select Committee where they can interrogate ministers for fuller answers and question ambiguous replies.

#### 6. Other DU weapon identification options

While formal requests for disclosure are blocked by the US and UK governments suspected DU weapons may be investigated by **further analysis of weapons information** from reliable sources, by **target inspection** and by **laboratory analysis of bomb fragments, dust, soil or water** from the target area. This could include inspection of guided bomb and missile targets in the Balkans if access to Afghanistan is difficult. It may include photographs or TV coverage of targets and casualties. These may include signs of intense heat from suspected incendiary effects of large DU warheads. Full DU health precautions should be taken in suspected DU target areas as done by UNEP teams.

Indirect identification may also be done through medical reports of casualties exposed to hard target bomb or missile attacks, subsequent health problems and uranium monitoring. These could include people in Afghanistan and KFOR troops.

7. **If any US or allied weapon systems are proved to contain DU then all weapons using the same warhead technology become highly suspect.**
8. According to US Government reports either **Al Qaeda or Taliban forces or both possessed stocks of DU or weapons with DU warheads** (page 120). The same weapon identification is needed for all potential sources of DU contamination. This is essential to a comprehensive DU risk assessment in Afghanistan, whether such DU materials were used in combat, training or hit by US bombing.

The statement that "U.S. forces found some missiles with depleted uranium warheads" is very important. **This is the first official acknowledgement that any non-nuclear missile in the world contains a DU warhead.** The US Government should be asked what weapon was involved. The UK Government need to know since it invalidates their previous re-assurances to MPs that DU has not been used in Afghanistan.



### **Potential environmental impact of large DU warhead weapons and assessment issues** (and see DU scenarios on page 95)

9. **If none of the suspected weapon systems contains DU**, this will be one less problem for people in Afghanistan and neighbouring countries, and in other countries where these weapons have been used. It will also save a lot of time and resources otherwise needed for investigation. However, **rigorous verification of official re-assurances will be essential** as illustrated by statements from UK Government defence spokesmen in Part 2 and on page 131. This best case scenario is now in doubt due to the US reports of a missile with a DU warhead.
10. **If DU is used in explosive warheads or sub-munitions its toxic and radioactive properties will undoubtedly cause 'widespread, long term and severe damage' to the natural environment, thereby '.. compromising the health and survival of the population'** within the meaning of **Article 55** of the **First Protocol** additional to the **Geneva Conventions** of 1949. Even more so if such weapons have been used in large numbers in Afghanistan.

Weapons containing DU are not "considered illegal" under these terms according to Dr Moonie's letter (page 53). And yet the fine oxide dust produced by burning U238 and contaminated with U234, U235, U236, Plutonium 239, 240 and other transuranic metals disperses widely. Once burned in air DU is a source of radioactive contamination that cannot be removed from the natural environment. The same health precautions, risk assessments, radiation protection and nuclear waste regulations should apply in combat zones as in any other human environment.

11. **If DU has been used in the warheads of the weapons identified in Part 3, there may be a grave and widespread risk of exposure to DU contamination for all civilians and military personnel exposed to bombing locations in Afghanistan.** This should be a matter of immediate concern to all countries supplying troops or civilian personnel to aid and reconstruction in Afghanistan. It has immediate implications for the planning and co-ordination of UN post-conflict operations in Afghanistan including repatriation of refugees.
12. **In the worst case scenario 500-1000 tons of DU may have contaminated populated regions of Afghanistan. If so then the long term health effects are likely to be as grim as those in Iraq, and more widespread.** At worst whole regions may become uninhabitable with major implications for the refugee crisis to be expected once birth defects and other untreatable illnesses become obvious. These hazards should have been clear to US military planners and arms manufacturers unless they shared the popular belief that "DU is safe".
13. **If the UNEP PCAU study is allowed to work quickly, effectively and without political interference they may have a provisional assessment of DU contamination in 2-3 months** - much faster than in the Balkans. This may be vital input to plans for humanitarian aid and repatriation of refugees by other international agencies. Until then DU precautions would be wise.
14. **A serious possibility exists that the US and UK governments, military or commercial organisations may seek to conceal their use of DU weapons in Afghanistan and to delay or interfere in UN environmental assessments as happened in the Balkans studies.** How this can be deterred or controlled is a problem for the world community acting through the UN.

