Discussion Paper (Draft) 24 July 2007

Evidence of "almost natural" Uranium contamination in recent combat zones indicates the development and use of large uranium weapons.

Control samples of natural uranium in UK are compared to:
1) UK Gulf War 2 (Op Telic 2003) veterans, 2003 and
2) UNEP soil samples from Khiam, Lebanon, Nov 2006

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Several studies have reported increased levels of uranium contamination in human and environmental samples since the use of uranium weapons by US and UK forces in combat zones since 1991.

Officially reports acknowledge the use of Depleted Uranium in kinetic energy (high density) anti-tank and anti-missile ammunition.

However urine samples from civilians living near bombed targets in Afghanistan (UMRC 2002) showed very high levels of apparently natural uranium contamination - from 15 to 80x normal compared to the UK population (80 to 400 ng/litre compared to normal of 5 ng/litre). These observations led to the scenario that US weapons manufacturers may be using uranium alloys based on almost natural uranium feedstock instead of recycled depleted uranium.

Weapons analysis can be done from available design and warhead technological data (refer my Eos reports DU weapons 2001-2002 and Uranium Weapons 2001-2003 online at www.eoslifework.co.uk/pdfs/DU012v12.pdf and www.eoslifework.co.uk/pdfs/u25.pdf).

Weapons analysis can also be done from environmental sampling (air, soil, water etc) refer reports of increased uranium dust in the Balkans during US bombing in 1999 (Kerekes et al) and detected in UK HVAS filters at Aldermaston in 2002, 2003 and 2006 (Busby, Williams).

Since 2003 it has become possible to identify explosion features of new guided weapons using high density bunker buster penetrator warheads, and new thermobaric explosives. These indicate extreme white light ignition flashes at night, large fireballs and large plumes of dense dark grey or black smoke rising to high altitudes above high temperature explosions (photos from Iraq and Lebanon, Eos reports 1, August 2006 and 2, October 2006 for Lebanon).

The ultimate concern is long term human contamination with nano particles of uranium oxide dust with consequent hazards of internal alpha radiation contamination as well as toxic effects on the renal system in large doses.

The prime method for research into exposure to Uranium oxide has been urine testing analysed with high precision ICPMS techniques e.g. at the UK Harwell and NIGL laboratories. These are reported in the UK Ministry of Defence Depleted Uranium Oversight Board report (2007). This includes details of hundreds of urine samples from veterans of Gulf War 1 (2001), Gulf War 2 (2003) and a control group of UK residents not exposed to recent combat zones.

The isotopic ratio of U235 and U238 are crucial to identifying artificial uranium contamination from weapons versus natural uranium from the environment.
In nature this is approximately 137.8. Levels above 140 indicate depletion. Levels below 136 indicate enrichment.

The following pages show extracts of charts showing the distribution of isotopic ratios for the normal control group in the DUOB study and compared with the veterans exposed in Gulf War 2. These have significant numbers of samples in the range 139 to 142.

Given the precision of the equipment used by Harwell and NIGL (see for example the tight distribution NIGL samples, Standard Deviation around 0.5) then these higher ratios indicating very slight depletion are significant.

