Depleted Uranium and Its Use in Modern Warfare

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Depleted uranium (DU), a substance very few ever hear about, is rarely brought into public or political debate, and yet is a topic seriously worth looking into. Depleted uranium has played one of greatest roles in altering modern warfare, as well as the lives of countless individuals who have come into contact with it. Therefore, the purpose of the following is two-fold. First, it is to shed some light into depleted uranium, its history, uses, advantages and disadvantages, and consequences. Second, it is for those individuals who have served in the military for the right reasons and have become trapped in a vicious debate with no clear evidence or solutions; for individuals who became victims of conflicts they had no say in and who wonder why they are and never will be the same, why they are sick, and why world leaders, organizations, and government are not dealing with this issue in greater force.

DU is a waste by-product of uranium enrichment and has many practical applications in civil and military systems; however, DU is also an extremely dangerous environmental and organism pollutant. Depleted enriched uranium was first manufactured in the United States early in the 1940s during the onset of the nuclear weapons program. Later in the decade, Britain, France and the Soviet Union began their nuclear weapons program and in turn ran into DU.

Since the 1940s, it has been used as armor and armor-piercing ammunition in many international military conflicts, which include the Gulf War, Kosovo Conflict, Iraq and Afghanistan. The United States military first began equipping its forces with depleted uranium in the 1980s. The first things to be armed with DU were tanks, shells and rockets. DU is extremely dense and is one of the heaviest metals around, which enables it to burn and destroy conventional armor with precision and accuracy. DU munitions are extremely effective weapons that are known to infiltrate armor on any military vehicle, as well as protective bunkers. DU can serve both as a weapon and a protective armored-plating shield. Non-DU shells do not stand a chance against this sort of armor. Currently, DU weapons are used unreservedly by the armed forces as necessary asset for the military. DU is not only a superior armor penetrator, but is required to compete with any modern military force in order to penetrate targets (3). These weapons, even though proven to contain toxic elements that effect the population and surrounding areas for decades, if not centuries, to come, from a military point of view, serve an extremely effective advantage over their opponents. DU allowed for Iraqi tanks to be destroyed in a matter of hours with little casualties for Americans. Citizens of countries want to see as little death of possible from their soldiers. Therefore, the military and weapons manufactorys' usage of DU has become an ingenious idea, which at the same time is practical and very cost effective.

Nonmilitary uses of DU include counterweights in airplanes, shields against radiation in medical radiotherapy units and transport of radioactive isotopes (2). It is also used in the shielding of radiographic cameras, coloring in consumer products, trim weights in aircraft, as well as sampling of calorimeters for detectors in high-energy particle accelerators.

However, if DU is used extensively in the military and is quite common in civil usage, then why the concern? DU behaves both toxicologically and chemically like natural uranium metal. DU can be toxic to many bodily systems. Most importantly, normal functioning of the kidney, brain, liver, and heart can be affected by DU exposure (2). An additional hazard is DU's chemical toxicity. An Armed Forces Radiobiology Research Institute study of rats after the Gulf War found that DU exposure damaged their immune and central nervous systems and may have contributed to some of the cancers they developed (3).

Yet DU on its own is quite safe, the main concern with DU is when it is used as a military shell, missile or projectile. Natural uranium is comprised of three radioactive isotopes: 238U, 235U, and 234U. However, the enrichment process reduces the radioactivity of DU to roughly 30% of that of natural uranium (1). While depleted uranium is less radioactive than natural uranium, it still retains all the chemical toxicity associated with the original element (5). This toxicity is made evident in missile conflict. When a projectile composed of DU hits a target, up to 70% of the DU vaporizes through the intense heat into a fine dust, which in turn settles in the surrounding area. While DU does prove effective and has a very high rate of destroying its targets, there is a great side effect. The after-blast of DU continues with an army of toxic substances surrounding the exploded area. The size of these toxic particles is smaller than 5 microns, and a human being can inhale anything under 10 microns. The DU radioactive dust settles in the soil, water and air, which then can be moved great distances by plants, underground water and wind currents. This transfer to drinking water or locally-produced food has enough potential to lead to significant exposures to DU. Once inhaled, depending on aerosol speciation, inhalation may lead to a protracted exposure of the lungs, blood and various other systems and begin to emit a dose of alpha radiation.

