A Study on the Feasibility of Using Depleted Uranium Weapons

by
Abraham Hooker

April 24, 2007

Letter of Transmittal

Dear concerned citizens of the United States of America,

My main reason for writing this report is to bear witness to my own fatherôs contamination and death as a result of depleted uranium (DU) exposure during his participation in Gulf War I. I take great offense in the fact that the US government (now through three administrations) refuses to properly educate their personnel of the hazards of using DU weapons and cease usage of such weapons of mass destruction. The main purpose of this report is to inform the reader of the history of depleted uranium munitions and the effects of using the weapons realized since Gulf War I. The greatest limitation I experienced while writing this report is the fact that the pentagon and Department of Defense have been covering up the adverse effects of DU exposure for liability reasons. Due to the cover-up, large quantities of government documents portray a subdued, misleading account of the detrimental effects of DU contamination. However, when one looks to the scientific community, the evidence overwhelmingly verifies the dangers associated with DU munitions. My quotations from several interviews with Dr. Rokke provide the greatest validity to my report. Dr. Rokke is the former director of the US Army depleted uranium project and was responsible for producing the official military depleted uranium training video and overseeing the contamination cleanup attempts after Gulf War I. Having seen a third of his cleanup crew (about 30 out of 100) die from DU exposure in the decade and a half since their 1992 cleanup mission, Dr. Rokke boldly summarizes the effects of using depleted uranium munitions saying, ñThis whole thing is a crime against God and humanityò (Johnson). Throughout my report, I will

systematically validate his claim that DU munitions are indeed a crime against humanity and that the longevity of their adverse effects make using DU weapons stand out even amongst the most heinous of war-crimes in the extensive disgusting history of war.

Table of Contents

List of Illustrations

Executive Summary

Depleted Uranium (DU) is a co-product of the uranium enrichment process. Uranium enrichment is the process of extracting U-235 from natural uranium. The U-235 is a valuable resource in nuclear weapons programs and certain civilian power reactors. Depleted uranium is composed almost entirely of U-238 making it a toxic radioactive heavy metal. Depleted uranium was considered a hazardous radioactive waste until the 1980ôs when the military started using it to increase the penetrating power of anti-tank ammunition. The heavy metal has military applications because it is currently the only material known to be dense enough to pierce a multi-layered tank armor array. DU weapons were first used in 1991 during Operation Desert Storm in Gulf War I and afterwards in various combat operations. Since there is no natural analogue to depleted uranium and there was a limited number of studies concerning possible risks associated with the material prior to 1991, scientists did not begin to realize the detrimental effects DU has on exposed people and the environment until the effects actually began to appear.

Depleted uranium exposure poses two main threats. The two primary threats are heavy metal poisoning and radiation. The two main methods of exposure to depleted uranium are externally through radiation, and internally through ingestion or inhalation of particles. After the first Gulf War, a variety of illnesses and environmental hazards arose as a result of depleted uranium contamination in Iraqi battlefields and United States DU munitions testing facilities. The heavy metal poisoning and radiation risks effect the environment on both a short-term (within our lifetimes) and long-term (billions of years) scale. The short-term health effects of human DU contamination includes reactive airway disease, neurological abnormalities, kidney stones and chronic kidney pain,

rashes, vision degradation and night vision losses, lymphoma, various forms of skin and organ cancer, neuropsychological disorders, uranium in semen, sexual dysfunction and birth defects in offspring. The long-term effects include the destruction of contaminated populationsô reproductive abilities, and the permanent contamination of the water table and the food chain. The half-life of depleted uranium is 4.5 billion years and the US contaminated the environment with at least 320 tons of radioactive waste in Gulf War I alone. The longevity and associated risks of DU contamination warrants further studies into the severity and range of any contamination.

There is overwhelming evidence of the dangers of DU weapons in the form of doctorôs and scientistsô testimonies, veteran statistical anomalies, and experimental data collected from veterans with known DU exposure. The short and long-term health and environmental effects of DU weapons greatly outweigh the combined benefits of the penetration power and cost efficiency of our militaryôs DU munitions arsenal. Due to the severity of the risks and longevity of adverse effects of using DU munitions in combat, the continued use of weapons utilizing DU components is not feasible. The recommendations of this study are: to cease usage of DU weapons of mass destruction, to rehabilitate and educate those exposed to depleted uranium, and to conduct major studies to determine the range and severity of depleted uranium contamination.

