DU WEAPONRY: A VIEW ON FACTS AND DECEPTIONS

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ABSTRACT

The paper summarizes the results of literature research conducted by the author on the use of depleted uranium (DU) weaponry. The research was initiated during the NATO bombing of Yugoslavia in 1999 with an objective of searching for facts in the presence of massive deceptions staged by the huge propaganda machinery of DU weaponry use proponents. The U.S. made use of DU penetrators in the Persian Gulf war as well as in the Balkan wars both in Bosnia and Kosovo. Brief science and history backgrounds are provided including overviews of DU uses and abuses in these three wars. The U.S./NATO public pronouncements have been centered around the theme that there has been no proven link between DU and cancers. In the author's view, these types of carefully word engineered statements are motivated by possible compensation and cleanup claims rather than supported by hard data and sound science. Since underlying causes of so called Gulf and Balkan syndromes have not been found despite a decade elapsed since conclusion of the Persian Gulf War, the DU must continue to be a frontline suspect. From the standpoint of public health and safety, it is prudent and responsible to call for a moratorium. DU use in the Kosovo war, which was not sanctioned by the UN Security Council, was reckless in the extreme.

Key words: natural radionuclides, depleted uranium, DU weponry

SCIENCE

Depleted uranium (DU), a radioactive waste product of uranium enrichment, is basically natural uranium (99.3% U-238) in which the fissionable U-235 isotopic content has been reduced from 0.72% to 0.2%. Obtaining a few kilograms of U-235, needed as fuel for the civiliam and military nuclear power programs, leaves more than a ton of U-238 as waste. Less U-235 in DU means 43% reduction in alpha activity. The natural uranium has not been deemed to constitute a health hazard. These two points have been invariably emphasized and reemphasized by the DU weaponry proponents and became part of routine numerous Pentagon/NATO briefings. However, these points are moot since: (a) DU invariably comes in highly concentrated form and thus more than makes up for its lower alpha activity; and (b) U-238 exposure is not entirely harmless. Adverse health effects in natural uranium mining have been reported in the U.S., Canada, France, Germany,

Namibia, South Africa and the Czech Republic. Increased incidence of lung cancer have been recorded in several Ohio counties in the vicinity of the uranium enrichment facility [Durakovic, 1999].

U-238, half life of 4.5 billion years, is predominantly an alpha emiter producing two decay progeny that are always present with it which add significantly to its radioactivity: thorium-234 (Th-234) and protactinium-234 (Pa-234). Th-234 and Pa-234 each emit beta particles and gamma rays. High energy gamma from Pa-234 is much more penetrating than a typical medical X-ray and can damage far more living cells. Many 2.29 MeV beta particles emitted by Pa-234 are extremely penetrating in body tissue. Alpha, beta and gamma have the same biological effects on cells and organs and much of their radiation damage to tissue can accumulate over the time of exposure. Therefore all of them must be accounted for when examining possible cancer risk and genetic damage. This point is seldom mentioned by the DU weaponry proponents.

The United Nations Environmental Program Balkans Task Force (UNEP/BTF) Kosovo study [UNEP, 2001] showed traces of U-236 and Pu-239/240 in DU penetrators suggesting that part of the material originated from reprocessing of nuclear fuel. However, the European labs which analyzed the samples taken claimed very low content and insignificant impact on levels of radioactivity.

DU, 1.7 times or 65% denser than lead-19g/cm3, exhibits pyrophoric nature of uranium metal, i.e. it burns (oxidizes) rapidly when heated by impact or in fires. It oxidizes at room temperature as well as in vapor, which makes it necessary to use in aluminumprotective coating [Durakovic, op.cit.]. When a DU penetrator, possessing a sharpening effect, strikes a hard object up to 70% (range 0.9% to 70%) of the penetrator is oxidised and scattered as invisible aerosol particles, of between 0.5 and 5 microns size, which become airborne and can be transported over long distances. In 1979, at the Knolls Atomic Power Laboratory (KAPL) in Schenectady, New York, traces of DU were detected at a distance of 42 kms from the National Lead Industries plant which was subsequently shutdown by a court order [Dietz, 1999]. Nonetheless, some DU weaponry proponents claim that, because of its mass and density, it travels only short distances within 100 metres of the target.

