

THE SCOURGE OF DEPLETED URANIUM

Dr Doug Rokke presented this paper at the UNESCO Conference on "The Child: A Victim of War and A Messenger of Peace", held on May 24-25, 2001, in Athens, Greece.

ABSTRACT

Depleted uranium (DU) munitions have been used in combat because they are extremely effective. However, in winning these battles we have contaminated air, water and soil. Consequently children, women and men have inhaled, ingested or had wounds contaminated with uranium. Uranium is a heavy metal and radioactive poison.

In this paper, Dr Rokke—the health physicist originally tasked by the United States Army to clean up the DU mess—will discuss: What is depleted uranium? How is DU used by the military? Where and when has DU been used? What did we find immediately after Operation *Desert Storm* (ODS) friendly-fire and combat incidents? How did the Depleted Uranium Project get started and what were its objectives? What adverse health effects have been observed, recognised, treated and documented? Based on all previous research and the Depleted Uranium Project, what were the recommendations? What has occurred? What should happen next?

In summary: medical care must be provided to all DU casualties; environmental remediation must be completed; and DU munitions must be banned.

Official denials about DU's serious health effects

Medical evidence—and especially the birth defects in children born to parents in areas with DU contamination—is an issue of growing concern. Depleted uranium (uranium-238) as well as other contaminants of war have been implicated. Today, 10 years after the Gulf War, warriors and non-combatants are exhibiting serious adverse health effects from exposure to depleted uranium munitions contamination, Iraq's chemical and biological weapons and released industrial chemicals. While health effects are linked to complex exposures, I would like to focus on depleted uranium or DU.

Today, United States, British, Canadian and NATO officials continue to state specifically that there are no known adverse health effects in those of us in the US Department of Veterans Affairs Depleted Uranium medical project. That is a lie, as has been proven by our own medical records based on diagnosis of medical problems completed by our personal primary care physicians.

A press report from January 10, 2001, reported that "Defense Secretary William Cohen stated that DU was no more dangerous than leaded paint", and a US Army briefer assured reporters that it was "safe enough to eat". I do not know of any physician who would insinuate that either lead paint or uranium is safe to eat. The children of the world have been poisoned by lead and now by depleted uranium.

While government officials continue to deny any relationship between uranium exposures and adverse health effects, uranium miners and casualties of war who were exposed to uranium contamination are exhibiting the same adverse health effects. Although the *Radiation Exposure and Compensation Act of 1990* was supposed to provide compensation payments to these Americans, a report on the front page of the *New York Times* of March 27, 2001, described how these individuals were sick and waiting for payments because of inadequate budgetary allocations.

I find it very disturbing that while one portion of the US government recognises the serious adverse health effects of uranium exposure, US Department of Defense officials

Depleted uranium munitions cause environmental contamination and adverse health effects, but US officials are in denial, refusing to implement clean-up protocols or provide appropriate medical care to victims.

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refuse to recognise the same health effects from exposures caused by wartime use of uranium munitions.

Officials of the World Health Organization released their anticipated report during April 2001. While this report made specific recommendations, the authors of this report, just as with other governmental agencies' reports, did not consult with those of us who actually cleaned up the DU mess following ODS and completed the research as part of the Depleted Uranium Project.

I also find it astonishing that once more the authors of a report have ignored the facts that although medical care for all exposed individuals has been required since the war and environmental remediation has also been recommended or required, neither has been completed. The authors of the WHO DU report also did not contact any of us who are confirmed DU casualties, nor did they speak to our physicians about observed and diagnosed health effects of DU exposures. Once more, the Los Alamos memorandum (March 1991) directives written by LTC M. Ziehmn, USMC, are fulfilled.

What is depleted uranium?

Depleted uranium, which is 99.8% by mass U-238, is made from uranium hexafluoride, the byproduct of the uranium enrichment process.

Recent documents released by the US Department of Energy state that a small proportion of other toxic heavy metals such as plutonium is also present. Although 60% of the ionising radiation given off by gamma emissions from U-235 and U-234 is eliminated during the enrichment process, alpha particles at 4.2 MeV and 4.15 MeV—which cause significant internal ionisation with consequent cellular damage—are proportionally increased. The continuing incomplete statement that DU is 60% less radioactive than natural uranium simply ignores the serious internal damage caused by alpha emissions. In addition, daughter products emit beta particles and gamma rays that may cause further radiological damage.

