

# Iraq War: How the U.S. Contaminated Iraq with Depleted Uranium

## Unspoken War Crimes

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*For more than three decades [since 1991], the United States of America and the United Kingdom have been waging continuous wars on Iraq to occupy this oil rich country.*

*The armed forces of those two countries attacked civilians with different kinds of conventional, non-conventional, and banned weapons such as cluster bombs ammunitions, napalm bombs, white phosphorous weapons and depleted Uranium weapons.*

*Depleted Uranium (DU) is a radioactive and chemically toxic heavy metal. If ingested, inhaled, or it enters the human body through wounds or skin, it remains there for decades.*

*Within the human body the (DU) particles would be a continuous source for emitting alpha particles. With its toxic effects, published research & epidemiological studies have proved that it causes serious health damages to the human body. Some of the damage to the human body is to lymph tissue, kidneys, developing fetuses, neurological system, the bones, lung fibrosis, and an increase in the risk of many types of cancer and malignancies.*

*Hundreds of tons of (DU) expenditure have been fired & exploded on Iraqi highly populated areas like Basrah, Baghdad, Nasriya, Dewania, Samawa, and other cities.*

*Exploration programs and site measurements by Iraqi and non-Iraqi researchers all proved the existence of (DU) related contamination over most Iraqi territories.*

*Iraq's Minister of Environment admitted in July 23, 2007 in Cairo that "at least 350 sites in Iraq are contaminated with (DU)". She added that the nation is facing a tremendous number of cancer cases and called for the international community to help Iraq cope with this problem.*

*A few years after exposure to (DU) contamination, multifold increase of malignancies, congenital malformations, miscarriages, children leukemia, and sterility cases have been registered in suburb areas of Basrah and other surrounding areas. Similar problems appeared in Falluja, where illegal weapons were also used intensively in the 2004 attack of occupation forces on the city. More than two million of the Iraqi population died since 1991*

*because of the synergic multiple impact of using (DU) weapons, economical sanctions, and the destruction of the health care systems.*

*The economical sanction that were also imposed by USA and UK administrations deprived the children and people of Iraq their rights in food, potable water, health care, sanitation and other life supporting necessities.*

*The USA and UK administrations have subjected the whole nation of Iraq for two decades to torture and slow death through the intentional use of radioactive weapons and the sanctions. The continuous and intentional use of radioactive weapons is a crime against humanity due to its undifferentiating harmful health effects on civilians in contaminated areas tens of years to come after the military engagements. The existence of (DU) radioactive contamination in the surrounding environment is a continuous source of exposure to low level radiation. This exposure can be considered as a systematic attack on Iraqi civilians in an armed conflict, according to Article 4 of the official regulations and Article 7 of the ICC.*

*This paper is submitted to present the facts and scientific evidence regarding the intentional use by the USA and UK of depleted uranium weapons against the people and environment of Iraq, in addition to the health consequences that have been result from them.*

## Introduction

The administrations of the United States of America and the United Kingdom have been continuously waging wars against Iraq since 1991.

The armed forces of these two administrations have been using different kinds and new generations of conventional, nonconventional, and illegal weapons like Napalm, cluster bombs, white phosphorous, microwave, and Depleted Uranium weapons [1][2][3][4] against the human population and the environment of Iraq. Invasion and occupation of Iraq proved to the world that oil flow is the main reason behind these criminal attacks.

As a result of using these weapons, with the economical sanctions that were also imposed on Iraq by the same administration more than two million Iraqi people died and the count continues.

In this paper, we present the consequences and damage resulting from the use of Depleted Uranium weaponry against Iraq, backed by scientific fact and research.

## What is Depleted Uranium?

Depleted Uranium (DU) is a man-made, radioactive, heavy metal extracted from Uranium ore. Since (DU) is a byproduct of the Uranium enrichment process to produce spent fuel for nuclear reactors. Natural Uranium has an isotopic content of 99.274% of U-238 by weight, 0.072% of U-235, & 0.0057% of U-234 [5].

Due to its highly pyrophoric and spontaneously ignitable properties, the DU penetrator ignites on impact generating extremely high temperatures. As the projectile pierces, it leaves its jacket behind dispersing DU dust into the environment during the impact. The quantity of the aerosol production is proportional to DU mass within the projectile and the hardness of the impact.

