

Uranium weapons 2001-2003

Hazards of Uranium weapons for Afghanistan and Iraq

Occupational, Public and Environmental Health Issues in Radiological Warfare

Collected studies and public domain sources compiled by:

Dai Williams

Second report updating

Depleted Uranium weapons in 2001-2002

Mystery Metal Nightmare in Afghanistan?



Photo: Oleg Nikishin © Getty Images
published in the Guardian 27 Nov 2001

- Updated list of hard target guided bombs, missiles and sub-munitions suspected of Uranium warheads
- Increasing concerns about use and effects of Uranium weapons in the Afghan War
- Undepleted Uranium?
- New evidence from US Patents with Uranium warhead designs
- Outlook for civilians, troops and aid workers from US war plans for Iraq
- Issues for governments, UN agencies and NGO's.



Eos Life Work

October 2002

PREFACE

20 October 2002

These investigations have immediate implications for the health and welfare of civilians, troops and aid workers in Afghanistan and Iraq. They pose serious questions for many countries and the UN.

Hazards of Uranium weapons in the proposed war in Iraq was written on 22nd September. ***Uranium weapons 2001-2003*** contains this report, a summary for decision makers and new findings from US Patent records. These include updated lists of the 23 weapon systems now suspected of Uranium warheads and extracts from 7 US weapons patents including **Uranium** as a warhead material.

These papers cover developments since my first report ***Depleted Uranium weapons 2001-2002, Mystery Metal Nightmare in Afghanistan?*** published on 31 January 2002. This was sent to the UK Government, selected MP's, UN agencies and the Afghan Embassy in Geneva earlier this year. It is available on the Internet at <http://www.eoslifework.co.uk/du2012.htm> and in hard copy or CD-ROM format.

The first report identified **two warhead technologies** that appeared to use **Depleted Uranium (DU)** to increase **penetration effects** on hard or deeply buried targets, and **incendiary effects** to neutralise chemical or biological warfare agents. These are 1) large explosive warheads using 'dense metal' **unitary** or **advanced penetrators**, and 2) a range of warheads and sub-munitions using **shaped charge** technology. Advanced R & D into use of Uranium in both types of warhead is now confirmed. **How many Uranium weapons have been used since 1985 and where?**

This new report asks parliaments and media to question the role of governments, UN agencies and the validity of past research and policy advice concerning the health and environmental effects of Uranium weapons. It is relevant to negotiations with US representatives regarding a United Nations resolution to permit or restrain the US Government from **a major military offensive on Iraq** on the pretext of destroying weapons of mass destruction. Such an attack will rely primarily on **hard target guided weapons**. **If Uranium warheads are used then the proposed war could add 1,500+ tons of Uranium dust to existing contamination in Iraq creating another radiological warfare disaster.**

The situation in **Afghanistan** is still unclear. Despite my warnings in January environmental monitoring for potential Uranium contamination by the UN Environment Programme (**UNEP**) has not happened. The lives of thousands of people who may have been exposed to, or be living in, areas heavily contaminated by Uranium weapons are at risk. Reports from the Balkans war and new evidence of seriously ill civilians with severe Uranium contamination in Afghanistan suggest that US guided weapons have been using **undepleted Uranium**. This would confuse medical and environmental testing and explain official denials about the use of *depleted* Uranium weapons.

The **global proliferation of Uranium munitions as weapons of indiscriminate effect** is a vital arms control issue. Their use constitutes **radiological warfare**. It is vital for the health and safety of troops and civilians that the use of suspected Uranium weapons in Afghanistan and the Iraq no-fly zones is suspended, and that they are rigorously investigated before further use in Iraq.

The existence and use of weapons with large uranium warheads - **radiological bombs** - remains a closely guarded military secret. Their use and hazards have been the subject of systematic misinformation by NATO and other sources. The use of small (less than 5 kg) Depleted Uranium anti-tank penetrators has deflected public and media concern away the use of far larger weapons e.g. the GBU-24 and 28 that may contain 500-1500 kg of Uranium.

This secrecy and deception may have misled UN agencies and other research organisations to seriously under-estimate the potential humanitarian and environmental impacts of radiological weapons and the development of radiological warfare using "conventional" Uranium weapons made from nuclear waste since 1985, possibly even back to the Yom Kippur War in 1973.

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20 October 2002

These documents are also available on the Internet at <http://www.eoslifework.co.uk/u23.htm>

Hazards of Uranium weapons for Afghanistan and Iraq

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Uranium weapons in 2001-2003

Occupational, public and environmental health issues

Hazards of suspected Uranium weapons in the proposed war on Iraq (summary)

Updated analysis of collected studies and public domain sources
compiled by Dai Williams, 24 September 2002

See also [Full report](#), and [US Patents confirm Uranium warheads](#)

On 24 September Prime Minister Tony Blair presented a dossier of evidence about weapons of mass destruction in Iraq to the UK Parliament to support military action proposed by the US Government. This is a summary of a new analysis that questions the weapons that may be used by US and allied forces in the proposed war on Iraq and raises issues for international decision makers and media. The use of these weapons may create serious and permanent health hazards for troops, expatriate civilians and the Iraqi population.

In January **Depleted Uranium weapons 2001-2002, Mystery metal nightmare in Afghanistan?** (available at <http://www.eoslifework.co.uk/du2012.htm>) investigated the suspected use of Uranium warheads in a new generation of hard target guided weapons. It questioned their use in Iraq and the Balkans since 1991, and raised immediate health and safety issues for civilians and troops from their use in Afghanistan. It was sent to the UK Government and UN agencies. The new analysis **Hazards of suspected Uranium weapons in the proposed war on Iraq**, September 2002, is available at <http://www.eoslifework.co.uk/u231.htm>.

[**Update:** In October 2002 sick Afghan civilians with severe undepleted uranium contamination were reported by Canadian researchers (9). The Iraq analysis, US Patents for uranium warheads and a warning to the UK Government were published in **Uranium weapons 2001-2003: Hazards of Uranium weapons for Afghanistan and Iraq** - <http://www.eoslifework.co.uk/u232.htm>.]

Summary

Most public debate about US war plans for Iraq has been led by US allegations about Iraqi **weapons of mass destruction** justifying "regime change" by military action. UK and other governments appear caught up in the **group think** of the Bush Administration's "War on Terrorism". Group think involves self-justifying logic that generates an illusion of morality, demands unquestioning conformity, accepts dangerously high risk strategies and demonises enemies and dissenters (1). It explained strategic errors that led to the Bay of Pigs fiasco.

In time of war vital combat and aftermath data that may alter public perception, government decisions or arms procurement is classified, concealed or distorted on the pretext of state security. It is vital to separate facts from propaganda about terrorist threats and Iraqi or allied weapons. Since September 11th US and UK Government agendas have excluded any debate about **the weapon systems used by US and allied forces** (2). **Their potentially devastating effects on the Iraqi population and allied ground forces may far exceed hazards from weapons that Iraq may have developed.**

Most of the guided weapons that will be used in new air attacks on Iraq - **smart bombs and cruise missiles** - will be the same as those used in Afghanistan, see [Table 1 \(3\)](#). No independent assessment has been made of post-war health & environmental conditions there. It is feared that these weapons have already started widespread and irreversible health problems for civilians and troops - a potential Afghan War Syndrome.

Most of these "hard target" guided weapons contain **a mystery and highly secret "dense metal"**- over twice the density of steel and pyrophoric, creating intense heat inside their targets (see [Figure 1](#)). **The only metal that meets both requirements is Uranium**, depleted or non-depleted.

If Uranium is used in large, explosive "hard target" warheads (up to 1500 kg) it will create **levels of radioactive contamination 100 times higher and more widespread than the depleted uranium anti-tank "penetrators" used in the Gulf War**. After bomb attacks in the Balkans in 1999 increased levels of airborne Uranium dust were detected in Greece and Hungary. **Any warheads containing Uranium will cause permanent Alpha, Beta and Gamma radiation hazards in target areas. They are radiological bombs - weapons of indiscriminate effect in terms of the 1st Protocol additional to the Geneva Conventions**. 23 weapon systems are questioned see Figure 1 (warhead size) and Table 1 (combat use since 1991) in Appendix 1 and sections 4 & 5 in the full report.

All Parliaments that have been asked to support a new war on Iraq are strongly advised to ask these two basic questions:

- A. What is the secret, high density metal used in the new generation of hard target guided bombs and cruise missiles produced in US and other countries?**
- B. If this mystery metal is Uranium how will national leaders and parliaments justify attacking unconfirmed weapons of mass destruction with weapons of indiscriminate effect ?**

Weapons of mass destruction cause sudden death or destruction in target areas, some with long term or widespread effects. **Weapons of indiscriminate effect** cause widespread or long lasting contamination liable to cause injury, chronic illness, slow death or severe birth defects. Both are outlawed in the 1st Protocol of the Geneva Conventions.

Action needed by Parliaments and media

The "heavy metals" used in hard target guided weapons have been a closely guarded military secret since 1990. They can only be Tungsten or Uranium. Why classify the use of Tungsten?

To establish the truth about suspected "conventional" Uranium weapons and their effects Parliaments and media across the world are urged to demand the following actions **before** sanctioning any new military action by the USA in Iraq or other countries:

- 1. Immediate, independent investigations by UN inspectors and Parliamentary representatives to verify the materials used in all the suspected Uranium weapons identified in this analysis ([Table 1](#))**. These to include current weapon stocks and manufacturing facilities in all countries, and full disclosure of combat use since 1990.

2. **Rigorous environmental monitoring for Uranium contamination in Afghanistan and re-survey of other recent combat zones.** Both UNEP studies (2001, 2002) of Depleted Uranium in the Balkans excluded guided bomb, missile and cluster bomb targets. And see [\(4\)](#) re Afghanistan.
3. **Independent and ongoing health monitoring of troops and civilians (local residents, refugees and expatriates) exposed to suspected Uranium weapons in Afghanistan, the Balkans and Iraq.**
4. **Medical aid and environmental protection for all civilian communities at risk of Uranium contamination.**
5. **Review of past medical research, hazard assessments and policy advice concerning Depleted Uranium (DU) weapons** based on Uranium exposure from small penetrator warheads (less than 6 kg), or overlooking widely varying levels of U235 (undepleted U), U 236 and Plutonium contamination (Dirty DU).

Urgent need for public debate about Uranium weapons likely to be used against Iraq

There has been very little media coverage except Le Monde Diplomatique in March [\(5\)](#), ABC Australia in July [\(6\)](#), Guardian in September [\(7\)](#), and no public debate in the US or UK about the new generation of hard target guided weapons used in the Afghan war. Over 2,000 were used. **If the secret metal they use is Uranium then 1000+ tons of fine oxide dust will have contaminated many areas. Thousands of Afghans, and many expatriates, may have been exposed to moderate or severe levels of uranium contamination with grave implications for their long term health, similar to those in Iraq since the Gulf War.**

Hundreds or thousands of civilians in Afghanistan may already have died from acute Uranium exposure, their symptoms compounded by, or misdiagnosed as, common causes of death during the Afghan winter e.g. pneumonia, acute gastric infections and malnutrition. There are very few independent laboratory facilities for medical or environmental analysis of Uranium contamination in the world and none in Afghanistan.

International proliferation of known and suspected Uranium weapons - to over 20 countries since 1991 - is a major arms control problem. The **5 action points** identified above indicate **the complexity and scale of responding to Uranium weapons contamination and the public health disasters they may cause.** These effects can be seen already in Iraq and for Gulf War veterans since 1991. They represent a grave risk not yet assessed in Afghanistan.

To launch another military campaign in Iraq on the scale of the Afghan war - with the same suspected armada of Uranium weapons - and without attempting to evaluate their health and environmental impacts in Afghanistan and on allied troops and expatriates seems irresponsible beyond belief, verging on genocide.

Until these questions are raised in the national and international media, **most politicians will be unaware of the hazards and scale of problems of Uranium contamination that may now exist in Afghanistan caused by allied bombs and missiles.** If politicians and governments have been deceived about these hazards they may inadvertently support US action in Iraq with the same Uranium weapon systems - a grim responsibility.

The military are employed to conduct wars effectively by any means authorised by their governments. The legal, moral and ethical consequences of war are the ultimate responsibility of governments, not the military. **If the perceived threat from Iraq is considered serious enough to justify using weapons of indiscriminate effect - nuclear, chemical or radiological - this should be a decision for parliaments and the UN General Assembly, not the Pentagon or heads of state that rely totally on military briefings.**

In the absence of public questions and debate about Uranium weapons political representatives have had to rely on cumulative pro-Uranium propaganda since 1991. This includes statements from government, military and commercial sources (arms and nuclear industry) and several compromised scientific reports, even by UN agencies, that have relied on government or military funding and co-operation. Refer Part 4 of Depleted Uranium weapons 2001-2002.

Is Uranium the mystery metal in any hard target guided weapons? If so there may only be a few weeks left to prevent a new public health disaster in Iraq, larger than the one that already exists due to 300 tons of Uranium weapons and the effects of sanctions.

This briefing was originally prepared for the UK Government, MPs and media contacts for consideration in the **Iraq War debate in Westminster on Tuesday, 24th September.**

These questions and actions need to be raised in all countries that are expected to support a US led attack on Iraq, whether with troops, logistic facilities or by voting in the UN General Assembly. The USA, UK, France, Israel, Russia, Pakistan and any other country manufacturing suspected Uranium weapons must be called to account for their weapon systems by the UN General Assembly before their use is sanctioned in future military action. This includes weapons now being used by the US and UK in the Iraq no-fly zones. To widen this debate this updated analysis will be offered in the public domain via the Internet.

Any politician, leader or government that supports a new military offensive against Iraq before the identity and effects of suspected Uranium weapons used in Afghanistan are fully investigated would be wise to read Articles 35 and 55 of the First Protocol additional to the Geneva Conventions of 1949 very carefully.

