

Chapter 13

Toxic Pollution, the Gulf War, and Sanctions

The Impact on the Environment and Health in Iraq

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The Gulf War ended in 1991, but the massive destruction linked to it continues. An unprecedented catastrophe resulting from a mixture of toxic radiological, chemical, and electromagnetic exposure is still causing substantial consequences to health and the environment, exacerbated by the sanctions imposed on Iraq. Much of Iraq has been turned into a polluted and radioactive environment.

The use of depleted uranium

In spite of the international treaties that prohibit “use of weapons or tactics which cause unnecessary or aggravated devastation or suffering ... indiscriminate harm ... to noncombatants ... [and] widespread, long-term, and severe damage to the environment,” more than 1 million rounds of weapons carrying depleted uranium (DU) were used against Iraqi troops in the Gulf War.¹ DU is radioactive waste used because of its capacity to destroy armor and other defenses.² Most of its radioactivity is attributed to uranium-238 and its daughters, mainly thorium-234 and protactinium-234.³

DU is both radiologically and chemically toxic to humans and other forms of life. A terrifying total of 320 to 350 tons of DU were fired, including 14,000 large-caliber (105 and 120 millimeter) and 940,000 small-caliber (25 and 30 millimeter) bullets. As much as 300 tons of expended DU ammunition remains scattered throughout Iraq and Kuwait.⁴

Upon impact, DU penetrators oxidize rapidly, spreading toxic uranium oxide dust particles. If a person inhales or ingests DU, it enters into the bloodstream and then can circulate throughout the whole body. Prolonged

internal exposure to radiation may cause severe health problems, including cancers (mainly leukemia and lung and bone cancer); pulmonary and lymph node fibrosis; pneumoconiosis; inhibition of reproductive activities; chromosomal changes; depletion of the body's immune system; and finally death.⁵

Aware of these dangers, US authorities warned prior to the war that the use of DU could have potential health and environmental consequences.⁶

DU pollution is also transferred to humans through water contaminated by soluble components of DU and through eating either contaminated plants or animals living on such contaminated plants.

In 1993, Iraqi researchers found the first evidence that DU was used in the war, when they successfully analyzed a specimen taken from an Iraqi tank that was destroyed by a DU bullet in the battlefield in the south of Iraq. When radioactivity of sites inside and outside the destroyed tanks was measured, researchers registered levels of 84 microrentgen per hour, twelve times the natural background of 7.1 to 7.9 microrentgen per hour. Researchers also detected elevated concentrations of U-238 chain, mainly thorium-234 and radium-226. These increases were associated with high concentrations of low-percentage (depleted) U-235. This proved beyond any doubt the existence of DU contamination.⁷

An Iraqi team including Dr. Suaad Al-Azawi and Dr. Baha'a El-Dean Marouf performed a comprehensive study to investigate the presence of DU in the battlefields in five regions of south-central Iraq: Zubair, Safwan, Sanam, and Southern and Northern Rumeila. In Sanam and Southern and Northern Rumeila, radioactivity around the destroyed tanks was 79.3 to 184.5 microrentgen per hour, compared with a natural background of 7.1 to 7.9 microrentgen per hour. Surface and ground water and sediments of stream channels were contaminated.⁸ Professor Mikdam Saleh and Ahmed Mequar have also found significant levels of U-238 series in 154 plant and animal tissues.⁹

To investigate the presence of DU in the body of exposed persons, Dr. Hari Sharma, at the University of Waterloo in Canada, examined the amount of DU in the urine of Gulf War veterans.¹⁰ The concentration of DU in twenty-four-hour urine samples of thirty veterans from the United States, United Kingdom, Canada, and Iraq ranged from 3 to 18 micrograms.¹¹ The concentration in urine specimens of Iraqi civilians in the southern city of Basra was 2 micrograms per day.

Dr. Neboysa Ljepojevic, a professor of physics at London University, studied the ratio of U-235 and U-238 in the urine of some Gulf War veterans by using delayed neutron counting, neutron activation, and two other mass spectrometric methods. The average excreted amount was 3 micrograms per day (1,000 times higher than normal values of natural uranium). Measurements confirmed beyond any doubt the presence of DU in the samples.¹²

It is well established that only 10 electron volts of energy is required to break DNA or other molecules in the body.¹³ Since DU is a very forceful alpha particle emitter, of 4.2 million electron volts (MeV) per particle, one can estimate the deleterious consequences of such exposure on veterans and public health, especially increased risk of cancer.