Introduction

The depleted uranium munitions controversy has risen and fallen numerous times since the US military first used the weapons during the Gulf War I conflict in 1991. Those who oppose the use of depleted uranium (DU) ammunition claim the negative consequences of using the toxic DU weapons outweigh the benefits of their military applications. Depleted uranium shrapnel poses an immediate threat to soldiers on the battlefield and a long-term threat to the territory surrounding the battlefield by contamination of the soil and water table. The United Nations defines depleted uranium weapons as ñweapons of mass destructionò and ñindiscriminateò (UN, 1996). Despite the global outcry for the elimination of indiscriminate weapons, those responsible for the use of the weapons (US Department of Defense, Pentagon officials, President Bush Sr., etc.) claim that no studies have shown adverse effects in the environment and health of those veterans and civilians exposed to DU.

The discussion of the effects of DU was largely subdued by the late 1990ôs because DU munitions were becoming a less used technology due to new harsher international environmental pressures. However, the discussion was revitalized in 2002 when the US began using DU weapons once again despite the known risks experienced after using DU in Gulf War I, Bosnia, and Yugoslavia. The main focus of the international discussion is whether the use of DU weapons is feasible in light of their known environmental hazards and health risks. This report examines the positive and negative consequences of using DU weapons and summarizes the feasibility of using such weapons.

Background

1. The Production of Depleted Uranium

Hexafluoride, or depleted uranium, is an extremely dense metal formed as a co-product of a process called uranium enrichment. Since 1945, the US has been using the enrichment process to extract U-235 from natural uranium. Natural uranium consists of three isotopes, U-234, U-235, and U-238, of which only U-235 is fissile (i.e. useful in nuclear weapons). Uranium enrichment is the process of removing U-234 and U-238 from natural uranium to obtain ñrichò uranium (higher percentage of U-235 than natural uranium). Depleted uranium is the U-238 co-product of the enrichment process. Like most heavy metals, the remaining U-238 is toxic and poses an additional threat because it has radioactive properties. By 1999, the production of significant quantities of U-235 for weapons and for civilian power reactor purposes resulted in a significant stockpile of depleted uranium (U-238) hexafluoride stored in cylinders at gaseous diffusion plant sites in the US (Welch 1).

2. The Development of Depleted Uranium Munitions

Depleted uranium penetrators were first engineered to be the solution to a strategic military problem. Before the invention of multi-layered tank armor, the ammunition used to penetrate tank-armor was primarily composed of Tungsten. In 1980, military engineers reported that tungsten-carbide penetrators are not effective against spaced armor targets (Davitt 3). The US military conducted experiments comparing new tank-penetrator designs that utilized the density of both tungsten and depleted uranium. The government scientists reported, ñWhen the inherent penetration performances of the two materials are compared, the DU is not only a superior armor penetrator, but in fact is required in order to penetrate modern targets with modern ammunition.ò (1). However, the performance of the DU penetrators was not the only reason that they replaced the obsolete tungsten penetrators; finances played an equally important role in the final decision to implement the use of the weapons.

The fact that the raw materials required for DU munitions could be purchased from toxic waste facilities 30 times cheaper than raw tungsten material provided strong motivation to ignore the potential environmental hazards of DU (1). Once the US militants discovered that depleted uranium is the only metal dense enough to penetrate modern tanks and that large scale production of DU munitions would save millions in raw material costs, armor-penetrating weapons developed into devices tipped exclusively with depleted uranium. The environmental hazards of depleted uranium were marginalized because of the cost and effectiveness of the metal. However, the cost of depleted uranium was only drastically lower because the metal was already stockpiled in nuclear waste facilities. The fact that depleted uranium is a toxic radioactive heavy metal

was not significant enough to persuade the US Army to study the substance more cautiously.

3. The History of the Usage of Depleted Uranium Munitions

Depleted uranium was first used to make denser ammunition rounds to increase the penetration power of the rounds. However, the use of depleted uranium in conventional warfare is not limited to ammunition. Due to the fact that DU is 1.7 times more dense than lead, the material can be used as tank-armor to repel enemy ammunition made from less dense materials. Depleted uranium also has applications in the aircraft industry. Since DU has a high density, a small amount of the material can be very heavy. The small, but heavy weights can be used as counterweights for aircraft (Brown, Croff, Haire 5).