While DU may not be an external hazard, it is a very serious internal hazard. Consequent inhalation, ingestion and wound contamination pose significant and unacceptable risks. Also, spent penetrators or fragments emit beta particles at 300 mrem/hour and thus cannot be touched or picked up without protection being worn.

How is DU used by the military?

DU is used to manufacture kinetic energy penetrators—giant pencils or rods. Each kinetic penetrator consists almost entirely of uranium-238.

The United States munitions industry produces the following DU munitions with the corresponding mass of uranium-238:

- 7.62 mm with unspecified mass;
- 50 cal. with unspecified mass;
- 20 mm with a mass of approximately 180 grams;
- 25 mm with a mass of approximately 200 grams;
- 30 mm with a mass of approximately 280 grams;
- 105 mm with a mass of approximately 3,500 grams;

- 120 mm with a mass of approximately 4,500 grams;
- Submunitions/landmines such as the PDM and ADAM, whose structural body contains a small proportion of DU.

Many other countries now produce or have acquired DU munitions. DU is also used as armour, counterweights, radiation shielding and, as proposed by the US Department of Energy, as a component of road and structural materials. All of these uses are designed to reduce the huge US Department of Energy stockpiles left over from the uranium enrichment process.

It is important to realise that *DU penetrators are solid uranium-*

238. They are not tipped or coated! During an impact, at least 40% of the penetrator forms uranium oxides or fragments which are left on the terrain, within or on impacted equipment or within impacted structures. The remainder of the penetrator retains its initial shape. Thus we are left with a solid piece of uranium lying someplace, which can be picked up by *children*. DU also ignites in the air during flight and upon impact. The resulting shower of burning DU and DU fragments causes secondary explosions, fires, injury and death.

To put it simply, who would want thousands of solid uranium pencils of masses between 180 and 4,500 grams lying in your backyard? Who would want any uranium contamination of any type lying in your backyard?

Where and when has DU been used?

Photographic evidence of destroyed equipment and reports suggest that DU was used for the first time during the 1973 Arab-Israeli War. Physicians using medical laboratory tests have verified an internalised DU exposure in the individual who inspected that

destroyed equipment.

The Persian Gulf War saw the first significant use of DU in combat. Pilots flying aircraft fired at least 850,950 rounds and tank gunners fired another 9,640 rounds, for a total weight of 631,055 pounds or over 315 tons. Recent conversations with the individual who managed all DU rounds suggest that this figure may be too low and that the actual quantity should be 25% greater or about 390 tons.

Although warnings were issued to refrain from DU use, the US Marines fired DU munitions on three separate occasions during 1995 and 1996 while conducting operations in Okinawa, and then did not tell the Japanese government for over one year.

During 1995, the US military also fired at least 10,000 rounds of DU munitions in Serbia. Recently [1999–2000], US forces fired at least 31,000 rounds of 30-millimetre DU munitions into Kosovo or Serbia.

DU munitions have been fired on ranges in Indiana, Nevada, New Mexico, Florida, Maryland, Scotland and Canada. Astonishingly, the US Navy fired DU on Vieques, Puerto Rico, to prepare for the Kosovo attacks.

Vieques is currently a national and international issue, with confirmed environmental contamination and documented adverse health effects similar to those observed in other DU casualties. Recently, Secretary of Defense Donald Rumsfeld decided to

"The authors of the WHO DU report also did not contact any of us who are confirmed DU casualties, nor did they speak to our physicians about observed and diagnosed health effects of DU exposures."

suspend Vieques operations. However, Secretary Rumsfeld must order complete environmental remediation and medical care for all affected children and others on Vieques. All military operations must be stopped forever.

What did we find immediately after Operation Desert Storm friendly-fire and combat incidents?

I was assigned to the ODS DU assessment team as the health physicist and medic by Headquarters, Department of the Army, in Washington, DC. What we found can be explained in three words: "Oh my God!" According to official documents, each uranium penetrator rod could lose up to 70% of its mass on impact, creating fixed and loose contamination, with the remaining rod passing through the equipment or structure to land and lie on the terrain. On-site impact investigations showed that the mass loss is about 40%, which forms fixed and loose contamination, leaving about 60% of the initial mass of the penetrator in the solid pencil form. We found that standard radiacs [radioactive detection, identification and computation sets] will not detect this contamination. Equipment contamination included uranium fragments, uranium oxides, other hazardous materials, unstable unexploded ordnance and byproducts of exploded ordnance.

