# Depleted Uranium weapons in 2001-2002

Occupational, Public and Environmental Health Issues

# Mystery Metal Nightmare in Afghanistan?

Collected studies and public domain sources
compiled by Dai Williams

Photo: Oleg Nikishin The Guardian 27 Nov 2001

- **DU in smart bombs and cruise missiles**
- **Dirty DU**
- **DU in the Afghan War?**

These papers have immediate implications for the health and welfare of civilians, troops and aid workers in Afghanistan.

They question the role of Governments, UN agencies and the validity of official research studies concerning DU to date.

They raise serious questions about the global proliferation of DU in military and civilian applications.

They have fundamental implications for the classification of DU munitions as weapons of indiscriminate effect.

*Eos Life Work*

January 2002

# DU weapons in 2001-2002

## PREFACE

This Report is based on analysis of public domain sources on the Internet, published news reports and correspondence concerning known and suspected Depleted Uranium (DU) weapons collected from January 2001 to date.

It is designed for on-line viewing (as well as printing) so that readers and researchers can use Internet links to check original sources, and to locate other Internet resources specialising in the health or environmental effects of DU. Some Internet pages referring to DU or hard target guided weapons have been changed or withdrawn from public access since they were first located. This is usually due to website re-design or sometimes to tighter public access controls.

The report raises public policy questions and offers facts and sources as briefing materials for social, medical, environmental, legal and political debate and research. It concerns **health and safety risk assessments** for employers with civilian or military personnel in Afghanistan.

**Parts 1-3** consolidate information about known and suspected DU weapons systems up to and including those used in the Afghan War since October 7th 2001. **Part 4** offers **seven scenarios** for the possible use of DU weapons in Afghanistan. It identifies human, environmental and political issues concerning the use of known and suspected DU weapons of immediate concern in 2002. It relates the questions and issues raised in Parts 1-3 to post-conflict interventions in Afghanistan and for Afghan refugees. It raises serious questions about DU research and policy.

The Conclusions in **Part 5** highlight the need for **immediate precautions against potential DU hazards in Afghanistan** and for **urgent international interventions for full DU risk assessments**. The issues raised here need vigilance by many governments to ensure that the **UNEP PCAU** (United Nations Environment Programme Post Conflict Assessment Unit) can conduct fast and rigorous **environmental assessments** of suspected DU contamination in Afghanistan without political, military or commercial interference. The report urges equally fast, rigorous and independent **medical and epidemiological assessments** of civilians, refugees and troops at risk of DU exposure during or after the Afghan bombing by the **WHO** and other independent aid or research organisations.

The **questions and scenarios** raised here will require updating as environmental assessments, humanitarian interventions and weapons investigations proceed. Ideally this should be done by specialists with good resources and direct access to the situation in Afghanistan. The report offers a basis for fast, wide ranging, rigorous and politically independent assessments of DU hazards in Afghanistan. It calls for re-assessment of all military training, weapons testing and conflict zones where suspected DU weapons systems have been used since 1973.

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**Note: The PDF version is available in separate files for each Part, designed for printing and on-line viewing for web links at:** http://www.eoslifework.co.uk/du2012.htm

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# Depleted Uranium weapons in 2001-2002
# Mystery Metal Nightmare in Afghanistan?

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# What is the mystery metal in hard target guided weapons?

**These investigations question one of the best kept military secrets of the last decade. The facts about DU weapons are well known to military experts and arms manufacturers in the US, UK and at least 30 other countries. But how much do politicians know about them? What have aid agencies been told? And why have the media stayed silent about new weapons in the Afghan war?**

We know that many anti-tank shells use **depleted uranium** (**DU**). But what was the 'dense metal' in the GBU-31 bomb dropped near US troops on 5 December and in scores of Bunker Buster bombs from Kandahar and Kabul to Tora Bora? **What is the mystery metal** used in the new generation of hard target guided weapons - smart bombs and cruise missiles - designed to penetrate Saddam Hussein's command bunkers, tested in the Balkans War and widely used in the hunt for Bin Laden?

This report investigates the evolving technology of hard target warheads, the systems involved and UK Government statements about DU weapons. It is a dossier of questions and search results sent to the Government, some MPs, media contacts and other researchers in 2001. Yet the mystery **'dense metal'** used in hard target weapons in Iraq, the Balkans and now the Afghan War remains a strict but simple military secret. It can only be Tungsten, Depleted Uranium alloy or both.

**If it is DU, how much is used** in the warheads of the AGM-86D, AGM-65G, AGM-154C and other **hard target cruise missiles,** or in the 1 ton GBU-15, -24, -31 and 2 ton GBU-28 Bunker Buster **smart bombs**? Most of these weapons have been used extensively on Afghan towns, caves, mountains and tunnels during the last 3 months.