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Appendix 1

Figure 1 and Table 1 on the following pages were first published in **DU weapons 2001-2002** pages 89 and 131. They have been updated for the two new US hard target weapons - the Thermobaric bomb GBU-118/B first used in February and the 20,000 lb Big BLU reported to be under development in March (planned since 1997 and probably operational now). Both use "dense metal" Advanced Unitary Penetrators, suspected to be uranium.

Figure 1

Hard target guided weapons in 2002: smart bombs & cruise missiles **with "dense metal" warheads** (updated September 2002)

Warhead weight

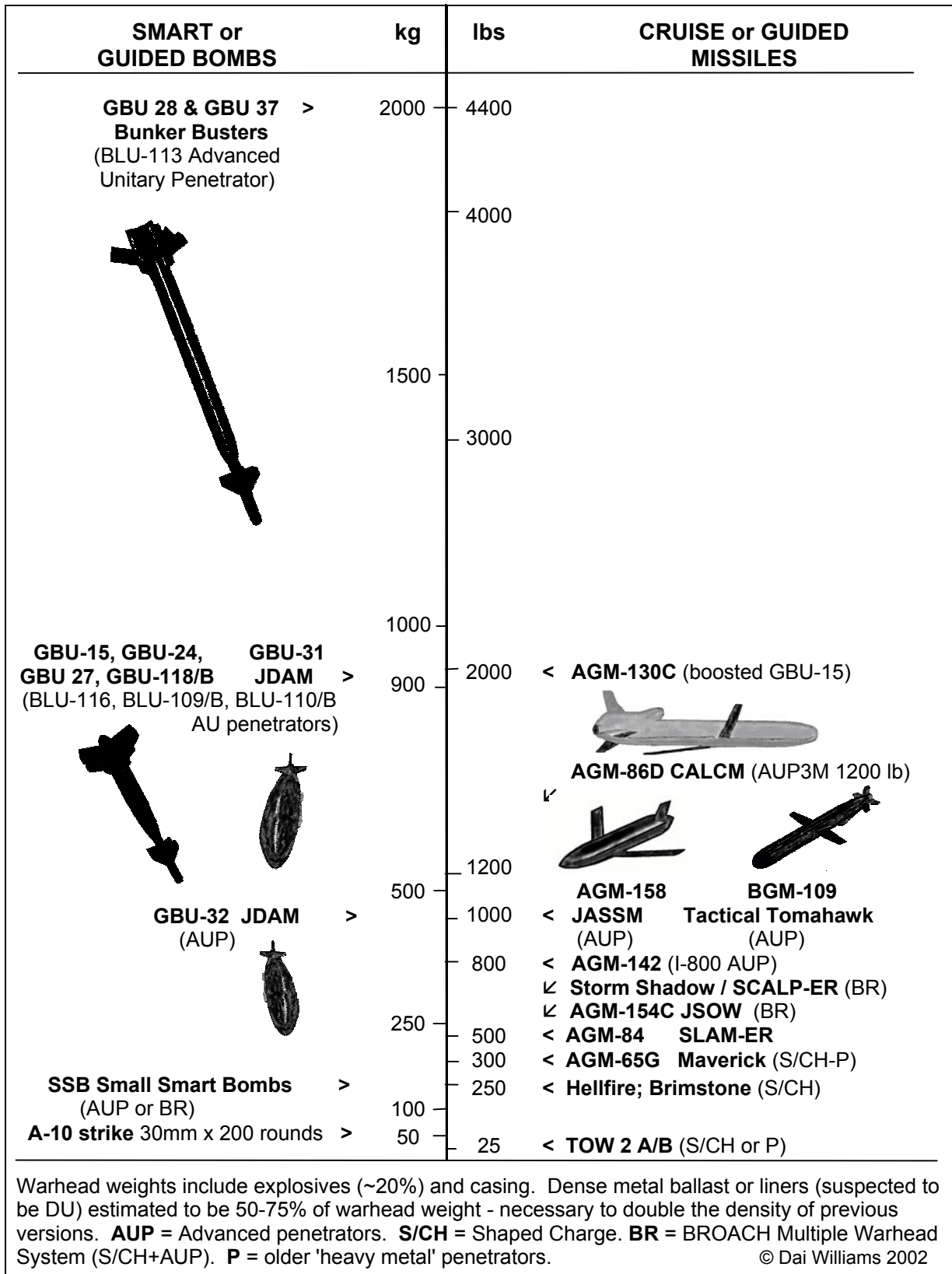
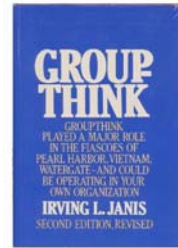


Table 1: Combat use of known and suspected conventional Uranium weapon systems with dense metal penetrators or shaped charge warhead technology (updated September 2002)

Weapon	Gulf War 1991	Bosnia 1995	Desert Fox 1998	Balkans War 1999	Iraq no-fly zone 1992>	Afghanistan 2001-2	Iraq 2002 /2003
Guided Bombs (AUP upgraded versions)							Big BLU
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	?
GBU-118/B Thermobaric						Y	?
SSB					P	P	D
Guided missiles							
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	e		P	D
Storm Shadow / SCALP ER						P	D
Sub-munitions							
BLU-108/B A/Tank c/b				?		?	?
BLU-97B cluster bomb				Y		Y	?
Armor-piercing ammunition (DU confirmed)							
20mm Phalanx sea-to air							
25mm M791						?	?
30mm PGU-14/B	Y	Y		Y		?	?
120mm-US & Charm-UK	Y	?					?
<p>Key: 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</p> <p>Note: Data on warhead technology, operational status and combat use taken from: Federation of American Scientists; Jane's Defence; Center for Defense Information; Hansard.</p>							

References



- (1) Janis, I. L. & Mann, L. (1977). **Decision making: A psychological analysis of conflict, choice, and commitment**. New York: Free Press
key points at <http://www.cedu.niu.edu/~fulmer/groupthink.htm>
and
Janis, I.L (1983) **Groupthink - Psychological Studies of Policy Decisions and Fiascos**, Houghton Mifflin Co Boston. 2nd ed. ISBN 0-395 33189 7.
- (2) The only debating question about **Depleted Uranium in Afghanistan** was asked by MEP Paul Lannoye in the European Parliament, Strasbourg on 9 April 2002. Transcript at: <http://www.xs4all.nl/~stgvisie/VISIE/europ-parliament-afghanDU.html>

Written questions and answers in the UK Parliament are available in **Hansard** online, search at <http://www.parliament.uk/hansard/hansard.cfm> and in Part 2 of the first report, see (3) below.

[Update: On 7 November 2002 **Alice Mahon MP** challenged the UK Government about allied weapons in the Iraq war: "First, can we have an absolute assurance that our Government will have nothing to do with the use of nuclear weapons, bunker busters or depleted uranium? Secondly, can we be told the truth about civilian casualties this time? Whenever there is a statement on Afghanistan, nobody in the Government seems willing to tell us how many civilians have died there." Both questions were not answered.]
- (3) Williams, D (January 2002) **Depleted Uranium weapons 2001-2002, Mystery metal nightmare in Afghanistan?** at <http://www.eoslifework.co.uk/du2012.htm>
and from Politicos bookshop, London (<http://www.politicos.co.uk>)
- (4) The **UNEP PCAU study proposal for Afghanistan** contained no reference to uranium or depleted uranium monitoring see <http://www.postconflict.unep.ch/actafghassessment.htm>
- (5) Parsons R.J. (March 2002) **America's Big Dirty Secret**, Le Monde Diplomatique
in English at: <http://mondediplo.com/2002/03/03uranium>
- (6) Barraud, A (1 July 2002) **Was depleted uranium used in Afghanistan?** ABC Asia Pacific radio (Australia) http://www.abc.net.au/ra/asiapac/features/AsiaPacFeatures_595813.htm
- (7) Hambling, D. (5 Sept 2002) **The heavy metal logic bomb**, Guardian (UK)
<http://www.guardian.co.uk/science/story/0,3605,785897,00.html> (Subscription required).
- (8) **Big BLU Direct Strike Hard Target Weapon (DSHTW)**. USAF Concept 1997. Development reported March 2002 at <http://www.globalsecurity.org/military/systems/munitions/dshtw.htm>
20,000 lb penetrator with dense metal ballast.
- (9) Durakovic Dr A. **New Concepts in CBRN Warfare in the Light of the Gulf War Experience and Current Reality of Global Terrorism**. At <http://www.umrc.net> . Afghan Uranium contamination report on page 4. Presentation to the Third GCC Conference of Military Medicine and Protection Against Weapons of Mass Destruction, Doha, Qatar, October 20-23, 2002. See also Afghan field team report at <http://www.umrc.net/projectAfghanistan.asp>

Other references are provided by Internet links to sources in the full analysis.

Full report

The full analysis **Hazards of Uranium weapons in the proposed war on Iraq** (24 September, 2002, 18 pages) is available on the Internet as follows:

As HTML at <http://www.eoslifework.co.uk/u231.htm>

As a PDF file at <http://www.eoslifework.co.uk/pdfs/Uhaziraq1.pdf>

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APPENDIX 2:

Added 13 October 2002

US Patents confirm Uranium warheads (summary plus report link)

On 8th October another weapons researcher located US Patent application 6,389,977 submitted by Lockheed Martin Corporation on December 11, 1997 for a "Shrouded Aerial Bomb". This defined the upgrading of the 2000 lb BLU-109/B warhead with the Advanced Unitary Penetrator (now known as AUP or BLU-116). This provides an outer shell or "shroud" that looks like the earlier warhead to maintain similar aerodynamic characteristics and to use the same range of guidance and delivery options (see Figure 1). The upgraded warhead is used in the GBU-15, GBU-24, GBU-27 and GBU-31 guided bombs and in the rocket boosted AGM-130C version of the GBU-15. The patent also provides for adaptation to similar weapons of different sizes e.g. the GBU-32 1000 lb guided bomb.

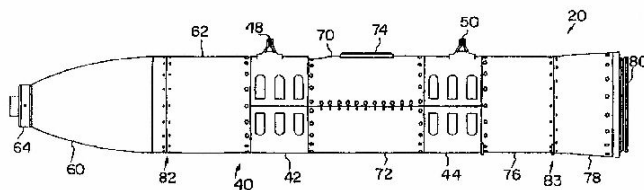


FIG. 1

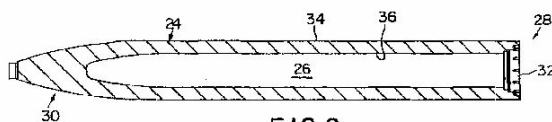


FIG. 2



Raytheon GBU-24 using the "shrouded aerial bomb" warhead with laser guidance systems attached to nose and tail. See illustrations of the Paveway III range of hard target guided bombs GBU-24, 27 and 28 at <http://www.raytheon.com/products/paveway/>

Illustrations from US Patent 6,389,977 for the Shrouded Aerial Bomb

The Patent clearly provides design concepts for both Tungsten **and Depleted Uranium** "penetrating bodies" (advanced penetrators) shown in Figure 2 of the patent application above. See extracts from the Patent record below:

"A target penetrating aerial bomb including a penetrating body shaped for improved target penetration, having a narrower impact profile at approximately the same weight as an existing bomb.

An aerodynamic shroud encases the penetrating body and emulates the aerodynamic shape of the existing bomb, and the weight, center of gravity, and moments of inertia of the bomb closely approximate those properties of the existing bomb. The bomb constructed according to the present invention may be qualified by similarity to the existing bomb, thus avoiding lengthy and costly qualification procedures.

Claims:

1. a penetrating body having a nose section shaped with an ogive and having a hollow bore with an opening at a tail end and extending toward the nose section; and an aerodynamic shroud mounted to an outer surface of the penetrating body, the shroud including means for securing the shroud to the penetrating body, wherein an aerodynamic shape of the shroud is substantially identical to an aerodynamic shape of a selected, qualified aerial bomb and the penetrating body and shroud have a weight, center of gravity, and moments of inertia substantially similar to a weight, center of gravity, and moments of inertia of said selected, qualified aerial bomb ...

4. The shrouded aerial bomb as claimed in claim 1, wherein the penetrating body is formed from tungsten.

5. The shrouded aerial bomb as claimed in claim 1, **wherein the penetrating body is formed of depleted uranium.**

The present invention relates to aerial bombs, that is, bombs dropped from aircraft, and more particularly, to aerial bombs for penetrating hard targets.

More particularly, the present invention provides a bomb having an improved penetrating warhead, that is, a warhead that more deeply penetrates a protected target, however, the bomb is substantially identical in aerodynamic and mass properties to a qualified [already patented] bomb.

The bomb (20) includes a penetrating body (24) or warhead (shown in FIG. 2) and a shroud (40) shaped to emulate the aerodynamic shape of an existing, qualified bomb. In the exemplary embodiment, the bomb (20) is shaped to emulate the BLU-109/B bomb, that is, the outer shape of the shroud (40) is substantially identical to the outer shape of the hard case of the BLU-109/B. In addition, the weight, center of gravity, and moments of inertia of the bomb (20) are substantially identical to those physical characteristics of the BLU-109/B.

It is understood that the invention is not limited to a particular diameter or weight ratio as compared to an emulated bomb. The diameter and weight of the warhead are to be selected, for example, for the penetrating and explosive functions desired, within the constraint of the total weight of the warhead and shroud being approximately equal to that of the emulated weapon."