US Army Materiel Command documents sent to us during ODS stated that the uranium oxide was 57% insoluble and 43% soluble and at least 50% could be inhaled. In most cases, except for penetrator fragments, contamination was found inside destroyed equipment or structures, on the destroyed equipment or within 25 metres of the equipment. However, during the 1994 and 1995 Nevada tests, we found DU contamination out to 400 metres from a single incident.

After we returned to the United States, we wrote the Theater Clean-up Plan which reportedly was passed through the US Department of Defense to the Department of State and consequently to the Emirate of Kuwait. Today, it is obvious that none of this information regarding clean-up of extensive DU contamination was ever given to the Iraqis. Consequently, although we knew there were and still are substantial hazards existing within Iraq, these have been ignored by the United States and Great Britain for political and economic reasons.

Iraqi, Kosovar, Serbian and other representatives have asked numerous times for DU contamination management and medical care procedures, but this information has not been provided. Residents of Vieques, who are US citizens, also have asked for medical care and completion of environmental remediation, but DOD officials still refuse to complete these essential actions.

How did the Depleted Uranium Project get started, and what were its objectives?

The probable health and environmental hazards of uranium contamination were known before the Gulf War. A United States Defense Nuclear Agency memorandum, written by LTC Lyle, that was sent to our team in Saudi Arabia, stated:

"As Explosive Ordnance Disposal (EOD), ground combat units, and civil populations of Saudi Arabia, Kuwait, and Iraq come increasingly into contact with DU ordnance, we must prepare to deal with potential problems. Toxic war souvenirs, political furor, and post-conflict clean-up (host nation

agreement) are only some of the issues that must be addressed. Alpha particles (uranium oxide dust) from expended rounds is a health concern, but beta particles from fragments and intact rounds is a serious health threat, with possible exposure rates of 200 millirads per hour on contact."

This memorandum, the reports that we prepared immediately after the Gulf War as part of the DU assessment project to recover DU-destroyed/contaminated US equipment, the previous research and other expressed concerns led to the publication of a United States Department of Defense directive signed by General Eric Shinseki on August 19, 1993, to:

1. Provide adequate training for personnel who may come in contact with depleted uranium equipment.
2. Complete medical testing of personnel exposed to DU contamination during the Persian Gulf War.
3. Develop a plan for DU-contaminated equipment recovery during future operations."

It is important to realise that DU penetrators are solid uranium-238. They are not tipped or coated!

It is thus indisputable that United States Department of Defense officials were and are still aware of the unique and unacceptable hazards associated with using depleted uranium munitions.

Consequently, I was recalled to active duty in the US Army as the DU Project Director and tasked with developing training and environmental management procedures. The project included: a literature review; an extensive curriculum development project

involving representatives from all branches of the US Department of Defense and representatives from England, Canada, Germany and Australia; and basic research at the Nevada Test Site located 120 miles northwest of Las Vegas, Nevada, to validate management procedures. The products of the DU Project included:

- Three training curricula: (1) Tier I: General Audience, (2) Tier II: Battle Damage and Recovery Operations, (3) Tier III: Chemical Officer/NCO;
- Three videotapes: (1) "Depleted Uranium Hazard Awareness", (2) "Contaminated and Damaged Equipment Management", and (3) "Operation of the AN/PDR-77 Radiac Set";
- The US Army Draft Regulation, "Management of Equipment Contaminated with Depleted Uranium or Radioactive Commodities";
- A United States Army pamphlet specifying "Handling Procedures for Equipment Contaminated with Depleted Uranium or Radioactive Commodities";
- A redesigned radiac capable of finding and quantifying DU contamination.

Although these products were completed, approved and ready for distribution by January 1996, the US Army, US Department of Defense, British, German, Canadian and Australian officials have disregarded repeated directives and have not implemented, or have only implemented portions of, the training or management procedures. The training curriculum and management procedures have not been given to all individuals and representatives of governments whose populations and environment have been exposed to DU contamination, as verified by US General Accounting Office investigators in a report published in March 2000 and through personal conversations.

What adverse health effects have been observed, recognised, treated and documented?

Deliberate denial or delay of medical screening and consequent medical care of US friendly-fire casualties who inhaled, ingested and had wound contamination from DU, and of all others with verified or suspected internalised uranium exposure, limits recognition and verification of health effects.

Although during March 1991 and many times since then we recommended immediate medical care, the United States Department of Defense, the British Ministry of Defence and consequently the United States Department of Veterans Affairs are still reluctant to provide thorough medical screening and necessary medical care.