The UK and other European governments, the UN, WHO, IAEA, aid organisations, medical researchers and even military personnel in DU combat zones appear to be totally unaware of the suspected use of DU in bombs and missiles since 1991.

But a 2-ton DU warhead, suspected in the GBU-28 & 37 Bunker Buster bombs, would deliver **50-100 times more DU oxide contamination** per target than the 30 mm DU anti-tank shells fired by A10 aircraft in the Balkans War. This risk could totally alter previous evaluations of the health and environmental hazards of DU to civilians and troops, past present and future, in combat zones from Iraq and the Balkans to Afghanistan.

**Are politicians truly unaware**, deceived by their advisers or part of a massive cover up of the use of DU weapons from the Gulf War to Afghanistan and new ones being developed? What kind of health and environmental nightmare is unfolding in the Afghan winter if 500-1000 tons of DU weapons have been used in the US bombing? Why has the Pentagon started to leak reports about risks of Al Qaeda's "dirty bombs"? **How much DU has been used in the Afghan War? Where? And who used it?**

This report investigates suspected new sources of DU contamination as a potential occupational and public health hazard. Thousands of lives in Afghanistan - from America, Britain, Europe and many other countries but especially Afghans - depend on finding the answer to these questions NOW, as winter deepens and as international peacekeeping and aid operations begin.

Dai Williams, independent DU researcher, UK
January 2002

THE PEOPLE

CPTNet, January 17, 2002
KABUL, AFGHANISTAN: **Bombs by day and night**
by Doug Pritchard [extract]

The continuing US bombing of Afghanistan has the support of Afghanistan's interim government and the people.

On January 6, the CPT delegation visiting Afghanistan met with villagers in Bibihisar, ten kilometres south of Kabul to learn about their experience of the bombing. At 8 a.m. on Nov. 10, 2001, the US dropped two large bombs on a water reservoir on a mountainside above the village. One bomb destroyed the reservoir, but the other bomb split in half and failed to explode. One half of that bomb remains in the crater, but the other half, and hundreds of boulders up to 70 kgs in size, were blown into 100 nearby shops and homes. A 23 year old man named Freidun was killed by the blast while working in his field near the reservoir.

Despite this damage, villagers said they were satisfied with the US bombing since it freed them from the Taliban. One even noted that they had water again. Although the reservoir was gone, so were the al-Qaeda fighters who had blocked off the village's irrigation channels when they refused to support the fighters. [They also bombed the local Schist quarry]. The quarry-owner Merajuddin said, "We are hopeful for the future now. We feel fresh. We will have human rights, schools, and women's rights."
Source: Christian Peacemaker Teams, Chicago

THE TECHNOLOGY

**Guided Bomb Unit-24 (GBU-24) Paveway III**
"The **Multi-Segment Hard Target Penetrator (MSHTP)** This weapon detonates a copper cutter charge upon entering the target and cuts the rear portion of the bomb off, which then detonates. The rest of the weapon continues down to the next level."
**"BLU-116 Advanced Unitary Penetrator**: The AUP maximizes sectional density by reducing the explosive payload and using **heavy metals** in the warhead case." (pages 76-85). Source: Federation of American Scientists.

THE POLITICS

"One site registered an elevated level of radioactivity but it appeared to be a result of depleted uranium on some warheads and not from any nuclear or radiological weapon of mass destruction", Rumsfeld said.
Source: Reuters, 16 January 2001. (see page 120).

THE QUESTIONS

The CPT report sounds like the GBU-24 with a multi-segment warhead. Or was it a malfunction of the latest AUP version? Which bombs were dropped in Bibihisar? What is the mystery "heavy" metal in their warheads?

Has the US bombing truly liberated this village and hundreds like it? Or has it perpetually poisoned their water supplies and irrigated land with depleted uranium (dense or heavy metal) warheads? Local doctors will know within a year. Perhaps the truth should be told now.

# Introduction

The enclosed studies and sources have been compiled as a briefing for Members of Parliament, health advisers, managers of organisations with personnel in Afghanistan, the media and other researchers. They are also offered to the new **UNEP PCAU** (United Nations Environment Programme Post-Conflict Assessment Unit) that was launched on 11 December 2001. Their first task will be to evaluate the environmental aftermath of allied bombing in Afghanistan, hopefully without the delays and political interference suffered by their Balkans study team. See the UNEP website at http://postconflict.unep.ch/press/11.12.01.html

The report is based on a series of discussion papers, correspondence and extracts from Internet sources. These investigate the suspected use of depleted uranium (DU) in far larger weapons systems than its known use in anti-tank penetrators. Most papers in Part 1 have been published on the Internet for evaluation by other DU researchers. Some have been sent to the UK Government and MPs in four parties.