(Extracts from US Patent 6,389,977)

A further search of the US Patent database revealed **6 other warhead designs** that specifically include the use of Uranium as an alternative to Tungsten. These include the patent for the new **Tactical Tomahawk Penetrator Version warhead** (US Patent 5,939,662 of December 3, 1997) and for the Explosively Formed Penetrator (EFP) used in the **CBU-97 Cluster Bomb** (US Patent 6,308,634). The suspected use of Uranium warhead components in these systems was indicated in Part 3 of Depleted Uranium Weapons 2001-2002 (January 2002) available at <http://www.eoslifework.co.uk/du2012.htm>

Extracts from these patents, plus links to the US Patent Office database, are contained in the document **United States Patent Office references to conventional guided weapons with suspected Uranium components**, 12 October, 2002. (PDF format).

These Patent records verify that at least 8 of the guided weapon systems suspected of using uranium warheads in my January report were specifically designed to include Uranium warhead options (GBU-15, 24, 27, 31, 32 plus AGM-130C, BGM-109, BLU-108/B). The identification of Depleted Uranium as a direct option for Advanced Unitary Penetrators reasonably implies that it is also a design option in the larger GBU-28, GBU-37 and Big BLU Bunker Buster guided bombs.

This verification raises serious and immediate issues for troops and civilians in several countries, and for all governments that currently support the use of the same weapon systems in the proposed war on Iraq. It adds great urgency to the [actions required of governments](#) proposed on 24 September.

13 October, 2002

Full US Patent report

"US Patent office references to conventional guided weapons with suspected Uranium components" 9 pages PDF format is available at: <http://www.eoslifework.co.uk/pdfs/USpats.pdf>

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Hazards of Uranium weapons in the proposed war on Iraq

Updating *Depleted Uranium weapons 2001-2002, Mystery metal nightmare in Afghanistan, Jan 2002*

Dai Williams, Independent researcher
22 September, 2002

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Summary

Most public debate about US war plans for Iraq has been led by US allegations about Iraqi **weapons of mass destruction** justifying "regime change" by military action. UK and other governments appear caught up in the **group think** of the Bush Administration's "War on Terrorism". Group think involves self-justifying logic that generates an illusion of morality, demands unquestioning conformity, accepts dangerously high risk strategies and demonises enemies and dissenters (1). It explained strategic errors that led to the Bay of Pigs fiasco.

In time of war vital combat and aftermath data that may alter public perception, government decisions or arms procurement is classified, concealed or distorted on the pretext of state security. It is vital to separate facts from propaganda about terrorist threats and Iraqi or allied weapons. Since September 11th US and UK Government agendas have excluded any debate about **the weapon systems used by US and allied forces** (2). **Their potentially devastating effects on the Iraqi population and allied ground forces may far exceed hazards from weapons that Iraq may have developed.**

Most of the guided weapons that will be used in new air attacks on Iraq - **smart bombs and cruise missiles** - will be the same as those used in Afghanistan (3). No independent assessment has been made of post-war health & environmental conditions there. It is feared that these weapons have already started widespread and irreversible health problems for civilians and troops - a potential Afghan War Syndrome.

Most of these "hard target" guided weapons contain **a mystery and highly secret "dense metal"**- over twice the density of steel and pyrophoric, creating intense heat inside their targets (see [Figure 1](#)). **The only metal that meets both requirements is Uranium**, depleted or non-depleted.

If Uranium is used in large, explosive "hard target" warheads (up to 1500 kg) it will create **levels of radioactive contamination 100 times higher and more widespread than the depleted uranium anti-tank penetrators used in the Gulf War**. After bomb attacks in the Balkans in 1999 increased levels of airborne Uranium dust were detected in Greece and Hungary. **Any warheads containing Uranium will cause permanent Alpha, Beta and Gamma radiation hazards in target areas. They are radiological bombs - weapons of indiscriminate effect in terms of the 1st Protocol additional to the Geneva Conventions.** 23 systems are suspect.

All Parliaments that have been asked to support a new war on Iraq are strongly advised to ask these two basic questions:

- A. What is the secret, high density metal used in the new generation of hard target guided bombs and cruise missiles produced in the USA and other countries?**
- B. If this mystery metal is Uranium how will national leaders and parliaments justify attacking unconfirmed weapons of mass destruction with weapons of indiscriminate effect ?**

Weapons of mass destruction cause sudden death or destruction in target areas, some with long term or widespread effects. **Weapons of indiscriminate effect** cause widespread or long lasting contamination liable to cause injury, chronic illness, slow death or severe birth defects. **Both** are outlawed in the 1st Protocol of the Geneva Conventions.

Action needed by Parliaments and media (summary of section 13)

The "heavy metals" used in hard target guided weapons have been a closely guarded military secret since 1990. They can only be Tungsten or Uranium. Why classify the use of Tungsten?

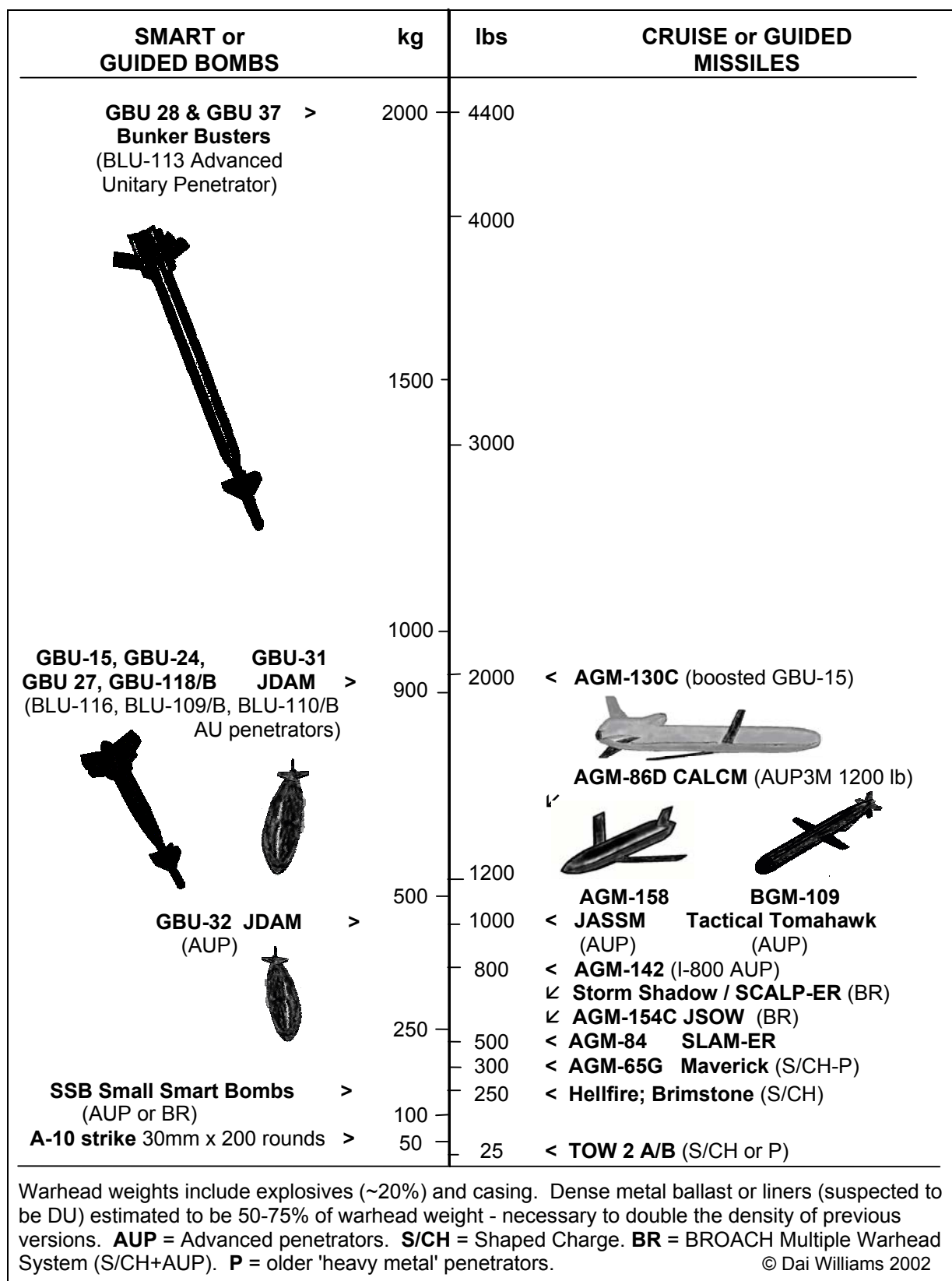
To establish the truth about suspected "conventional" Uranium weapons and their effects Parliaments and media across the world are urged to demand the following actions **before** sanctioning any new military action by the USA in Iraq or other countries:

- 1. Immediate, independent investigations by UN inspectors and Parliamentary representatives to verify the materials used in all the suspected Uranium weapons identified in this analysis ([Table 1](#)).** These to include current weapon stocks and manufacturing facilities in all countries, and full disclosure of combat use since 1990.
- 2. Rigorous environmental monitoring for Uranium contamination in Afghanistan and re-survey of other recent combat zones.** Both UNEP studies (2001, 2002) of Depleted Uranium in the Balkans excluded guided bomb, missile and cluster bomb targets.
- 3. Independent and ongoing health monitoring of troops and civilians (local residents, refugees and expatriates) exposed to suspected Uranium weapons in Afghanistan, the Balkans and Iraq.**
- 4. Medical aid and environmental protection for all civilian communities at risk of Uranium contamination.**
- 5. Review of past medical research, hazard assessments and policy advice concerning Depleted Uranium (DU) weapons based on Uranium exposure from small penetrator warheads (less than 6 kg), or overlooking widely varying levels of U235, U 236 and Plutonium contamination (Dirty DU).**

Figure 1

Hard target guided weapons in 2002: smart bombs & cruise missiles
with "dense metal" warheads (updated September 2002)

Warhead weight



1. Prime targets in Iraq

President Bush's main justification for an attack on Iraq is the proposition that Saddam Hussein has developed a new arsenal of "weapons of mass destruction" since UN arms inspectors were withdrawn from Iraq in 1998.

The US and UK Governments express concern that Iraq has developed new stocks of **chemical, biological and possibly nuclear weapons**. In view of extensive satellite surveillance of Iraq since 1991 some facilities are likely to be in underground caves or bunkers, or hidden beneath large buildings e.g. offices, factories or hospitals.

2. New generation of hard target guided weapons

In order to counter such threats the US military launched a new weapons programme - **Hard or Deeply Buried Target Defeat Capability (HDBTDC)** - in the mid 1990's. See the **FAS** website (Federation of American Scientists) at <http://www.fas.org/man/dod-101/sys/smart/hdbtdc.htm>

HDBTDC weapons require two main features:

- a) the ability to penetrate underground targets - in caves, reinforced concrete bunkers or below multi-storey buildings. This requires high density penetrating warheads with delayed action "hard target smart fuzes".
- b) to neutralise chemical or biological agents before they are released into the atmosphere ("Agent Defeat" capability). This is to be achieved by using warheads with powerful incendiary capabilities.

3. Investigations into mystery metal warheads since 1999

The possibility that Uranium has been used in bombs and missiles was first investigated by **Dr Theodore Liolios** in Greece in November 1999 (8). Anomalies in early reports from the UNEP (United Nations Environment Programme) study in Kosovo in January 2001 led me to research suspected use of Uranium in guided bombs and cruise missiles through primary public domain websites e.g. US and UK military, FAS, Jane's Defence, CDI, Boeing, Raytheon, MTP, LLRC.

Extracts from **the USAF Mission Plan, 1997** on the FAS website indicated **a new generation of hard target guided weapons with warheads from 250 - 20,000 lbs.** that would use **"dense metal"** to double their penetration effect. The Jane's website reported that DU had been used to increase the penetration effect of guided weapons and in shaped charge warheads.

In **March 2001** I sent copies of this data to **UNEP** asking if they had monitored hard target bomb and missile targets as well as anti-tank targets for Uranium contamination. They had not, or were not allowed to by NATO. Despite this warning they did not include bomb or missile targets in their second study of DU in Serbia and Montenegro conducted in Autumn 2001.

In **October 2001** first reports of the Afghan bombing campaign referred to use of **GBU 28 Bunker Buster** guided bombs. These used "dense metal" warheads like other weapons in the USAF 1997 mission plan. On 16 October I sent a warning that these may be Uranium weapons to the UK Government via my MP. A reply from UK Minister for Veterans Affairs & DU, Dr Moonie, dismissed this possibility and said that DU was "too soft" for hard targets and presented "minimal" health hazards. This year the MoD acknowledged that DU alloys (used in armour plating and high velocity anti-tank penetrators) can be extremely hard.

Throughout the Afghan war I monitored bombing reports from the Center for Defense Information <http://www.cdi.org>, investigated other potential uranium weapons systems and monitored statements by the US and UK Governments. The results with sources were published in **Depleted Uranium weapons 2001-2002, Mystery metal nightmare in Afghanistan?** published 31 January 2002 (3), available from Politicos bookshop in London (<http://www.politicos.co.uk>) and online at <http://www.eoslifework.co.uk/du2012.htm>

The report identified **7 scenarios for Uranium contamination in Afghanistan** (page 95) and **21 suspected DU weapon systems** (page 131). Part 5 lists **27 conclusions** identifying the need to inspect the weapons concerned, the environment in areas where they had been used, to initiate health and safety precautions for all civilians and troops exposed to hard target bombing and to set up urgent health monitoring for Afghan and expatriate civilians, refugees and allied troops. These conclusions provide the basis for action priorities in section 13 below.

The report was sent to several **UN agencies** including **WHO, UNEP** and **UNIDIR**, to **NGO's** ICRC, MSF and a de-mining network, and to the **UK Government** and media. It was reported in **Le Monde Diplomatique in March 2002** (<http://mondediplo.com/2002/03/03uranium>), leading to a **question in the EU Parliament in Strasbourg by MEP Paul Lannoye on 9th April (2)**.

Several **UK MPs** submitted written questions to the UK Government regarding these concerns from October 2001 onwards (quoted in Part 2 of the report). There appears to be a cross-party consensus (or veto) not to question Uranium weapons in open debate in the UK Parliament.