Electromagnetic pollution

Electromagnetic pollution is the spread of unwanted electromagnetic fields in the environment. This type of pollution is particularly dangerous because it is often undetected. Electromagnetic pollution can cause pregnancy problems, anxiety, depression, and fatality. In Finland, heart failures, cardiovascular diseases, and cancers have increased in an area containing early detection radar systems. Increases in the incidence of leukemia and eye and skin diseases have been recorded among workers in other electromagnetic environments.¹⁴

During the forty-five days of the Gulf War, the Allies widely deployed electronic devices such as advanced radar systems and laser-guided missiles, which released high-frequency electromagnetic energy into the atmosphere. The effects of this electromagnetic pollution were exacerbated by the massive bombardment of Iraqi troops and infrastructure. A total of 88,000 tons of explosives were dropped on Iraq—an explosive tonnage judged equivalent to nearly five Hiroshima-sized atomic bombs.¹⁵ As a result of the energy released by this bombing, ionization of the Iraqi atmosphere transpired. Normally oxygen in the air is a relatively weak oxidant. However, if enough energy is available, complete reduction of oxygen by univalent pathway occurs, causing the formation of unusual oxygen ions (radicals) such as superoxide.

These free radicals are toxic because they react with aquatic solutions of the human body, creating highly energetic chemical compounds.¹⁶ The formation of electron flux from a variety of chemical reductions usually follows, causing oxygen reduction and further generation of more toxic

free radicals inside the living cells. This can have dangerous consequences both at the cellular and organic levels, causing health disorders and life-threatening diseases, including cancers; heart, vascular, respiratory, and gastrointestinal diseases; and depletion of the immune system, which leads to the spread of infectious diseases.¹⁷

It is worth mentioning that under normal nutritional conditions, many enzymes function to protect the cells from such toxicities. Some vitamins and nutrients, such as vitamin E, betacarotene, ascorbic acid, and niacin are among those required for such protection.¹⁸ Therefore, lack of such nutrients in daily diet of the Iraqis due to sanctions increases the harmful effects of this type of pollution.¹⁹

Chemical pollution

The massive and indiscriminate onslaught of the Gulf War extended far beyond military targets to include elements of Iraq's industry and social infrastructure. Targets in all of Iraq's main towns were comprehensively bombed, some repeatedly. Destruction of oil installations, pipelines, refineries, storage facilities, stations, and delivery vehicles caused the release of thousands of tons of toxic hydrocarbons and chemicals into the air, soil, and water resources. Rates of pollution are escalating because of the continuation of comprehensive sanctions, which has paralyzed efforts to control environmental degradation.

The release of toxic fumes and acid rains followed the bombardment of numerous Iraqi oil wells. Soot filled the atmosphere and black rain fell all over the country. Bombardment of industrial plants caused the leakage of sulfuric and phosphoric acids, ammonia, and insecticides.²⁰ The closure of gas purification and water treatment units due to the lack of spare parts means toxic gases and heavy metals are being discharged into the air and drinking water resources.

The maximum concentration of air pollutant measured as total suspended particles has increased in Baghdad by 705 percent.²¹ Eight years after the war, the values are up to 1,330 micrograms per cubic meter, constituting 887 percent of the levels recommended by the World Health Organization (WHO). Concentration of toxic metals in these particles has also increased due to the effects of the ongoing war, fuel combustion, and industrial pollution. Lead increased from 2.5 micrograms per cubic meter in 1989 to 87 micrograms in 1997 (172 times WHO standards). Carbon monoxide increased to three times WHO-recommended values, reaching

67 parts per million. It is well established that some of these metals and gases induce, among other problems, genetic defects, cardiovascular damage, and cancer.²²

In addition, the accumulation of solid home wastes and water swamps creating a suitable media for the growth of microbes, insects, and rodents has contributed to the spread of infectious diseases. Under these circumstances, it is clear that the Iraqi people are living through a health crisis of immense proportions.

The impact on the environment

The massive destruction of Iraq's infrastructure inevitably produced substantial damages to its flora, fauna, and food chain. Soil and soil productivity were destroyed or damaged. In particular, the military bombardment altered the physical conditions of surface soil and incinerated many areas' plant cover. This inevitably affected the seed bank, which in turn reduced the density and composition of Iraq's plant life. In other areas where the soil has been compacted or severely eroded, plants can no longer grow. New fields of sand dunes were created, with simultaneous increase of dust storms and dust falls.