Dr Bernard Rostker wrote to me in a letter dated March 1, 1999, that physicians and health physicists at the completion of the ground war decided that medical screening and care for uranium exposures was not required. Actual documents refute this! Today, individuals (including myself) are sick and others are dead—people who were denied medical care, even though I requested it in a letter dated May 21, 1997, which was sent to the Office of Surgeon, US Army Materiel Command, and forwarded to Dr Rostker.

Verified adverse health effects from personal experience, from physicians, and from personal reports from individuals with known DU exposures include: (a) reactive airway disease; (b) neurological abnormalities; (c) kidney stones and chronic kidney pain; (d) rashes; (e) vision degradation and night vision losses; (f) gum tissue problems; (g) lymphoma; (h) various forms of skin and organ cancer; (i) neuropsychological disorders; (j) uranium in semen; (k) sexual dysfunction; and (l) birth defects in offspring.

Today, health effects have been documented in uranium processing facility employees and residents living near: Paducah, Kentucky; Portsmouth, Ohio; Los Alamos, New Mexico; Oak Ridge, Tennessee; and Hanford, Washington. Employees at uranium manufacturing or processing facilities in New York, Tennessee, Iowa, Massachusetts and the four corners area of southwest Colorado also have repeatedly reported health effects similar to those reported by verified Gulf War DU casualties. Iraqi and other humanitarian agency physicians are reporting the same health effects in exposed populations.

Scottish scientists recently verified that residents of the Balkans were excreting uranium in their urine. This suggests that depleted uranium (U-238) is mobile and is contaminating air, water and soil—just as specified in an October 1943 letter to General Leslie Groves.

Today, verifying the correlation between uranium exposures and adverse health effects may not be possible, except in only a few cases, because of deliberate delays in required screening—a radio-bioassay. Screening involves the collection and analysis of urine, faecal and throat samples within 24 hours of exposure. Today, months or years after exposure, only a small fraction of the sequestered uranium will be detected. That is why WHO scientists recommended immediate testing of exposed populations. This detectable fraction represents only the mobile or soluble portion. A recent autopsy in Canada has revealed that sequestering is

occurring and that the mobile fraction may not be representative of what is actually present.

Even when verified medical evidence attributing adverse health effects to DU exposures is available, official recognition and documentation is limited. For example, during 1994 and 1995, United States Department of Defense medical personnel at a US Army installation hospital removed, separated and hid documented diagnoses (including my own) from affected individuals and other physicians. Some medical records were retrieved during the fall of 1997, but probably too late for many individuals. Today this practice continues and, consequently, exposed individuals are not receiving adequate and effective medical care. This includes individuals whose required medical care has been requested and ordered many times. This will continue as long as the United States, British, Canadian and other governments and NATO are permitted to ignore the emerging evidence and deny medical care to *all* individuals who have been or may have been exposed to depleted uranium (uranium-238), other isotopes and other contaminants created as a result of depleted uranium munitions use.

The criteria describing exposures requiring medical screening within 24 hours of exposure and consequent medical care were specified in a message from Headquarters, Department of the Army, dated October 14, 1993. These exposures included:

- a. Being in the midst of smoke from DU fires resulting from the burning of vehicles uplocated with DU munitions or depots in which DU munitions are being stored.
- b. Working within environments containing DU dust or residues from DU fires.
- c. Being within a structure or vehicle while it is struck by DU munitions."

These guidelines must be applicable with care to all exposed individuals, independent of military or civilian status. They must be implemented *now*!

Medical care must be planned and completed to identify and then alleviate actual physiological problems, rather

than the emphasis being placed on psychological manifestations and continued testing. Children and others are sick and deserve care for the complex exposures that have resulted in health problems. Medical care for known uranium exposures should emphasise (concern in parentheses):

- a. neurology (heavy metal effects);
- b. ophthalmology (radiation and heavy metal effects);
- c. urology (heavy metal effects and crystal formation);
- d. dermatology (heavy metal effects);
- e. cardiology (radiation and heavy metal effects);
- f. pulmonary (radiation, particulate and heavy metal effects);
- g. immunology (radiation and heavy metal effects);
- h. oncology (radiation and heavy metal effects);
- i. gynaecology (radiation, neurological and heavy metal effects);
- j. gastrointestinal (systematic effects);
- k. dental (heavy metal effects);

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1. psychology (heavy metal effects).

Many individuals with known exposures still have not received requested care. As stated on March 10, 2001, by Dr Michael Kilpatrick, US Department of Defense, only 60 individuals (including myself) are receiving minimal medical care from physicians assigned to the Baltimore, Maryland, Department of Veterans Affairs Depleted Uranium Project. That includes only a fraction of over 350 individuals with verified exposures.