All enquiries in the UK and EU Parliament have received very brief denials from Defence ministers that any DU weapons have been used in Afghanistan. On 5 Nov 2001 Defence Minister Geoff Hoon said that DU safety guidelines would be issued if necessary for troops or civilians. On 16 January **Donald Rumsfeld** reported an elevated level of radioactivity in one area in Afghanistan due to "depleted uranium on some warheads", allegedly missiles captured from Al Qaeda in December (report page 120). But no DU warning was published in UK.

The Pentagon did not report the type of missiles found or which country made them. However the risk of Al Qaeda using radiological "dirty bombs" was a major theme in Pentagon statements from 5th December 2001 to May 2002. This proposition may be raised again by the US Government if serious Uranium contamination is discovered in Afghanistan in the near future.

Apart from the Jane's Defence website no guided weapon system (excepting nuclear) in any country has been officially acknowledged to use Uranium warheads. However in March 2002 the UK MoD website, DU Research Proposal Appendix A (9) disclosed "**Anglo-French research on a tandem warhead with depleted uranium lined rear charge**" in January 1999, first studied in 1995 and later tested at Aldermarston and Eskmeals (10). This may have been for the TRIGAT project, or the BAE-RO BROACH warhead (see section 5 below). On 6 December 2001 UK Defence spokesman Mr Ingram gave a written reply about the BROACH warhead: "The only dense metal contained in the BROACH MWS is a tungsten-based alloy. No other dense metal is or has been used in its development or testing". This needs independent verification - the high melting point of Tungsten would seem unsuitable for the shaped charge.

The principle that Uranium (depleted or not) is used in some guided weapons, as well as anti-tank penetrators, is now established by statements from Jane's, Donald Rumsfeld and the UK MoD. The question now is not "Has Uranium been used in guided weapons?" but "Which ones, how many, when and where?"

The UNEP PCAU (Post Conflict Assessment Unit) started planning environmental surveys in Afghanistan in December 2001. However, despite my warnings about the risk of DU warheads in bombs and missiles sent to them in March 2001 and in February 2002, **no UNEP environmental monitoring for Uranium contamination has been reported from Afghanistan since the bombing started 11 months ago.**

NATO delayed the UNEP Kosovo DU study until 16 months after the Balkans War, and after at least 10 NATO survey teams had been allowed to "inspect" (clean-up?) DU target zones (source: US DoD). The latest report is that **UNEP PCAU will start a project in Afghanistan this month** (September 2002). See <http://postconflict.unep.ch/actafghassessment.htm>

However, on 28 August Afghanistan PCAU Project Co-ordinator Peter Zahler (who joined UNEP in May from the USA) said **UNEP has no specific plans to investigate Uranium contamination risks in Afghanistan**. He seemed unaware of my report though he had been shown a copy and thoroughly briefed about it in May. Bomb and missile targets are conspicuously absent from both UNEP Balkans DU studies. Despite its valuable expertise and detailed reports the integrity of UNEP environmental monitoring for Uranium contamination in the Balkans, and for its new studies in Afghanistan, Bosnia and Palestine, appears to be compromised by external pressures.

The first UK Press report on suspected use of Uranium in bombs and missiles was published by David Hambling in the Guardian on 5th September 2002 - **The heavy metal logic bomb (7)**. He checked available dimensions of advanced penetrators and concluded that "the AUP-116 has around a quarter of a ton of dense metal ballast. This ballast might not be DU at all; tungsten is similarly heavy. But DU is the military's usual choice."

<http://www.guardian.co.uk/science/story/0,3605,785897,00.html> .

Will other UK editors or MP's risk breaking the silence surrounding these secret warheads before the UK Government commits to supporting their use again in Iraq?

4. Guided bombs to be used in Iraq

The following **hard target guided bombs** are operational and have been used in bombing caves, bunkers and other strategic targets in Afghanistan. Most were also tested in the Balkans in 1999. These versions all contain "dense metal" **advanced penetrator warheads** (see also [Figure 1](#) and [Table 1](#) updated from *DU weapons 2001-2002* and Part 3 of the report).

- **GBU-28 & GBU-37 Bunker Busters** - 2 tons with BLU-113 "dense metal" warhead. The secret "dense metal" ballast is estimated to be 50-75% of warhead weight - up to 1500 kg. (For comparison 1450 kg of DU was released when nearly 300 DU anti-tank shells were destroyed in the Doha ammunition dump fire in the Gulf in 1991).
- **GBU-15, 24, 27 and 31 JDAM** hard target guided bombs - 2000 lbs. The upgraded BLU-109 warhead uses an Advanced Unitary Penetrator designated AUP or BLU-116 with "heavy metal" ballast (500+ kg). GBU 24's or 31's were involved in the friendly fire bombing accidents in Afghanistan and in the bombed Afghan wedding incident this year.
- **GBU-32 JDAM** hard target 1000 bomb with BLU 110B "dense metal" warhead (250+ kg). Possibly involved in the Canadian friendly fire bombing incident.
- **GBU-118B thermobaric bomb** - 2000 lbs uses the BLU 109 upgraded "dense metal warhead" casing (BLU/AUP-116 for high penetration) and a modified explosive.

The latest addition to the US hard target guided bomb inventory, reported in March 2002, is the **"Big BLU" Bunker Buster**. This is a **20,000 lb. guided bomb**, scaled up from the GBU-28 Bunker Buster. It also has a warhead with "dense metal ballast" - **potentially 5+ tons of uranium per weapon**. <http://www.globalsecurity.org/military/systems/munitions/dshtw.htm>

This 20,000 lb bomb was first proposed in the 1997 USAF mission plan - see original USAF specification on page 15 of the DU weapons report, or on the FAS website at: http://fas.org/man/dod-101/usaf/docs/mast/annex_f/part26.htm project WPNS 104.

5. Cruise missiles to be used in Iraq

The following are the hard target versions of cruise or air-to-ground (AGM) missiles, some with advanced penetrators, others with shaped charges, some with both. See Figure 1 for sizes, Table 1 for combat use, and **DU weapons** Part 3 for specifications and links. Combat use in Afghanistan confirmed by CDI and other reports:

- **AGM 130C** - 2000 lbs, rocket propelled version of the GBU-15 with AUP-116 "dense metal" warhead.
- **AGM-86D - CALCM** - the biggest, long range cruise missile converted from nuclear to "dense metal" warheads since 1998. Uses a Lockheed Martin AUP3M advanced penetrator warhead, reported 1200 lbs. BAE-RO developed their BROACH warhead for the CALCM in 1998. Both were under competitive evaluation (combat testing?) during the Balkans War. 30+ were used in Afghanistan until stocks ran low in December.
- **AGM-142 Raptor/Hav Nap** (Israeli design) cruise missile with 800 lb penetrator warhead. Developed in the early 1990's. Used in Afghanistan when 86D stocks ran low.

Several smaller AGM missiles (**Maverick, Hellfire / Brimstone**) and the most widely used cluster bomb BLU-97B all have "shaped charge" warheads, suspected of using DU liners. All were operational during the Afghan War and would be used against surface targets in Iraq.

The following **new hard target missiles** were officially still under development in 2001 but pre-production prototypes should have been ready for combat testing in Afghanistan. They are likely to be included for further testing or ready for full operational use in an attack on Iraq this year:

- **AGM-154C JSOW** BROACH warhead, 500 lbs. 154A version combat tested in the Iraq no-fly zone in 1999. C version tested May 2002, initial production 2002-3.
- **AGM 84 SLAM-ER** - high-explosive blast "Titanium" warhead (488 pounds) with double the penetration effect of its previous Tomahawk penetrator warhead. Suspected to use a DU/Titanium shaped charge warhead.
- **AGM 158 JSSAM** - AUP warhead
- **BGU-109 Tactical Tomahawk Penetrator Variant** with 1000 lb "dense metal" penetrator warhead.
- **UK Storm Shadow / French SCALP-ER** cruise missile (originally due for operations December 2001) BROACH Multiple Warhead System (shaped charge plus dense metal rear penetrator warhead) - either 500 (as for AGM-154C) or 1200 lbs (option for AGM-86D).

US and allied forces used over 6000 guided weapons (smart bombs and missiles) **in bombing raids in Afghanistan**. Their heaviest use was against caves in Tora Bora and Gardez but many were used in initial air attacks on command centres and other strategic targets in towns, air fields, Taliban training centres and the underground Karez water supply systems. **If only 1 in 3 of these used hard target warheads then the campaign may have dumped over 1000 tons of toxic, radioactive Uranium Oxide dust into the Afghan environment.** If so this will have spread over wider areas during summer heat and high winds.

These weapons would require a variety of different Uranium alloy mixes (with Titanium, Niobium or Molybdenum) to achieve different mechanical properties, and varying isotopic mixes (ratios of U238, 235, 236 etc) depending on source of production or to make widespread contamination hard to differentiate from natural uranium. The Taliban and Al Qaeda were unlikely to have the resources to make or deliver large uranium bombs or missiles but may have acquired small ground launched anti-tank missiles with Uranium warheads, or supplies of Uranium to manufacture static dirty bombs from other countries. Medical and environmental testing laboratories will need to consider all these possibilities.

Table 1: Combat use of known and suspected conventional Uranium weapon systems with dense metal penetrators or shaped charge warhead technology (updated September 2002)

Weapon	Gulf War 1991	Bosnia 1995	Desert Fox 1998	Balkans War 1999	Iraq no-fly zone 1992>	Afghanistan 2001-2	Iraq 2002 /2003
Guided Bombs (AUP upgraded versions)							Big BLU
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	?
GBU-118/B Thermobaric						Y	?
SSB					P	P	D
Guided missiles							
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
Sub-munitions							
BLU-108/B A/Tank cb				?		?	?
BLU-97B cluster bomb				Y		Y	?
Armor-piercing ammunition (DU confirmed)							
20mm Phalanx sea-to air							
25mm M791						?	?
30mm PGU-14/B	Y	Y		Y		?	?
120mm-US & Charm-UK	Y	?					?
<p>Key: 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</p> <p>Note: Data on warhead technology, operational status and combat use taken from: Federation of American Scientists; Jane's Defence; Center for Defense Information; Hansard.</p>							

6. Widespread health hazards of large Uranium weapons

In the 1991 Gulf War Allied forces admit to using 300+ tons of depleted uranium. These are strongly suspected by independent researchers of being a prime factor in the epidemic of birth defects, leukaemias and cancers in Iraq over the last 10 years with tens of thousands of victims. Over 200,000 US and allied troops were exposed to DU contaminated battlefields.

The US Government, supported by some 40 countries including the UK, voted to cancel a WHO study into the effects of DU on civilians in Iraq in November 2001. There have been no thorough studies of the health effects of DU contamination in civilian populations by NATO countries or WHO. Women and children are more susceptible to the hazards of low level radiation than fit soldiers. Studies by doctors in Iraq are limited by minimal medical resources, none sufficient for detailed medical analysis of uranium contamination.

7. International proliferation of Uranium weapons

The US have already exported known and suspected DU weapons to over 20 countries in Europe, the Middle East and Commonwealth. These may involve several \$ billions of existing inventory and new orders. Other Governments that manufacture or have purchased Uranium weapons are likely to be compromised into maintaining US secrecy over the extent of conventional Uranium weapons proliferation. They may face serious legal and political consequences if chronic illnesses or deaths in Iraq, the Balkans and Afghanistan are proved to be due to Uranium contamination. The stakes are very high for all countries concerned.

The potential variety and sources of Uranium weapons may go well beyond the 21 systems identified in the Appendix plus the 2 latest guided bombs. The UK MoD is currently evaluating options to import 5,000 **SPIKE** anti-tank missiles from Israel, against the equivalent JAVELIN missiles from the US, to replace the aborted Anglo-French TRIGAT project.

SPIKE and JAVELIN both use small but powerful tandem warheads capable of penetrating 600+ mm of armour. In view of the MoD's research these systems are likely to use a DU shaped rear charge. If so these tests raise fresh environmental concerns for residents in MoD testing and training areas e.g. Eskmeals. Though small they may be used in large numbers, potentially adding significantly to battlefield Uranium contamination. Parliament must question the precise construction of both systems and veto use of Uranium warheads of any size as a violation of the principles of the Geneva conventions - weapons of indiscriminate effect.

8. Conspiracy of silence over Uranium health effects?

Several countries that have purchased or developed Uranium weapons, including the US and UK, have already repressed prompt and comprehensive health and environmental research by UN agencies (UNEP, WHO). Target information and access necessary for monitoring the worst contaminated areas was delayed for 16 months by NATO in the Balkans.

Access for Uranium monitoring in Afghanistan has been delayed for 10 months. If large Uranium weapons were used casualties caught in the explosion plume may have died soon after. Taliban doctors reported several undiagnosed deaths within 2-3 days of bombing incidents that they suspected were due to chemical or uranium weapons. (Reuters 29 October 2001, see DU weapons report page 35).

Allied Governments may already be well aware of the hazards of Uranium weapons. The Bulgarian contribution to the ISAF force in Afghanistan included a team of 20 radiation decontamination personnel. (Bulgarian News 9 January 2002, <http://www.news.bg>).

In 2000 rising death rates among Spanish and Italian Balkans veterans from lymphomas and leukaemias caused alarm and led to a health survey of Balkans veterans in several NATO countries. Results published by the US DoD in October 2001 (DU report page 116) indicated no significant DU-related health problems. The UK has not surveyed its Balkans veterans.

Fortunately most NATO troops may not have been at risk in the Balkans except those deployed to most heavily bombed regions. The use of hard target bombs and missiles was most intense in the western region, where Italian and Spanish troops were assigned, and in Serbia.