Chronic low-dose exposure to depleted uranium also alters the genetic structure of developing organisms. Adult animals that were exposed to depleted uranium during development display persistent alterations in behavior and brain chemistry, even after cessation of depleted uranium exposure (2). Despite its reduced level of radioactivity, evidence continues to accumulate that depleted uranium, if ingested, may pose a radiologic hazard (2).

The former state of knowledge concerning DU is currently being debated and discussed. While the Army intensively studied DU's value as a weapon, less effort was made to learn about its possible hazard to health. In fact, the Army's Environmental Policy Institute criticized the command in a 1995 report for its failure to "closely coordinate the planning and performance of experiments for DU health and environmental assessments" (4). The result of this was an agreement to a $3.0 million fund appropriated for the authorization of establishing an environmental policy lab under the direction of the Army Environmental Policy Institute (4).

Still, the United States Military was not the only institution which began to question the use of DU. In 1996, the International Court of Justice (ICJ) gave an advisory opinion on the "legality of the threat or use of nuclear weapons" (8). The court ruled that nuclear weapons are legal because their primary or exclusive use does not fall under the category for use of poisoning or asphyxiating. This ruling removed depleted uranium from the weaponry category. Again, in 2002, Y.K.J. Yeung Sik Yuen argued that the use of DU in weapons, along with the other weapons listed by the Sub Commission, may breach one or more of the following treaties: the Universal Declaration of Human Rights, the Charter of the United Nations, the Genocide Convention, the United Nations Convention Against Torture, the Geneva Conventions including Protocol I, the Convention on Conventional Weapons of 1980 and the Chemical Weapons Convention. Yeung Sik Yuen wrote in Paragraph 133 under the title "Legal compliance of weapons containing DU as a new weapon":

"Annex II to the Convention on the Physical Protection of Nuclear Material 1980 classifies DU as a category II nuclear material. Storage and transport rules are set down for that category which indicates that DU is considered sufficiently "hot" and dangerous to warrant these protections. But since weapons containing DU are relatively new weapons no treaty exists yet to regulate, limit or prohibit its use. The legality or illegality of DU weapons must therefore be tested by recourse to the general rules governing the use of weapons under humanitarian and human rights law which have already been analyzed in Part I of this paper, and more particularly at paragraph 35 which states that parties to Protocol to the Geneva Conventions of 1949 have an obligation to ascertain that new weapons do not violate the laws and customs of war or any other international law. As mentioned, the International Court of Justice considers this rule binding customary humanitarian law" (9).

This again was neglected and the use, transport and further development of DU continued. In 2001, Carla Del Ponte, former chief prosecutor for the International Criminal Tribunal for the Former Yugoslavia, said that NATO's use of depleted uranium in former Yugoslavia could be investigated as a possible war crime. Del Ponte concluded that:

"There is no specific treaty ban on the use of DU projectiles. There is a developing scientific debate and concern expressed regarding the impact of the use of such projectiles and it is possible that, in future, there will be consensus

views in international legal circles that use of such projectiles violate general principles of the law applicable to use of weapons in armed conflict. No such consensus exists at present"(10).

In 2006, some states and the International Coalition to Ban Uranium Weapons, a coalition of more than 155 nongovernmental organizations, asked for a ban on the production and military use of depleted uranium weapons. However, France and Great Britain, which hold permanent positions at the United Nation Security Council, rejected a ban (11). Three years ago, in December, the UN General Assembly passed a resolution calling for users of DU to hand over quantitative and geographical data on their use. The resolution passed by 148 votes to four, with 30 abstentions. The UK, US, Israel and France voted against (11).

The countries which abstain or vote against any anti-DU regulation are also the countries with the largest and most developed militaries. The value of DU usage in warfare was first seen and thoroughly analyzed during Operation Desert Storm in the Persian Gulf in 1991 by the American and British militaries. Most of the main battle tanks fired rounds that contained DU rounds. The Pentagon later estimated that over 14,000 such rounds were fired (6). Another 940,000 DU rounds were fired by aircraft in support of their "tank killing" operations during the brief war. All told, the Pentagon estimated that 320 tons of depleted uranium were fired by US and UK units (6). This amount of radioactive material had a tremendous impact on the population, and, in a sense, kept the country underdeveloped and in constant need of aid from outside actors.

