Lethal Dust

Effects of Depleted Uranium Ammunition

For the past few months, there has been growing evidence of the hazards posed to soldiers and citizens of war-afflicted zones by the use of depleted uranium in anti-tank weapons. Increased cases of cancer and other health disorders have been reported from Iraq and from the Balkans. It is now clear that the US was aware of the potential dangers of depleted uranium, but its efforts at cover-up are, however, under increasing international scrutiny.

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Efforts by NATO to suppress information about the hazards of depleted uranium – a substance that NATO troops used in shells fired during the Gulf war in 1991 and in the Balkans war in 1998 – have received a serious jolt. In early January this year Russia demanded a summit on the dangers of depleted uranium (DU) ammunition. Growing alarm over the residual toxicity of depleted uranium, that many believe has affected hundreds of thousands of civilians in Iraq and later in the Balkans and may have left its scars on troops serving in these wars, has prompted Greece to tell its troops to leave the Balkans if they feared for their health. NATO, however, still insists there is no proven link between depleted uranium and cancer.

But at least nine deaths from leukaemia among Italian troops and illness among servicemen from France, Netherlands, Spain, Belgium and Portugal have been blamed on depleted uranium, and driven rifts through the alliance. In Belgium, five cases of cancer have been diagnosed among soldiers who were on duty in the Balkans. In Spain, two soldiers have also been affected; one of whom died in October 2000. The Spanish government has launched a study of the health of the 32,000 Spanish soldiers who have been in the Balkans and the Portuguese government will examine 900 of its country's troops. In mid-December 2000, the Italian government also launched an inquiry into why some of their military personnel have recently died of leukaemia.

The numbers may not appear large. But, many believe, they represent the proverbial tip of the iceberg. They are indicators of the horrors perpetrated on civilian populations in Iraq and the Balkans, where DU weapons were used by NATO forces. For almost a decade, there has been mounting evidence linking DU weapons to a host of illnesses, including cancers. The recent deaths among NATO's own forces, dramatically represented in the European media, has served to focus renewed concern regarding DU weapons used by NATO forces.

NATO Use of DU Weapons

Shells reinforced with depleted uranium were mounted on A-10 Warthog jets that hit targets in Kosovo. The A-10s were the preferred anti-tank weapon in the 1991 war against Iraq. It carries a cannon capable of firing 4,200 rounds per minute. DU, is a radioactive heavy metal. It is the waste left over when the isotope uranium-235 is extracted from naturally occurring uranium to fuel nuclear power stations and build nuclear bombs. As a by-product of the nuclear industry, DU is cheap and plentiful. Further, DU shells are a very effective weapon against tanks and armoured cars. They can pierce several inches of armour-plated steel tanks to DU's extremely high density. They are better at penetrating armour than traditional anti-tank weapons made of tungsten.

After their first use in 1991, the US Department of Defence now says that US planes and tanks fired 8,60,000 rounds of ammunition containing 290 tonnes of DU. Gulf veterans believe exposure to this DU is one of the causes of 'Gulf War Syndrome', the unexplained illness or group of illnesses that has afflicted thousands of soldiers since the war. Iraqi scientists also claim that DU was responsible for a rise in the numbers affected by cancers and birth defects in southern Iraq.

Responding to requests from veterans and their families, the National Gulf War Resource Centre, and the Military Toxics Project conducted an in-depth investigation of Persian Gulf War exposures to depleted uranium fired from US tanks and aircraft. The investigation showed that the US Department of Defence (DoD) had engaged in a deliberate attempt to avoid responsibility for consciously allowing the widespread exposure of hundreds of thousands of US and coalition servicemen and women to more than 6,30,000 pounds of depleted uranium released by US tanks and aircraft during the Gulf war. The number of people in Iraq and Kuwait who were exposed to this hazard, and continue till date to be exposed, is several times more this number.

The magnitude of contamination caused by the use of DU can be gauged from the fact that in 1980, the National Lead Plant in New York state was shut down for releasing an amount of depleted uranium dust that was approximately 7,00,000 times less than the amount of depleted uranium released during the Gulf war.