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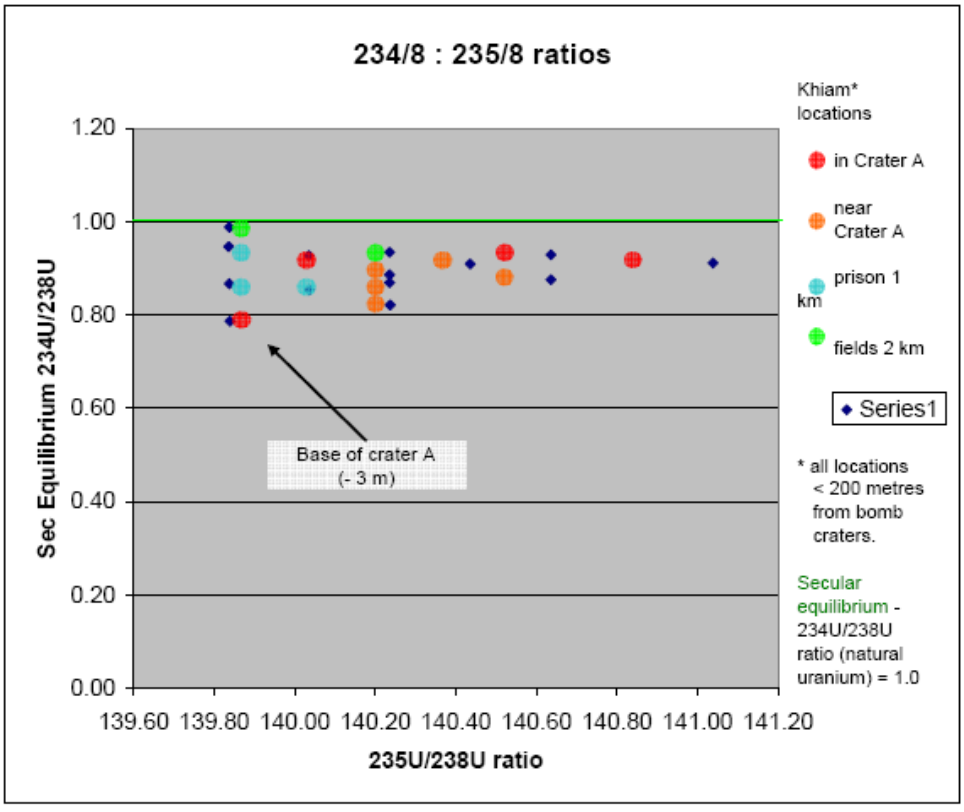
Then compare the U235/U238 ratios reported by UNEP in soil samples they collected from in and near recent bomb craters in Khiam, Lebanon. The most extensively tested crater (Crater A, reports from Busby 2006, and Kobeissi 2007) also showed high ambient gamma radiation in August and September - 725 to 830 nsv/hour compared to normal of 35 nsv/hr in Beirut). This reduced to 140 by November after remediation (being filled and excavated 2x).



The UNEP samples range from 139.8 to 141.04. None of these samples falls near the natural uranium ratio of 137.8. Yet UNEP smear samples from 25 other locations in Lebanon reported more normal ratios. The UNEP Sector field ICMPS equipment is accurate - precision between the Harwell Octopole and NIGL Multicollector ICPMS equipment. Experimental error is unlikely to explain these results.

This page (page 57 from the DUOB report) shows the distribution of isotopic ratios for the normal UK control group in the DUOB study:

Table 3.1 The normative study results; uran is the total concentration in urine ng/l; sigrat is the standard error of the ratio U238/U235

Descriptive Statistics

N		Minimum	Maximum	Mean	Std. Deviation
Uran	28	.48	11.28	4.2804	2.99867
Ratio	28	136.72	138.96	137.6511	.56656
Sigrat	28	.42	.78	.5057	.08909

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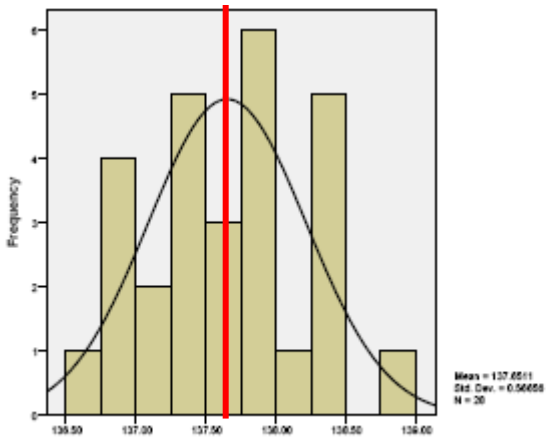
Fig 3. 1 The distribution of the normative study uranium ratios