The history of depleted uranium weapons is not limited to Gulf War I. Their initial success in Operation Desert Storm sealed their permanent place in the US militaryøs arsenal. Since their initial use in 1991, DU weapons have been used in Bosnia, Kosovo, Operation Enduring Freedom (Afghanistan), Operation Iraqi Freedom, and are currently being used in our participation in the Iraqi civil war. Table 1 on the following page outlines which conflicts DU weapons were used in and detail which weapons contained DU and how much depleted uranium contaminated the battlefields.

Table 1 ï Depleted Uranium Usage in Conflict

Iraq 1991	DU was first used extensively in combat during the 1991 Gulf War. U.S. tanks and aircraft and British tanks fired about 850,000 small caliber and 9,600 large caliber DU shells containing over 286,000 kg of DU during operation Desert Storm and on U.S. Army bases in Kuwait. The bulk of DU shells expended during the war (83% by weight) were fired by U.S. A-10 aircraft, although DU was also fired by U.S. M60A3 and Abrams tanks, A-16 jets, AV-8B Harrier jets, Navy Phalanx guns, and by British Challenger tanks.
Bosnia 1994-1995	U.S. A-10 aircraft shot approximately 10,800 DU rounds containing 3,260 kg of DU as part of North Atlantic Treaty Organization (NATO) operations in Bosnia and Herzegovina during 1994 and 1995.
Kosovo, Yugoslavia 1999	U.S. A-10 aircraft fired DU during NATO action in the Yugoslavian province of Kosovo in 1999. Approximately 31,300 rounds containing 9,450 kg of DU were fired at targets in Kosovo, Serbia, and Montenegro during this conflict.
Afghanistan 2001-2003	It appears likely that U.S. forces used some DU munitions against Taliban forces in Afghanistan, although conclusive evidence has not yet been presented. The U.S. Department of Defense has neither confirmed nor denied the use of DU weapons, although several actions occurred

	involving weapons systems known to fire DU. There were at least seven attacks in 2002 and 2003 by U.S. A-10 aircraft, which normally fire a mix of high explosive and "depleted" uranium rounds. The Marine Corps deployed light armored vehicles and Harrier aircraft known to fire DU to Afghanistan, some of which were involved in combat. There is some limited evidence that Al Qaeda or Taliban forces may also have possessed DU rounds. Defense Secretary Donald Rumsfeld stated on several occasions that the U.S. found radioactivity that appeared to indicate depleted uranium. No further information has been released.
Iraq 2003	DU munitions were used in Iraq during the second Gulf War in 2003. An initial Pentagon disclosure stated that A-10s ï which normally fire a mix of four DU shells to one conventional shell ï shot about 300,000 total bullets. As much as 75 tons of DU may remain in Iraq from A-10 expenditure alone. No estimates are available for use of DU by tanks or other weapons.

Source: <http://www.kahea.org/lcr/pdf/Depleted_Uranium_Fact_Sheet.pdf>

Table 1 above shows that a combined effort from US and British aircraft and tanks dispersed approximately 370,000 kg of depleted uranium into the environment across the globe. All of this depleted uranium weaponry was used without any precautions or protective measures taken. The Unites States General Accounting Office

stated the reason for the militaryôs lack of precaution in their 1993 report entitled Army Not Adequately Prepared to Deal with Depleted Uranium Contamination. The report stated, ñArmy officials believe that DU protective methods can be ignored during battle and other life-threatening situations because IN-related health risks are greatly outweighed by the risks of combatò (GAO/NSIAD-93-90 4). No consideration was given to the dangers depleted uranium poses to the environment and the local population in a battle area. Despite the fact that the government acknowledged that it knew there were health risks related to DU, it has continued to use depleted uranium munitions even today.

Summary of the Benefits of Using Depleted Uranium

The controversy over the feasibility of using depleted uranium munitions has focused on the benefits to risk ratio of their use. Due to the extreme environmental and health effects associated with depleted uranium munitions, the benefits of using the weapons would have to be substantial in order to warrant their use in combat. Despite the vast amount of benefits that would be required to validate the use of depleted uranium weapons, the military can name only a few examples. The benefit of depleted uranium munitions lies in its density. The density of depleted uranium makes it useful in tank-penetrating ammunition, tank armor, and as counterweights for aircraft. The only additional benefit to using depleted uranium in combat is that the raw material used to produce the munitions is cheaper to acquire than its closest competitor, tungsten (WA).