Uranium is a naturally occurring heavy metal that is extracted from the earth through mining. After uranium ore is removed from the earth, it may undergo a process called uranium enrichment. During uranium enrichment, a small amount of the highly radioactive U-235 isotope is extracted from uranium ore for use in nuclear weapons and reactors. The waste byproduct of the enrichment process is called 'depleted' uranium. Depleted uranium is about 60 per cent as radioactive as naturally occurring uranium, and has a half-life of 4.5 billion years. Both naturally occurring uranium and 'depleted' uranium are comprised of over 99 per cent of the U-238 isotope (see the table).

Table: Composition of the U-238 Isotope
(Per Cent)

	Uranium Ore	Depleted Uranium
U-235	00.72	00.2
U-238	99.28	99.8

In the 1960s, the US army became interested in using depleted uranium in weapons systems because it is extremely dense, pyrophoric (capable of spontaneously igniting), and cheaply available in huge quantities. Their chief interest lay in the use of DU in kinetic energy penetrators and tank armour. Depleted uranium possesses characteristics which make it very attractive for weapon technology. It is the heaviest element occurring naturally on earth – about 1.7 times heavier than lead.

Kinetic energy penetrators are dense metal rods which can pierce armour when fired at a high velocity. Depleted uranium

and tungsten are the two heavy metals most suitable for use as kinetic energy penetrators. Depleted uranium is available in larger quantities and at a cheaper price than tungsten, and DU also slightly outperforms tungsten alloy in armour penetration. Depleted uranium, however, is radioactive and 25 times more chemically toxic than tungsten. Both depleted uranium and tungsten alloy penetrators are used in the US arsenal, as well as in arsenals of armed forces around the world.

One major disadvantage to tungsten for the US is that the country currently imports approximately 50 per cent of its tungsten supply from China. The slight advantage of DU over tungsten alloy in armour penetration and the large stockpile of DU waste material within the US are the two main reasons that the US military has chosen to make its kinetic energy penetrators out of depleted uranium. Generally speaking, because of its toxicity and radioactivity, wastes from the uranium industry in Europe are deposited in salt galleries. These wastes must be safely deposited for a very long period of time. Such deposition processes seem to be extremely expensive. So, to save money, the uranium industry is giving depleted uranium, free of charge, to institutions or others, who are interested in it.

Though DU penetrators were extensively used for the first time in the Gulf war of 1991; Honeywell, Aerojet and others have manufactured different types of DU ammunition in the US since 1977. At present there exists also mass-production in Britain and France and its export continues to other NATO countries, as well as to Japan, Australia and New Zealand.

The depleted uranium kinetic energy penetrators used by the US military do not explode; they fragment and burn through armour due to the pyrophoric nature of uranium metal and the extreme flash temperatures generated on impact. Depleted uranium is also used to reinforce the armour protection of M1 series tanks.

When a depleted uranium penetrator impacts a target, or a tank with DU armour or DU rounds are consumed in a fire, some of the depleted uranium will burn and oxidise into small particles. Depleted uranium penetrators that miss their target may come to rest on the soil surface, or become buried in the earth or submerged in water. These spent penetrators will oxidise over time, breaking down into uranium dust. The oxidation of a bare penetrator will occur most rapidly in water or a wet environment.

US army test data shows that between two and seven pounds of highly toxic and radioactive uranium dust is created from the impact of one 120mm depleted uranium penetrator with an armoured target. DU oxide aerosol (fine droplets) formed during the impact of DU into armour has a high percentage of respirable size particles (50 to 96 per cent), and an appreciable percentage of those respirable particles are readily soluble in lung fluids (17 to 48 per cent). Respirable size particles are less than 0.0004 inch in diameter. By comparison, a typical grain of sand is approximately 0.04 inch in diameter – or 100 times larger than the majority of the uranium dust particles created by a penetrator impact. Because of their microscopic size, respirable size particles may easily enter the body via inhalation, ingestion, or wound contamination.

Depleted uranium oxides formed by an impact or a fire may become airborne. These uranium dust particles may be carried by the wind for miles before falling to the ground. Depleted uranium dust and penetrators deposited in the soil may contaminate food or water supplies. DU's mobility in water is due to how easily it dissolves. The end result of air and water contamination is that DU is deposited in the soil. Once in the soil, it stays there unless moved. Thus, the area remains contaminated, and will not decontaminate itself. The only effective way to decontaminate an area is to remove DU fragments and the top layer of soil and dispose of these materials in a radioactive waste repository.