These toxic micro-particles can be inhaled or ingested, impacting the human health. The physiological behavior of uranium compounds depends mainly on their solubility. The soluble compounds in internal contamination cause chemical damage to kidneys while less soluble ones are primarily retained in the lungs. Once inhaled or ingested in sufficient quantities, the particles in the body have a potential to irradiate the tissue around it. One “hot particle” in the lungs is equivalent to one chest x-ray every hour of every day practically for the rest of one’s life. Insoluble uranium dioxide stays in the lungs for 10 or more years—slow irradiation takes place possibly resulting in radiation sickness, lung cancer, leukemia and life shortening [Coghill,1999].

Existing radiation protection standards applied in the nuclear industry are built on the hypothesis that any radiation dose, no matter how small, can cause detrimental health effects including cancer. It is postulated that these effects are directly proportional to the dose received such that doubling the radiation dose results in doubling the effect. The bulk of the knowledge has been derived from studies of survivors of Hiroshima and Nagasaki atomic bombings. This knowledge combined with research on animals and cells led to the adoption of so called linear no-threshold (LNT) hypothesis as the dose-response relationship that also describes the radiation health effects at the low doses and dose rates experienced by the radiation workers and the public. The U.S. federal agencies, including the Nuclear Regulatory Commission, the Department of Energy, and the Environmental Protection Agency follow the LNT model. It is a safe and conservative approach. If in

error, it is on the side of enhanced protection. The LNT model has been challenged by some in favor of a threshold model. However, no convincing evidence has been produced thus far. Presumably, the DU weaponry proponents believe or would like to believe in the threshold model.
DU is incorporated into the soil taken up by vegetables. In clay soils, DU penetrators may reach more than two metres depth. Possible contamination of ground water depends on a range of factors including hydrology, chemistry and structure of the surrounding soil, and rainfall.

HISTORY

As a result of over 50 years of uranium enrichment for use in nuclear weapons, nuclear power plants and nuclear research reactors, the U.S. has accumulated over one million tons of DU waste material. In the 1970s, the U.S. government started exploring ways to dispose of DU in order to relieve burden of storage in low-level waste repositories. DU is provided for free to arms manufactors who then reap hugh profits. DU avilability in large quantities, no cost and kinetic energy, made it attractive for use in munitions. Fired at a speed of 1,200 meters per second (Mach 5) it pierces tank armor and can pierce a block of concrete three meters underground [Mond, 7/2/1999]. As a result, DU weaponry have been called by Pentagon “silver bullets.”
The nearest alternative is tungsten. The U.S. has not produced tungsten since 1994 importing it instead from Russia and China [Heritage, 2001]. The British Royal Navy is phasing out the DU ammunition after the U.S. manufacturers stopped producing them. The U.S. Navy had also been phasing out stocks for a decade and replacing with tungsten-tipped ammunition which is not radioactive and far less toxic [AFP, 1/13/01].
The design of the bullet is to encompass a long thin cylinder of DU housed in a sheath called often jacket. U.S. first began producing DU ammunition in 1978. U.S. arms dealers sell DU to 16 countries. A survey found that the DU weaponry has been used or tested in 41 countries from Britain to Japan, where unauthorized firing by the U.S. military led to a massive cleanup operation [Scottish Sunday Herald, 4/15/01].
It was also found that incorporating DU into tank armor made tanks less vulnerable to penetrations. During 1970s and 1980s testing at more than dozen domestic sites took place [Fahey,1999]. However, planning and performance of experiments for the health and environmental assessments was lacking [AEPI, 1995]. Under the U.S. supervision, anti-tank DU shells were first used in combat in 1974 during the Yom Kipur War by the Izraeli Army [Venik, 2001]. Operation Desert Storm during the Gulf War in 1991 provided the first opportunity for the Pentagon to use DU munitions on a wide scale.
DU has also been used for years in civil applications such as radiation shielding and construction of aircraft and ships as ballast. The U.S. Federal Aviation Administration (FAA) warned, in a document developed for the aircraft accident investigators, about the harmful effect if the material is internalized by the body advised use of gloves, industrial eye protection and respirator masks [FAA, 1984].
On October 4, 1992, an Israeli El Al Boeing 747 cargo aircraft crashed into an Amsterdam 12-story apartment complex killing 47 people. The aircraft carried 380 kgs counterweights of DU which were burned in the inferno. Six years after the crash 1200 local residents and rescuers have complained of physical and psychological ailments. Surface soil layer of 40 cms has been removed from the crash area [Los Angeles Times, 10/16/98]. American physicist, Robert Parker, estimated that in a worst case scenario 250,000 people would run health risks from such a crash [Nature, 1998].