The most substantial benefit of depleted uranium munitions is the performance of depleted uranium tipped tank-penetrators. The DU pierces enemy tanks with such deadly

force, that the actual combat operations of Desert Storm lasted little more than a day. Although the US government argues that depleted uranium weapons have saved countless numbers of American lives, it is debatable whether or not the amount of lives saved counter-balances the number of lives lost from DU contamination. There is not a substantial need for DU tank-armor; the higher density is simply an optimization. Similarly, smaller counterweights in aircraft are not a necessity. The financial benefit of cheaper raw material costs of DU in comparison to WA is large. However, the cost of providing health care to the 56% of Gulf War I veterans now on permanent disability outweighs the initial savings in production costs (Tucker).

Summary of Risks Associated With Depleted Uranium

All the health and environmental risks of depleted uranium are not yet realized. However, the list of known adverse effects of the weapons is large and continues to grow with each new study. The United States military was not fully aware of these adverse effects prior to using the weapons in 1991, but the negligence of the United States military in researching these possible effects is well documented. For example, the dangers to the environment and military personal where the weapons are used is foreshadowed in a study comparing the strengths and weaknesses of using tungsten and depleted uranium as penetrators. When comparing the safety differences between Tungsten (WA) and DU as penetrator materials the scientists assigned to the project summarized, ñFinally, if the safety, environmental and deployment implications of the two materials are considered, it becomes readily apparent that WA can be treated similar to any other metal, while DU requires a host of special considerationsò (Davitt 1). These

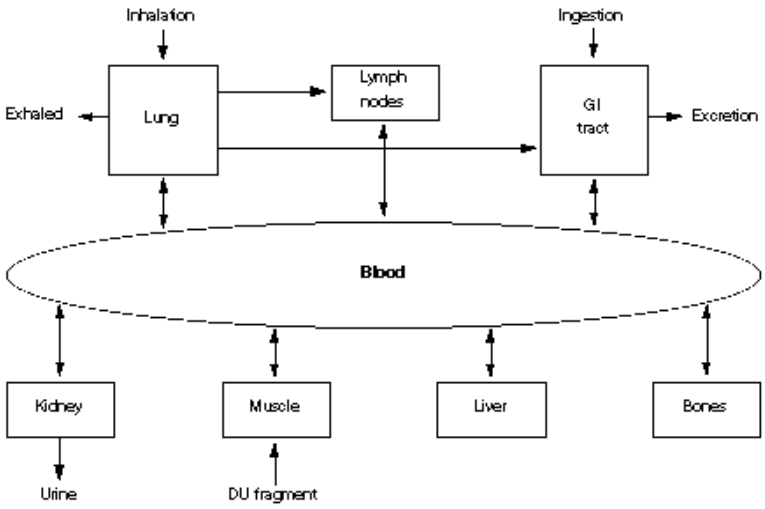
ñhost of special considerationsò were not thoroughly considered until after DU weapons had already been used in Gulf War I. The United States government testifies to their own negligence again in October, 2004 when the Chemical and Biological Defense Information Analysis Center concluded, ñBefore the Gulf War, the U.S. Army had conducted periodic impact tests with DU munitions fired against armored targets; however, these tests involved only limited sampling to characterize the aerosols that form when DU penetrators impact and perforate targetsò (Szrom). The studies prior to the first Gulf War focused on the effectiveness of the weapons rather than the possible environmental hazards that would arise in a combat environment. Post war studies have highlighted the basic risks associated with using depleted uranium munitions in combat.

Depleted uranium exposure poses two main threats. The two primary threats are heavy metal poisoning and radiation. The two main methods of exposure to depleted uranium are externally through radiation, and internally through ingestion or inhalation of particles. Whenever a weapon containing DU is fired, there is a threat to all combatants in the theater of inhalation of DU particles and a small risk due to exposure to radiation. Depleted uranium emits alpha particles which do not penetrate the skin; however, if a particle is inhaled, the radiation from the DU can have serious genetic consequences. The half-life of depleted uranium is 4.5 billion years. The definition of a half-life will be defined in detail in later sections. The important fact to note is that in comparison to the half-life of depleted uranium, the life span of a human is relatively short. The following section outlines the short-term threat of DU contamination.