Soon after the Gulf War ended, questions and concerns began to arise regarding DU. After the Gulf War, thousands of veterans began to voice their newly emerging chronic health problems. 'The Gulf War syndrome' or 'Gulf War illness' were coined to describe this new illness affecting hundreds of thousands of people. Approximately 250,000 of the 697,000 veterans who served in the 1991 Gulf War are afflicted with enduring chronic multi-symptom illness, a condition with serious consequences (1). Many veterans looked for answers and treatment at VA medical centers or military hospitals, but very few found answers. They reported some or all of the following symptoms: neurological problems, chronic skin rashes, respiratory problems, chronic flu-like symptoms including severe body aches, immune system disorders, severe fatigue, joint pain, gynecological infection, bleeding gums and lesions, and unexplained rapid weight loss (7). Hundreds of thousands of veterans were examined and told that they suffered from an illness that was not yet able to be diagnosed. Despite all this, the military has still not agreed to fund studies to finally prove that veterans who were exposed to DU have health related issues.

The United States and its Allies have not reduced or revised their use of DU weapons since. DU was used in Kosovo and Serbia, Iraq, Afghanistan and Libya, even though the military in Libya claimed no knowledge of such weapons. Peacekeeping troops, civilians and relief workers would have been very surprised to learn that the former battlefields they spent time around were contained with DU. The worst part is that children play on and around destroyed armored vehicles and adults are known to scavenge this equipment for usable parts and scrap metal.

Much research about DU can be attributed to the countries of former occupations after they began to study the effects of their wars. Iraq reported a sharp increase in the incidence of child leukemia and genetic malformation among babies born, and Iraqi doctors attributed these malformations to the possible long-term effects of DU; this opinion is shared by several newspapers, including the St. Petersburg Times, Boston Globe, Settle Post and the Sunday Herald. A medical survey in the BBC was conducted and published in July 2010, which stated that, "Increase in cancer and birth defects…are alarmingly high" and that "infant mortality 2009/2010 has reached 13.6%" (12). In Kosovo, the number of patients suffering from malignant diseases has increased 200% since 1998 (12). Contamination results have also been growing in Afghanistan and Iraq.

The debate on depleted uranium has been ongoing ever since the first Gulf War; however, the literature seems to have strong arguments to both sides. A 1999 literature review conducted by the Rand Corporation stated: "No evidence is documented in the literature of cancer or any other negative health effect related to the radiation received from exposure to depleted or natural uranium, whether inhaled or ingested, even at very high doses" (13). A 2001 oncology study concluded that "the present scientific consensus is that DU exposure to humans, in locations where DU ammunition was deployed, is very unlikely to give rise to cancer induction"(14). The IAEA reported in 2003 that, "based on credible scientific evidence, there is no proven link between DU exposure and increases in human

cancers or other significant health or environmental impacts," although, "like other heavy metals, DU is potentially poisonous. In sufficient amounts, if DU is ingested or inhaled it can be harmful because of its chemical toxicity. High concentration could cause kidney damage" (15). The IAEA concluded that while depleted uranium is a potential carcinogen, there is no evidence that it has been carcinogenic in humans (15).

According to the official website for Military Health, every single study done on animals did not result in conclusive data, and further information needs to be conducted. In one project, the military developed an animal model to examine the toxicological and behavioral effects of depleted uranium on female rats (17). This study did show that the DU is potentially high enough to adversely affect the developing fetus, but no further conclusive studies were needed. Current research is being conducted on the potential treatments for neurotoxicity caused by chronic exposure to depleted uranium (17).

The pointing of fingers, victimizing of self and blaming others is not always the most productive way of finding solutions to problems. Countries such as the United States, China, Britain, Russia, Pakistan and France understandably see DU as a necessity in modern warfare. The United States is developing drones and unmanned fighters. Artificial Intelligence is exponentially growing. Future weapons will rely more on computer systems and robotic units than humans. It is very difficult to get a country, let alone a group of countries, to admit that they committed acts of treason. It would seem much simpler for these countries to learn from past mistakes and develop new medicines or technologies to combat DU and its environmental and health effects. Yet costs, evidence and time seem to be the biggest obstacles to overcome here.