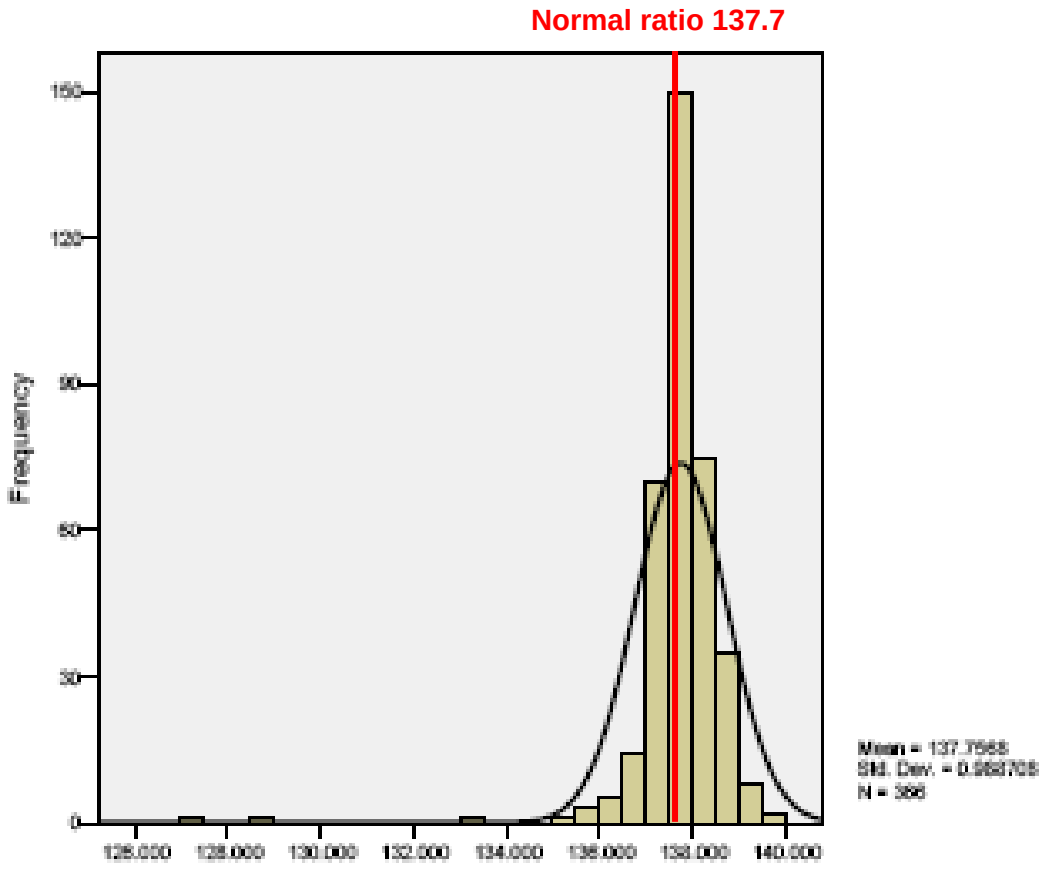


Normal ratio 137.7

In addition, we examined the shape of the normal distribution to see if it was skewed in the direction of high ratio or low ratio. The coefficient of skewness was +0.2 (SE = 0.44). That is to say, it was slightly skewed to the DU end but not significantly. It is clear that in the normative study, the mean was slightly below 137.88 and the standard deviation of the measurements made by NIGL was 0.57. Thus we can argue that a cut off of 142 for deciding that there was DU exposure was too high. However, the board also defined that in addition, the laboratory had to have no suspicion (e.g. from U-236 measurements) that there was DU present. Scientists would normally use two standard deviations from a mean to signal a statistically significant effect. For the NIGL measurements, the cut off should therefore be 139.02 for DU or 136.74 for enriched uranium (EU). There is a probability of 0.05 or 1 in 20 that a result outside these ranges could have occurred by chance. Three standard deviations from 137.88 is 139.59. There is a probability of 1 in 100 that a result above this value signalling DU exposure could have occurred by chance.

This page from the DUOB report shows the tight precision of test results for the very accurate NIGL multicollector ICPMS:

Fig 3.3 Distribution of NIGL ratio results

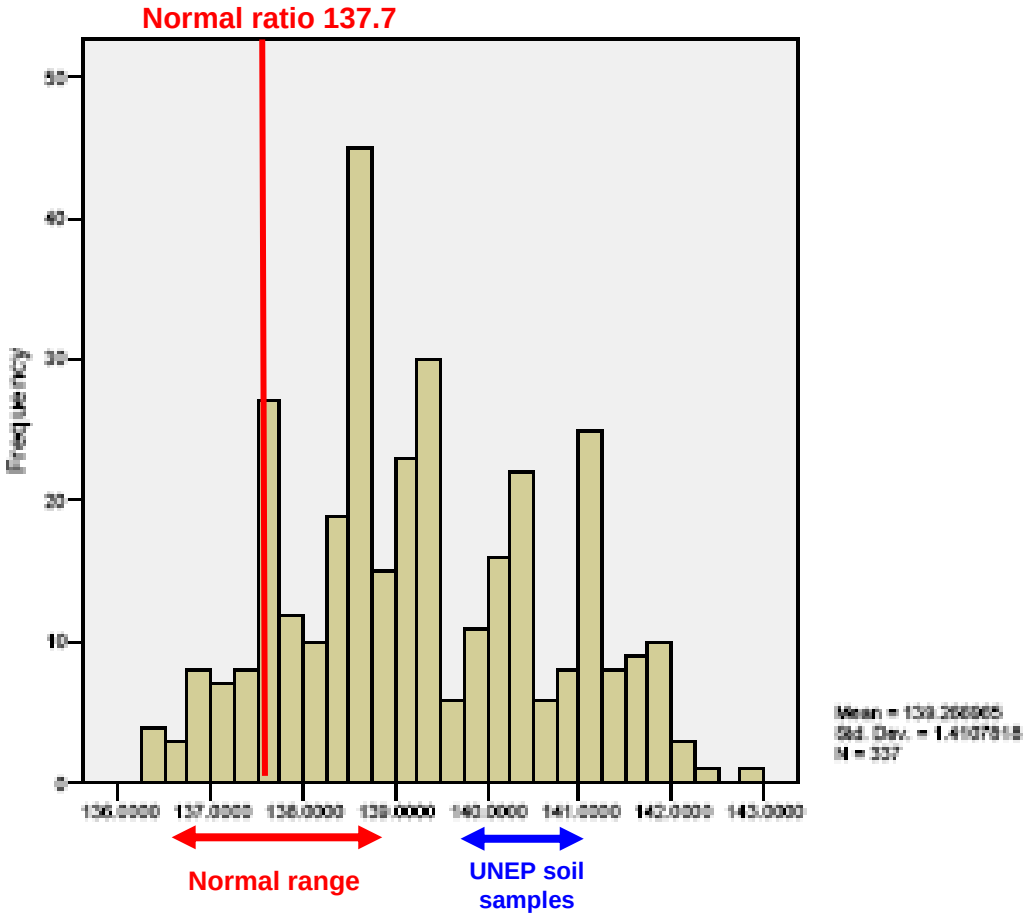


Comparing results:

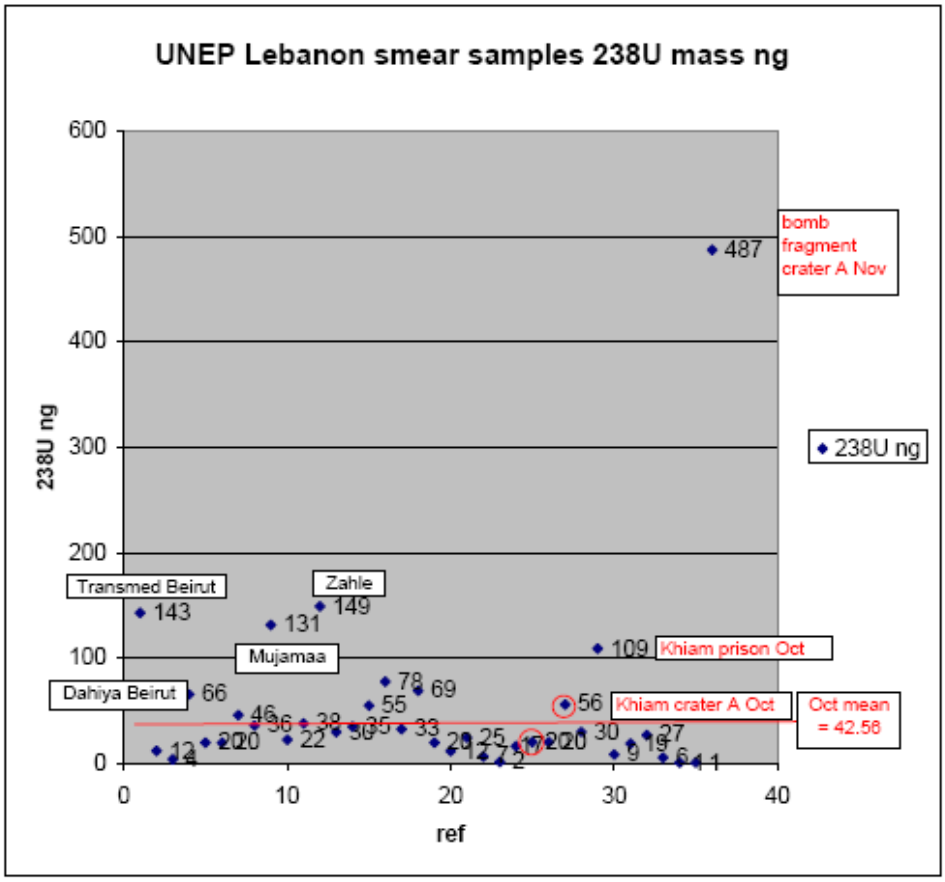
This page from the DUOB report shows isotopic ratios of uranium in the UK Gulf War 2 veterans (OpTelic) samples, compared with:

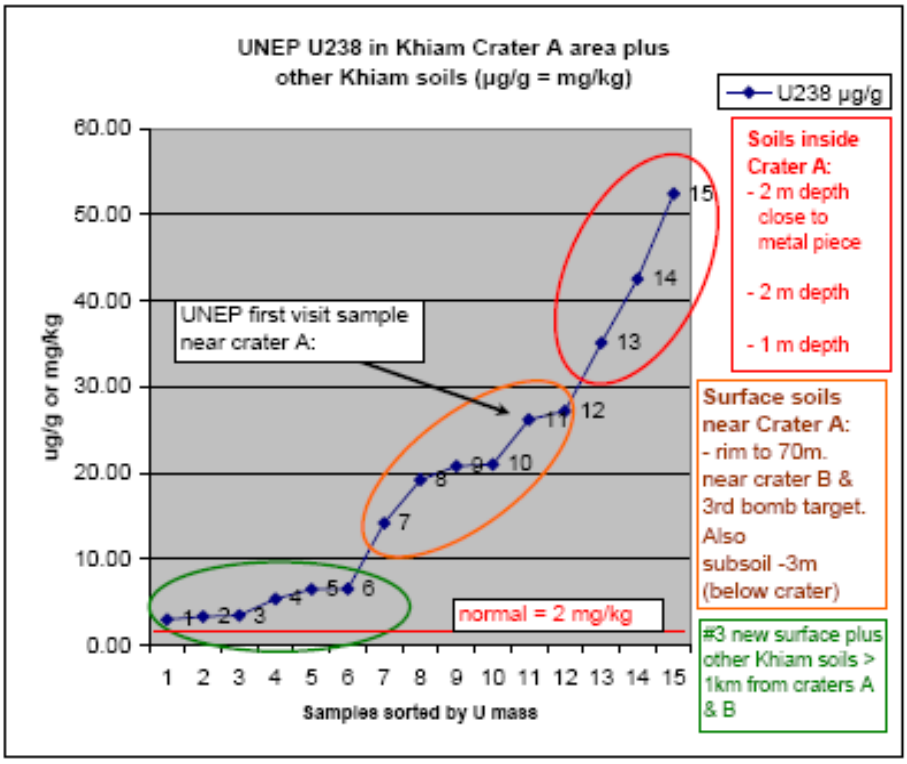
a) the UK control group (in red) and
b) the UNEP soil data from a known radioactive crater in Khiam.

Fig 4.1 OpTelic data isotope ratio distribution



Other UNEP data also shows the level of Uranium contamination of a bomb fragment found in Crater A in November 2006. UNEP stated that that the isotopic ratio for this sample was normal. The data only gives U238 mass data but the most contaminated soil sample was next to this metal fragment.





Other unpublished results

Dr Mohamed Ali Kobeissi announced the results of his study of soil and water samples from Lebanon on 19 July. This report is expected to be published later this month.

Some additional samples (soil and urine) from my Eos survey in Lebanon have not yet been published.

Several urine samples have been tested from civilians in South Beirut during the bombing in 2006. These results have not been published for confidentiality reasons. Some contain unusual uranium contamination.

Further urine studies for civilians, military and UN personnel who were in heavily bombed locations in Lebanon during the war in 2006 are a very high priority for the health and safety of those concerned, and to assess how much uranium contamination occurred from Israeli bombs and missiles, particularly hard target and thermobaric weapons supplied by the USA. As reconstruction work continues environmental testing may become more difficult. But uranium testing for humans who were in heavily bombed locations may provide a long term record of what different types of uranium contamination occurred, and in what locations.

Conclusions

The high density metal in the new generation of hard target guided bombs and missiles used by US forces in the Balkans, Afghanistan, Iraq and by Israel in Lebanon remains a military secret.