1. Short Term Threat Assessment

The short-term risks associated with depleted uranium exposure are possible internal and external exposure on the battlefield. Fine radioactive particles are released into the air when a DU penetrator strikes its target. External exposure to depleted uranium is not a serious threat to human health unless the exposure lasts for an extended period of time. The most serious health effects occur when DU particles make it inside the human body. Figure 1 on below shows the main points of entrance for DU particles, the lungs, the GI tract, or through an embedded fragment in a wound.

Figure 1 - Possible Paths of DU Particles Upon Entering the Body



Source: http://www.gulflink.osd.mil/library/randrep/du/mr1018.7.chap2.html

Figure 1 above shows that once a DU particle has entered the body, it can travel to any organ, muscle, or bone in the body. This is because DU particles are partially soluble and can travel through the bloodstream. The US government was aware that this health

hazard makes DU munitions indiscriminate weapons meaning they are lethal to both enemy and friendly troops. However, they did not believe that there was an adequate need to take safety precautions because the immediate threat of battle was considered a greater threat to the health of our soldiers. The detrimental effects of this lapse in safety measures are evident in the dramatic rise in the number of US veterans currently on permanent medical disability.

While Gulf War I was still in progress, soldiers started to complain of symptoms which came to be known as ñGulf War Illnessò or ñGulf War Syndrome.ò Of the 580,400 American veterans of Gulf War I, 11,000 are now dead and 325,000 (56%) are on permanent medical disability. This is a substantial percentage compared to the disability rate for veterans of the world wars of the last century (5%), which rose substantially in Vietnam (to 10%) (Tucker 2006). Most of the illnesses associated with Gulf War Syndrome have also been confirmed to be associated with DU exposure. One of the most outspoken scientists informing the public about the dangers of depleted uranium is Dr. Doug Rokke. Dr. Rokke is the former director of the US ARMY depleted uranium project and was responsible for producing the official military depleted uranium training video and overseeing the contamination cleanup attempts after Gulf War I. Rokke said: "Verified adverse health effects from personal experience, physicians and from personal reports from individuals with known DU exposures include reactive airway disease, neurological abnormalities, kidney stones and chronic kidney pain, rashes, vision degradation and night vision losses, lymphoma, various forms of skin and organ cancer, neuropsychological disorders, uranium in semen, sexual dysfunction and birth defects in offspring.ò (Johnson). Rokke himself has reactive airway disease,

neurological damage, cataracts and kidney problems. Rokke blames his illness on depleted uranium exposure and the government confirms the validity of his claims by providing him with a 40 percent disability payment plan for his exposure after Gulf War I. Furthermore, the longevity of DU contamination has been confirmed by a 2005 study which found that Gulf War veterans with embedded DU shrapnel had significantly elevated urine levels of uranium indicative of a continued systematic exposure to uranium, even after 12 years. In a 2005 animal study, systemic DU rapidly entered brain and was concentrated in select brain regions (Deployment Health 12). The harmful short-term effects of depleted uranium are well documented amongst our veterans, but the DU contamination is not limited to American casualties.

According to Dr. Jawad Al-Ali, director of the oncology center at the largest hospital in Basra, the health situation in Iraq is similarly dismal. He said ñtwo strange phenomenaò are occurring in Basra, Iraq which never occurred in significant numbers before Gulf War I. First, once rare cases of double and triple cancers in a single patient have become a common diagnosis. Secondly, the now common occurrence of clustering of cancer in families was unprecedented in medical journals prior to Gulf War I. Cancer of the lymph system, which has rarely been seen before the age of 12, is now also common in Iraqi children (Koehler). Dr. Al-Ali reports that children are at a higher risk for the adverse effects of DU contamination to harm their health. He attributes this higher risk to ña much higher absorption rate as their blood is being used to build and nourish their bones and they have a lot of soft tissues.ò He goes on to say, ñBone cancer and leukemia used to be diseases affecting them the most. However, cancer of the lymph system, which can develop anywhere on the body and has rarely been seen before the age

of 12, is now also common". Dr. Al-Ali concludes that ñit defies logic to absolve DU of blame when veterans of the Gulf War and of the fighting in the Balkans share common illnesses with children in southern Iraq.ò (Koehler) The children of the populations that the United States of America contaminated with DU are not alone in their suffering. The families of US veterans exposed to DU munitions are experiencing similar medical complications.