When low level radiation epidemiologist Chris Busby re-analysed the Italian statistics he found they had used invalid reference groups. His corrected analysis indicated 11 times the expected rate of Leukaemias and Lymphomas. Health statistics for Spanish and Portuguese veterans may need similar recalculation. They were also deployed in western Kosovo in 1999.

Allied governments may already be aware of unusual health problems for troops assigned to Afghanistan. Initial influenza type symptoms were reported by US troops soon after service in the Gulf War in 1991. Significant Uranium exposure may lead to an increase in birth defects or miscarriages for veterans families and civilians 9+ months after the bombing started i.e. from now onwards. Special forces troops assigned to inspect heavily bombed targets are at highest risk unless they had full NBC protection. Cancer rates may increase progressively over 5-10 years - based on experience in Iraq since 1991 and a WHO survey of low level radiation exposure in Russia following the Chernobyl nuclear power station fire.

If US war plans for Iraq use hard target weapons with uranium warheads similar grim health prospects may await allied troops deployed in ground operations.

The UNEP PCAU post-conflict environmental assessment project in Afghanistan is vital to identifying potential hazards from suspected Uranium weapons for troops and civilians. Its findings may be essential to identify priority areas for health monitoring. All **seven DU scenarios** in the DU weapons report (page 95) should be considered. Uranium monitoring is needed in areas hit by allied bombs or missiles, cluster bombs and landmines. They may also detect Uranium from Al Qaeda weapons or from the war with Russia.

The speed and integrity of the PCAU Afghan study needs the highest priority and support from UN member states.

9. Other health effects of Uranium weapons

Most medical studies of uranium contamination for veterans have been carried out years after initial exposure, far too late to allow de-contamination treatment. There seems to be no systematic study of the early onset effects of Uranium oxide exposure. Early symptoms have been identified by personal reports from veterans in media interviews. It is now 10+ months since local citizens and some allied troops may have been exposed to Uranium weapons.

There has been an urgent need for Uranium monitoring (in the environment and for troops and civilians suffering respiratory or intestinal problems) in Afghanistan ever since the first suspicions and warnings that Uranium weapons may have been used (16 October 2001).

Afghanistan has many endemic health problems. During the early stages of the war, effects of mild DU contamination may have been hard to recognise. Medical teams faced with severe trauma casualties would have had minimal time, and (unlike the Balkans) no briefing to be alert for potential Uranium contamination. Extensive bombing caused a lot of atmospheric pollution - "the haze over Kabul" noted by one reporter. This may have caused the persistent cough noted by another journalist among media and aid workers in bombed areas. Has anyone documented personal health problems despite more immediate hazards like mines and bombs?

A range of Uranium health effects are possible depending on dose (how much is inhaled or ingested), duration of exposure (brief or ongoing), age, gender and the type of material involved (refer High exposure DU health risks, Part 4, section 3 and Figure 2 in the DU weapons report). Over a longer period there may be several phases from early onset medical conditions (e.g. birth defects) to slower onset conditions like cancers. Uranium oxide is a toxic heavy metal. Toxic effects may be most significant soon after exposure e.g. on the renal system (refer Royal Society report, March 2002). Internal radiation hazards may take months or years to become evident.

Toxic and radiation effects on the immune and nervous system may develop in weeks depending on level and duration of exposure. Some Gulf Veterans reported temporary loss of feeling in hands and feet - potentially important diagnostic clues to Uranium exposure for medical personnel with limited facilities.

I have not seen any follow-up health reports on the 4 SAS troops evacuated sick, presumed wounded, for the US or Canadian troops caught near fratricide (friendly fire) bombing incidents or for the Marines based at Bagram airport who suffered a mystery vomiting illness in May http://news.independent.co.uk/world/middle_east/story.jsp?story=296255, <http://news.bbc.co.uk/1/hi/uk/1989777.stm>. After several days of uncertainty this was officially attributed to common "winter vomiting sickness". But Bagram was heavily bombed last autumn and is a potential Uranium risk area. Similar health problems were unofficially reported for many local civilians.

Uranium screening (urine testing) would seem prudent for all expatriate personnel exposed to bombing incidents or heavily bombed areas if this has not already been done, especially those who experience unusual medical problems.

In June-July family doctors in UK were advised to expect flu or malaria-like symptoms among UK troops returning from Afghanistan. "All practitioners should consider malaria if consulted by UK service personnel who have served in Afghanistan complaining of fever, a flu-like illness, or other unexplained symptoms." (11). This is prudent for individuals returning from a country with minimal public health facilities and a number of infectious diseases. But co-ordinated health monitoring is important to identify unusual collective health problems.

Earlier this year there were outbreaks of a more severe gastric illness initially reported as CCHF (**Crimean Congo Haemorrhagic Fever**). CCHF is endemic in parts of Afghanistan in the summer. But see the Action Against Hunger report about the village of Tajwara in February at: <http://www.msnbc.com/news/721381.asp#BODY>. This report is not on WHO epidemic reports but the UN was aware according to <http://www.ph.ucla.edu/epi/bioter/outbreakkills28afgan.html>.

A specialist was concerned because February was the wrong season for CCHF and that laboratory tests failed to confirm CCHF, as in Bosnia several months after bombing there (<http://www.who.int/disease-outbreak-news/n1996/feb/n5feb1996.html>), and in south western Kosovo in 2001 (<http://www.who.int/disease-outbreak-news/n2001/june/8june2001.html>). In 1995 Professor Siegwart Horst Gunther listed symptoms associated with DU exposure in Iraq (DU report page 107). Severe vomiting, diarrhoea and internal bleeding are potential symptoms of significant exposure to toxic or radioactive materials.

Dr Asaf Durakovic, professor of radiology and nuclear medicine, started research with DU casualties in the Pentagon and now heads the independent UMRC (Uranium Medical Research Center) in Canada. (see <http://www.umrc.net> for research papers). He has pioneered independent research with US, Canadian and UK Gulf veterans to identify levels of internal Uranium contamination. He works closely with Leonard Dietz and Pat Horan. Their latest veterans study was published in the **Journal of Military Medicine**, August 2002;167(8):620-7, summary at <http://www.xs4all.nl/~stgvisie/quant-du.html> [and see [update](#) 20 October, ref 12]

Several of the warnings and questions I raised in October-November 2001 (first report pages 27, 37, 41, 46, 49) were followed up rapidly by several UK MP's in written questions to the Government from October onwards. They received very little investigation by the media in the UK or other countries except for reports in France and Australia. Whether this was due to security restrictions on the media since the War on Terrorism is not known.

10. Grim outlook for Iraq

US guided weapons stocks should be back to September 2001 levels by early October according to recent media reports in New York. **This implies that another 1000 tons of suspected Uranium based, hard target guided weapons will soon be ready for use in Iraq if President Bush's war plans go ahead.**

On 16th September Donald Rumsfeld said he wanted to reduce the risk to pilots patrolling the Iraqi no-fly zones. This suggests that **US and UK forces may increase the use of medium range missiles as well as smart bombs in Iraq soon - without declaring war or waiting for UN consent.** Use of guided weapons in the no-fly zones needs investigation. At least one of the suspected DU missile delivery systems - the AGM 154 Joint Stand Off Weapon - was first combat tested in the Iraq no-fly zones in 1999 according to US military reports. Many other hard target weapons may have been tested there in recent years. Additional uranium contamination and its health effects on civilians could be hard to identify in areas first attacked in 1991.

Uranium warheads, depleted or not, are radiological bombs - weapons of indiscriminate effect that will permanently contaminate target environments. The half life of U238 radiation is 4.5 billion years. Several areas of Iraq are now permanently contaminated.

The prospect of allied forces and governments knowingly increasing Uranium contamination in Iraq from 300 to 1300+ tons seems tantamount to genocide. Every politician and military planner associated with this decision - in the US, UK or other allied countries - should be aware of this moral and potential legal responsibility.

11. Nuclear versus conventional radiological bombs

The potential hazards of "conventional" Uranium weapons have been skilfully played down by US Government statements. These have included plans to develop nuclear penetrating bombs earlier this year, threats of radiological bombs being used by terrorists and the latest warning of potential first strike nuclear attacks by the US and UK Governments. Rhetoric about developing and using nuclear weapons, or exotic radiological bombs by terrorists, seems calculated to alter the threshold of "acceptable" weapons systems used in defence or in retaliation for attacks on September 11, 2001.

Talk of developing "nuclear bunker busters" earlier this year was not news to weapons researchers. The B-61 nuclear bunker buster bomb was tested in 1997. It might be useful to start earthquakes in fault zones but would create more surface contamination than the biological or chemical weapons target it hits. Use of extreme (nuclear) force to achieve "regime change" in Iraq would also alter the thresholds of acceptable force for terrorists. Tactically and strategically a nuclear strike makes no sense when existing systems can already achieve the same "agent defeat" effects in deeply buried targets.

Politicians and media analysts need to be aware of the systematic dis-information and secrecy used to minimise public vigilance about the hazards of Uranium weapons. (Refer **Don't Look Don't Find** by Dan Fahey <http://www.miltoxproj.org/DU/IOM-cover.htm> and other sources in Part 4, page 115-124 of the DU weapons report). The care taken to keep the mystery "dense metal" in hard target warheads secret suggests that its disclosure could be seriously compromising to manufacturers and the military. It is not a secret to weapons manufacturers in several countries who are using similar warhead technology. When extensive information is available about the general specifications of these weapons why should the warheads be secret - unless they are "conventional" Uranium weapons?

Uranium weapons - whether fission or non-fission - are all radiological bombs, equally outlawed by the Geneva Conventions. If the snowballing epidemic of cancer and birth defects in Iraq is due to long term uranium contamination from the Gulf War then similar public health disasters may be expected in the Balkans and Afghanistan. The potential scale of human suffering and long term fatalities is awesome. The permanent environmental contamination and hazards of using thousands of "conventional" radiological guided weapons in many locations in Iraq could be as high as that caused by several tactical nuclear weapons.

The threat of using tactical nuclear weapons does not reduce the grave risks of using conventional uranium weapons. But most politicians and media analysts are probably completely unaware of this conventional weapons threat. Both strategic options need full analysis and public debate.

12. Urgent action needed on conventional Uranium weapons

This update continues a quest to establish the truth about suspected "conventional" Uranium weapons and their effects in target communities. Parliaments and media across the world are urged to demand the following actions **before** sanctioning any new military action by the USA in Iraq or other countries:

1) Independent inspection of suspected uranium weapons

Immediate, independent investigations by UN inspectors and Parliamentary representatives are needed to verify the materials used in all the suspected Uranium weapons identified in this analysis. These must include current weapon stocks and manufacturing facilities in all countries, and full disclosure of combat use since 1990.

These inspections are needed to verify the exact nature of the "mystery" metal or metal alloys used in all hard target guided weapons. The first priority are those systems already used in Afghanistan, the Balkans, Iraq or any other combat zone since 1990, and all those intended for use against Iraq.

A list of suspected Uranium weapon systems is given on page 131 of **Depleted Uranium weapons 2001-2002** plus BLU-118/B and Big BLU (see [Table 1](#)). This should be extended to include any weapon systems in other countries using similar hard target warhead technologies (explosive penetrators or shaped charges) e.g. SPKIE, JAVELIN and several similar tandem warhead anti-tank missiles.

Weapons inspections need to include **disclosure of all training and combat locations** where suspected Uranium weapons have been used since 1990 so that these can be tested for environmental contamination and potential hazards to local communities, troops or other civilians exposed to them.

2) Independent environmental monitoring for Uranium contamination in Afghanistan and other recent combat zones

Rigorous environmental monitoring for Uranium contamination is needed in Afghanistan and re-survey of other recent combat zones. Both UNEP studies (2001, 2002) of Depleted Uranium in the Balkans excluded guided bomb, missile and cluster bomb targets. Surveys need to include soil, water, air, plants and animals for uranium contamination within 10 kilometres of all bombed areas in Afghanistan, the Balkans and Iraq. National parliaments and UN member countries need greater vigilance to assure the independence of monitoring teams and laboratories and to confront any political or military interference.

All environmental monitoring samples and data acquired by military inspection teams operating in Afghanistan should be disclosed for comparison with new surveys.

A new survey of Uranium contamination in the Balkans is needed to investigate targets hit by guided bombs, cruise missiles or cluster bombs - omitted in UNEP studies of Kosova, Serbia and Montenegro. New UNEP studies in Bosnia-Herzegovina and Palestine must include bomb, missile and cluster bomb targets and targets hit by armoured vehicles or helicopters equipped to fire anti-tank Uranium ammunition or tandem warhead missiles. A major survey in Iraq should be planned as soon as diplomatic conditions permit.

These environmental surveys need to be correlated with suspected combat use, target locations and the weapon systems used, as requested in (1) above and identified in [Table 1](#).

3) Independent health monitoring of troops and civilians exposed to suspected Uranium weapons

Independent and ongoing health monitoring is needed for troops and civilians (local residents, refugees and expatriates) exposed to suspected Uranium weapons in Afghanistan, the Balkans and Iraq. This should include local citizens, aid workers, troops and refugees or civilians now in other countries who were within 10 kilometres of guided weapon targets in Afghanistan or the Balkans. Highest priority is needed for Uranium screening of medical patients suffering respiratory, stomach or kidney disorders, birth defects, lymphomas or leukaemias, and patients who die from these conditions.

Medical groups (local medical staff, NGO's and occupational health teams in home countries) need to be briefed on identification of potential Uranium related illnesses. The geographic location of potential exposures needs to be included where possible. Survey data should be co-ordinated by the WHO, preferably in co-operation with other independent medical research organisations.

The International Atomic Energy Authority (IAEA) has a crucial role to play in identifying sources of radiation in suspected Uranium weapons. Its terms of reference include investigation and advice on health effects of radiation, overlapping with WHO interests in international health and illnesses. It also has the most sophisticated resources to analyse suspected Uranium contamination, and potentially databases on the isotopic profiles of Uranium from different countries and manufacturing processes.