Today, I and others must take antibiotics and steroids to control medical problems. It is impossible to get proper care and treatment. If the authorities do not provide medical assessment for those with verified exposures and health problems, then they can say DU did not cause any adverse health problems because they never saw any health effects. So much for medical science when a cover-up is directed by politicians to limit liability.

The cover-up started with the infamous Los Alamos memorandum sent to our team in Saudi Arabia during March 1991. This memo told us to be sure that we should

only report our findings so that DU munitions could always be used. *In other words, lie!*

The letter sent to General Leslie Groves during 1943 is even more disturbing. In that memorandum, dated October 30, 1943, senior scientists assigned to the Manhattan Project suggested that uranium could be used as an air, water and terrain contaminant. According to the letter, sent by the Subcommittee of the S-1 Executive Committee on the "Use of Radioactive Materials as a Military Weapon", inhalation of uranium would result in "bronchial irritation coming on in a few hours to a few days". This is exactly what happened to those of us who inhaled DU dust during Operation *Desert Storm* and to US soldiers in the Balkans.

The subcommittee went on further to state that:

"Beta-emitting products could get into the gastrointestinal tract from polluted water, or food, or air. From the air, they would get on the mucus of the nose, throat, bronchi, etc. and be swallowed. The effects would be local irritation, just as in the bronchi, and exposures of the same amount would

be required. The stomach, caecum and rectum, where contents remain for longer periods than elsewhere, would be most likely affected. It is conceivable that ulcers and perforations of the gut followed by death could be produced, even without any general effects from radiation."

Today, medical problems continue to develop. Medical care is still being denied or delayed for all uranium-exposed casualties, while United States Department of Defense and British Ministry of Defence officials continue to deny any correlation between uranium exposure and adverse health and environmental effects. They contend that they can spread radioactive waste (uranium-238) in anyone's backyard without cleaning it up and providing medical care. *Their arrogance is astonishing!*

Based on all previous research and the DU Project, what were the recommendations?

The DU Project and review of previous research reinforced our original 1991 conclusions and recommendations that:

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1. All DU contamination must be physically removed and properly disposed of to prevent future exposures.

2. Specialised radiation detection devices that detect and measure emissions of alpha-particles, beta-particles, X-rays and gamma-rays at appropriate levels from 20 dpm up to 100,000 dpm and from 0.1 mrem/hour to 75 mrem/hour must be acquired and distributed to all individuals or organisations responsible for medical care and environmental remediation activities involving depleted uranium/uranium-238 and other low-level radioactive isotopes that may be present. Standard equipment will not detect contamination.

3. Medical care must be provided to all individuals who have (or may have) inhaled, ingested or had wound contamination, to detect mobile and sequestered internalised uranium contamination.

4. All individuals who enter, climb on or work within 25 metres of any contaminated equipment or terrain must wear respiratory and skin protection gear.

5. Contaminated and damaged equipment or materials should not be recycled to manufacture new materials or equipment.

What has occurred?

Visual evidence, personal experience and published reports verify that:

1. Medical care has not been provided to all DU casualties.

2. Environmental remediation has not been completed.

3. Contaminated and damaged equipment and materials have been recycled to manufacture new products.

4. Training and education has only been partially implemented.

6. Contamination management procedures have not been distributed and implemented.

What should happen next?

All citizens of the world must raise a unified voice to ban the future use of depleted uranium munitions and force those nations that have used depleted uranium munitions to recognise the immoral consequences of their actions and assume responsibility for medical care and thorough environmental remediation.

There is a famous quotation, "And a child shall lead them". But if the children are sick or dead and the citizens of the world permit this to continue, then there will not be a child who can fulfill the prophecy and lead us to peace. *I implore you to act!* ∞

About the Author:

Dr Doug Rokke is a Doctor of Philosophy (University of Illinois, 1992), a Master of Science (University of Illinois, 1986) and holds a Bachelor of Science degree (Western Illinois University, 1975). He is an environmental sciences and nuclear medical sciences specialist, educator and consultant with extensive experience in academic and military fields. During Operation *Desert Storm*, Dr Rokke served as a health physicist with the 3rd Medical Command, US Army, in assessing and cleaning up the DU contamination.

To see more of Dr Rokke's writings on Gulf War casualties and depleted uranium, visit the Traprock Peace Center website, <http://www.traprockpeace.org>.