It is estimated that up to 70% of DU in the projectiles to be aerosolized when on the impact DU catches fire [6]. The explosion generates high temperatures of (3000-6000) °C. The aerosols particles are smaller than 5µm in size [6]. These nano-particles act more like a gas than a particle. The DU aerosols remain windborne for an extended time and this is the most dangerous pathway on civilian population around the battlefield areas.

## Depleted Uranium within the human body

There is empirical documentation that suggests that DU aerosols can travel up to 26 miles [5], others suggest even further distances. The full radiation effect of DU occurs six months after production [6]. One milligram of U-238 can give of 1, 07, 000 alpha particles in one day. Each alpha particle releases over 4 MeV (million-electron-volts) of energy. If swallowed or inhaled, this much energy will hit up to 6 nearby cells away in the organ [6]. Just 6-10eV (electron volt) is needed to cleave the nuclear DNA strand in the cell.

Dr. Rosalie Bertell, an epidemiologist with 30-years experience in the field of low level radiation explains DU potential harm to the human body [6]:

After inhalation (DU) nano-particle aerosols cross the lung-blood barrier and gain entrance to the cells. They create free radicals. As a heavy metal, DU toxicity attacks the proteins in the cell which normally fight the free radicals, and creates extra free radicals. This amount of free radicals creates total oxidative stress in the human body. This stress causes failure to protective enzymes, leaving cells vulnerable to viruses and mycoplasmas, damage to cellular communication system and the mitochondria.

As a heavy metal, DU replaces the magnesium in the organ's molecules that normally function as antioxidants, and causes the destruction of the body's repair mechanisms. Consequences of this destruction are chronic diseases and tumors. Free radicals can also totally disrupt the folding process and manufacturing of the molecule proteins which is sequenced by DNA and manufactured by the RNA. Some of the diseases resulted from misrouted proteins include cystic fibrosis, diabetes insipidus and cancer. [6]

Amassing and accumulation of misfolded proteins leads to neurodegenerative diseases, Parkinson's Diseases and early onset Alzheimer's disease. In these diseases, amyloids are formed from protein fragments and dysfunctional proteins and that "Misfolded proteins" are the central pathogenic mechanism.

Gulf War veterans have manifested many of the symptoms of these neurodegenerative diseases.[6]

Other health effects of DU within the human body are:

- Lou Gehrig's disease is twice as commonly diagnosed in Gulf War veterans as expected.
- Immune and Hormonal system damage
- Disturbance of thyroid function
- Mycoplasmas invasion into human cells.
- Initiation or promotion of cancer

- Tetragenic toxicity which causes mental retardation, congenital malformations.
- GW veterans were twice-three times as likely to report children with birth defects as their counter partner who did not serve in the first Gulf War.
- Miscarriages

Dr. Hari Sharma, formerly of the University of Waterloo, tested the urine of some US, UK and Canadian veterans as well as Iraqi civilians from Basra and Baghdad.

Using 24hr urine samples, his isotopic analysis revealed a range of DU in the sample of (81-1,340) nanogram. Results showed that two of the three Iraqis from Al Basra had 147 - 426 nanograms respectively in their urine. Also it showed that 2 out of 5 Iraqis from Baghdad have DU in their urine

### Other Important Scientific Evidence:

- Dr Alexandra C. Miller and her team at the Armed Forces Radiological Research Institute, Bethesda, MD and the University of Paris, France used human cell models (the human Osteoblast cell HOS) to evaluate the carcinogenic potential of DU in vitro through assessing morphological transformation, genotoxicity [7] (chromosomal aberration), mutagenic (HRRT loci) and genomic instability.

Published data of the results have demonstrated that DU exposure in vitro to immortalized HOS cells is neoplastically transforming, mutagenic, genotoxic, and induces genomic instability. Other results showed:

- Exposure to embedded DU pellets could induce leukemia in mice.
- Internalized DU resulted in significant increases in the mutagenic frequency in the Lac gene in the tests of the exposed mice.
- Internalized DU resulted in the development of bladder carcinoma in 75% of all animal exposed within 90 days of initial DU exposure.

