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MEASUREMENTS OF RADIOACTIVE CONTAMINATION IN KOSOVO BATTLEFIELDS DUE TO THE USE OF DEPLETED URANIUM WEAPONS BY NATO FORCES

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During the last war in the Balkan area (Kosovo-Serbia War, spring-summer 1999), NATO forces admitted the use of weapons containing Depleted Uranium (DU). In particular, 30 mm bullets being fired by A-10 anti-tank aircraft and probably all Tomahawk Cruise missiles in this action contain depleted uranium.

The development of these radioactive weapons is based on the fact that uranium (atomic mass 238) is much denser than lead (atomic mass 207), and therefore its kinetic energy is sufficient to penetrate tank armour or concrete buildings more effectively than lead, prior to detonation. The design of the bullet is to incorporate a long thin cylinder of DU housed in a plastic sheath or "sabot". This means in turn that the very small leading edge of the bullet pierces with maximum impact. The same principle is used in Tomahawk Cruise missiles, with the aim of piercing concrete obstructions rather than metal.
DU's ability to self-sharpen as it penetrates armor is the primary reason why DU is a more potent weapon than alternate tungsten munitions, which tend to mushroom upon impact. Fragments and uranium oxides are generated when DU rounds strike an armoured target.
When DU bombs detonate, uranium oxide is formed in particulates of between 0.5 and 5 microns. These can be windborne several hundred miles or suspended electrostatically in the atmosphere.
The size of the particles varies greatly; larger fragments can be easily observed, while very fine particles are smaller than dust and can be inhaled and taken into the lungs. Whether large enough to see, or too small to be observed, DU particles and oxides contained in the body are all subject to various degrees of solubilization—they dissolve in bodily fluids, which act as a solvent.
Once dissolved in the blood, about 90% of the uranium present will be excreted by the kidney in urine within 24-48 hours. The 10% of DU in blood that is not excreted is retained by the body, and can deposit in bones, lungs, liver, kidney, fat and muscle. Insoluble uranium oxides, if inhaled, can remain in the lungs for years, where they are slowly taken into the blood and then excreted in urine.

Toxicity of DU is both of chemical and radiological type.

Concerning chemical toxicity, although heavy metals are not attracted to single biological compounds, they are known to have toxic effects on specific organs in the body. Previous research has demonstrated that the organ that is most susceptible to damage from high doses of uranium is the kidney. The uranyl-carbonate complexes decompose in the acidic urine in the kidney. This reaction forms the basis for the primary health effects of concern from uranium. The effects on the kidney from uranium resemble the toxic effects caused by other heavy metals, such as lead or cadmium.

Concerning DU radiotoxicity, U-238 is a long-lived alpha-emitter, with a weak emission of beta and gamma rays. External exposure hazards mainly regard military personnel using tanks with DU shields, while it is negligible in other occasions. The most important pathways for DU exposure are therefore in case of ingestion or inhalation.

Personnel in or near (less than approximately 50 meters) an armoured vehicle at the time these vehicles were struck by depleted uranium munitions could receive significant internal DU exposures (i.e. those in excess of allowable standards). On the other hand, army officials believe that DU protective methods can be ignored during battle and other life threatening situations because DU-related health risks are greatly outweighed by the risks of combat. This is not the case, however, for the exposure of public due to DU contamination.

The DU bullets were used in the Gulf War , and some 1 million of them still lie in the deserts of that region. No precise data are available, however it appears that, subsequently, the incidence of leukaemias, cancer, and birth defects have risen sharply in that area. This could be a consequence also of the ensuing environmental radiation. The amount of DU scattered around the Gulf war zone is given as 350 tonnes, but including the nose cones of Cruise missiles and helicopter rotors, the figure is nearer 750 tonnes. This is 27 TBequerels of radioactivity. The same happened in Bosnia where DU was also employed.
Exact data about the amount of DU weapons used in the Kosovo-Serbia war are lacking at the moment.

Some 80,000 US Gulf War veterans now suffer from the so-called Gulf War syndrome. However, it seems very questionable whether this syndrome could be due to DU internal radiation exposure.

This paper wants to assess the use of DU weapons in the Kosovo-Serbia war by an experimental determination of DU concentration in samples taken in Kosovo battlefields.

Ground samples have been taken in several Kosovo battlefields: in particular, locations near destroyed and burnt tanks have been selected, together with locations like destroyed bunkers and bombarded Serbian military quarters.
Practically all battlefields are now completely open to public access: in most cases, people live very close to these locations, and in some cases children use these battlefields as a playground.
Samples have been brought to Italy and then analysed by means of both radiation and radiochemical techniques in order to assess the presence of DU.

The sampling procedure and locations, together with the first results of the analysis, are described in the paper.