These enquiries started from first reports of the UNEP study of DU targets in the Balkans War in January 2001. They contained at least two curious anomalies:

- Why did UNEP find so little evidence of DU contamination in Kosovo when increased airborne radiation levels were reported 500 miles away in Greece soon after the Balkans bombing started?
- How did UNEP teams find DU penetrators with Beta and Gamma detectors when pure DU (U238) emits very short range Alpha radiation?

These questions led to a new analysis of potential military uses of DU in smart bombs and cruise missiles - denied by Nato during the Balkans War.

## Mystery metal in new hard target warheads

The studies revolve around one main issue: what is the "**dense metal**" that has been used in many guided weapons (mostly smart bombs and missiles) since 1989? The first clue was an Internet link to the **US Air Force Mission Area Plan** dated 1997 on the **Federation of American Scientists** (FAS) website - see **Tip of the Iceberg** in **Part 1**. This included frequent references to the use of "***dense metal ballast***" and "***dense metal penetrators***" that would double the effect of earlier hard target weapons e.g. by upgrading the BLU-109 warhead used in the GBU-31 JDAM smart bomb. This would provide a new generation of "advanced penetrator" warheads ranging from 250 pounds to 2 tons for upgrading guided bombs and cruise missiles like the AGM-86D.

The second clue was in **Jane's Defence** website: "***It is true that some guided weapons used depleted uranium to increase the penetration effect***." (Jan 2001).

Detailed descriptions of "**smart weapons**" on the FAS website explain their design and development (see **Part 3**). An essential requirement is that the "dense metal" must be at least twice the density of steel. This enables warheads of the same length and weight to be 30% thinner, more like explosive spears than bombs, and so to penetrate twice as deep as older ones - up to 100 feet of earth or 20 feet of concrete.

Only two common metals are heavy enough for high kinetic energy weapons: either Tungsten - expensive to buy and manufacture, or Depleted Uranium - a low cost waste product from the nuclear industry and easier to manufacture. DU has the added advantage of being pyrophoric (it burns fiercely in air) - ideal for incendiary effects.

For military, technical and economic reasons DU seems the most suitable material for high-density, hard target warheads. Legal and humanitarian concerns about DU's potential health effects are political, not military considerations. DU is likely to be used as the main ballast making up 50-75%+ of the weight of the new penetrator warheads. It may be contained inside a steel alloy casing or forged to make the casing itself. **Weapons grade DU** is alloyed with 0.75% Titanium or other metals like Molybdenum and heat-treated for hardness and strength. Tungsten may be used for warhead tips but would be an expensive option for the main ballast with no incendiary effect.

A slightly different design concept is used in the BAE-RO "BROACH" hard target warheads. These combine a first stage "shaped charge" (see below) with a second stage "dense metal penetrator" with delayed action fuze to explode inside the target. DU is likely to be used as the liner in stage 1 and main ballast or casing in stage 2.

If DU is the mystery metal in these warheads they present **serious environmental concerns** in any combat location because of their size - far bigger than any DU weapon previously known to the public or health researchers. They are of special concern in Afghanistan where hundreds of hard target weapons have been used.

## Mystery metal in other hard target warheads

If DU is used in new hard target penetrator warheads where else has it been used? One clue to its suspected use in other (and older) bombs and missiles was another quote on Jane's Defence website in January 2001. This stated that DU is also used as ***"liners in shaped charge warheads"***. This comment has since been removed.

Enquiries in the last 2 months indicate that new "heavy metal" warheads may have developed from earlier guided weapons in the 1980's e.g. the hard-target version of the Maverick cruise missile, AGM-65G and the TOW 2A/B fly-by-wire anti-armour missile.

These, and a number of sub-munitions in cluster bombs, use "**shaped charges**". The explosive is contained inside a cone-shaped metal liner so that its explosive force is focused in one direction (Part 3 page 78). This concept dates back to World War II. A variation uses a shaped charge at the back of a warhead to create a "boosted penetrator". [ Kinetic energy is a function of mass and velocity: $KE = 0.5mv^2$ ].

Shaped charge technology is used in a range of armour-piercing or hard-target munitions and in some cluster bombs. A dense metal like DU offers maximum inertia to focus the blast. Its melting point makes it interchangeable with Copper that is known to be used in shaped charge liners to project a jet of molten metal at very high velocity - an explosively formed penetrator. Thousands of these weapons were used during and since the Gulf War. The quantity of DU involved may range from a few kilograms up to 135 kg in the Maverick G warhead. So the total tonnage of DU contamination in recent conflicts may be far higher than previously disclosed. Independent researchers suspect that 800 tons of DU may have been used in the Gulf War, not the 320 reported by the US Government. This report also questions whether DU weapons have been used in other bomb and missile attacks on Iraq since 1991.

If DU is used in shaped charges and penetrator warheads then there may be much more DU contamination than the 3.3 tons in Bosnia or the 10 tons in the Balkans War reported by the US. If DU has been used in earlier guided weapon systems this would totally alter the evaluation of DU exposure in these conflicts. They were used in many other locations as well as tank battlefields (to date the only known DU risk zones), so health effects will need to be re-assessed for veterans and civilians alike.