Depleted uranium contamination does not only affect people who are directly exposed to DU, the adverse effects of DU radiation on the human genome can cause birth-defects in the offspring of contaminated parents. Numerous studies conducted by government agencies including, Birth Defects and Pediatric Genetics Branch, Centers for Disease Control and Prevention, Atlanta, Georgia and Department of Defense Center for Deployment Health Research, Naval Health Research, Center, San Diego, California concluded, ñWe observed a higher prevalence of tricuspid valve insufficiency, aortic valve stenosis [heart defects], and renal agenesis [kidney defects] or hypoplasia among infants conceived postwar to GWV [Gulf War Veteran] men, and a higher prevalence of hypospadias among infants conceived postwar to female GWVsò (Araneta). Another study, conducted by the US Department of Defense and the Department of Family and Preventive Medicine found that Gulf War-exposed veterans (female) were at substantially increased risk for ectopic pregnancies and spontaneous abortions (miscarriages). An ectopic pregnancy is when a fertilized egg has implanted outside the uterus. The conclusions of the study found that non-deployed veterans (NDV) had a 9.1% chance of a miscarriage while a GWV had a staggering percentage of 22.8%. The risk of ectopic pregnancy for a GWV rose from 1.4% (for a NDV) to 10.7% (Kamens). These realized

health effects on the children of enemy and friendly populations is yet another reason the United Nations has declared DU munitions indiscriminate weapons of mass destruction.

In conclusion, documented health effects to those exposed to DU including reactive airway disease, neurological abnormalities, kidney stones and chronic kidney pain, rashes, vision degradation and night vision losses, lymphoma, various forms of skin and organ cancer, neuropsychological disorders, uranium in semen, sexual dysfunction and birth defects in offspring indicate that the short term risks alone warrant the cessation of using DU munitions in combat. Due to the longevity of DU contamination, which calculates out to be in the billions of years, the health effects that the world is currently experiencing will continue to plague the global population beyond the lifespan of current US citizens. It is therefore imperative that the citizens of America prepare for the future effects of DU exposure by ensuring the short term effects are common knowledge and prepare knowledge of the long-term threat for future generations.

2. Long-Term Threat Assessment

When considering the threat that DU poses to health and the environment, the short-term threat is only a preview of the future of our planet. The half-life of DU is so long, that for billions of years the health and environmental effects will continue to plague any population that stays in contaminated sections of the globe for any extended period of time. The concept of a half-life is important to thoroughly understand because the length of time that the depleted uranium will remain in the environment is the most serious threat posed by contamination. Half-life is an increment of time that is used to calculate the rate of radioactive decay of an element. The radioactive decay of an element particle

is the process of isotopes breaking free from the particle over time. The half-life of the particle is the increment of time required for half of the particleôs mass to decay. The important detail about the half-life of any particle is that once half of the particleôs mass has decayed, the second half of the particle only loses half its mass during the next increment of the same amount of time. For example, Barium-122 has a half-life of 2 minutes. This means that an 80g sample of Barium-122 will have a mass of only 40g after two minutes of decay, after another two minutes only 20g is left, after another two minutes only 10g is left, and so on.

The half-life of deplete uranium is 4.5 billion years. This means that a 10kg sample of depleted uranium will lose 5kg of its mass in the first 4.5 billion years of decay. However, the amount of depleted uranium in the sample is almost irrelevant in comparison to the vast amount of time in the expanse of 4.5 billion years. The decay rate of depleted uranium is so slow, that the 10kg sample would still have a mass immeasurably close to10kg after a mere 1000 years (three times the length of time the USA has existed). This means that unless scientists discover a method for cleaning up contaminated sites, 10 generations from now, the descendants of the current population will live in a world with virtually the same amount of depleted uranium contamination we experience today. Since the half-life of depleted uranium is 4.5 billion years and the US fired 320 tons of DU in Iraq during Gulf War I, in 4.5 billion years there should be 160 tons of depleted uranium left in Iraq and 320 tons of DU left at the end of our lifetimes. However, this would only be the case if depleted uranium remained in one place. There is a legitimate worry that the DU contamination will spread from its original contamination site. The US military concluded that it is unable to diminish the