Nevertheless, there is always a bright side to any situation. Recently, Sciencenews.org posted an article that Northwestern University is producing and testing new drugs to treat radiation sickness (18). This drug is composed of an ordinary antibiotic combined with a microbe-fighting compound that, experiments with mice suggest, may protect thousands of people from the ravages of radiation sickness. Researchers exposed mice to a heavy dose of radiation and 24 hours later gave some of them injections of an antibiotic and a protein that is made naturally by the immune system. Thirty days later, most mice that received no treatment were dead, whereas nearly 80 percent of mice that received the treatment still appeared healthy (18). Current radiation sickness treatment is aimed more at preventing further radioactive contamination, managing organ damage, reducing symptoms and managing pain than actually curing the poisoning, but the future looks very promising in these fields of study.

Now this does not solve the current problem of using DU weapons or armor, but it can help future exposed individuals. When it comes to a solution for protective armor, the German military might be the right place to start. It currently arms its anti-armor shells with tungsten alloy. Tungsten has the same density as DU but does not burn like DU when it strikes a target. This eliminates the microscopic dust that can be harmful if inhaled. However, DU can engage the enemy at greater distances than tungsten penetrator rounds can. Also, when the rounds strike a target, tungsten penetrators blunt while DU has a self-sharpening property. DU ammunition routinely provides a 25 percent increase in effective range over traditional kinetic energy rounds (17).

Another argument used by proponents of depleted uranium is that it is provided free of charge as it comes from America's vast storehouse of nuclear waste. Tungsten, by comparison, must be mined at considerable expense (7). Unfortunately herein lays the biggest obstacles for the future halt of DU: what to do with all the waste from Nuclear Power Plants, and why increase the production of weapons and armor when there is a constant, cheap flow of DU? With over 20 percent of the United States' power production being of a nuclear nature, and all of this nuclear production generating high-level nuclear waste, the US has already accumulated large quantities of volatile nuclear waste and will only have more in the future (16).

There are very few effective ways of dealing with nuclear waste. One proposed solution for the management of nuclear waste is through underground sequestration in a large Department of Energy run facility. It might be a good idea to store the entire nation's accrued nuclear wastes in one safe location underground to allow the waste to decay over time in a controlled environment isolated from environmental factors that could undermine their containment (16). While the Bush Administration supported the Yucca Mountain, Barack Obama views the solution to be a greater burden than solution. Obama has publicly stated that nuclear waste processing should be developed before new

nuclear reactors are built. Furthermore, in May of 2010, the US Government approved a 2010 Budget Proposal to cut all funding to the Yucca Mountain program (16). The Yucca Mountain program and the $9 billion already spent on research and testing is now a thing of the past. The US government and Department of Energy are now looking for other long-term solutions to deal with both the 67,000 tons of spent nuclear waste Americans have already accumulated and the waste of the future (16).

The past is gone, never to return again, the future does not exist, and predictions are often incorrect; therefore, all the citizens of the world have is now. It is in this now that everything exists. Every idea, action, suffering, happiness, solution and problem exists now and only now. Depleted uranium is a product invented in the past, used for ingenious means, and, for many, the cause of hundreds of thousands – if not millions – of causalities, sickness and problems. It has changed the way modern warfare is fought and established itself as a necessary ingredient in today's conflicts. On the other hand, the future of DU is unknown: will it continue to be used, in greater or different ways, or will it be replaced by something better and more effective? The past is gone and the future is unknown. The individuals, families, communities, corporations, and countries engulfed with the reality of DU must stop thinking about the past and future and focus on what can be done NOW. The solutions are always to be found if enough effort and concentration is focused on them. Focusing on the past only delays solutions, and the future will be shaped by the thoughts and actions of the now. It can be interpreted that it is terrible how DU has been used and how it has affected people and the environment; however, it also can be a stepping stone to something greater and better. Only time will tell and only people tell time; let the human race make the most of their time, and may DU stop taking time away from people.

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