## Dirty DU

Another issue raised by the UNEP Balkans study was the presence of Plutonium and U236 as part of the "isotopic mix" in some of the penetrators found in the Balkans. Depleted Uranium is never "clean" or pure U238. In theory it is natural uranium with 70% of the U235 removed for military or energy use. This reduces U235 from 0.7% to about 0.2%. But Plutonium and U236 are not present in natural Uranium ore. This contamination can only come from nuclear reactors. The UNEP samples confirmed that weapons grade DU is contaminated with Uranium 236, Plutonium 239/240 and other transuranic metals produced by recycling spent fuel rods from nuclear reactors.

Until the UNEP report most statements about DU by the US Government and NATO have trivialised its radiation hazards. For example NATO spokesman Major Badger said that a DU penetrator contains "the amount of Uranium that would go into for example a glow in the dark type of watch, - a very minuscule amount, very inconsequential in relative terms." (BBC Radio 4, 7 May 1999). 30mm PGU-14 penetrators are solid DU, 99% U238, not tipped or plated with Uranium (see Part 3, page 81). Each contains 0.275 kg of DU alloyed with 0.75% (2 grams) of Titanium and including 0.5 gram of U235. They are fired in bursts of 100-200 rounds per strike.

The US Department of Energy confirmed Plutonium contamination in DU to the US campaign group the **Military Toxics Project** (MTP) in January 2000 see DoE letter on their website. Although Plutonium quantities in the UNEP samples are very small they add to the radiation output of DU (see page 158 of the UNEP report). Any particles of Plutonium dust in the lungs or body represent a serious internal radiation hazard.

The health hazards of inhaling or ingesting DU oxide dust are the most widely disputed field of DU research. An employer's legal liability for health and safety of staff or the public commences when a risk exists or is suspected. **This report investigates newly suspected sources of DU exposure in combat zones - from different and larger weapon systems.** The history of DU weapons and the health hazards associated with DU exposure are best explained in other studies available on the Internet. For example the MTP website includes Dan Fahey's report **Don't Look, Don't Find** - a comprehensive review of Gulf War Veterans and US depleted uranium studies from1990-2000 at http://www.miltoxproj.org/DU/IOM-cover.htm. Dr Chris Busby's website contains the latest **Low Level Radiation** research at http://www.llrc.org.

**DU contamination with highly radioactive isotopes is likely to vary widely between batches produced at different times, from different plants and in different countries**. DU quality control was likely to be less rigorous before DU health hazards became a public issue raised by Gulf war veterans in the 1990's. This has implications for re-examining DU contamination and exposure hazards to troops and civilians in every conflict zone since the first combat use of US DU shells by Israel in the Yom Kippur War in 1973. International comparisons of DU produced in the US, UK, Russia, Israel etc are urgently needed. The Dirty DU issue has equally serious implications for commercial plans to widen the use DU in civilian applications. **This is an issue for international assessment, publication and control.**

**Analysis of Dirty DU will be an important part of the UNEP study in Afghanistan if evidence of DU contamination is found, whether from US or Al Qaeda sources.** DU from other countries e.g. Russia or Pakistan may have significantly higher contamination than permitted in US nuclear reprocessing, increasing the health risks of any DU exposure. **The isotopic mix of DU (the percentages of U238, 234, 235, 236, Plutonium and other metals) will provide a 'fingerprint' to identify sources of DU.**

## Internet sources

Information about the weapon systems investigated in this study (in **Parts 1** and **3**) has been collected from the **Federation of American Scientists** and **Jane's Defence** websites, both regarded as reliable sources, and from manufacturers' web sites, e.g. Raytheon and Boeing. Reports about weapons used in the Afghan bombing come from the **Center for Defence Information** web site in Washington, and from Jane's.

**UK Government** comments about DU in guided weapons, Dirty DU and DU in the Afghan war, have been taken from **Hansard Online**, the official daily record of the UK Parliament, and from a written reply to DU questions raised via my MP. See **Part 2**.

The following reports contain Internet links to these and other DU research websites. When digital versions of this report are viewed on computer these links will go direct to the original Internet sources while they are available.

## Immediate priority: DU in Afghanistan?

The 3,767 civilian deaths in Afghanistan up to 6 December are documented in Professor Marc Herold's **Dossier on Civilian Victims of United States Aerial Bombing of Afghanistan** at http://www.cursor.org/stories/civilian_deaths.htm.

