HAWAII STATE DEPARTMENT OF HEALTH

The Facts about Depleted Uranium in Hawaii

Public interest and concern is sometimes raised about the medical effects of exposure to depleted uranium (DU). In this fact sheet, the Department of Health will discuss these concerns and explain why DU does not pose a significant health threat to the people of Hawaii.

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What is Depleted Uranium (DU)?

Uranium is a dense, weakly radioactive metallic element that naturally exists in the environment. Uranium is found in rocks, soil, water, and air, as well as in plants, animals, and humans.

- Natural uranium consists of a mixture of three elemental forms, which are identified by the mass numbers ^{238}U (99.27% by mass), ^{235}U (0.72%), and ^{234}U (0.0054%). Uranium in the environment also contains radioactive elements, such as thorium and radium.

- Depleted uranium is natural uranium that has been changed by removal of the more radioactive isotopes, leaving it about 99.8% ^{238}U. Depleted uranium has 40% less radioactivity than natural uranium.

What is Depleted Uranium used for?

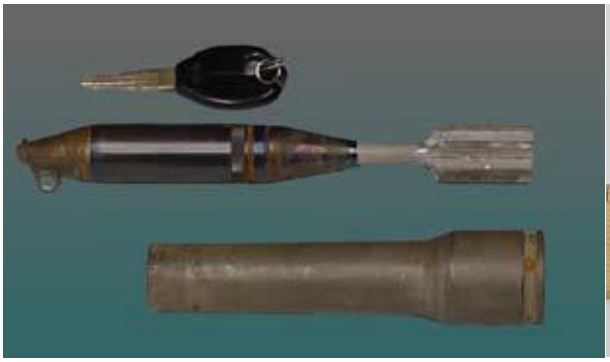
Because uranium is about 60% heavier than the same volume of lead, DU is used as ballast and counterweights in airplanes and ships. It also is used to shield containers for the transport of radioactive materials and in medical devices.

The military uses DU as armor to protect military tanks and their crews from enemy anti-tank munitions. DU is also used as armor-piercing projectiles because of its high density, ability to self sharpen as it penetrates a target, and propensity to ignite on impact at temperatures exceeding 1000 degrees Fahrenheit.

Was Depleted Uranium ever used in Hawai'i by the military?

Yes. DU was used in M101 spotter rounds as part of the Davy Crockett Weapon System from 1961 until 1968. The M101 20mm spotting round was used to verify the aiming point of the weapon system. The M101 was about 8 inches long and 1-inch in diameter. It weighed about one pound and contained 6.7 ounces of DU alloy (92% DU, 8 % Molybdenum).

Unlike modern munitions that use DU as penetrators to defeat enemy armor, the DU in the M101 was used to provide weight sufficient for the spotting round to simulate the flight of the Davy Crockett projectile.



M101 spotting round and cartridge case

M101 spotting round fragment

Army and DOD regulations now prohibit the use of munitions that contain DU in training.

Where is Depleted Uranium found in Hawaii?

In 2005, fragments from the 1960's era M101 were discovered at the firing range at Schofield Barracks, Oahu. The Army then investigated the history of use of the Davy Crockett weapon system on Hawaii ranges and acknowledged that the Pohakuloa Training Area on the Big Island was also used for training with the Davy Crockett. Other ranges in the state are being investigated for possible exposure to DU.

Does the Hawaii Department of Health regulate Depleted Uranium?

Depleted uranium is regulated under the sole authority of the U.S. Nuclear Regulatory Commission (NRC). The Department of Health does not have any jurisdiction on federal property for radioactive materials.

However, the Department has and will continue to independently monitor ambient radiation levels in areas adjacent to DU use. In our ambient background surveys on the Big Island of Hawai'i and Oahu since 2007, all radiation levels have been within normal background levels. We performed air sampling near Waikoloa Villages from Feb-May 2009 and found normal background levels of natural uranium, and no detectable DU. Our radiation experts continue to consult with the NRC and the Army related to the Army's license for DU.

Are there any health effects associated with exposure to DU?

According to the Agency for Toxic Substances and Disease Registry (ATSDR), uranium is a naturally occurring radioactive element. Uranium gives off very small amounts of radiation and therefore poses little radioactive danger. Depleted uranium is less radioactive than naturally occurring uranium. Natural and depleted uranium have the same chemical effect on the body.