- 15. The source of any DU metal or oxide contamination discovered in Afghanistan can be tracked down.** Like Anthrax, DU has its own "fingerprint" i.e. the isotopic mix for each batch. Rigorous international inspection should be able to track down how many different sources of DU may be involved and which countries they came from. **UNEP isotopic analyses of any DU found will be very important. So will the vigilance of the international media and independent states in the UN.** It is possible that UNEP investigations may be directed towards alleged Al Qaeda DU contamination with DU from Russia or Pakistan instead of inspecting a wide cross section of US bombing targets as well. All DU contamination needs independent scrutiny.

UNEP staff will be aware of this but in the Balkans they were given Nato maps and accompanied by troops 'for their own protection' from unexploded ordnance including cluster bombs. With hindsight perhaps the UNEP teams should have been testing some of this other ordnance and target areas as well because two types include shaped charge cluster bombs, now identified in the list of suspect DU weapons on page 131. Samples of dust and weapons fragments may be legal evidence for the International Court and will need high security.

### **Potential health hazards from large DU warhead weapons: health monitoring and risk assessments**

- 16. The clinical and epidemiological basis for several DU medical studies quoted by the US and UK Governments is deeply flawed** (pages 4 and 99-108). **They have reduced the vigilance of politicians and the media to DU health hazards in 2001. None of these studies addressed the risks of acute and widespread DU contamination from large warheads that may now exist in Afghanistan.**

However these studies are still quoted to justify DU weapons to elected representatives and the public (see Dr Moonie's letter, page 53 and the US Embassy website in Italy). There are very few **acute dose** studies for troops and **no known chronic exposure studies for civilians** living or working in DU contaminated combat locations. Hence they are not valid for predicting health hazards from intense or widespread DU contamination suspected in Afghanistan from many large warheads.

- 17. Recent low level radiation research and epidemiological analysis also indicate significantly higher risks from the alpha radiation of inhaled or ingested DU than previously acknowledged.** Hopefully these problems may be recognised by the newly established DU Oversight Boards in the UK and USA which include military and independent researchers.
- 18. If DU is used in explosive warheads or sub-munitions the resulting toxic and radioactive contamination is a serious health risk to humans, animals and plants.**

DU oxides may be inhaled or ingested in significant quantities from airborne dust, water or food (including animals) produced in contaminated areas. **DU doses may be acute** in target zones **or cumulative** over an extended period in post-combat environments. The **internal alpha radiation exposure** from DU oxides is likely to cause biological mutations resulting in lymphomas, leukaemia, birth defects and other forms of cancer or damage to the nervous or immune systems. **See High exposure DU health risks** in Part 4, section 3 (page 105).

These potential health consequences associated with internal exposure to DU contamination unquestionably involve **unnecessary suffering** by any humanitarian standard. They fall within the meaning of Article 35 of the first Protocol additional to the **Geneva Conventions** of 1949. They are reasons to take DU health precautions and risk assessments very seriously.

- 19. Governments, aid organisations, employers, managers, officers, troops and other employees or volunteers involved in the reconstruction of Afghanistan are entitled to demand and support fast, rigorous and independent inspections by UNEP and WHO.** The questions raised in this report must be asked and answered within weeks if the lives of thousands more people are not to be put at risk this year as well as those of native Afghans already at risk. Each organisation may prefer, or be required in law, to do a careful **health and safety risk assessment** for their staff or volunteers assigned to Afghanistan.
- 20. The 3-month delay in DU disclosure since my first warnings to the UK Government (see Part 2) has given time for death tolls to rise due to winter conditions and food shortages in Afghanistan.** These problems are likely to dominate the humanitarian agenda there over the next few months. See **MSF's** report of 18 January: **Food Crisis Worsening in Northern Afghanistan** at: <http://www.doctorswithoutborders.org/pr/2002/01-18-2002.shtml>

- 21. A 'natural' humanitarian disaster is likely to deflect media and medical research interest away from significant numbers of acute DU casualties and fatalities.** This potential disaster will also give several months delay before the latency period for more distinctive DU health consequences become evident, e.g. birth defects and early onset lymphomas or leukaemia - see Figure 2, page 106.

If potential DU contamination is not suspected by medical personnel this may affect their diagnosis of some conditions or cause of death. If early medical monitoring is not done it becomes very hard attribute slow onset medical conditions to DU exposure, either for treatment or research purposes. This has been a feature of the "Don't Look, Don't Find" approach to DU health research for Gulf and Balkans War veterans over the past 10 years.

## Political context for the use of DU weapons

- 22. If DU has been secretly used in guided weapons in Afghanistan, the Balkans or Iraq, then many countries and citizens need to question how and why it has been concealed.**

The use of DU weapons in the Gulf War has been strongly suspected of having catastrophic effects on the health of many thousands of people - troops and civilians alike. It seems likely that several governments may be well aware of DU contamination hazards but have failed to disclose them to their parliaments or the media for a number of years.