The immediate purpose of this report is to draw attention to **the possible risk of widespread use of depleted uranium weapons in Afghanistan - potentially 500-1000 tons**. It offers a basis for more rigorous questioning of governments, armed forces and manufacturers involved with the production, sale or use of DU in any weapons system. It questions previous studies of DU health and environmental hazards for troops and civilians. If DU is used in guided weapons systems this also raises questions about the independence of international agencies like the WHO and IAEA that have either failed to investigate, identify or disclose wider use of DU to date.

The US and UK military and governments are likely to continue to deny DU use in Afghanistan. The US may impede independent UN investigations as they did after the Balkans War. **Other governments and aid organisations sending personnel to the Afghan relief operation cannot afford to risk lives while waiting for the truth about DU use.** They are urged to take precautions to protect troops and aid workers.

Airborne DU dust hazards may be lower in the Afghan winter. But if water and buildings are contaminated these will create immediate risks. It may be significant that the US Government is reluctant to take part in the Afghan "clean-up" operation and is paying Afghans to inspect the heavily bombed Tora Bora caves. Donald Rumsfeld knows what has been used. He said it was a "dirty war". If DU weapons have been used with indiscriminate health effects these will have been war crimes.

It may be significant that the UK Government plans to remove its troops by the end of the winter. I sent them DU warnings in October (see Part 2). By now they should know the scale of DU use and its potential hazards in Afghanistan - winter and summer. **But what are the risks for other people in Afghanistan - local citizens, expatriates and refugees returning? Will suspected DU contamination spread in the summer?**

## Background to the studies

I am a concerned citizen, not an arms expert. But as an Occupational Psychologist my work has included aspects of occupational health and safety. In March 1999 Dr Rosalie Bertell, a Canadian environmental epidemiologist, sent an Internet warning that US forces were likely to use **DU weapons in the Balkans War**. She was right.

My suspicions were aroused because in 1982-3 I was responsible for implementation of Shell Canada's occupational health monitoring programme in Vancouver refinery, with a toxicologist and an occupational health physician. So I became more aware that low doses of hazardous substances or "***bad actors***" over an extended period can lead to cancers or other serious health problems. The study included health screening.

Internet searches showed that Depleted Uranium weapons were strongly suspected as a potential cause of **Gulf War Syndrome** despite government-sponsored studies claiming otherwise. I studied many reports on government, research, media and Gulf War veteran websites and talked to Doug Rokke, involved in DU clean-up and training.

Internet research requires careful cross checking to establish original sources and facts. Inconsistencies can reveal key issues. I forwarded summaries and sources to the BBC who rapidly followed up the DU issue with questions to UK Government and NATO spokesmen, plus several BBC Online reports and a documentary by Alex Kirby.

But one question evaded most DU researchers in 1999: **Was DU used in bombs and missiles in the Balkans War?** Nato denied this. In the absence of further information I concentrated on alerting the UK media to the use of DU anti-tank munitions and the need for troops and civilians to avoid potential exposure to DU targets in the Balkans.

Later in 1999, the **Military Toxics Project** in the USA (http://www.miltoxproj.org ) used the US freedom of information procedure to ask the US Navy if DU was used in **Tomahawk missiles**. The answer was no, except as dummy nuclear warheads in test flights. This may have been correct at the time. However the advanced penetrator and sub-munition options in the latest Tactical Tomahawks are now suspected DU systems.

The question should not have been restricted to Tomahawks. **Part 3 of this report identifies 10 guided weapon systems used in the Balkans that are suspected of containing DU warheads or sub-munitions.** The GBU-24 and 28 and JDAM guided bombs were definitely used according to US Government and FAS websites. Over 30 AGM-86 and some AGM-142 cruise missiles were used. The AGM-86D was at prototype stage, competitively evaluating its two hard target warhead options.

The first independent researcher to analyse possible effects of DU warheads in the Balkans was a physicist, Dr Theodore Liolios in Greece who wrote "**Assessing the risk from DU weapons used in Operation Allied Force**" (November 1999). He used FAS website data and modelled potential fallout plumes from 100 kg DU warheads. I did not see his paper until November 2001 so most of this investigation was a parallel study. His updated analysis is due for publication in Greece this month.

The first two studies in **Part 1** - **Tip of the Iceberg** and questions about the UNEP study - **DU in the Balkans War** - were copied to UNEP and UK media contacts in March 2001. They were updated in June but there was no media interest in them. I dropped these enquiries until 11 October when **Bunker Buster bombs were first reported in the Afghan war**. This provided a new line of investigation into DU in guided bombs and the urgent need for answers to the following questions:

- What is the mystery metal that has doubled the effectiveness of a new generation of "hard target" smart bombs and cruise missiles? (see page 89).
- How many weapons systems use DU - past, present and future?
- How much DU has been used in the Afghan War?
- What are the likely health and environmental effects of DU bombs for the people of Afghanistan?

- How many DU bombs or missiles have been used in Iraq and the Balkans since 1990? Where else have they been used?
- Why is there so much secrecy and deception by the US and UK governments about DU weapons if, as they claim, DU presents 'minimal' hazards to humans?
- How widely have DU weapons been traded by the world arms industry?