The Tomahawk Cruise Missiles contain DU in their tips to provide weight and stability. Abrams main battle and other tanks carry DU sabot rounds. The U.S. Air Force's A-10 "tank-killer" aircraft, used extensively against Iraqi armored vehicles and artillery, fired about 940,000 30 mm rounds in combat [Fahey, op.cit]. By war's end, 320 tons of DU lay scattered across the battlefields of Iraq and Kuwait. Some Russian military experts believe that the actual amount may be close to 1000 tons [Venik, op.cit.].

U.S. forces came in contact with DU in a number of ways, e.g. exposure during combat; exposure during recovery of contaminated vehicles hit by so called friendly fire; exposure during massive fire at the U.S. base in Doha, Kuwait; tank driver exposure due to own armor and exposure due to presence in contaminated areas. It should be noted that the U.S. recovered own contaminated vehicles but thousands of Iraqi vehicles, and DU penetrators which missed their mark, littering the battlefields have never been cleaned up [Fahey, op. cit]. Thousands of British, Egyptian, Kuwaiti and Saudi soldiers have been exposed as well.

No warnings or protective gear were issued before the war because DU-related health risks were deemed to be outweighed by the risks of combat [GAO, 1993]. However, seven months after the war end, the Army sent a warning fact sheet to the training centers. Although Pentagon and Veterans Affairs (VA) have provided medical exams to more than 85,000 Gulf War veterans (approximately 1 in 7) who have confirmed health problems (so called Gulf War Syndrome), only a handful have been tested for DU exposure. The most persistent ones have shown elevated levels in their urine several years later indicating they received pretty heavy doses [Fahey,op.cit.]. The Army Surgeon General's office initially asserted that only 35 veterans were exposed, number so small that id did not justify further research [AEPI, op.cit]. However, it was corrected in 1998 admitting that there were thousands of unnecessary exposures.

29 American vehicles were contaminated with DU on the battlefield. 21 of these were penetrated by DU rounds. 13 soldiers were killed and 50 wounded [AEPI,op.cit]. 22 wounded retained uranium shrapnel in their bodies [GAO, op.cit]. 30 are being monitored by the DU Program at the Baltimore, VA Medical center. It has been claimed by the Pentagon that none of them developed cancer. State-wide survey of 251 Gulf War veterans in Mississippi reported that 67% of their children conceived after the war were been born with birth defects and severe illnesses [Nature, 1994].

Dr. Doug Rokke, a health physicist and former head of the DU Program, was in charge of DU decontamination in Iraq, Kuwait, and Saudi Arabia. Within 2 weeks upon return to the U.S., Rokke and other team members began developing health problems. Of 100 members of the team, at least 20 died from lung diseases as a result of inhaling uranium dust, only one is not ill, the rest have respiratory problems, rashes, kidney disease and cancer [Times, 1/31/01]. Rokke's lungs are scarred and he has skin problems and damaged kidney. A urinanalysis, showed a uranium level 5000 times higher than the U.S. safety limit. His team used only face masks as they were assured that DU posed no risk"

In 1995, Rokke was assigned to produce a Pentagon training video to teach soldiers how to handle DU. His recommendations included respiratory gear and a full skin protection suit for anyone going within 25 meters of DU shells after impact. The video was shelved and never shown to the troops [CBC, 2000]. "The Department of Defense doesn't want to admit that DU is harmful because they don't want the liability." [NS, 1999]. In the British parliament, Rokke described the continued use of DU ammunition in the absence of a full-scale survey on the health of troops and civilians as "crime against God, a crime against humanity, a war crime."