Have other countries been warned about potential DU hazards in Afghanistan during the formation of the UN Peacekeeping force in Afghanistan? Why should Bulgaria be sending a radiation decontamination team to Afghanistan? This raises questions about the democratic accountability of governments who may have developed acquired or used weapons of indiscriminate effect over a decade. If this has happened in the US, UK and other countries then all military technology should be subject to more rigorous public audit and control to ensure it complies with international law.

- 23. The widely held belief in military, government and academic circles that 'DU is safe' and that its military use presents 'minimal' health hazards must be questioned.** This collective rationalisation is one of the features of psychological *group think* in DU politics. See <http://www.cedu.niu.edu/~fulmer/groupthink.htm>

This belief is not consistent with the precautions taken to control DU radiation hazards in manufacturing and military testing facilities or as required by civilian regulations. It may come from military settings where temporary, low dose DU exposure is considered "an acceptable risk" compared to hazards associated with nuclear weapons, reactors or battlefield conditions. The military are concerned with immediate tactical hazards and effectiveness. Long term health consequences and ethical responsibilities for troops and civilians are the responsibility of governments who employ the military, in accordance with international conventions and legal liability.

However, despite official health studies, acute DU doses may incapacitate troops in combat within a few days. This may have occurred to special forces troops inspecting DU targets or caught in the friendly fire bombing accident. If suspected high load DU warheads were involved they may have been exposed to 100x more contaminated locations than any where since the Doha ammunition dump fire in 1991. The only equivalent military exposure may have been for KFOR troops inspecting suspected DU bomb and missile targets in western Kosovo in 1999.

- 24. The myth that 'DU is safe' has become a self-perpetuating belief in government and military circles.**

This belief provides psychological comfort for those responsible for commissioning the manufacture, sale, purchase and use of DU weapons, or justifying them to parliaments. It exonerates them from responsibility for using weapons of indiscriminate effect. It is also very useful for reducing public vigilance in the marketing of civilian DU products.

This myth has been carefully encouraged through compromised research and it may have allowed the US and other governments to justify using more and larger DU weapons. Lt Col Ziehm's memo from Los Alamos on 1 March 1991 (see page 115) has defined US (and UK) military policy towards DU ever since:

" There has been and continues to be a concern regarding the impact of du on the environment. Therefore, if no one makes a case for the effectiveness of du on the battlefield, du rounds may become politically unacceptable and thus, be deleted from the arsenal.

If du penetrators proved their worth during our recent combat activities, then we should assure their future existence (until something better is developed) through Service/DoD proponency. If proponency is not garnered, it is possible that we stand to lose a valuable combat capability."

For these reasons it is hazardous for scientists and professionals within government, the military or universities that rely on public funding to produce research that could challenge this belief, or that may undermine public confidence in DU. Self-censorship, conformity and negative stereotyping of out-groups are more features of group-think (Irving Janis, Yale, 1977, 83). Dr Gunther in Germany and Dr Sharma in Canada have been severely harassed for their research into adverse DU health effects. Most independent DU researchers are self-funded on very low budgets. By contrast lack of rigorous official DU health research leaves military and political planners dangerously mis-informed.

- 25. High conformity to the mistaken belief that DU presents minimal health hazards to humans may have resulted in strategic errors by the US and UK Governments in the last 4 years.** Group decision making tends to "shift to risk" in group think, ignoring obvious dangers and facts e.g. in the Bay of Pigs affair.

This may have contributed to a decision to develop the new generation of hard target weapons with DU warhead systems. Minimising DU risks may have also contributed to widespread use in Afghanistan without regard to predictable environmental contamination and under-estimating consequent health hazards.

If such errors of judgement have occurred in Afghanistan they may result in major legal actions, deep political embarrassment or criminal prosecution. If a DU health disaster develops in Afghanistan in 2002 then political and military authorities and advisers who believed that DU is safe may find this was a dangerous assumption. Medical professionals involved in DU policy and practice may recognise this first.

- 26.** These conclusions largely focus on the US and UK governments and immediate priorities in Afghanistan. But over 30 countries possess known or suspected DU weapons in their arsenal. These questions should be applied to government policy in all these countries, and to review the use of DU weapons in training or combat in any country since 1973. They also need to be reviewed collectively in the United Nations e.g. by the UN Institute for Disarmament Research.

## Future outlook for DU weapons

- 27.** The total value of suspected DU weapons listed in Table 4, either in stock or on order, around the world must be billions of dollars. Governments will be very reluctant to give them up. However many of the missile systems have modular warheads that can be changed.