As we can see all these results suggest that long-term exposure to internalized DU could be critical to the development of neoplastic disease in humans.

- Pub. Radiation Protection Dosimetry Schroder, Heike 2003. A molecular biologist conducted research about the chromosomal aberration on white blood cells of 16 British Gulf War veterans of 1991. The veterans have suffered from symptoms ranging from headache, to chronic fatigue, depression, muscle and joint pains, impaired short-term memory and other cognitive defects. [8]

The results showed that the mean frequency of their blood cells chromosomal aberrations is 5-fold elevation higher than the control blood samples. This strongly indicated previous exposure to ionizing radiations.

The intercellular distribution of the Dicentric and Centric ring chromosomes indicates significant over dispersion on the group level for the veterans who served in the Gulf War. Dic and CR are a known consequence of non uniform irradiation on the human body. [8]

- Dr. Huda Ammash, Professor of Molecular Biology in Baghdad University and her team [9] conducted and published the results of genetic hematological analysis for a group of individuals living in DU contaminated areas in southern Iraq. Blood tests for the (47) individuals who lived in Basrah contaminated areas and another 30 as a control group. The control group individuals lived in Baghdad.
- Blood tests showed that 21% of the studied individuals in Basrah group suffered a reduction in hemoglobin concentration of (9-13) g/d.
- The blood packed cell volume (PCV) test results showed that 25.5% of Basrah studied group showed abnormal (PCV) rates of (30-39)% less than the normal rate.
- Total white Blood Cells count (WBC) results showed that 8% of the individuals in the Basrah study group with (WBC) less than normal which is (4000)c/ml or higher than normal rate (1100)c/ml.
- Compound chromosomal changes in the lymphocytes of peripheral blood of the individuals of Basrah studied group had been found at a ratio of (0.1118)% which is significantly higher than that of the control group.
- The ratio of dicentric and ring centric chromosomal abnormality fraction was found to be (0.04479) which is higher than ordinary ratio chromosomal damages where mostly in male veteran individuals. One case was for a 13 year old young boy at the time of the exposure in Al-Zubair contaminated area.
- Rita Hindin, et al [5] published a paper "Teratogenicity of Depleted Uranium aerosols: A review from an epidemiological perspective" in which they stated that animal studies firmly support the possibility that DU is a teratogen. They also concluded that the human epidemiological evidence is consistent with the increased risk of birth defects in offspring of persons exposed to DU.
- For further scientific evidences by Iraqi researchers, check: "Depleted Uranium Contamination: Iraq: An overview" (Global Research)

## Contaminating Iraq with Depleted Uranium

The USA and UK armed forces used Depleted Uranium ammunition for the first time in the history of their wars during the Gulf War of 1991. About one million bullets, projectiles, and missiles were fired along the highway from Kuwait to Basrah then up to Nasriya and other Iraqi cities. About 60-65% of this ammunition and expenditure were fired within Iraqi territories, Figure 1 shows areas where DU expenditure have been used in the Gulf War of 1991 [11].