In 1996, the DU issue was brought up before the UN Human Rights Tribunal in Geneva. The tribunal condemned it and called it a weapon of mass destruction. The Pentagon

sponsored a Special Oversight Board, headed by former senator Warren Rudman, which produced an interim report recommending further studies. On the basis of studies by the Rand Corp., radiation was ruled out in the Gulf War illness thus far. Bernard Rostker, under secretary of the army, stated: "We have published over 23 reports. Unfortunately, we have not found a smoking gun" [CBC, 2000]. A veterans group, the National Gulf War Resources Center, denounced the panel's findings as an "incomplete whitewash and failure" [AP, 1999].

Reports from Iraq indicate that large numbers of children who lived near contaminated areas have developed leukemias and other health problems attibutable to DU exposure. Adults had scavenged destroyed equipment for usable parts and scrap metal. Iraqi ministers have claimed that hundreds of thousands of Iraqi civilians have been affected, submitted pictures of congenital defects of children, quoted statistics such as that the leukemia cases were six times more common than in 1989, and demanded a prompt scientific inquiry. Dr. Hari Sharma, of the University of Waterloo in Ontario, predicted an increase of 20,000-100,000 fatal cancers in veterans and Iraqi citizens.

Alpha radiation measurements in the Iraqi battlefields were 20 times higher than in Baghdad almost ten years later [Christian Science Monitor, 1/11/01]. It was a decade later that the World Health Organization (WHO) decided to send a team to study the DU effects [AP, 1/25/01]. At the same time, the UNEP and the IAEA announced they were considering sending fact-finding missions to Bosnia, Yugoslavia and Iraq.

BOSNIA

NATO war planes dropped 10,000 of DU ammunition in Bosnia in 1994 and 1995. In early 2001, so called "Balkan War Syndrome," hit the headlines in Europe following revelations that the casualty toll included about 30 European soldiers from ten countries who served in Bosnia and Kosovo. They died mostly from leukemia. It takes 2-5 years for the leukemia to develop after the exposure. Five families of Belgian soldiers who died of cancer and 18 who are seriously ill have filed a lawsuit in Brussels.

Dr. Zoran Stankovic, head of the Department of Forensic Medicine of the Yugoslav Military-Medical Academy in Belgrade, linked the death of about 400 Bosnian Serbs (10% of the population) of Hadzici (near Sarajevo), bombed by NATO in 1994, to DU shells. Some of the victims had worn flak jackets made from used DU shells. Many worked in a factory repairing tanks and armoured vehicles which was heavily bombed. Dr. Stankovic, who performed 4000 autopsies, stated: The death pattern was easy to follow in an isolated population with an increased occurence of malignant diseases and deaths" [Reuters, 1/13/01].

The Serb Republic in Bosnia is already reporting a fivefold increase in cancers over the past five years, with Banja Luka, heavily bombed in 1995, among the worst affected. The cancer rate climbed from 816 in 1999 to 1800 in 2000 [Independent, 1/19/01].

KOSOVO

According to the NATO Secretary the U.S. Air Force A-10 "tankbuster" fired General, George Robertson, 31,000 rounds or 9 tons of DU ammunition throughout Kosovo. (Incidentally, in Kosovo, these tankbusters damaged only 13 tanks and disabled permanently only 4). Recently, Prof. Vladimir Ajdacic disputed Robertson's figure in favor of 43,300 rounds or 13 tons at 115 different locations. To support his claim, Ajdacic displayed the map showing locations including those in Albania and Macedonia [Danas, 6/21/01].