However the combination of data from military, environmental and biological sources collected by UN, UK AWE and independent researchers in Hungary, Canada, UK and Lebanon points increasingly to the use of uranium alloys manufactured with an isotopic ratio “almost” the same as natural uranium.

However the comparison of isotopic ratios in urine and soil samples listed above shows consistently abnormal results in the range 139 to 141+.

These ratios, together with the far above normal concentrations of uranium in soil samples nearest to craters, and in the urine of civilians resident in areas at the time of bombing, clearly point to the use of uranium alloys in warheads.

These results are consistent with the Lockheed Martin Patent (1997) for the upgraded BLU 109/B 2000lb (900 kg) penetrator bomb.

Since no traces of tungsten were found in Eos soil samples from Khiam then the majority of high density metal in the bombs must have been uranium i.e. in quantities likely to be up to 50% + of warhead mass i.e. possibly 400 to 500 kg per bomb.

Since no uranium metal fragments were found in the locations tested in Lebanon there must have been 99%+ combustion of the uranium components of the bombs, or the uranium may have been in powder form within the explosive as the reactive metal used in thermobaric weapons.

Other Eos / Green Audit samples from an adjacent crater in Khiam, from water in the base of Crater A and from an air filter in Beirut also showed traces of low enriched uranium contamination (isotopic ratios between 102 to 127 varying between samples and test methods). These can only have come from human contamination, not natural sources.

One or two samples from Khiam also had traces of low depleted uranium. These, together with the enriched samples, indicate that different warheads may use different uranium materials - possibly depending on how old the weapons were, or on their different designs e.g. whether in warhead ballast or in high density explosives.

Further Action

1. The growing evidence of the use of large uranium weapons by US forces in the Balkans, Afghanistan, Iraq and by Israel in Lebanon has implications for:

- Local civilians resident in bombed areas during and since combat periods.
- Local emergency personnel - paramedics, police, military - involved in rescue operations in recently bombed locations.
- International peacekeeping and aid personnel - UN, NGO etc plus media personnel - present in combat zones.
- Military personnel assigned to combat zones during or after heavy bombing.

2. The discovery of “almost natural” uranium contamination indicates that people and locations exposed to US guided weapons attacks at any location since 1991 may have suffered contamination from almost natural uranium. Most human and environmental assessments published by the UN and NATO and by the UK Royal Society and UK MoD DUOB have assumed that the only known uranium weapons used small quantities of Depleted Uranium with a distinct isotopic ratio typically 400+.

All of these studies require re-analysis to consider all types and levels of uranium contamination.

3. For any military personnel or civilians who are suffering leukaemia, cancer, respiratory or renal diseases, or who have suffered miscarriages or children with birth defects, there should be systematic Uranium testing - both for quantities and isotopic ratios.

4. There is no known treatment for illnesses caused by exposure to uranium nano particles. However further exposures can be minimised by rigorous and on-going environmental testing, with subsequent control over contaminated dust and water from these locations.

5. The UN Human Rights Council should re-open its enquiry into use of illegal weapons (radioactive and/or incendiary) by IDF forces in Lebanon, including identifying the origins of these weapons i.e. from US and Israel.

6. The UN Secretary General needs to establish an investigation into the conduct of environmental testing by UNEP, the absence of uranium testing by WHO and the quality of advice provided by the IAEA to the Lebanese authorities in 2006. The

UNEP reports to the UN HRC and their final Environmental report, clearly conceal the evidence of their own environmental test data (eg that included above). This is a question of grave concern.

7. The sponsors of the UNEP study in Lebanon - Switzerland, Norway and Germany - may wish to question the use of their funds for a study that systematically concealed the use of uranium weapons by Israeli forces.

8. An international conference of scientists and other researchers concerned about the known and suspected use of radiological weapons since 1991 is needed to widen discussion and analysis of the growing collection of human and environmental contamination data now available, and to compare methodologies for future surveys.

9. The Lebanese authorities are reported to have conducted extensive testing for uranium contamination but without any unusual results. However where their analysis has been restricted to Gamma spectroscopy (unsuitable for detecting uranium dust) and to seeking only evidence of highly depleted uranium their studies may have been totally subverted by misleading scientific advice from UNEP and the IAEA. The Lebanese Government would be wise to commission a public review into their radiological health and safety survey methods with advice from multiple independent specialists.