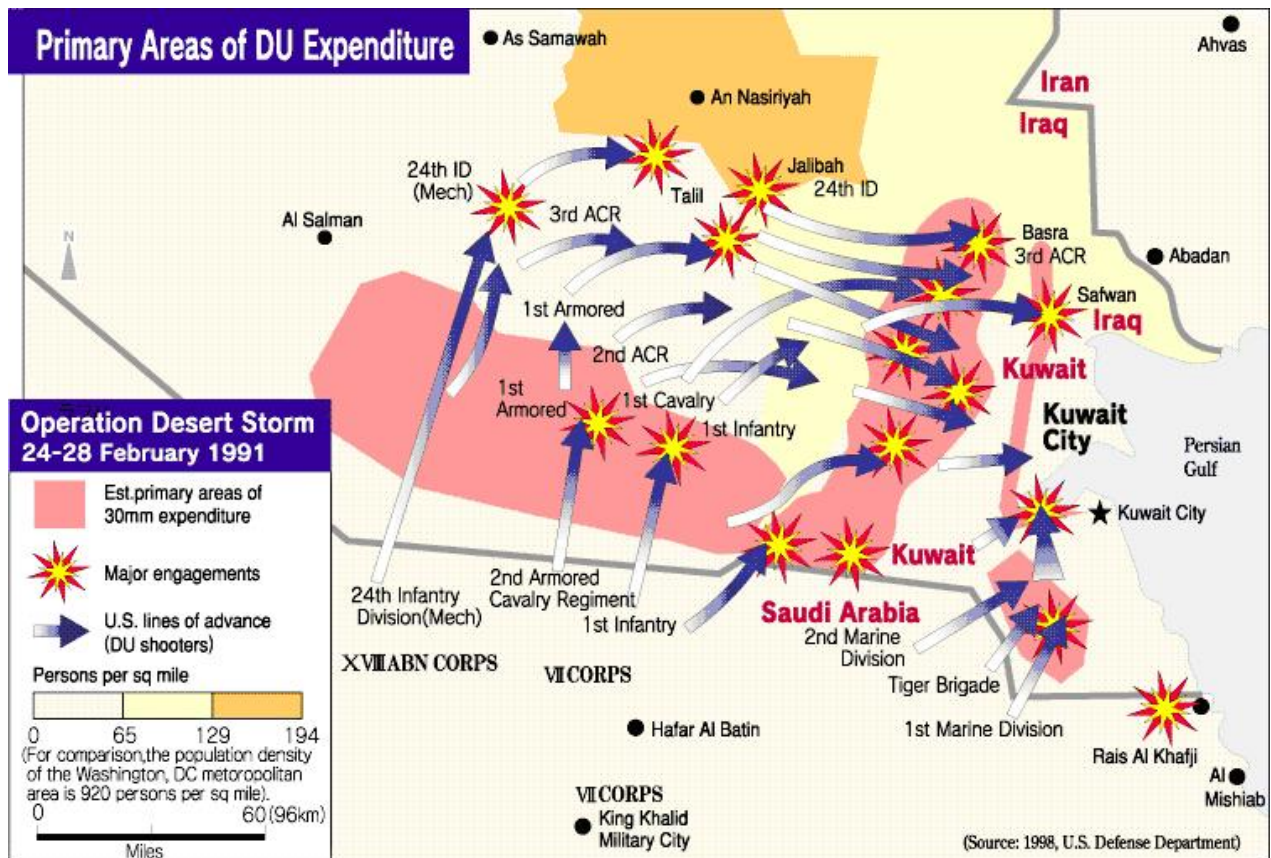


Figure 1 areas where DU expenditure have been used in Gulf War 1991.

Figure 2 represents a photo of the Iraqi army artilleries and vehicles destroyed on that highway by (DU) weaponry [12].



Figure 2: Iraqi army artilleries that have destroyed using DU on Highway

As stated previously, as soon as DU projectiles hit the target, it will ignite with a huge explosion that generates Depleted Uranium oxide aerosols. Mixing height of the aerosols in the atmosphere gets to 250m [13]. Area of Basrah War Zone and highway warzone [10] [14] were calculated to be around 2400km<sup>2</sup>. This area was the major continuous source of DU aerosols and contaminants to surrounding areas years to come.

Types of Depleted Uranium contaminants in the studied areas were:

1. Destroyed tanks and artilleries.
2. DU projectiles shells (exploded and unexploded)
3. DU shrapnel's (different sizes)
4. Deposited DU particles
5. Deposited DU oxide aerosols

Modeling mechanisms of spreading of DU pollutants from the source to surrounding populated areas were done by the Environmental Engineering department of Baghdad University [10] [14] [15]. The results of modeling spreading of pollutants through different environmental pathways to human population suggested that total calculated annual body dose received from DU aerosols inhalation pathway for the period from 1991-1996 in Basrah warzone was between 0.1768 Sv and 0.2309 Sv [10] (for a person both in normal or active duty respectively). Compared to normal background annual effective dose people should receive of 2.4 mSv only. In the highway warzone, these values came up to 0.4425 Sv and 0.577 Sv [14] respectively.

## DU Contaminated Dust Storms In Iraq

Spreading and dispersion of DU contamination to surrounding areas also occurs through wind storms, dust storms, sandstorms, and rainstorms. Mechanisms of surface migration of DU radionuclide's in soil include [16]:

- Siltation, creeping, and suspension from contaminated soil to atmosphere.
- Suspension and re-suspension of deposited DU aerosols are the most dangerous and critical pathway of transfer and spreading from source to the human population.