Contamination of soil with heavy metals, for example nickel and vanadium, reduced permeability and aeration, hindering seed germination, pollination, and fertilization. The destruction wrought by the unremitting onslaught on Iraq's electric power plants destroyed critical saline drainage systems, thus inducing waterlogging and salination of soils. Other impacts on flora include change of habitat conditions, change of run-off and floristic composition, vulnerability of soil to wind and water erosion, and the burial of topsoil with unproductive substratum. Many endangered species, especially the trees of *Acacia gerrardi*, are threatened.

Since the components of the ecosystem were changed, Iraq has seen an increase in rodents and scorpions, which has caused considerable problems for health and agriculture.

Most important, many animals were killed during the war. Although large mammals escaped from the war zone, their breeding was adversely affected. Small animals and soil invertebrates, which cannot escape rapidly, were destroyed.²³

The impact on public health

The result of such a multiplicity of toxic factors, compounded with malnutrition and lack of medical care, has been a dramatic deterioration of public health. Elevated rates of cancers, congenital abnormalities, genetic defects, infertility, renal and hepatic dysfunction, cardiovascular diseases, malnutrition, spread of infectious disease, and death have all occurred.

Similar syndromes have been noticed among Gulf War veterans.²⁴ Throughout Iraq, but especially in the south, an approximate fivefold rise in cancer has been recorded since the Gulf War.²⁵ Not only the rate of cancer in the population increased, but the pattern of cancer is also changing, especially for lymphoma and leukemia. The incidence of more than one cancer type in the same family was recorded among fifteen families in Basra in 1998.²⁶ In addition, new types of cancers are being recorded for the first time in Iraq, and there has been a measurable decrease in the average age of cancer victims.²⁷

Among Iraqi veterans, 1,425 cancer cases were recorded during the period from 1991 to 1997. Lymphoma, leukemia, and lung cancer, respectively, formed the highest percentages (31.5, 21.8, and 14.7 percent). Brain, bone, liver, gastrointestinal, and pancreatic cancers were also recorded.²⁸

Upon calculating the external and internal DU exposures of Iraqi and non-Iraqi Gulf War veterans, Ljepojevic estimates that there could be 3,000 to 21,000 additional cancers for every 100,000 veterans.²⁹

Cancer is not the only medical problem that results from DU exposure. If DU or its derivatives reach the blood of pregnant women, it can pass through the placenta and cause damages to the fetus. Congenital abnormalities have increased in Iraq since the Gulf War. For example, Dr. Salma Al-Hafith has recorded a significant increase in the number of children born with various genetic malformations, including missing limbs, ears, and eyes.³⁰

The dramatic impact of the war and sanctions can be seen in the huge number of children and adults dying from the spread of infectious diseases due to immunodeficiencies and the closure of waste water treatment units.³¹ Although the country had been free of cholera and scabies, both are now affecting thousands of Iraqis. Incidence of malaria and leishmaniasis not only rose but spread to new governorates in which no cases have been recorded previously.³² According to the WHO and the

Iraqi Ministry of Health, the rate of increase of various infectious diseases (many of them deadly) ranges from 1.6 to 10.9 times 1989 levels.³³

It is important to emphasize that these statistics probably underestimate the scale of the health problem in Iraq, as hundreds of victims, especially in rural areas, die before reaching any hospital. Recorded disease figures represent the official in-patient and out-patient admissions to public hospitals only. Therefore, cases referred to private clinics are not included. In addition, a substantial number of cases are not included because they cannot be diagnosed properly: Iraq's medical system lacks proper diagnostic materials and spare parts, rendering many medical instruments useless.

As a result of all these factors, Iraqi death rates have increased significantly, with cancer representing a significant cause of mortality, especially in the south and among children. The latest survey carried out by Unicef concluded that a "major increase" in child mortality has occurred from 1989 to 1999. The infant mortality rate increased from 47 per 1,000 live births in 1989 to 108 per 1,000 in 1999. Death of children under five years old increased from 56 to 131 per 1,000 children.³⁴

Conduision

The impacts of depleted uranium, electromagnetic pollution, and the destruction of the Iraqi infrastructure—combined with malnutrition and lack of medical care due to the continuation of the sanctions—have already claimed the lives of hundreds of thousands of Iraqi people, and threaten many more. Though some estimate the harm to be many times greater than even that caused by the Chernobyl disaster, the long-term, prolonged effects of the war and sanctions on Iraq are yet to be seen.