Implicitly, Robertson's letter to the UN Secretary General, Kofi Annan, rules out use of DU outside Kosovo. Five sites in southern Serbia and one in Montenegro were, however, also

contaminated. Tests by the Yugoslav authorities in one location in Southern Serbia showed concentrations of uranium over 1000 times the natural level, which is used as a basis for cleanup decisions.

Commander of the third Yugoslav Army, general Lazarevic, which operated in Kosovo during NATO bombing, made a public announcement that there is an increasing number of Serbian soldiers suffering from malignant diseases including death and warned about an impending possible catastrophe [Beta, 3/5/01]. It was reported that three officers of the Pristina Corps died of leukemia, ten others are ill with four in critical condition [Nedeljni Telegraf, 1/17/01]. An Athens News journalist, Svetlana Stankovic Lala, reported that in Kosovska Mitrovica , the number of malignant diseases increased 200% in 2000 compared to 1998, the year before the bombing [Athens News, 2/15/01]. Doctors in the area, including the Nis Clinical Center council of doctors, estimate that birth deformities have increased by 250% over 1998 [SSH, 4/15/01].

The UNEP Balkans Task Force in Kosovo carried out first-ever-international assessment of impact of DU when used in a real conflict situation. Field mission in which soil, water and other samples were collected, from 11 out of 112 sites (or 12%) identified by NATO, took place 5-19 Nov 2000, some 18 months after the bombing. Some sites were inaccessible due to presence of mines. Five separate laboratories analyzed the samples with the results published in March 2001 [UNEP, 2001]. The results showed low levels of radioactivity resulting in the conclusion that no immediate cause for concern exists. However, "major scientific uncertainties persist over the long-term environmental impacts of DU, especially regarding ground water." A clear need was identified for the cleanup and decontamination of polluted sites and for future monitoring. Similar field studies for the sites in Serbia and Montenegro struck by DU ordinance were recommended. In addition, a broad-based environmental assessment including the DU issue, was recommended for Bosnia.

NO PROVEN LINK BETWEEN DU AND CANCERS?

In response to the Balkan War Syndrome revelations in the European media, Pentagon/ NATO spokesmen have been saying in an orchestrated manner: "There is no scientific evidence that DU causes cancer." Pentagon spokesmen have dismissed concerns as unscientific hysteria and propaganda. For example, Army Col. Eric Daxon characterized it as "a purposeful misinformation campaign by the Iraqi government" [Fahey, 2001]. It is only to be expected from the U.S. secretaries of defense and the state to play down fears of a health risk. Secretary Cohen stated that DU "doesn't pose an unreasonable risk" [WP,1/28/01]. Secretary Albright stated "There is absolutely no proof that there is a connection" [AFP, 1/8/01]. Russian airforce chief, general Anatoly Komukov, characterized these types of declarations as "intended for the amateurs" [AFP, 1/11/01]. One might recall that Secretary Albright's spokesman claimed that 500,000 Kosovo Albanians were missing feared dead after only 25 days into the war. There was only scant coverage in the U.S. and Canadian media. Some of them, like Chicago Tribune [CT, 1/28/01], reported: "Uranium Hysteria Sweeps Europe." Globe and Mail [G&M, 1/11/01] in the piece titled: "DU fears are baseless," accused the suffering soldiers for "falling prone to society's hypochondria."

On the NATO web site [nato.int/du] one could find: "Although a large body of existing scientific and medical research has found no link between DU ammunition and the reported illnesses, NATO immediately established an Ad Hoc Committee on DU as a clearing house." In a matter of days this committee stated that "no evidence has yet been found..." The words "large body" and "yet to be found" are probably carefully chosen. It should be noted that these orchestrated denials have been made despite the fact that what is known

from basic physics, as briefly summarized in this paper, plus lack of definitive studies hardly constitute dismissal material. Noteworthy is testimony of Pentagon's own top DU researcher, Dr. David McClain, who in a 1999 congressional testimony stated that "strong evidence exists to support a detailed study of potential DU carcinogenicity". Way back, July 1990, U.S. Army report stated that DU is "linked to cancer when exposures are internal" [Fahey, op.cit.].