**These questions and warnings were sent to the UK Government** via my MP on **16th October** and to the Prime Minister and several MPs in four parties on 1st November, see **Part 2**. This report offers some answers and asks more questions.

Dr Lewis Moonie, UK minister responsible for DU and veterans affairs, replied on **19th November**. He denied any use of DU in the Afghan War and denied knowledge of the dense metal used in hard target weapons. He thought DU would present a "minimal" risk if it is used. **Part 2** contains this correspondence and **recent DU questions and answers in the UK Parliament**. 17 MPs have raised DU questions since 1999.

## What next?

There is an **urgent need for independent environmental and health monitoring** programmes in Afghan towns and in other bombed areas. **The UNEP Post Conflict Assessment Unit** can do **environmental monitoring** but this time all bombed areas need to be assessed, not just a small sample as in the Balkans. Ongoing air and water monitoring is an additional requirement if large DU weapons have been used. Latest reports suggest that the PCAU will go to Afghanistan in February 2002. Ideally a pilot study team should be sent there immediately.

Military environmental monitoring teams from the US and the UK started surveys of suspected NBC (Nuclear, Biological and Chemical warfare) targets in November. The US and UK governments cannot be trusted to disclose their full findings (see Part 4).

The new Afghan Government may need to set up a permanent environmental monitoring organisation if DU has been widely used. This is likely to be opposed, or controlled by the US military to minimise publication of adverse results. The US Congress needs to consider what moral and legal obligations the USA has to the environmental health and safety of the people of Afghanistan in the aftermath of the bombing, including the possible effects of DU contamination in water, soil and air.

Until independent surveys are done **all organisations employing expatriates would be wise to take DU precautions for their staff and civilians in Afghanistan**. An alert was sent to the UK Red Cross and Oxfam on 5 November (see Part 1, page 37). This report encourages all international employers to question or investigate the risks of DU environmental contamination in Afghanistan.

**Medical health monitoring** is equally important and urgent, but medical aid teams are unlikely to have time or resources to do this systematically. Ideally the **World Health Organisation** should send in **epidemiological teams** to monitor health problems and causes of death including potential symptoms of DU oxide exposure. They need a public health equivalent of the UNEP PCAU. **Does such a team exist?** Unfortunately the WHO does not seem to regard DU as a priority issue, possibly compromised by its links to the International Atomic Energy Authority with its nuclear industry connections. (refer Robert James Parsons report in The Nation of 9 April 2001). **Will the UK and other UN member states support the WHO in setting up an Afghan health study?**

If DU has been used in guided weapons in the Afghan War this is likely to be on a **larger scale than in Iraq or the Balkans** because much of the campaign has involved bomb and missile attacks on hard or deeply buried targets. Also if DU has been used, **the size of these weapons represents up to 100 times greater risk of DU contamination per target than assessed in any published environmental or health study to date** (see **Figure 1** re "dense metal" warhead sizes on page 89).

Such levels of exposure for people in hard target bombing zones may involve **acute doses and health effects of a kind not previously associated with depleted uranium weapons**. Medical personnel need to be alerted to this possibility.

**DU may add the problems of toxic and low-level radiation exposure to illnesses already expected by aid organisations in the Afghan winter**. **Acute exposure cases are unlikely to survive the winter**. They may appear to die of "common respiratory disorders" before accurate diagnosis is made, conveniently concealing the potential scale of casualties exposed to high doses of DU contamination. According to Rosalie Bertell this strategy was used in 1945 to conceal mortality figures at Hiroshima and Nagasaki for 6 years. (see http://www.mothersalert.org/bertell2.html ).

**Intermediate exposure cases** (downwind of explosion clouds) who survive the winter may develop Leukaemia and similar disorders within a year. For others living in DU contaminated areas subject to atmospheric or water pollution it may be several months or years before radiation-related health disorders reach significant proportions, though possibly faster than in Iraq if large DU warheads have been used.

In the absence of a WHO PCAU study team other **international medical aid teams** may have relevant data e.g. Medecins Sans Frontieres, the International Red Cross and independent health researchers. Ideally DU testing is needed with analysis of illnesses and fatalities, plus autopsies of fatalities suspected of acute DU exposure. Parallel studies are needed for recent **Afghan refugee groups** in Pakistan and Iran, and for **expatriates** returning from recent Afghan assignments.

If large areas have been contaminated with DU this has **profound implications for the civilian population**. UN and other international aid agencies have **only 2-3 months to evaluate these risks** and options for relocating communities before hot weather and high winds may stir DU pollution into the atmosphere again. This is likely to increase chronic exposure risks and to affect more people each summer as dust contamination spreads. **Meteorological analysis** of recent winds, rain and haze or smog is essential, for correlation with details of weapons used and target locations.