**Recent developments in shaped charge warheads and other weapons design suggest that DU penetrators could soon become technically obsolete.** Other metals can be used to achieve similar or greater penetration effects without the human or environmental hazards of DU (see Part 3, page 78). Kinetic energy weapons needed for hard or deeply buried targets increase their effect dramatically with greater speed. Future systems will achieve high penetration with smaller but faster missiles. DU is cheap and readily available as nuclear waste. But it is not essential to effective hard target or anti-armour weapons.

However the costs of attempting to clean up DU contaminated areas, of legal compensation to individual casualties and possibly having to relocate large numbers of refugees may far exceed the cost or benefits of the weapons identified in this report.

If DU has been used in large amounts in Afghanistan a humanitarian disaster of nightmare proportions may be unfolding. Aid programmes can eventually provide food and shelter. They cannot reverse cancers or birth defects. Civilian fatalities of the Afghan bombing already exceed the terrorist murders of September 11<sup>th</sup>. They may become far higher over the next 5-10 years as in Iraq, including expatriates.

The potential political consequences of a DU disaster in Afghanistan for the US and UK governments, and on the credibility of the war on terrorism are serious. They will become worse if there is any further delay in disclosing the actual use of DU weapons, or any attempt to cover this up by fabricating DU evidence against Al Qaeda or the Taliban.

## Further action

The immediate purpose of this report is **to alert UN agencies, governments, aid organisations and other employers to the suspected health and safety risks of DU contamination in Afghanistan** - whether from Al Qaeda devices or US and allied weapons.

A draft of this report was sent to several UN agencies on 23<sup>rd</sup> January. This final version will be circulated to them, the UK Government and media contacts. It will also be offered as a public domain source on the Internet for aid agencies, employers, political representatives and researchers.

Other analysts and researchers have more specialised knowledge of specific subjects in this report e.g. the hazards, diagnosis and treatment of low level radiation exposure, public and occupational health precautions, epidemiology, environmental biology, environmental assessments and weapons technology. Several of these or their organisations are identified by links in the text. They are welcome to question and improve on the data, interpretation and interim conclusions in this report.

Ultimately it may not be public opinion that decides the future of DU weapons or their urgent investigation in Afghanistan. Long term radiation hazards are intangible to most people except those who see or suffer cancers or birth defects in their own lives or work. The best hope for the people of Afghanistan is **that doctors, scientists, writers, editors, politicians and senior military professionals of integrity will decide that Depleted Uranium weapons have become totally unacceptable**, and that as weapons of indiscriminate effect their use is a war crime. This report is for them.

The courage of these key professionals is vital to confront the network of deception that has enabled global DU proliferation to develop unnoticed over the last decade. Their integrity and support is vital to the effectiveness of UNEP, WHO, the United Nations peacekeeping force and aid programmes in Afghanistan.

Their testimonies may be important to empower Bill 3155 put to the US Congress on 17 October, 2001 - the **Depleted Uranium Munitions Suspension and Study Act of 2001\*** - which calls for a moratorium on the development and use of Depleted Uranium weapons in the USA.

Similar DU disclosure and vigilance is needed urgently now in the UK, Europe and other countries to protect troops and civilians involved in the reconstruction of Afghanistan. A similar moratorium is needed internationally through the UN to ensure a global ban on the military and commercial use of depleted uranium. Further action will depend on DU contamination levels in Afghanistan and which DU scenarios develop. The immediate question is no longer if, but how much, DU will be found in the coming weeks and months.

Dai Williams

31 January 2002

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\* To see the Depleted Uranium Munitions Suspension and Study Act go to <http://thomas.loc.gov> and enter Bill = **HR3155**

## Acknowledgements and use of this report

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### Distribution

This report is written for the UNEP PCAU, WHO, UNHCR, WFP, UNIDIR and other international organisations working for the future of the people in Afghanistan, elected representatives and others with a concern for the use of DU weapons.

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For any questions regarding further publication please contact Dai Williams by Email at [eosuk@btinternet.com](mailto:eosuk@btinternet.com) .

### Dedication

To the civilians and troops of all countries whose health, lives and families have been, are being, or will be ruined by exposure to depleted uranium weapons.

To those with the courage to confront, expose and ultimately ban the military use of depleted uranium world-wide as weapons of indiscriminate effect, and any unregulated civilian use of this hazardous nuclear waste.

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*Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has."* Margaret Mead

*We have a testimony to living in that life and power that takes away the occasion of war. How does it lead you towards a way of life that does not rely on, or benefit from violence?*  
 Questions & Counsel, Society of Friends

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