DU nano-particles through this mechanism stay suspended in the atmosphere for tens of days. With each dust storm a new DU attack on the civilians within populated cities occurs. Published data indicate a significant increase in the frequency of annual dust storms in both Iraq and Kuwait areas [17]. The first 8 months of 2009 witnessed 20 dust storms, as declared by the Iraqi Minister of Health [18]. Figures (3) and (4) show sites of these dust storms.

DU contaminated dust storms can be considered as new systematic attacks by USA armed forces, on civilians, since it adds an extra harmful radioactive dose received by the people internally and externally.

The USA and UK administrations should be held responsible for exposing a whole nation to the risk of continually receiving high radioactive and toxic persistent contaminants such as

DU.

Cumulative effects of these additional doses add additional risk to residents of these areas. Intentional denial and cover up of the types, locations and amounts of DU ammunitions by the US and UK armed forces prevent Iraq from taking any precautionary measures to reduce exposure to additional radioactive doses.

To understand how persistent these pollutants are; Soil and dust samples from areas near NL Industries site in Colonie, NY, USA proved containing DU after more than 20 years of the closure of these DU manufacturing industries [19].

A total of 5 to 10 metric tons of DU dust and aerosols settled from air on soil, rooftops, and other surfaces near the plant during its operation. The plant was closed in 1984 and contaminated soil was removed. In 2006, twenty-two years later, dust samples that had been collected from residents in the area proved the existence of DU significantly above the clean up standard. People working near NL Industries also tested positive for DU in their bodies. Results of these tests are being published in the international journal "Science of the Total Environment" [20].

If we compare this case study with Basra DU contamination where (320 tons of DU \* 0.65 in Iraqi territories \* 0.6 aerosolized) we end up with about 114.80 metric tons of DU aerosols spreading through winds to huge inside Iraq and the Gulf countries' areas, then pre-suspension of these contaminants to larger areas with each dust and sand storm that hits the area.

In 2003, it is estimated the US & UK armed forces used about (700-800) tons of DU [21]. The aerosolized portion of this amount is about 420 metric tons, a quantity large enough to cover the soil of the whole country after the dispersion of plumes with the previously mentioned mechanisms.

### DU Contamination Casualties in Iraq:

Epidemiological studies in contaminated areas indicated a drastic rise in the incidences rate of malignancies amongst children to be far more noticeable from 1995 onward, namely a four times increase than prior to 1991, the distribution of this increase specifically in contaminated areas west of Basra City [22].

Moreover, the shift in Leukemia to younger children supports the criteria of biological plausibility specificity and is consistent with findings of correlating such incidents to exposure to ionized radiations [23].

Also a six fold increase in congenital malformations among births in Basra City since 1995 onward, have been registered [24]. Congenital heart diseases and chromosomal aberrations have been also reported.

Another crime of the occupation forces is the destruction of the evidence targeting the Iraqi research centers related to this issue.

Two decades of suffering, pain, and human life losses, the Minister of Environment in Iraq finally announced in 2007 the disaster of DU contamination in Iraq. She pointed out that more than 300 sites have been contaminated with these radioactive weapons [25]. She also called for the Japanese authorities and the international community to help Iraq with coping



with the drastic increase of cancer incident rates [26].

To prove our case: Kuwait DU waste & wreckage from Gulf wars are shipped back to be dumped in USA.

After 18 years, Kuwait required US dept. of defense to remove the DU contaminated wreckage from their land [21]. Over 6,700 tons of contaminated soil, sand and other residues were collected and shipped back to the USA for burial by American Ecology at Bios, Idaho.

The US administration and pentagon officials still insist that DU has no significant health hazards, if so, why would they have to ship back their dirty radioactive wreckage back home from Kuwait?

## Stand of the International Community on DU Weaponry

The Hague and Geneva conventions and its protocols and subsequent treaties clearly declare that weapons which cannot discriminate between civilians and military or combatants are prohibited from not only use but also from manufacture and sale [27].

