



Health Physics Society
Specialists in Radiation Safety

Depleted Uranium

Since the 1991 Gulf War, people have raised concerns about exposure to depleted uranium (DU), especially among veterans and healthcare professionals. This fact sheet explains what DU is, how it's used, and what the science says about its potential health risks.

What Is Uranium?

Uranium (U) is a naturally occurring, dense metal that is weakly *radioactive*¹. It can be found throughout the environment such as rocks, soil, water, air, and in plants, animals, and humans. All uranium is radioactive, but not all *radioactive isotopes* are equally radioactive.

Natural uranium is made up of three isotopes:

- ²³⁸U (99.27% by mass)
- ²³⁵U (0.72%)
- ²³⁴U (0.0054%)

Enriched uranium, used as fuel in nuclear power reactors, has an increased percentage of ²³⁵U compared to natural uranium, typically between 1.5% and 4.6%. This level of enrichment is not sufficient to produce nuclear explosives.

After enrichment, the leftover uranium contains mostly ²³⁸U (about 99.8%), with lower amounts of ²³⁵U and ²³⁴U. This material is known as **depleted uranium** and is less radioactive than natural uranium. Depleted uranium is uranium of almost entirely ²³⁸U, due to the vast removal of the other isotopes.

What Is Depleted Uranium Used For?



M1 Abrams tanks
Photo courtesy of DOD FHPR

Civilian uses—Due to its high density, almost 1.7 times more dense than lead, the main civilian uses of DU include counterweights in aircraft and as stabilizers in boats and yacht keels. Because materials with high density are excellent at shielding gamma rays, DU is also used to make shielded containers for the transport of other radioactive materials that emit gamma rays.

Military uses—DU is used for armor-penetrating bullets and penetrators because of its high density, its ability to self-sharpen as it penetrates its target, and its propensity to ignite on impact at temperatures exceeding 600 degrees centigrade. It is also used as defensive armor plate on the M1 Abrams tank. The use of DU as ammunition has been strictly limited since the 2003 initial invasion of Iraq, with a few exceptions in the fight against terrorists in Operation Iraqi Freedom and Operation Enduring Freedom.

¹Words in italics are defined in the Glossary on page 3.

Are There Health Effects Associated with Exposure to DU?

External to the body, DU generally does not pose a health threat. When DU enters the body through embedded fragments, wounds, inhalation, or ingestion, it can pose a chemical (toxicological) hazard to the kidney. **The chemical hazard is greater with increasing exposure.** In general, DU is not considered a *radiation* hazard, unless tiny insoluble particles (that is, particles incapable of being dissolved) are inhaled and lodged in the lungs. Direct (external) radiation from DU is very low and only of concern to workers who melt and cast U metal.

DU used in commercial civilian applications does not present a significant health hazard because it is usually in solid form and not available for inhalation or ingestion. Military operations with DU, however, may contaminate soil, groundwater, and breathing air. When a DU weapon impacts a target, small particles of DU may be produced. These particles have high density and most fall to the ground very close to where they are produced.



Depleted uranium

Photo courtesy of DOD FHPR

Research involving workers, military personnel, and others who have inhaled or ingested uranium has not found a link between low-level DU exposure and harmful health effects, including birth defects (follow links under “Resources for More Information” at the end of this fact sheet). In large quantities, DU exposure can cause skin or lung irritation, but only soldiers in the immediate vicinity of an attack that involves DU are potentially exposed to these levels of contamination. Soldiers with wounds containing fragments of DU shrapnel may develop effects at the wound sites. The health

consequences decrease quickly once the DU is removed, but it is almost impossible to remove all DU fragments. Persons exposed to very large inhalation doses of U, including DU, have shown minor, transitory kidney effects, which typically disappear within days to a few weeks after exposure. People who inhale insoluble uranium particles that remain in the lungs may face an increased risk of lung cancer over time, especially if they also smoke. But an excess of lung cancer has yet to be demonstrated in U workers or others exposed acutely or chronically to U, including DU.

Groups of Gulf War veterans who have DU fragments still in their bodies continue to be medically followed by the Department of Veterans Affairs’ Depleted Uranium Follow-up Program to determine whether there will be long-term health effects. As of early 2019, only subtle but clinically insignificant changes in kidney function have been observed. One common observation is a persistent elevation in the amount of U measured in the urine. This reflects the continued presence of embedded DU in wound sites and its ongoing low-level mobilization and absorption to blood. Speculation is ongoing about a relationship between DU exposure and the so-called Persian Gulf Syndrome, with no known causal relationship to date.

DU Risk Pathways & Effects (Bleise et al. 2003)		
Exposure Route	Main Risk	Severity
Inhalation (soluble)	Chemical (kidney)	Low–Moderate
Inhalation (insoluble)	Radiological (lung)	Long-term cancer risk
Embedded fragments	Local toxicity	Wound-site reactions
Ingestion	Minimal (due to poor absorption)	Very low

In summary, minor health effects have been observed following exposure to DU, but ONLY with high levels of exposure, and these effects are caused primarily by the chemical toxicity and not the radiological hazard. Veterans concerned about potential DU exposure are encouraged to contact their local Department of Veterans Affairs (VA) facility (www.va.gov/directory/) to be screened and monitored for any health consequences.

Glossary

Radiation

Energy in the form of electromagnetic waves or particles.

Radioactive

A property of material that tends to undergo spontaneous radioactive decay and can result in the emission of ionizing radiation.

Radioactive Isotope

Unstable (radioactive) atoms of the same element that have nuclei containing the same number of protons but different numbers of neutrons.

References

Bleise A, Danesi PR, Burkart W. Properties, use and health effects of depleted uranium (DU): a general overview. *Journal of Environmental Radioactivity* 64: 93-112 [online]; 2003. Available at <https://core.ac.uk/download/pdf/357588385.pdf>. Accessed 4 August 2025.

Resources for More Information

Health.mil. The official website of the military health system. Depleted Uranium [online]. Available at <https://www.health.mil/Military-Health-Topics/Health-Readiness/Environmental-Exposures/Depleted-Uranium>. Accessed 12 August 2025.

Health Physics Society. *Health Physics* Journal. Series of technical articles on hazards from armor-piercing penetrators. *Health Phys* 96(3):207–409 [online]; 2009. Available at <https://journals.lww.com/health-physics/pages/toc.aspx?year=2009&issue=03000>. Accessed 12 August 2025.

International Atomic Energy Agency. Depleted Uranium [online]. Available at <https://www.iaea.org/topics/spent-fuel-management/depleted-uranium>. Accessed 12 August 2025.

US Department of Veterans Affairs, Office of Public Health and Environmental Hazards. Depleted uranium [online]. Available at https://www.publichealth.va.gov/exposures/depleted_uranium/index.asp. Accessed 12 August 2025.

US Department of Veterans Affairs, Office of Public Health and Environmental Hazards. Depleted uranium fact sheet [online]. Available at https://www.publichealth.va.gov/docs/depleted-uranium/MEDU_DU_INFO_VETERAN.pdf#. Accessed 12 August 2025.

World Health Organization. Depleted uranium. Available at <https://www.who.int/teams/environment-climate-change-and-health/radiation-and-health/environmental-exposure/depleted-uranium>. Accessed 12 August 2025.

Author History

Ian Prado, HPS PIC Member. 2 August 2025. Revisions.

The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Formed in 1956, the Society has approximately 3,500 scientists, physicians, engineers, lawyers, and other professionals. Activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. The Society may be contacted at 950 Herndon Parkway, Suite 450, Herndon, VA 20170; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.