If DU has been widely used in Afghanistan the **US Government and military** may be looking for ways of explaining **several hundred tons of toxic and radioactive 'dirty' Uranium oxide dust** (i.e. contaminated with traces of U235, U236, Plutonium etc). This is to be suspected in scores of locations hit by hard target guided bombs or missiles and in down-wind areas. Oxides may be dispersed over wide areas as fine dust in air, sand, soil and water - in effect as low-grade nuclear fallout. In the next few months they may also have to explain symptoms of **Afghan War Syndrome** among troops who inspected bombed targets, friendly fire casualties and Afghan allies.

On 4 December US intelligence sources released reports that Al Qaeda has stock-piled and tested "**dirty bombs**" made of nuclear waste and capable of contaminating "several city blocks" (International Herald Tribune, 5 December 2001). See http://www.iht.com/cgi-bin/generic.cgi?template=articleprint.tmplh&ArticleId=40891

On 21 December "low grade uranium" was reported in an Al Qaeda store near Kandahar airport (Kansas City Star). On 16 January Don Rumsfeld gave the first report of " **an elevated level of radioactivity but it appeared to be a result of depleted uranium on some warheads and not from any nuclear or radiological weapon of mass destruction**" (see pages 120-1). What warheads and whose?

If DU contamination is found in parts of Afghanistan we may be told that these were Al Qaeda test sites, that DU ammunition stores were hit by "clean" US weapons, or that the Taliban used them in a "scorched earth" retreat. See **DU scenarios** on page 95.

**If these reports about Al Qaeda DU weapons are true they indicate an immediate need for independent DU health and environmental monitoring in Afghanistan** and for refugees in neighbouring countries - even if there was no DU in US guided weapons. They also indicate the need for **immediate public health precautions**, especially for water supplies and catchment areas that may have been contaminated.

**Health problems in Iraq** since the Gulf War may offer a model for the public health effects of widespread DU contamination in a population over a number of years. Countries that recently voted down a UN study of DU in Iraq (mostly countries that have suspected DU weapons systems?) may need to reconsider whether they can afford to ignore Iraq's experience of DU, especially if they have staff in Afghanistan.

I was suspicious about DU in guided weapons in January 2001. My enquiries over the last 3 months documented in this report increase my concern. They raise **questions that affect every government sending personnel to Afghanistan, United Nations agencies covering health, environment, refugees and arms control and all organisations that have conducted DU research in the last 10 years.**

I would like to be wrong. I hope that none of the hard target weapons identified here use DU. This would be one less problem for the humanitarian disaster in Afghanistan.

But I have seen too many errors of fact, misleading statements and inconsistencies in government statements and official studies in this investigation to trust any official re-assurances about DU weapons and DU health hazards. They point to **a major international cover-up** regarding DU weapons of all kinds and their hazards. Robert James Parsons' article **DU Balkans cover-up** warned of this in The Nation, 9 April 2001, see http://urbana.indymedia.org/front.php3?article_id=3601&group=webcast.

**If the mystery metal in any guided weapon proves to be DU then all systems with the same warhead technology must be questioned**. If DU has been used in large explosive warheads the resulting toxic and radioactive contamination and their permanent hazards to life and health would clearly identify them as "**weapons of indiscriminate effect**". One example may be the bombing of Afghan 'Kerez' (underground water tunnels) reported in New Scientist (see page 43). These targets and water supplies will need rigorous inspection for DU contamination. The potential human and environmental hazards of DU in any weapons system should be obvious to everyone involved in their design, manufacture, testing, approval and operational use.

Hard target guided weapons now represent **several billion $ of existing weapons inventory** plus new versions on order or under development in the US, UK and other countries. If these use DU warheads then many governments, military and commercial organisations have **a vested interest in keeping the issue of DU in guided weapons secret.** If DU is involved then governments and manufacturers may face huge compensation claims from 300,000+ war veterans and from civilian populations. Some could face criminal prosecution.

The hazards of DU, long delays in acknowledging them, and potential compensation claims have much in common with the history of the asbestos industry. Recent US allegations about potential weapons of mass destruction in Iraq and Afghanistan may be intended to deflect attention away from their use of weapons of indiscriminate effect.

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With one exception **the UK media** has declined to raise any of these questions about DU in guided weapons over the last 9 months or during the Afghan War due to "lack of firm proof". But these investigations identify **specific weapon systems** using the "mystery dense metal" and **errors of omission, ignorance or deliberate deception that conceal its identity and use,** see **Parts 2** and **4**. They involve government ministers and international agencies. Obvious errors of fact should cast serious doubt on government denials if the DU issue is raised in national or international courts. They may indicate negligence for duties of care to military and civilian employees. DU weapons may involve criminal liability for death or incapacitation of civilians including birth defects in children. Risk assessment starts with suspicion of hazards, not proof.