The Nuremberg principles were incorporated into the Charter of the UN, a treaty which is supposed to be "Supreme Law" in the USA. When the American Administration ratified it, the 7th principle declares that "Complicity with a crime against Humanity is a war crime".

UN resolutions since 1996 called DU weaponry "incompatible" (i.e. illegal) under existing humanitarian law and human rights [UN Doc. E/CN.4/Sub.2/1997/27 and additions; E/CN.4/Sub.2/2002/38 and E/CN.4/Sub.2/2003/35] [28].

Uranium radiation hazards are covered up and misrepresented through the obsolete models of risk and derived standards of allowable exposure set by the International Commission on Radiological Protection (ICRP).

This model was derived from invalid assumptions due to secrecy and cover up about the health effects of the Hiroshima and Nagasaki bombs then, around the cold war developments of nuclear power and weapons [28].

The ICRP risk model was built from studies of the atomic bomb survivors, which overlooked the effects from the internal radiation source and ignored cancer that in some cases takes decades to appear.

It was certainly developed before the DNA and the human genome knowledge existed the way it does to date.

Cover-ups and deception are expected from American and UK administrations the perpetrators of all radiological wars and illegal weapons, which should face liability for war crimes, military and civilian casualties, as well as contamination of the environment.

The US has refused to disclose information about DU during the invasion military operations of Iraq in 2003, and did not let UNEP team study DU contamination Iraq [29].

With the great efforts of anti-nuclear weapons groups, NGO, peace organizations and international figures, the call of these organizations to ban the all Uranium weapons,

including DU, have earned very good momentum especially among the NATO countries.

- On March 23rd, 2007, the Belgian Chamber Commission on National Defense voted unanimously in favor of banning the use of DU ammunitions and armor plates [30].
- On November 1, 2008, a UN committee passed a resolution with an overwhelming majority, highlighting concerns over the military use of Uranium. The resolution entitled "Effects of the use of armaments and ammunitions containing Depleted Uranium 1" urges the UN member states to re-examine the health hazards posted by the use of Uranium weapons [31].
- Another historic sentence was pronounced on January 13, 2009 by a court in Florence, Italy asking the Italian Ministry of Defense to compensate Gianbattista Marica with Euro 545,061, a parachutist who was deployed in Somalia for eight months in 1993. The sentence is very important because it states "the casual link between the presence of depleted uranium and the illness (cancer) of the Soldier" [32]. The courts statement includes the report of technical consultant who maintains that there is a causal link between the Hodgkin Lymphoma developed by the soldier and the exposure to DU.
- In September 2009, a British jury at Smethwick Council House ruled that DU was likely cause of death of Gulf War veteran Stuart Dysan in June 2008. Dyson had been a Lance Corporal with the Royal Pioneer Corps and had cleaned tanks after the 1991 Gulf War. He developed colon cancer that killed him last year [33].

The European Parliament on 22nd of May 2008 passed its fourth resolution against the use Uranium weapons. MEP's have called for EU and NATO-wide moratorium and global ban [29].

### Concluding Remarks:

1. The US and UK administrations have been using Depleted Uranium weapons against the civilian population and the environment of Iraq since 1991.
2. Laboratory studies and scientific evidence prove the link and causal relationship between exposure to Depleted Uranium and the increased risk of inducing neurodegenerative diseases, immune and hormonal system damage, initiation or promotion of cancer, Tetratogenic Toxicity which causes mental retardation and congenital malformations, miscarriages, and sterility.
3. Intentional denial and refusal of the US and UK administrations to release any information about the types, locations, and amounts of DU weapons that have been used against Iraq have caused additional radioactive doses, and health damages to the people in contaminated areas. Both administrations should be held responsible for this crime.
4. The drastic increase of cancer incidences in Iraq since 1995 to date and the DU related diseases like congenital malformation, miscarriages, etc, are all attributed to the use of prohibited weapons including Depleted Uranium.
5. DU contaminated areas all over the country are continuous source of radioactive pollution. Without cleaning and other measures, resuspension of these contaminants with each dust and sand storm can be considered as systematic attacks by the US and UK armies on civilians in an armed conflict.

This is a crime against humanity to its undifferentiated harmful health impacts on civilians long times to come after the military operations (Article 4 of the official regulations and Article 7 of ICC).

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