Unfortunately the IAEA's obvious links with the nuclear industry around the world are treated with suspicion by independent radiation researchers. Its impartiality needs to be assured if UN member states are to trust its findings and recommendations on the use of conventional Uranium weapons to date.

At a radioecology conference in Monaco in September 2002 physical chemist Pier Roberto Danesi, former director of the International Atomic Energy Agency's (IAEA's) laboratory in Siebersdorf, Austria said "There is a consensus now that DU does not represent a health threat" (Report in Science Mag, 13/9/02 at: <http://www.sciencemag.org/cgi/content/summary/297/5588/1801>).

Each country that has sent troops or civilians to suspected Uranium combat zones since 1990 needs to set up independent health monitoring programmes for personnel involved, or to review those already established. These to include assessments of uranium contamination for all personnel at risk i.e. who have been in or near hard target bombing locations and related water catchment areas. Best practice standards of epidemiological analysis are essential to avoid repeating errors in NATO data for Italian Balkans veterans.

Health monitoring programmes need to include early Uranium screening and regular follow-up health checks by employers (military, NGO's, media etc.) of all personnel returning from suspected Uranium combat zones (currently Iraq, the Balkans and Afghanistan). Personnel found to have significant internal Uranium contamination may be helped with kelation treatment if detected early. Ongoing monitoring may enable early treatment of slow onset disorders.

Results of Uranium health screening and general health monitoring need to be published regularly (at least annually) for the next 5 years to enable national and international health statistics to be compared. This should include data on Special Forces personnel that would usually be classified secret.

Parliaments, professional medical associations, universities and other medical or environmental research organisations, and the media need to be highly vigilant for any military, political or commercial interference with the speed and reliability of Uranium screening and health survey results.

4) Aid and protection to communities at risk of Uranium contamination

Medical aid and environmental protection is needed for all civilian communities at risk of Uranium contamination. The greatest urgency is needed to **identify areas of potentially high Uranium contamination** so that civilians can be relocated to safe areas, and to avoid repatriation of refugees to Uranium contaminated environments.

Communities living in areas contaminated by large Uranium weapons are at risk of chronic and cumulative exposure via soil, water or air and food contamination. They may have already experienced early onset Uranium-related health problems and face a grim outlook requiring high levels of medical support - as seen in Iraq. Financial liability for medical support stands morally and possibly legally with any government that has deployed Uranium weapons in combat or training in their own country or overseas. This includes locations within the USA or US jurisdiction e.g. Vieques, in the UK and probably in all other countries that manufacture or purchase Uranium weapons.

Where possible environmental clean-up should be done, at least to contain existing contamination and protect water supplies. Full clean-up for heavily contaminated target areas is currently uneconomic. Plans to clean-up of the US Jefferson Proving Ground have been stopped due to an estimated cost of \$7.8 billion.

5) Review of Uranium medical research

Past medical research, hazard assessments and policy advice concerning Depleted Uranium (DU) weapons need to be reviewed if they were based on Uranium exposure from small penetrator warheads (less than 6 kg), or if they overlooked widely varying levels of U235, U 236 and Plutonium contamination (Dirty DU).

Most existing medical research on the health effects of Uranium weapons, and environmental hazard research has been based on the use of relatively small anti-tank penetrators (weight from 0.27 to 5 kg) with low rates of conversion to oxide dust.

Most studies have assumed fully depleted Uranium as a source hazard. They have also been based on military personnel exposed to contaminated environments for a short period of time - days or weeks.

Assumptions about radiation and toxic health hazards from such studies - mostly assuming "minimal" health risks - are not likely to be valid in combat zones where **high load** (large warhead) Uranium weapons have been used. These may have dispersed from 10 to 1500 kg of Uranium per weapon, mostly as oxide dust generated in large, very high temperature explosions with high oxidation rates and powerful convection effects for atmospheric contamination. Underground explosions may lead to heavy Uranium contamination of ground water or underground supplies (e.g. the Karez in Afghanistan).

The second Royal Society DU report (2002) recognised the potentially lethal toxic effects (death in 3 days from renal failure) of acute exposure to large quantities of Uranium oxide. Early DU health studies and advice e.g. by RAND and WHO require radical review of potential health hazards.

Special priority is needed for researching the health effects of Uranium weapons contamination on civilians - especially women and children, who are most vulnerable to internal radiation and chromosome damage owing to higher rates of cell division. These studies need to include communities with chronic exposure to Uranium contaminated environments, to contrast with existing data based on short term exposure risks for troops.

The proposed WHO Uranium study in Iraq could provide the most comprehensive evidence on these issues. It was vetoed by UN member states under pressure from the US in November 2001 but should now be re-commissioned.

Most previous studies have assumed the use of depleted forms of Uranium in weapons (U239 99.7% U235 less than 0.3%. But in the last 18 months varying levels of transuranic contamination from reprocessed nuclear fuel and different isotopic mixes (U235 / 238 ratios) have been identified by independent laboratories. These variations may lead to faster, more diverse and severe medical effects from new Uranium weapons than from those known of in the 1991 Gulf War.

Laboratories, researchers and scientific advisers to governments need to take these new factors into account when considering potential health effects of suspected Uranium weapons in Afghanistan and in a new attack on Iraq.

Conclusions: need for urgent public debate about weapons to be used against Iraq

There has been very little media coverage and no public debate about the new generation of hard target guided weapons used in the Afghan war. Over 2,000 were used. **If the secret metal they use is Uranium then 1000+ tons of fine oxide dust will have contaminated many areas. Thousands of Afghans, and many expatriates, may have been exposed to moderate or severe levels of uranium contamination with grave implications for their long term health, similar to those in Iraq since the Gulf War.**

Hundreds or thousands of civilians in Afghanistan may already have died from acute Uranium exposure, their symptoms compounded by, or misdiagnosed as, common causes of death during the Afghan winter e.g. pneumonia, acute gastric infections and malnutrition. There are very few independent laboratory facilities for medical or environmental analysis of Uranium contamination in the world and none in Afghanistan.

International proliferation of known and suspected Uranium weapons - to over 20 countries since 1991 - is a major arms control problem. The **5 action points** identified above indicate **the complexity and scale of responding to Uranium weapons contamination and the public health disasters they may cause**. These effects can be seen already in Iraq and for Gulf War veterans since 1991. They represent a grave risk not yet assessed in Afghanistan.

To launch another military campaign in Iraq on the scale of the Afghan war - with the same suspected armada of Uranium weapons - and without attempting to evaluate their health and environmental impacts in Afghanistan and on allied troops and expatriates seems irresponsible beyond belief, verging on genocide.

Until these questions are raised in the national and international media, **most politicians will be unaware of the hazards and scale of problems of Uranium contamination that may now exist in Afghanistan and parts of the Balkans caused by allied bombs and missiles**. If politicians and governments have been deceived about these hazards they may inadvertently support US action in Iraq with the same Uranium weapon systems - a grim responsibility.

The military are employed to conduct wars effectively by any means authorised by their governments. The legal, moral and ethical consequences of war are the ultimate responsibility of governments, not the military. **If the perceived threat from Iraq is considered serious enough to justify using weapons of indiscriminate effect - nuclear, chemical or radiological - this should be a decision for parliaments and the UN General Assembly, not the Pentagon or heads of state that rely totally on military briefings.**

In the absence of public questions and debate about Uranium weapons, political representatives have had to rely on cumulative pro-Uranium propaganda since 1991. This includes statements from government, military and commercial sources (arms and nuclear industry) and several compromised scientific reports, even by UN agencies, that have relied on government or military funding and co-operation. Refer Part 4 of Depleted Uranium weapons 2001-2002.

Is Uranium the mystery metal in any hard target guided weapons? If so there may only be a few weeks left to prevent a new public health disaster in Iraq, larger than the one that already exists owing to 300 tons of Uranium weapons and the effects of sanctions.

This briefing will be sent to the UK Government, selected MPs and media contacts for consideration in the **Iraq War debate** in Westminster on Tuesday, **24th September**.

These questions and actions need to be raised in all countries that are expected to support a US led attack on Iraq, whether with troops, logistic facilities or by voting in the UN General Assembly. The USA, UK, France, Israel, Russia, Pakistan and any other country manufacturing suspected Uranium weapons must be called to account for their weapon systems by the UN General Assembly before their use is sanctioned in future military action. This includes weapons now being used by the US and UK in the Iraq no-fly zones. To widen this debate this updated analysis will be offered in the public domain via the Internet.

Any politician, leader or government that supports a new military offensive against Iraq before the identity and effects of suspected Uranium weapons used in Afghanistan are fully investigated would be wise to read Articles 35 and 55 of the First Protocol additional to the Geneva Conventions of 1949 very carefully.

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UPDATES

13 October 2002

Internet searches of US Patent Office records have verified the use of Uranium warheads as design options in 8 of the weapon systems listed in Table 1. See **US Patents confirm Uranium warheads** at: <http://www.eoslifework.co.uk/u23.htm#USpatreport> and summary of relevant Patent records at <http://www.eoslifework.co.uk/pdfs/USpats.pdf>.

27 October 2002

Additional Internet references have been added to some items in the text, particularly in Section 9, and to the reference list below.

On 20 October Dr Asaf Durakovic reported first results of Uranium testing on samples from Afghan civilians in his keynote address to the **3rd Gulf Countries Conference on Military Medicine and Protection against weapons of mass destruction** in Qatar (12):

"Our current data of biological samples from Kandahar, Kabul, and Jalalabad obtained by state of the art mass spectrometry analysis confirm over 100 times higher concentration of uranium isotopes in the biological specimens as compared with the control group. The several thousand hard target guided weapons used in Afghanistan and in the Iraq "no fly zones" should be addressed by the UN general assembly before any further use in future military conflicts."

References

- (1) Janis, I. L. & Mann, L. (1977). **Decision making: A psychological analysis of conflict, choice, and commitment**. New York: Free Press
at <http://www.cedu.niu.edu/~fulmer/grouphink.htm>

- (2) Written questions and answers in the UK Parliament are available in Hansard online. The only debating question in any parliament about **DU in Afghanistan** this year that I have found was asked by MEP P. Lannoye in the European Parliament, Strasbourg, 9 April 2002 <http://www.xs4all.nl/~stgvisie/VISIE/europ-parliament-afghanDU.html>
- (3) Williams, D (January 2002) **Depleted Uranium weapons 2001-2002, Mystery metal nightmare in Afghanistan?** at <http://www.eoslifework.co.uk/du2012.htm> and from Politicos bookshop, London (<http://www.politicos.co.uk>)
- (4) The new **UNEP PCAU study for Afghanistan** contains no reference to uranium or depleted uranium monitoring see <http://www.postconflict.unep.ch/actafghassessment.htm>
- (5) Parsons R.J. (March 2002) **America's Big Dirty Secret**, Le Monde Diplomatique in English at: <http://mondediplo.com/2002/03/03uranium>
- (6) Barraud, A (1 July 2002) **Was depleted uranium used in Afghanistan?** ABC Asia Pacific radio (Australia) http://www.abc.net.au/ra/asiapac/features/AsiaPacFeatures_595813.htm
- (7) Hambling, D. (5 Sept 2002) **The heavy metal logic bomb**, Guardian (UK) <http://www.guardian.co.uk/science/story/0,3605,785897,00.html>
- (8) Liolios, T.E. **Assessing the risk from the Depleted Uranium Weapons used in Operation Allied Force** *Science & Global Security* 1999, Volume 8:2, pp 163-181 http://www.princeton.edu/~globsec/publications/pdf/8_2liolios.pdf
- (9) UK Ministry of Defence (14 March 2002) **Proposal for a Research Programme on Depleted Uranium: APPENDIX A**. DERA reports April 1995 - May 2001 at: http://www.mod.uk/issues/depleted_uranium/du_research/appendix_a.htm
- (10) UK Ministry of Defence **Depleted Uranium -The Facts**, paragraph 6, Test firings... at http://www.mod.uk/issues/depleted_uranium/facts.htm
- (11) CDR Weekly Vol. 12 No 27 (4 July 2002) <http://www.phls.co.uk/publications/cdr/archive02/News/news2702.html#malaria>
- (12) Durakovic, A (20 October 2002) **New Concepts in CBRN Warfare in the Light of the Gulf War Experience and Current Reality of Global Terrorism**. *3rd Gulf Countries Conference on Military Medicine and Protection against weapons of mass destruction, Qatar*.

Internet distribution

This report is available on the Internet for international access in the following formats:

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Summary report plus latest updates for new US Patent Office information is available at: <http://www.eoslifework.co.uk/u23.htm>

United States Patent Office references to conventional guided weapons with suspected Uranium warhead components

October 12, 2002

Tables A and B summarise US Patents with references to weapons systems known or suspected to contain Uranium warhead components. They include extracts from public domain records on the US Patent Office database at <http://patft.uspto.gov>.

Searches can also be made through esp@ace.net at http://gb.espacenet.com/espacenet/gb/en/e_net.htm?search5. Further details of the patents listed below are available by searching these sites by Patent Number. Direct file links are not available.

Ongoing research

These extracts are the latest findings from ongoing research into the proliferation of Uranium warheads in "conventional" guided weapons - guided bombs, cruise and other guided missiles and sub-munitions. Enquiries started in January 2001 but the secret "dense metal" used in 23 suspected systems has been hard to verify. Until now its identity has been concealed by vague data from military and manufacturers' sources and denial or misleading responses to enquiries by the US and UK governments (refer **DU weapons 2001-2002*** pages 52-57).

These extracts are selected from the most obvious US patent records. Further research is needed including patents for other weapons and in other countries. Some Internet sources have become less informative or have removed detailed specifications of suspected Uranium weapons since the start of bombing in Afghanistan in October 2001.