Nonetheless, in a matter of weeks later, EU experts came out with damage control of their own. Prof. Ian McAulay of Trinity University in Dublin who headed the EU panel, concluded that "radiological exposure to DU could not result in detectable effect on human health" [AP, 3/06/01]. It was not clear what evidence served as a basis for this conclusion. An Italian panel, which studied 28 cases of cancer (10 fatal) from late 1995 through January 2001 in 39,450 soldiers, concluded that incidence in soldiers was lower than the normal incidence in general population [AP, 3/19/01].

In May, a British Royal Society report concluded that: "A good deal is known scientifically about DU; it is also clear that a good deal remains to be learned." The authors urged more research to clear up the considerable uncertainty and hence could not rule out that DU could cause cancer [DT, BBC, 5/22/01].

It is clear that legal standard of preponderance of evidence cannot be satisfied by either side of the issue. This is in particular true for the proponents of DU weaponry who are using stonewalling propaganda type of techniques much more so than convincing facts. Explanations for underlying causes of casualties (troops and civilians) from Iraq, Bosnia and Kosovo are essentially non-existent. The UNEP/BTF Kosovo study is the only "real" post conflict study, including actual measurements of radioactivity levels in the battlefields. As such it provided an assurance that those currently living in Kosovo are not subjected to undue risk However, the study points out to scientific uncertainties and a need for the cleanup efforts, which have neither been initiated or even planned. Even armored vehicles struck by the DU rounds have not been removed. The study is also of limited scope. Only 7.5 penetrators and 6 jackets were found; are the others buried in the ground after hitting Serbian decoy targets? It may be interest to note that a Portuguese soldier, who served in Kosovo and is now suffering from leukemia said: "I was shocked by the amount of devastation. Every day, we passed wreckage of bombed tanks and anti-personnel carriers. People were picking up fragments of shells as souvenirs; no one told us anything" [DT, 1/14/01].

U.S. panel of 18 medical experts from the Institute of Medicine, headed by Dr. Harold Sox Jr., could not pinpoint cause of the Gulf Syndrome: "Without data on the levels of exposure in the Persian Gulf theater, answers will remain elusive." The U.S./NATO official statements on DU after the Gulf War are examples of damage control. One would have thought that enough time has now elapsed to expect firmer conclusions. Why is so much still unclear? Is there a cover-up? There seem to be two compelling reasons. First, concern regarding possibility of compensation which could amount to billions of dollars to thousands of victims along with billions more to finance cleanup. Second, the U.S. says it needs DU to counter large armored vehicle forces of its potential adversaries: North Korea maintains over 6,000; Iran and Iraq have a combining total of 7,500; China sustains a force of 13,000 [Heritage, 2001]. However, tungsten alternative is available and had been demonstrated to be almost as effective as DU munitions.

AUTHOR'S VIEW

Since underlying causes of so called Gulf and Balkan war syndromes have not been found thus far, the DU must continue to be a frontline suspect. My hunch is that the DU may not

be the only cause of ailments identified thus far but no other suspects have been pinpointed. Hence, from the standpoint of public health and safety, it is prudent to call for a moratorium at least until the WHO or another independent body comes out with a definitive explanation. However, it is questionable whether a definitive and independent study can indeed be conducted even by the WHO, since the governments facing huge possible compensation claims control the funding of these otherwise competent UN and other agencies. Several institutions, including the European Parliament, have proposed a moratorium as well. In addition, a larger issue of DU use must be addressed: the legal issue. In a December 18 document, the Environment Committee of the Council of Europe found that during the Kosovo war, NATO violated provisions of the Geneva Conventions intended to limit the environmental damage. Use of DU in an undeclared war, not approved by the UN security Council, against the background of dangers and uncertainties reviewed herein, was reckless in the extreme. The head of the Athens Bar Association and two human rights groups asked the chief war prosecutor for former Yugoslavia, Carla del Ponte, to charge NATO officials for allowing the use of DU in the Balkans [Kathimerini, 6/15/01].

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