Since these massively destructive conditions can be inflicted elsewhere, as can be seen in Nato's bombing and use of DU in Yugoslavia, and since the resulting pollutants are transferable far and wide by various means, their impact is not restricted to innocent Iraqis alone.³⁵

Notes

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- 1021mesl.htm), and "Pentagon Poison," *The Nation* 264: 20 (May 26, 1997): 17–22 (available online at <http://www.thenation.com/issue/970526/0526mesl.htm>). On international law, see Alyn Ware, "Depleted-Uranium Weapons and International Law," in *Metal of Dishonor: Depleted Uranium*, second ed., ed. Depleted Uranium Education Project (New York: International Action Center, 1999), p. 196.
- 2 See Naomi H. Harley et al., *A Review of the Scientific Literature as It Relates to Gulf War Illnesses, Volume 7: Depleted Uranium* (Santa Monica, California: RAND, 1999), pp. xiii and 1.
 - 3 Rosalie Bertell, "Gulf War Veterans and Depleted Uranium," in Laka Foundation, *Depleted Uranium: A Post-War Disaster for Environment and Health* (Amsterdam: Laka Foundation, 1999), pp. 18–26. Available online at <http://www.antenna.nl/wise/uranium/dhap99.html>. See also Harley et al., *Depleted Uranium*, p. 5, and Table 1.1 (p. 3), Appendix A (p. 73), and Appendix B (p. 75).
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 - 7 Baha'a El-Dean Marouf, "Pollution with Depleted Uranium in Iraq," *Umm Al-Ma'ark*, Vol. 16 (1998): 129–34.
 - 8 Baha'a El-Dean Marouf and W. Al-Hilli, *The Effect of the Use of Radioactive Weapons on Soil and Air in Selected Regions of the South of Iraq* (Baghdad: University of Baghdad College of Engineering, 1998). See also Suaad Al-Azzawi and Muhamed Sagi, "The Effect of Radioactive Weapons on Surface and Ground Waters in Selected Regions of the South of Iraq," *Journal of the Arabic Universities* 6: 1 (1999): 81–117.
 - 9 Mikdam M. Saleh and Ahmed J. Mequar, "The Effects of Using Depleted Uranium by the Allied Forces on Humans and the Biosphere in Selected Regions of the Southern Area of Iraq," International Scientific Symposium on the Use of Depleted Uranium and Its Impact on Humans and the Environment in Iraq, Baghdad, December 2–3, 1998.
 - 10 Dr. Hari Sharma's research, reviewed by Dr. Ljepojevic, "Depleted Uranium Health Hazards," is available online at <http://www.enadu.i.am>;

- Bertell, "Gulf War Veterans and Depleted Uranium," pp. 18–26; Arbuthnot, "Poisoned Legacy," p. 13; and Military Toxics Project, Press Release, "Military Toxics Project Confirms NATO is Using DU Munitions in Yugoslavia and Releases Results of Medical Study Indicating Potential for Fatal Cancers," May 4, 1999 (<http://www.miltoxproj.org/kosovo.html>); and Military Toxics Project, "Independent Pilot Medical Study on Persian Gulf Veterans Confirms Exposure to Depleted Uranium," Press Release, September 25, 1998 (<http://www.necnp.org/iraqvets.htm>).
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 - 12 See note 10.
 - 13 Bertell, "Gulf War Veterans and Depleted Uranium," pp. 18–26.
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 - 23 Nabil M. Alla El-Din et al., *A Rapid Assessment of the Impacts of the Iraqi-Kuwait Conflict on Terrestrial Ecosystems* (Baghdad: UNEP, 1991), Part I.

- 24 Robicheau, "The Next Testing Site for Depleted Uranium Weaponry," pp. 27–28. For useful reports, see the web site of the National Gulf War Resource Center (<http://www.gulfweb.org>). See also "Gulf War Veterans Illnesses," Committee on Government Reform and Oversight, US House of Representatives, House Report 105–388 (1997 Union Calendar 228); Mesler's reports cited in note 1; Safer, "DU," December 26, 1999; Seymour M. Hersh, *Against All Enemies: Gulf War Syndrome: The War Between America's Ailing Veterans and Their Government* (New York: Ballantine, 1998); Philip Shenon, "Army Knew in '91 of Chemical Weapons Dangers in Iraq," *New York Times*, February 24, 1997, p. A16; Haro Chakmakjian, "Uranium from Gulf War Weapons a Danger to Region: Scientists," *Agence France Presse*, December 3, 1998; and the articles by Robert Fisk in Chapter 7.
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- 29 See note 10.
- 30 Salma Al-Hafith, "Child Abnormalities in Iraq," International Scientific Symposium on the Use of Depleted Uranium and Its Impact on Humans and the Environment in Iraq, Baghdad, December 2–3, 1998.
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