Widespread Health Hazards

Prolonged, close contact with depleted uranium armour or ammunition could cause adverse health effects. However, depleted uranium has the greatest potential to cause health problems when DU fragments or dust particles enter the body. DU's chemical toxicity presents the greatest danger to health in the short term after exposure, but DU's radioactivity may even cause severe health problems years or decades after exposure. Soluble uranium compounds easily travel in the bloodstream and are more readily excreted from the body than insoluble uranium compounds.

Depleted uranium may be internalised as a result of breathing smoke or contaminated air containing DU aerosols, hand-to-mouth transfer as a result of contact with contaminated equipment or soil, inhalation or ingestion of resuspended particles, ingestion of food or water contaminated by DU, or contamination of wounds by DU dust. Ingestion of large amounts of depleted uranium dust may cause short-term health problems including nausea, vomiting, weakness, and diarrhoea. Depleted uranium fragments or particles in the body may cause severe health problems years or decades after exposure, including kidney and liver damage, a depressed immune system, cancers of the lung, bone and other organs, leukaemia, tissue decay, anaemia, chromosomal damage, reproductive problems and birth defects. Uranium fragments could also cause neurological damage depending on their location in the body. The kidney is understood to be the organ most sensitive to uranium's chemical toxicity.

Behaviour of inhaled uranium particles is dependent on the solubility of the particular uranium compound in body fluids. If the compound is soluble, uranium will be absorbed into the blood. If the particles are highly insoluble, some per cent of them will remain in the lung for months or years. Depleted uranium's radioactivity is considered to be 'low-level' when compared to the 'high level' radioactivity of enriched uranium. 'High level' radioactivity released by nuclear weapons and other sources is dangerous because high-energy gamma rays can penetrate the body and quickly cause significant damage or death. However, depleted uranium's radioactivity is considered 'low-level' because it is primarily an alpha particle emitter. The energy of an alpha particle is extremely high but only travels a short distance, making it the most dangerous form of radiation inside the body. When the alpha particle gets inside the body, the internal tissues absorb the energy causing mass destruction of the cells near the particle.

Internalised DU may also cause reproductive problems and chromosomal damage in exposed persons. A chromosome is a structure in the nucleus of a cell containing DNA, which transmits genetic information. Damage to the chromosomes could affect genetic structure and cause birth defects or developmental disabilities in the children of men and women exposed to depleted uranium.

The *New Scientist* (June 5, 1999) carried an article about Doug Rokke, who went to the west Asia in 1991 as a US army health physicist to 'clean up' uranium left by the Gulf war. He helped decontaminate 23 armoured vehicles hit by shells in 'friendly fire' incidents. A decade later, he has

difficulty in breathing, his lungs are permanently scarred and he has skin problems and kidney damage. Three years after he worked in the Gulf, the US Department of Energy tested his urine. They found that the level of uranium in his sample was over 4000 times higher than the US safety limit of 0.1 micrograms per litre. His travails have changed Rokke's life and he is active in the campaign to stop the use of weapons that use DU.

Doug Rokke visited the battle sites months after the war, and the effects are evident. It is not difficult to imagine the effects left by DU on populations immediately exposed to it in Iraq and in the Balkans. Since the Gulf war, the populations of Kuwait and Iraq have experienced health problems similar to those affecting American and coalition Gulf war veterans, civilian contractors and their families. The rising number of cases of different types of cancer in Iraq, particularly in the south where the greatest concentration of DU was fired, is staggering. Not just the south of Iraq, increased incidence of cancers have now been found even among Iraqi refugees in Iran who were caught in Allied fire on the roads north of Kuwait.

Iraqi physicians draw a parallel similar increases in cancer and deformities experienced in Japan after the two US atomic bomb attacks. They claim that cancers have increased between 7 and 10 fold; deformities between 4 and 6 fold. Ovarian cancer in women has increased by sixteen fold, and there has been a doubling in the incidence of cancers of the intestinal tract. There has also been an increase in the incidence of breast cancer among young females – nowhere else in the world has there been a high incidence below the age of 30.

A 1994 survey of 317 Iraqi doctors by the Iraqi Society for Environmental Protection and Improvement found higher rates of infertility, birth defects, leukaemia, arthritis, asthma, bronchitis, lung cancer, sinusitis, hearing loss, tumours, and blood disorders among the Iraqi population. Significantly, these mirror closely the kind of problems that have plagued American and British Gulf war veterans and their families. In January 1998, the Iraqi health ministry reported a rise in leukaemia rates in the Muthanna province bordering Kuwait and Saudi Arabia. Between 1989 and 1995, the leukaemia rate reportedly rose from 3.8 per cent of the population to 10.6 per cent.