Until now governments have concealed these issues by classifying the mystery metal in hard target guided weapons as **a military secret**. Since September 2001 they have been able to rely on the international media, through censorship or self-censorship in a time of war, not to publish these questions. That delay was sufficient for the bombing to continue without being seriously questioned, potentially at the cost of thousands more civilian lives. The initial trauma of September 11th 2001 won international support for the war in Afghanistan. If DU weapons have contaminated communities, water and land this support may change to outrage. The media silence cannot last indefinitely.

If DU has been used in guided weapons in Afghanistan or in previous conflict zones, this will become evident when more thorough, independent health studies are conducted for civilian and military populations. To date **UNEP, IAEA and NATO investigation teams** have not commented on DU contamination in hard target bombing locations in the Balkans. Perhaps they did not look. Perhaps they have been told to conceal the information they have found. Either they should re-survey these areas or publish the information they already possess without political interference. This may require a mandate from the UN General Assembly or the International Court.

The **wall of silence** surrounding military use of DU makes it difficult for independent researchers to give the media conclusive evidence about these suspect weapons until medical or environmental sampling can be done. Catch 22 is that unless a direct legal challenge is put to governments, the military or arms manufacturers they can rely on secrecy legislation to deny the existence of DU in guided weapons.

Most official DU research seems to based on "Don't look, don't find" methodology. To ensure there is not another cover-up in Afghanistan like the Balkans studies the suspected use of DU weapons must be challenged by the media, in parliaments and in the United Nations. Hopefully these will be backed up by questions from academic and professional institutions around the world e.g. in Medicine and Environmental Science.

The technology of upgraded hard target warheads described in **Part 3** indicates **a high probability that DU is the mystery metal involved in several weapons systems.** Only DU alloy or Tungsten can match the physical properties required for dense metal penetrators and only DU where incendiary effects are required (HDBTDC page 73).

For different reasons - the properties of DU, Jane's report and illustrations of DU products - this report also concludes that DU may also be used in several **shaped charge warheads** (page 79-80) and possibly in other explosive penetrator weapons

e.g. in anti-tank cluster bombs and mines (page 91). Other metals are also used in some shaped charges but this does not exclude DU from full investigation. All these weapons require rigorous public scrutiny for DU, including earlier systems and new weapons under development as well as those used in Afghanistan.

These questions have grim and immediate implications for millions of people living or working in Afghanistan in the last 3 months, staff about to be assigned there and refugees planning to return. Wider implications need to be checked by other analysts.

The **military and political secrecy about DU** must be questioned and exposed for full, independent and international scrutiny. This is not just an issue for the USA. Companies in the UK, France and Israel as well as the United States have developed some of the systems identified in Part 3. Russia and China also have DU anti-tank munitions and are probably developing similar hard target guided weapons. The arms industry has traded some of these suspected DU guided weapons to 20-30 countries.

If DU is used in guided weapons warheads any further delays, denials or deception by governments, the military or manufacturers are likely to carry a high economic and political price. Suspicions about DU are growing in many countries. DU weapons may become a scandal like Agent Orange with thousands of victims in several countries.

If my suspicions are correct then **shrewd military analysts and medical advisers have already begun to recognise the consequences of using DU in Afghanistan**. This may explain delays in deploying ground forces. If DU weapons have been widely used in the group-think belief that DU is "safe" they may already realise that this was a grave strategic error. If highly trained special forces and other troops from the US, UK, Australia and other countries are getting sick or have children with birth defects in the next year this may devastate troop morale and recruitment. The US and UK Navy's have already started to replace DU rounds with Tungsten despite the extra cost.

**Preliminary health and environmental assessments in Afghanistan** must be given the highest priority. Initial assessments must be completed and published for analysis by the UN and aid organisations within 3 months. This must be done before the winter snow and ice melts, potentially recycling hundreds of tons of uranium oxides into the environment in Afghanistan and neighbouring states by wind and water. Mobile laboratories would enable faster analysis of water, air and soil than in the Balkans.

**Full health and environmental assessments** may be needed for years. Ideally the governments responsible for the bombing should pay for these assessments. But to ensure truth and impartiality it is essential that they are funded through the UN and co-ordinated by countries not involved in the Afghan War or the DU weapons industry.

The bombing in Afghanistan continues. These questions need to be published now so that UN agencies and other researchers can start to assess the implications of DU in guided weapons and other previously unsuspected systems. **Part 4** develops seven DU Scenarios for Afghanistan and strategic issues including immediate health and safety priorities. These need to be updated as new information becomes available. But they already highlight **the need for UNEP and WHO assessments to proceed rapidly and without political interference**. The draft report has been sent to them and other UN agencies. It offers a basis for urgent action in Afghanistan and rigorous investigations in many countries.

Dai Williams 31 January 2002