contamination threat in a 1994 report to congress. In the report the US Army Environmental Policy Institute states, ñNo available technologies can significantly change the inherent chemical and radiological toxicity of DU. These characteristics are fundamental to the element uraniumò (AEPI). The US recognizes the hazardous effects of depleted uranium within our nationôs borders. From 1958 to 1985, the Starmet Corporation (formerly Nuclear Metals, Inc.) DU penetrator production facility in Concord, MA disposed of 400,000 pounds of DU and other toxic wastes into an unlined pit. This toxic material was carried by the water table to populations in the surrounding areas and there have been increased amounts of cancer within the contaminated populations (Kahea). In 2001, the U.S. Environmental Protection Agency added the facility to the federal Superfund National Priorities List as one of the most dangerous contaminated sites in the country (EPA). This highlights a dangerous characteristic of depleted uranium, the solubility of the material allows it to contaminate surrounding areas and affect the health of populations dependant on contaminated water sources.

Since DU contamination cannot be reversed and remains undiminished for billions of years, there is a legitimate threat that the contamination will spread to surrounding habitats. The majority of the adverse effects of depleted uranium have been focused in the immediate areas of contamination, but scientists are beginning to complain that they are recording evidence that the depleted uranium contamination is not contained to the original impact zones. Chris Busby, a chemical physicist from the British governmentôs radiation risk committee said, ñWe used to think (DU) traveled up to a hundred miles, It looks like it goes quite around the planetò (Kahea). After the ñShock and Aweò campaign in Iraq in 2003, filters in Britain collected very fine particles of

depleted uranium. These particles traveled in seven to nine days as far away as 2,400 miles from the combat zone. The radiation measured in the atmosphere quadrupled within a few weeks afterwards showing the quickness and severity of the spread of depleted uranium contamination. At one of the five monitoring locations, the levels of depleted uranium captured were twice the amount requiring an official alert to the British Environment Agency (Moret). A Japanese physicist at the University of the Ryukyus in Okinawa, revealed the most probable cause for the elevated levels of DU around the globe. He estimated that the atomic equivalent of at least 400,000 Nagasaki bombs has been released into the global atmosphere since 1991 from the use of DU munitions and added that it is mixed into the atmosphere within one year (Moret). Given the longevity and range of the contamination, it will be important for the citizens of America prepare for the future effects of DU exposure by ensuring the dangers of depleted uranium and the areas of contamination are common knowledge.

The Feasibility of DU Weapons

The UN declared depleted uranium weapons WMDs and indiscriminate. The health and environmental risks associated with depleted uranium weapons testify to their inhumanity. The severity of these risks increase each time depleted uranium munitions are used. Based on these findings, the use of such weapons is not feasible and all nations possessing DU weapons should cease using the weapons immediately. Furthermore, I recommend the immediate notification of all post-1990 veterans about the dangers of depleted uranium. The veterans should be advised to submit themselves for medical examinations focused on determining the severity of their exposure, whether or not they

have experienced symptoms typical of Gulf War Syndrome such as adverse health effects and complications with offspring. In addition to examining our own troops, the United States should send environmental and medical examiners to Iraq, Kosovo, Bosnia, and Afghanistan to collect data on adverse affects of depleted uranium contamination in those areas and identify possible victims. The US must offer medical aid to all victims of the contamination. In accordance with US Army Regulations AR 700-48 and TB 9-1300-278, this requires treatment of radiation poisoning for all casualties, including enemy soldiers and civilians (Moret). Until a reliable method for decontaminating a depleted uranium battlefield is discovered, contaminated areas will remain dangerous long after the current population has passed away. Therefore, it will be important to educate our future generations about the dangers of hazardous sites. Education will require further studies to determine the range of the spread of depleted uranium contamination and to map the levels of contamination throughout the world.

Works Referenced

Johnson, Larry. Iraqi cancers, birth defects blamed on U.S. depleted uranium. Seattle Post-Intelligencer. 12 Nov. 2002. <http://seattlepi.nwsource.com/national/95178_du12.shtml>

Press Release HR/CN/755. United Nations. 4 Sept. 1996. <http://www.prop1.org/2000/du/resource/000310un.htm>

D. E. Welch, R. J. Moses, L. B. Shappert. U.S. Department of Energy Depleted Uranium Hexafluoride Conversion Project Requirements Document. Lockheed Martin Energy Research Corp. Aug. 1999. <http://www.ornl.gov/sci/nuclear_science_technology/ttg/104239.pdf>