Notes

US Patent 6389977 (Shrouded Aerial Bomb) clearly identifies **Depleted Uranium** as an intended design option for the hard target guided bombs most widely used in Afghanistan - upgraded versions of the 2,000 lb BLU-109/B hard target warhead with the AUP-116 advanced penetrator. These include versions of the GBU-15, 24 and 31 and the AGM-130C.

Patent 6389977 verifies Conclusion 1 in Depleted Uranium weapons 2001-2002 (page 129)* that some Advanced Penetrator warheads are designed to use Uranium as the main warhead casing or ballast.

The other patents listed in Table A indicate Uranium or Depleted Uranium as a viable design option to Tungsten **in other penetrator and shaped charge warheads and submunitions**. When Tungsten and other metals are compared for tactical effectiveness (high density and incendiary effects) and cost there is a high probability that Uranium (depleted or undepleted) has been chosen as the most cost effective combat option, despite comments recognising its health and environmental hazards.

The US Patents listed in Table B are relevant for analysts investigating weapons systems and warhead technologies that may use Uranium components or where it may be substituted with non-radioactive materials.

This search did not include patents for the use of Uranium in anti-armor penetrator ammunition, nor in nuclear weapons. Some numbers in the descriptions refer to diagrams in the original patent documents.

Further Information

Technical descriptions of some weapons using these patents are on the Federation of American Scientists (FAS) website at <http://www.fas.org/man/>

Items marked * are identified in **DU weapons 2001-2002** (January 2002), available online in PDF format at <http://www.eoslifework.co.uk/du2012.htm> or in hard copy or CD-ROM versions from Politicos Bookshop, London.

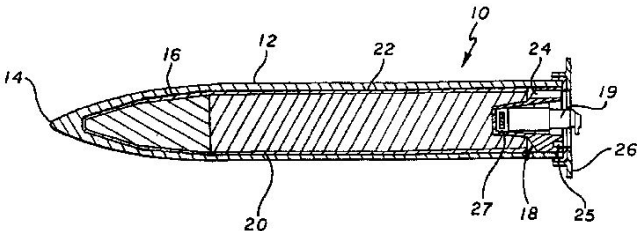
The implications of Uranium warheads in cruise missile and guided bombs for proposed military action against Iraq are considered in **Hazards of uranium weapons in the proposed war on Iraq** (September 2002), summary and full report at <http://www.eoslifework.co.uk/u23.htm>

Compiled by Dai Williams, independent researcher, eosuk@btinternet.com

Table A: US Patents with direct references to Uranium or Depleted Uranium (DU)

US Patent Number	Date	Title and extracts from patent specifications	Inventor	Assignee/Organisation & comments
4,638,737	June 28, 1985	<p>Multi-warhead, anti-armor missile</p> <p>A missile for defeating active armor¹ of a target as set forth in claim 3, wherein said primary warhead is made of a heavy metal selected from tungsten carbide and uranium ore</p> <p>A multi-warhead, anti-armor missile in accordance with this invention for defeating shielded armor of the type described above includes missiles 10a and 10b in FIGS. 2 and 3 each of which have two warhead sections. Missile 10a has a shaped charge main warhead (16) and missile 10b has a heavy metal type main warhead (18) which is made of a material such as tungsten carbide or depleted uranium that is designed to deliver a concentrated blow to the main armor of an armored vehicle. Missiles 10a and 10b each have secondary warheads (20) as illustrated with a multiplicity of a depleted uranium or tungsten carbide flechettes (22) that are mounted in holders for deployment and enclosed by nose cone sections (26).</p> <p>The secondary warhead includes a multiplicity of subcaliber kinetic energy warheads (22) as illustrated in FIGS. 2, 3 and 4 and these subcaliber warheads are preferably kinetic energy warheads that are referred to as flechettes and are made of heavy material such as depleted uranium or tungsten carbide</p> <hr/> <p>¹ Active armor also known as explosive reactive armor - an extra layer of armor plates with small explosive charges. When hit by a projectile the explosive blows off the plate deflecting the attack. Double warhead systems trigger the active armour with a small initial impact (in this case flechettes), followed by a main attack charge or penetrator.</p>	McIngvale	<p>US Army</p> <p>Example of anti-tank missile development for the US Army in the 1980's using Uranium warhead components.</p> <p>This system has not been identified but the TOW and Maverick missiles used extensively in the Gulf War (Desert Storm) 1991 had heavy metal warhead and shaped charge warhead options. (DU weapons * pages 82-3 & 88).</p> <p>Investigation of suspected Uranium warhead must include anti-armor guided weapons operational since 1990 and re-calculation of total Uranium tonnage used in Iraq in 1991.</p>

5,542,354	July 20, 1995	<p>Segmenting warhead projectile</p> <p>The warhead of claim 2 wherein said first housing and said second housing are independently each selected from the group consisting of iron, steel, tungsten, tantalum, depleted uranium and alloys thereof ...</p> <p>Other metals useful for the frangible first housing include tungsten, tantalum, depleted uranium and alloys thereof.</p>	Sigler	<p>Olin Corp, California</p> <p>The segmenting warhead projectile is launched from any suitable apparatus such as a grenade launcher, for example, the M-203 and Mark-19 utilized by the U.S. Armed Forces.</p>
5,691,502	June 5, 1995	<p>Low velocity radial deployment with predetermined pattern</p> <p>The invention can be employed in an interceptor missile for the purpose of increasing the area of potential impact with a target.</p> <p>Each lethality enhancing object (28) is preferably fabricated from a dense metal. While any suitable dense metal can be employed, metals having a density of at least 15 gm/cc are presently preferred, e.g., tantalum, tungsten, rhenium, uranium, etc.</p> <p>The higher densities permit a greater mass in a given volume or the same mass in a smaller volume, thereby enhancing the impact force of a lethality enhancing object (28) while decreasing the surface area exposed to aerodynamic forces. A presently preferred lethality enhancing object (28) is formed of pressed sintered particles of ductile tungsten</p>	Craddock, Graves	<p>Lockheed Martin Vought Systems Corp, TX</p> <p>Ground to air missile weapon system not identified.</p> <p>Patent involves multi-layered warhead casing giving variable control over fragmentation characteristics. Relevant in advanced penetrator warheads where fragmentation affects incendiary potential if uranium is used in casings.</p>

5,939,662	Dec 3, 1997	<p>Missile warhead design [Tomahawk]</p> <p>A hard-target penetrating warhead (10) adapted for use with length constrained warhead payload bays. The warhead (10) includes a warhead case (12) for containing warhead explosives (22, 27). A tungsten ballast (16) is disposed within the case (12) for providing a high warhead sectional pressure upon impact of the warhead (10) on a target</p> <p>The case (12) is a 330 pound penetrating thick-walled case constructed of 4340 mod aircraft quality steel alloy. The special nose (14) is a 6 caliber radius head nose (6 CRH, an arc with a radius of 6 times the diameter of the warhead) designed for maximum warhead penetration. The tungsten ballast 16 weighs approximately 240 pounds, and in combination with the nose (14) results in very high warhead sectional pressure. The tungsten ballast (16) and the special nose (14) provide significantly more target penetration than existing warheads whose lengths are constrained by payload bays or other factors.</p> <p>The ballast (16) is constructed of tungsten IAW MIL-T-21014D CLASS 4 cast and machined into the appropriate dimensions. The ballast (16) was designed to maximize ballast effectiveness while minimizing costs, however those skilled in the art will appreciate that other ballast shapes may be used without departing from the scope of the present invention.</p> <p>In addition, other ballast sizes and other materials such as lead or depleted uranium may be used without departing from the scope of the present invention.</p> 	Bootes	<p>Raytheon, US</p> <p>Example quoted for Tomahawk, or other missiles carrying penetrator in a weapons bay. This appears to be the warhead patent for Raytheon's Tactical Tomahawk Penetrator Variant approved May 1999. (DU weapons * pages 87-88).</p> <p>The concept in this patent is transferable to other cruise missiles.</p> <p>Like several other patents listed in Table A this application describes Tungsten ballast but specifically includes depleted uranium as an alternative ballast option.</p> <p>The earlier WDU-36 Tomahawk (Block III) warhead first used in the Sept 1995 Bosnia strike was reported to use Depleted Uranium (Hooper 1999, Liolios, 2002).</p>
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6,389,977	Dec 11, 1997	<p>Shrouded Aerial Bomb [BLU-109/B and variants]</p> <p>A target penetrating aerial bomb including a penetrating body shaped for improved target penetration, having a narrower impact profile at approximately the same weight as an existing bomb.</p> <p>An aerodynamic shroud encases the penetrating body and emulates the aerodynamic shape of the existing bomb, and the weight, center of gravity, and moments of inertia of the bomb closely approximate those properties of the existing bomb. The bomb constructed according to the present invention may be qualified by similarity to the existing bomb, thus avoiding lengthy and costly qualification procedures.</p> <p>Claims:</p> <p>1. a penetrating body having a nose section shaped with an ogive and having a hollow bore with an opening at a tail end and extending toward the nose section; and an aerodynamic shroud mounted to an outer surface of the penetrating body, the shroud including means for securing the shroud to the penetrating body, wherein an aerodynamic shape of the shroud is substantially identical to an aerodynamic shape of a selected, qualified aerial bomb and the penetrating body and shroud have a weight, center of gravity, and moments of inertia substantially similar to a weight, center of gravity, and moments of inertia of said selected, qualified aerial bomb ...</p> <p>4. The shrouded aerial bomb as claimed in claim 1, wherein the penetrating body is formed from tungsten.</p> <p>5. The shrouded aerial bomb as claimed in claim 1, wherein the penetrating body is formed of depleted uranium.</p> <p>The present invention relates to aerial bombs, that is, bombs dropped from aircraft, and more particularly, to aerial bombs for penetrating hard targets.</p> <p style="text-align: right;">/ ... continued</p>	Schmacker	<p>Lockheed Martin Corp Bethesda</p> <p>This is definitive patent for the outer casing of the upgraded GUB-15, 24,27, 31 and AGM-130C warheads. The shroud contains the AUP-116 advanced penetrator.</p> <p>This patent specifically identifies BOTH Tungsten AND Depleted Uranium penetrator versions.</p> <p>See USAF Mission Plan 1997 (DU weapons* pages 15-20). Also FAS website description of the GBU-24 2000 lb guided bomb with AUP-116 penetrator upgrade from BLU-109. (DU weapons* page 77).</p>
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More particularly, the present invention provides a bomb having **an improved penetrating warhead**, that is, a warhead that more deeply penetrates a protected target, however, the bomb is substantially identical in aerodynamic and mass properties to a qualified [already patented] bomb.

The bomb (20) includes a penetrating body (24) or warhead (shown in FIG. 2) and a shroud (40) shaped to emulate the aerodynamic shape of an existing, qualified bomb. In the exemplary embodiment, **the bomb (20) is shaped to emulate the BLU-109/B bomb**, that is, the outer shape of the shroud (40) is substantially identical to the outer shape of the hard case of the BLU-109/B. In addition, the weight, center of gravity, and moments of inertia of the bomb (20) are substantially identical to those physical characteristics of the BLU-109/B.

It is understood that **the invention is not limited to a particular diameter or weight ratio as compared to an emulated bomb**. The diameter and weight of the warhead are to be selected, for example, for the penetrating and explosive functions desired, within the constraint of the total weight of the warhead and shroud being approximately equal to that of the emulated weapon.

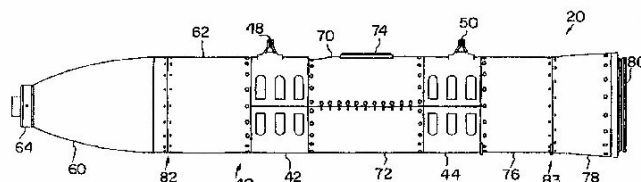


FIG. 1

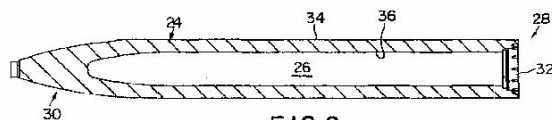


FIG. 2

6,308,634	August 17, 2000	<p>Precursor-follow through explosively formed penetrator (EFP) assembly.</p> <p>The precursor-follow through kinetic energy explosively formed penetrator assembly greatly enhances target penetration. It is formed of two sections: an initial precursor penetrator followed by a penetrator encapsulating a reactive material. The target will initially be perforated by the precursor penetrator with the second follow through penetrator containing a reactive material causing internal damage through a secondary reaction.</p> <p>The material of choice for the liner (20) is iron, tantalum, copper, or material of like composition, or of metallic materials such as silver, tungsten, or depleted uranium, or of other materials as described herein.</p>	Fong	<p>US Army</p> <p>Detailed description of explosively formed penetrators mainly for anti-armor guided weapons or submunitions e.g. the BLU-108/B anti-tank munition delivered in the CBU-97 "cluster bomb".</p> <p>See FAS website and picture in DU weapons * page 91.</p>
6,393,991	June13, 2000	<p>K-charge--a multipurpose shaped charge warhead</p> <p>A multipurpose warhead utilizes a shaped charge device with a shaped charge liner having an included angle in excess of 70 degrees. sealing an internal cavity that contains an explosive. A detonator system having a selectable plurality of outputs contacts the explosive. Peripheral detonation of the explosive generates a high speed, small diameter, penetrating jet that typically includes about 90% of the liner mass. Central point source detonation of the explosive generates a larger diameter, slower moving, explosively formed penetrator. A combination of plural peripheral point detonation and central point source detonation generates multiple fragments. An ability to select detonation type in the field enables a single warhead to be effective against multiple target types. The shaped charge liner may optionally be a composite material having a jet forming portion and an effect forming portion</p> <p>The shaped charge liner (18) is formed from a ductile metal or metal alloy and is typically copper. Other metals that have been disclosed as useful for shaped charge liners include nickel, zinc, aluminium, tantalum, tungsten, depleted uranium, antimony, magnesium and their alloys.</p>	Funston	<p>General Dynamics Ordnance & Tactical Systems FL</p> <p>Another development of shaped charge warheads. General reference is "typically" to Copper. However depleted uranium offers far higher density and temperature than copper for both modes.</p>