Not surprisingly, the US Department of Defence has repeatedly dismissed Iraqi claims of depleted uranium-related illness as propaganda. While an estimated 315 tons of DU dust was left in Iraq after the Gulf war, the US dominated Sanctions Committee has consistently refused to permit Iraq to import the clean-up equipment needed to decontaminate their country of depleted uranium ammunition. The Sanctions Committee has also refused to allow the mass importation of anti-cancer treatments, which contain trace amounts of radioisotopes, on the grounds that these constitute 'nuclear materials'. Further, the World Health Organisation, invited by Iraq to start research into the cancers, was dissuaded from doing so even though it had sent an initial team to Baghdad to start work.

The same tragic story is now being played out in the Balkans. Bosnians, investigating a growth in cancers, are denied any information by NATO. A team of UN scientists – sent to Kosovo under UN aegis – were denied information by NATO regarding the location of DU bombings in Kosovo.

Designed to Limit Casualties

It is now clear that the US was aware of the potential effects on civilians and military personnel of the chemical toxicity and radiological properties of DU ammunition long before the Gulf war began. Excerpts from a US Army document (Appendix D – US Army Armaments, Munitions and Chemical Command report, July 1990) says:

> Combat conditions will lead to the uncontrolled release of DU...The conditions of the battlefield, and the long term health risks to natives and combat veterans may become issues in the acceptability of the continued use of DU kinetic penetrators for military applications.

Later, after the Gulf war, the UK Atomic Energy Authority came up with some frightening estimates for the potential effects of the DU contamination left by the conflict. It calculated that if 23 tonnes of DU were inhaled – 8 per cent of the amount actually fired in the Gulf – it could cause '500,000 potential deaths'. These estimates have now been termed as unrealistic by the US and Britain.

The Pentagon plans its hi-tech battles so that no one at home sees US troops killed. If they die years after the battle – as they would from DU poisoning – few would link the deaths to the war. The Pentagon's use of depleted-uranium weapons brings an important contradiction to the fore: the goals of the US military on one hand and its need to minimise casualties among its troops on the other. With DU weapons the Pentagon postpones casualties and avoids responsibility for them. Former joint chief of staff, Colin Powell made it clear that his military doctrine in the Gulf war – and it was shared by many of his colleagues – was to limit US casualties for fear of losing political support at home. With vast profits from oil at stake in the Gulf, the Bush administration was prepared to risk many GI lives – but managed to get away with only 147 US troops killed in battle. The slaughter of the Iraqis was one-sided. That is where DU comes in. This dense material makes shells that penetrate and shields that block. It keeps combat casualties of the attacking troops lower during battle, but imposes them later when the political costs are small.

But, efforts, at what appears to be a diabolical cover-up are now facing increasing international scrutiny. The World Health Organisation (WHO) is planning a study to assess whether there had been an increased rate of cancer among military personnel who served in the Gulf war or Balkans, as well as among exposed populations.

Earlier, the United Nations Environment Programme (UNEP) in its report in May 1999 said "This [depleted uranium] type of ammunition is nuclear waste and its use is very dangerous and harmful. The effects on the population are terrible because in addition to injuries and destruction of body tissue, it causes radiological contamination. This contamination produces toxic and radiation effects that cause cancer." Klaus Toepfer, head of the UN Environment Programme (UNEP), and Pekka Haavisto, who leads its Balkans Task Force team, which has collected samples at 11 sites in Kosovo, have said that all 112 Kosovo sites should be analysed for possible health risks. In November 2000, UNEP experts tested 11 sites in the Italian and German peacekeeping sectors of western and southern Kosovo for radioactivity and toxicity in soil and water. The team collected 340 soil, water and vegetation samples and decontaminated the areas. Results of analyses, being carried out at five European laboratories, are due in early March 2001.

Former US Attorney General Ramsey Clark, who is a founder of the International Action Centre (against DU), has once again reiterated his call for a ban of the use of DU weapons – a call that he first raised in 1996. Since then conferences in Baghdad, Iraq, in 1999 and Gijon, Spain in 2000 have also demanded a ban on DU use. The forgotten children of Iraq may yet receive some semblance of justice! EPW