Davitt, Richard. A Comparison of the Advantages and Disadvantages of Depleted Uranium and Tungsten Alloy as Penetrator Materials. US Army Armament Research and Development Command Dover, New Jersey 07801. 8 March 2000. <http://www.deploymentlink.osd.mil/du/pdfs/1999279_0000010.pdf>

Colette Brown, Allen G. Croff and M. Jonathan Haire. Beneficial Uses Of Depleted Uranium. U.S. Department of Energy Germantown, Maryland 20871. Chemical Technology Division Oak Ridge National Laboratory Oak Ridge, Tennessee 37831-6180. 5 Aug. 1997. <http://web.ead.anl.gov/uranium/pdf/dubu97ke.pdf>

GAO/NSIAD-93-90 Army Not Adequately Prepared to Deal With Depleted Uranium Contamination. United States General Accounting Office Washington, D.C. 20548. National Security and International Affairs Division. Jan. 1993. <http://archive.gao.gov/d36t11/148474.pdf>

Tucker, James. Depleted Uranium Death Toll among US War Veterans Tops 11,000 Nationwide Media Blackout Keeps U.S. Public Ignorant About This Important Story. Center for Research on Globalization. 29 Oct. 2006. <http://www.globalresearch.ca/index.php?context=viewArticle&code=TUC20061029&articleId=3620>

F. Szrom, E. G. Daxon, M. A. Parkhurst, G. A. Falo, and J. W. Collins. Level II and Level III Inhalation and Ingestion Dose Methodology: Calculations and Results Attachment 4 Of Depleted Uranium Aerosol Doses and Risks:Summary of U.S. Assessments. US Department of Defense, Chemical and Biological Defense Information Analysis Center. Oct. 2004. <http://www.deploymentlink.osd.mil/du_library/du_capstone/Attachment%204/Attachment%204.pdf>

Deployment Health Working Group Research Subcommittee. Annual Report to Congress Federally Sponsored Research on Gulf War Veteransô Illnesses for 2005. US Department of Veterans Affairs, Department of Defense, Department of Health and Human Services. June 2006. <http://www.research.va.gov/resources/pubs/docs/GulfWarRpt05.pdf>

Koehler, Robert. Spreading Cancer Depleted uranium turns Bush's lies into high-tech horror. 29 June 2006 <http://www.uruknet.info/?p=24275>

Maria Rosario G. Araneta, Karen M. Schlangen, Larry D. Edmonds, Daniel A. Destiche, Ruth D. Merz, Charlotte A. Hobbs, Timothy J. Flood, John A. Harris, Diane Krishnamurti, Gregory C. Gray. Prevalence of birth defects among infants of Gulf War veterans in Arkansas, Arizona, California, Georgia, Hawaii, and Iowa. 1993 <http://www3.interscience.wiley.com/cgi-bin/abstract/104524280/ABSTRACT?CRETRY=1&SRETRY=0>

Deborah R. Kamens MBA, Maria Rosario G. Araneta PhD, Andrew C. Zau MPH, Victor M. Gastañaga PhD, Karen M. Schlangen MA, Katia M. Hiliopoulos MPH, MBA and Gregory C. Gray MD, MPH. Conception and pregnancy during the Persian Gulf War: The risk to women veterans. Department of Defense Center for Deployment Health Research, Naval Health Research Center, San Diego, California and University of California San Diego, Department of Family and Preventive Medicine, La Jolla, California. 7 Nov. 2003 <http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T44-49YD8FX-1&_user=10&_coverDate=02/29/2004&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=f051a74c98858632fb9f98fd8578a0ab>

US Army Environmental Policy Institute(AEPI). Health and Environmental Consequences of Depleted Uranium Use in the U.S. Army: Technical Report. June 1995 <http://www.fas.org/man/dod-101/sys/land/docs/chapter8.html>

Kahea. Military Toxics Project Information Sheet. June 2003 <http://www.kahea.org/lcr/pdf/Depleted_Uranium_Fact_Sheet.pdf>

US Environmental Protection Agency (EPA). National Priorities List for Uncontrolled Hazardous Waste Sites. 14 June 2001. <http://www.epa.gov/fedrgstr/EPA-WASTE/2001/June/Day-14/f14616.htm>

Moret, Leuren. U.S. Weapons Poison Europe Radiation From Iraq War Detected In UK Atmosphere. 6 March 2006. <http://www.americanfreepress.net/html/weapons_poison_europe.html>