Table B. US Patents with references to replacement of Depleted Uranium (DU), or warhead technologies using unspecified "dense metals"

US Patent Number	Date	Title and extracts from patent specifications	Inventor	Assignee/Organisation & comments
5,656,792	Sept 16, 1996	<p>Projectile</p> <p>A bomb in accordance with the disclosure of British Patent No. 1,605,340, for the attacking of concrete targets such as launch pads, possesses a hollow charge for the preboring of the launch pad and an explosive projectile constituting a follower projectile.</p> <p>Through the high energy of the penetrator 14, the latter penetrates through the target.</p>	Rentzsch	<p>Diehl GmbH & co Germany</p> <p>German invention with UK & US patent registration.</p> <p>Describes Durandell type runway breaking weapon. No reference to metals used but high kinetic energy for the following projectile likely to involve high density casing.</p>
5,910,638	Nov 28, 1997	<p>High density tungsten-loaded castable explosive</p> <p>Tungsten and other heavy metals, such as depleted uranium (DU), have been used in shaped charges, as the penetrator case or as a liner within the case. In the case of military warheads, the purpose has been to increase the total weight of the warhead for better penetration performance. With current environmental concerns, tungsten has been the preferred heavy metal, since it is essentially inert.</p> <p>However, structural strength limitations have been experienced with tungsten liners in large penetrator warheads. At the same time, fabrication of tungsten liners and cases is costly. Further, concentration of heavy metal at the walls of warheads degrades fragmentation performance</p>	Spencer	<p>US Air Force</p> <p>Acknowledges DU use in shaped charge warheads, as penetrator casings or liners (ballast) within casings prior to 1997.</p> <p>This patent acknowledges environmental concerns about DU in 1997.</p> <p>Note technical and cost limitations of Tungsten in large penetrator warheads. Tungsten metal is tougher than Uranium alloys hence not so effective for fragmentation.</p>

6,135,028	October 14, 1998	<p>Penetrating dual-mode warhead</p> <p>A penetrating, dual-mode warhead having soft target, surface burst mode and a hard target, penetrating mode is provided. The warhead has a cylindrical outer fragmenting shell which contains an explosive surround. A long-rod penetrator with an explosive payload is located within the outer fragmenting shell.</p> <p>During impact with a soft target, the external shroud and surround explosive is not stripped away. In this sequence, the penetrator's main charge is detonated by the fragmentation charge and both charges contribute to the surface blast.</p>	Kuhns	<p>US Navy</p> <p>No indication of metals used in the case or penetrator. The "long rod" penetrator has an explosive core.</p> <p>This may refer to the GBU-24 AUP-116 with explosive fill inside the outer "shroud" (see Patent 6389977, page 5).</p>
5,876,793	March 2, 1999	<p>Fine powders and method for manufacturing</p> <p>A bed of tungsten powder in which the particles have an average diameter of about 3 microns may be fluidized in a reactor using a turbulent fluidization flow, and coated with approximately 20 to 30 percent by volume of a mixture of titanium and hafnium. These coated powders are then blended with a transient liquid phase sintering aid, for example, copper, nickel, palladium, and the like, as sintering aids. The resulting admixture may be cold-pressed into a compact at approximately 5000 to 20,000 pounds per square inch applied load. The resulting compact may then be transient liquid phase sintered at a temperature between about 700 and 950 degrees Centigrade, and annealed to form a high density alloy material. The material may be further densified, for example, using high energy rate or upset forging, or through swagging to form a fully dense penetrator material mimicking the properties of depleted uranium.</p>	Sherman	<p>Ultramet, CA</p> <p>Indicates the quest to match the properties of DU (high density and pyrophoricity by including Titanium)</p>

US Patent Office copyrights for text descriptions and illustrations acknowledged

/ SEARCH SUMMARY ENDS

4. Letter to the Prime Minister regarding UK support for US war plans for Iraq

The Rt. Hon Tony Blair MP
10 Downing Street
LONDON SW1A 2AA

13 October 2002

Dear Prime Minister

Use of Uranium weapons in Afghanistan and Iraq: Hazards for civilians and ground forces

I have written to you several times over the past year* regarding suspected use of **Depleted Uranium guided weapons** in the Afghan War and their potential hazards for UK troops, civilian personnel and Afghan citizens.

Several MPs, including my own, have raised these concerns in written questions to your Ministers, receiving categorical assurances that no depleted uranium weapons have been used in the Afghan conflict and denying knowledge of such weapons.

Uranium weapon systems

In recent weeks I have been alarmed by your support for US plans to launch another major military offensive on Iraq, ostensibly to destroy Iraqi **weapons of mass destruction**.

I wonder if you have been briefed about the weapons that US and UK forces will use in a new attack on Iraq? They will rely heavily on the same **hard target guided bombs and cruise missiles** used extensively in Afghanistan, plus new guided weapons and an array of ground based ballistic or guided weapons known or suspected of using Uranium warheads or components.

My analysis in January identified **21** [now **23**] **weapon systems** suspected of containing Uranium warhead components. My worst case scenario indicated that **these may have dispersed 1000+ tons of Uranium oxides into the Afghan environment**. (refer my report **Depleted Uranium weapons 2001-2002**, page 95, sent to you earlier this year).

US Patents verify Uranium warheads

Last week I was advised of **US Patent Number 6,389,977** (1997) for a "shrouded aerial bomb". This is the patent for a series of guided weapons using the upgraded BLU-109/B warhead. Claim 5 of this patent states:

"The shrouded aerial bomb as claimed in Claim 1, wherein the penetrating body is formed of depleted uranium."

This and 6 other US patents verify the development of guided weapons and submunitions with Uranium warheads or components since 1985.

These weapons are **large radiological bombs**, directly in contravention of Articles 35 and 55 of the 1st Protocol additional to the Geneva Conventions. They are, put simply, **weapons of indiscriminate effect**.

You will find a full list of known and suspected Uranium weapons in **Table 1** of my report **Hazards of suspected Uranium weapons in the proposed war on Iraq** plus the relevant **US Patents** on my website at <http://www.eoslifework.co.uk/u23.htm> .

[* e.g. see letter of 1 November 2001, page 49 of [Depleted Uranium weapons 2001-2002](#)]

An additional problem is emerging from my recent investigations. **It seems likely that US arms manufacturers may be using standard, not depleted uranium in new weapons** i.e. Uranium metal with the same isotopic mix as natural uranium (99.3% U238, 0.7% U235).

This would explain why researchers in Hungary and Greece detected increased airborne Uranium dust soon after the Balkans bombing began, but that it appeared to be natural, not depleted uranium. It would also explain why US and Canadian environmental teams in Afghanistan were able to report finding no depleted uranium contamination (except in a burned out aircraft). It does not explain Donald Rumsfeld's reference to increased radiation "from Depleted Uranium on some warheads" in January this year. If Geoff Hoon and Dr Moonie are aware of this it may have justified their denials in response to parliamentary questions referring to "depleted" uranium. Independent researchers are now alert to this possibility. I hope MoD staff are also considering it. Unfortunately standard uranium is more radioactive than depleted uranium.

Implications for the Afghan War

These disclosures greatly increase the probability that there are **serious health risks due to Uranium contamination in many parts of Afghanistan**. These risks also apply to UK troops and civilians who have been there in the past year.

If so your involvement in the war on Afghanistan has not yet finished. You strongly supported it and committed UK troops to combat and ISAF operations. I suggest you have a responsibility to establish the full facts about US and UK weapon systems used in Afghanistan and their consequences for human health and the environment.

I suggest this is **an immediate priority** because troops and civilians exposed to Uranium oxide contamination are vulnerable to ongoing and cumulative internal radiation exposure. Any further exposure must be avoided without delay. Some may already have been irretrievably damaged by toxic or radiation effects that will lead to lymphomas, leukaemia's and horrific birth defects for their children. You are likely to find similar problems emerging for troops deployed in the Balkans.

Sadly, if my analysis is correct, Uranium contamination in Afghanistan may be at least 3 times greater than in Iraq after the 1991 Gulf War (where 300 tons of DU was admitted). The health consequences in Iraq have become increasingly obvious over the past 10 years. Your Government's decision to support the US in vetoing a WHO study into health effects of Depleted Uranium on Iraqi civilians last November is tragic.

Implications for the proposed war on Iraq

The new evidence that guided weapons used extensively in Afghanistan are designed to use Uranium warheads has profound implications for US & UK war plans against Iraq.

Planned attacks on supposed chemical or biological weapons targets in Iraq will rely extensively on the hard target weapons now identified as using Uranium warheads. US forces have rebuilt their stocks to September 2001 levels, plus new weapons.

I guess that the UK **Storm Shadow** cruise missile, also suspected of using Uranium components, has been tested in Afghanistan and will be operational in a new attack on Iraq. Other known or suspected Uranium weapons not needed in Afghanistan (e.g. anti-tank systems) will also be used in large quantities in Iraq.

The implication is that at least 1500 tons of Uranium weapons will be used to prosecute US war plans in Iraq, greatly increasing existing Uranium contamination from 1991 and jeopardising allied troops and Iraqi civilians alike.

Can you justify using known weapons of indiscriminate effect to defeat supposed weapons of mass destruction? The US has scant regard for international law in its military operations. What is your Government's view on knowingly using weapons of indiscriminate effect in Iraq? This letter puts you on notice of that issue. UK forces are accountable to you. The use of such weapons contravening international law must be a political, not military decision, preferably decided by Parliament.

Compromised health research and policy advice

Please also note the warning in my new report that **all existing medical research and policy advice assuring minimal hazards from Depleted Uranium weapons now require fundamental re-assessment**. Official studies (e.g. RAND, WHO, Royal Society, UNEP) were all based on DU weapons used in 1991 - maximum size 5 kg. **They took no account of large Uranium warheads**. The average size of hard target warheads is 2000 lbs e.g. in the GBU-15, 24, 27 and 31 guided bombs. **The latest US Bunker Buster, Big BLU, weighs 10 tons**. US Patent data indicates that at least 50% of these warheads is Uranium or Tungsten. In Agent Defeat warheads (for chemical or biological targets) it is probably Uranium due to its powerful incendiary effects.

Regardless of your obligations under international law (which President Bush has skilfully exempted US citizens from) I suggest you have moral obligations in this matter.

How will you justify risking the slow death of tens of thousands of people whose lives will be irreversibly affected by Uranium contamination? The word genocide comes to mind. This may not concern President Bush. I hope it will concern you, your Cabinet and all MPs asked to support your plans now you are alerted to the latest evidence about Uranium weapons.

These facts and their sources (DOD, MOD, Jane's, FAS, CDI) are available in the report I sent you in January and the two new reports mentioned above (see last page for links):

These reports are the direct equivalent of your recent **Dossier on Iraqi weapons of mass destruction**. You, your Cabinet colleagues and other parties and MPs may wish to be at least as familiar with facts about US and allied weapons as about Iraqi weapons **before you make any further commitment to support US war plans against Iraq**.

Dangers of Group think

If this letter reaches you I suspect you may be deeply shocked by its message. I doubt that you have knowingly supported the use of Uranium weapons in the Balkans or Afghanistan. I doubt if your staff showed you my earlier report or messages. If you were aware that these weapons were Uranium based perhaps you have been convinced, like Dr Moonie, that they present minimal health hazards?

In 1977 Yale psychologist Irving Janis identified a syndrome called **Group Think** in the US Government explaining the Bay of Pigs fiasco. This concerns self-justifying illusions that develop within highly stressed groups - illusions of invulnerability and of morality that lead to extreme risk taking, that stifle internal dissent and demonise outsiders.

The US Government displays all the symptoms of Group Think in its approach to the war on terrorism and plans for Iraq. The US and UK military and arms industry demonstrate collective group think in justifying and keeping secret the development and international proliferation of Uranium weapons over the past 10 years. You and your colleagues may wish to be alert to dangers of group think too.

Ask your commanders and troops

If my analysis is even partly correct then your military commanders are likely to be well aware of these Uranium weapons and becoming aware of their consequences for UK troops. The SAS and Marines recently assigned to heavily bombed locations in Afghanistan are at highest risk unless they had full NBC protection all the time. However officers, troops and families may be trapped by official secrecy, public assurances by Mr Hoon and Dr Moonie, and collective group think in the MoD "that DU is safe". It may not be DU.

Breaking out of Group think means thinking outside the box of normal political communications and briefings and giving key staff permission to express their concerns.

I suggest you ask your military commanders personally about these weapons, not just relying on briefings from your ministers and the MoD, or from the Pentagon. I suggest you ask field Medical Officers, not just MoD scientific advisers. I suggest that you personally meet troops who have been sick or injured, or whose families have suffered miscarriages or severe birth defects since service in the Balkans or Afghanistan.

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With respect Prime Minister I suggest you need a lot more facts before you commit more UK troops to a new war in Iraq. At this time you face being drawn by the Pentagon and US Government into the greatest military scandal since Agent Orange in Vietnam.

Yours sincerely

Dai Williams
(independent weapons researcher)

Internet references

1. **Depleted Uranium weapons 2001-2002** (January 2001) is available at <http://www.eoslifework.co.uk/du2012.htm> and in Politicos bookshop.
2. **Hazards of suspected Uranium weapons in the proposed war on Afghanistan** (summary with link to full report) and **US Patent Office references to conventional guided weapons with suspected Uranium components** are available at <http://www.eoslifework.co.uk/u23.htm>
3. Janis, I. L. & Mann, L. (1977). **Decision making: A psychological analysis of conflict, choice, and commitment**. NY: Free Press.
Summary at <http://www.cedu.niu.edu/~fulmer/groupthink.htm>