Other investigators can develop further implications, health and safety precautions and research implications from the data above and the reports from which these data have been taken.

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Dedication:
This summary is dedicated to the UN Observers and civilians who died in Khiam, Lebanon on 25 July 2006. Further analysis is required.

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References

1. UN priorities for investigating uranium and other suspected illegal weapons in the Israel/Lebanon conflict. D. Williams, Eos. 30 August 2006
www.eoslifework.co.uk/pdfs/u26leb806.pdf

2. UN Human Rights Council: “Second special session of human rights council decides to establish high-level inquiry commission for Lebanon”. See UN media release at
http://www.ohchr.org/english/press/hrc/index.htm

3. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol 1)
http://www.unhchr.ch/html/menu3/b/93.htm

4. Convention on Certain Conventional Weapons (CCW) Oct 10 1980
http://disarmament.un.org/ccw/

5. Post conflict assessment sought for Lebanon, 22 August 2006, Friends of the Earth Middle East, Beirut www.ens-newswire.com/ens/aug2006/2006-08-22-01.asp

6. UNEP Assessment of Environmental "Hot Spots" in Iraq, November 2005. and other UNEP post-conflict studies are available on the UNEP publications website t http://postconflict.unep.ch/publications.php?prog=iraq

7. Reports of UMRC post-conflict investigations in Afghanistan in 2002 are available at: www.umrc.net/os/downloads/AfghanistanOEF.pdf and in Afghan Field Trip #2 report. Tedd Weyman. UMRC, Canada www.umrc.net/os/downloads/destruction_effects.pdf

8. Report of UMRC investigations in Iraq: Abu Khasib to Al Ah'qaf: Iraq Gulf War 2 field investigations report. Tedd Weyman. UMRC, Canada, 2003. www.umrc.net/os/downloads/Iraq_report_1.doc . Other reports at www.umrc.net

9. DU Weapons 2001-2002 - Mystery metal nightmare in Afghanistan. D.Williams, Eos. January 2002. 139 pages. www.eoslifework.co.uk/pdfs/DU012v12.pdf .

10. Uranium weapons 2001-2003 - Hazards of uranium weapons for Afghanistan & Iraq. D. Williams, Eos. October 2002, 44 pp. www.eoslifework.co.uk/pdfs/u25.pdf .

11. Key issues for UN uranium testing in Iraq - implications of UNEP recommendations for Depleted Uranium studies in Iraq. D. Williams, Eos. 10 April 2003. www.eoslifework.co.uk/pdfs/UNiraqissues.pdf

12. Did the use of Uranium weapons in Gulf War 2 result in contamination of Europe? Evidence from the measurements of the Atomic Weapons Establishment, Aldermaston, UK. Chris Busby, Saoirse Morgan, January 2006. Green Audit, Aberystwyth. http://www.llrc.org/du/subtopic/aldermastonrept.htm Other reports at www.llrc.org

13. BBC TV 4 August 2006. John Simpson report 'New Israeli strike kill 28'. Download at: http://www.bbc.co.uk/mediaselector/check/nolavconsole/ukfs_news/hi?redirect=st.stm&news=1&bbram=1&bbwm=1&nbram=1&nbwm=1&nol_storyid=5247118 >

14. Doug Rokke reports online at http://www.traprockpeace.org/doug_rokke_12july04.html

15. Aspects of thermobaric weaponry. ADF Health 2003; 4: 3-6

www.defence.gov.au/dpe/dhs/infocentre/publications/journals/NoIDs/adfhealth_apr03/ADFHealth_4_1_03-06.pdf

16. Advanced thermobaric explosive compositions www.freepatentsonline.com/6955732.html
17. Global security reports:
www.globalsecurity.org/military/systems/munitions/thermobaric.htm
18. BLU-118/B www.globalsecurity.org/military/systems/munitions/blu-118.htm
19. SMAW-NE Thermobaric www.globalsecurity.org/military/systems/ground/smaw-ne.htm
20. AGM-114N TB Hellfire www.globalsecurity.org/military/systems/munitions/agm-114n.htm

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UK Mod Depleted Uranium Oversight Board Final Report www.duob.org.uk
United Nations Environment Programme post conflict report on Lebanon
Dr Mohamed Ali Kobeissi, July 2007 (reported in As-Safir newspaper on 19 July 2007) to be published shortly.