The health effects of uranium are due to its chemical toxicity rather than radiation. Like all chemicals, harm caused will depend on how much, how long, and how a person is exposed. Uranium is toxic to the kidneys at high enough exposures. Kidney damage is the only health effect that has been consistently found in humans after exposure to elevated levels of uranium compounds or in soldiers with uranium metal fragments in

their bodies. Some human studies of uranium miners have found significant increases in the risk of lung cancer, although it was not clear whether uranium or other chemicals caused the cancer. It is not known whether uranium is harmful to an unborn child.

Have there been any studies done in Hawai'i on DU health effects?

In 2008, the Hawaii Tumor Registry, operated by the UH Cancer Center and the Hawaii Department of Health, prepared a report on the number of cancer cases of people living on the Big Island of Hawaii compared to the whole state. From 1995 to 2000, no difference in overall cancer incidence was observed between the state and either West or East Hawaii residents.

For the period of 2001-2005, both West and East Hawaii residents exhibited melanoma and bladder cancers that were significantly higher than the state. In addition, breast cancer was higher in East Hawaii compared to the state.

Notably, lung cancer, the cancer associated with uranium exposure, was not elevated in either West Hawaii or East Hawai'i during these time periods. More study would be needed to determine the specific characteristics of the population such as ethnicity, age, gender, occupation, exposure history or personal habits such as smoking to determine the factors responsible for any increased cancer.

Is the public exposed to DU?

Some people have expressed concern about exposure to depleted uranium from dust at Pohakuloa Training Area (PTA). Of concern is the possibility that depleted uranium has been burned and carried down wind. Such DU dust could enter the lungs of a nearby person and stay in the body for months with possible negative health impacts.

It is unlikely that the general public is inhaling small particles of DU. The M101 spotting round does not vaporize but instead breaks into large fragments upon impact. Wind would not carry DU particles from the spotting rounds very far because DU metal and particles are heavier than soil and not easily carried through the air. Studies of conflict zones in Kosovo, Bosnia and Herzegovina found that most DU contamination is within feet of the point of impact, but is measurable up to 600 feet away.

In 2008, homeowners at Waiki'i Ranch , the closest civilian community to PTA had dust from a 20-year accumulation analyzed for DU. The NERC Isotope Laboratory in England reported that the dust sample had a uranium concentration that was 0.68 parts per million and was "overwhelmingly or entirely dominated" by natural uranium. Additionally, limited soil and sediment testing around PTA did not detect DU. Air monitoring of a controlled burn at the Schofield Barracks training area showed no evidence of depleted uranium. Soil sampling at Schofield Barracks indicated that DU did not move significantly from the point of impact.

Given the nature of the spotting rounds, the environmental data indicating a low potential for DU to become airborne, and the distance to populated areas, the Agency for Toxic Substances and Disease Registry(ATSDR), a federal health agency,

concluded that the general population around PTA is not exposed to DU. The Hawaii Department of Health concurs with ATSDR's conclusion.

Why is uranium found in urine?

Some people have raised concern about the presence of uranium found in the urine of several Hawai'i residents. Everyone will have some uranium in his or her urine since the metal is naturally found in air, water, food and soil. Most of a person's exposure comes through eating food and drinking water. A smaller amount may enter the body through breathing dust containing natural uranium. Depending upon the physical and chemical properties, some inhaled uranium can stay in the lungs for a long time.

When a person eats food (especially root vegetables) and drinks liquids containing uranium, a small amount of the metal will be absorbed into his or her blood. About 2/3 of the absorbed uranium will leave the body in urine within 24 hours, while the rest goes to the bone, kidney and liver. For the general public, the presence of uranium in urine reflects normal dietary exposure.

Where can I get more information?

Additional information regarding studies and potential health effects can be found on the following websites:

- Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Uranium http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=440&tid=77
- Deployment Health Clinical Center, Depleted Uranium http://www.pdhealth.mil/du.asp
- DoD Depleted Uranium (DU) Library http://fhp.osd.mil/du/
- Health Physics Society, "Fact Sheet on Depleted Uranium" www.hps.org/documents/dufactsheet.pdf
- International Atomic Energy Agency, DU Questions and Answers http://www.iaea.org/newscenter/features/du/du_qaa.shtml
- RAND Corporation, National Defense Research Institute, "Vol. 7, DU, A Review of the Scientific Literature as it Pertains to Gulf War Illnesses" http://www.rand.org/content/dam/rand/pubs/monograph_reports/2005/MR1018.7.sum.pdf
- World Health Organization, "Ionizing Radiation" http://www.who.int/ionizing_radiation/pub_meet/ir_pubs/en/index.html
- World Health Organization, "WHO Guidance on Exposure to Depleted Uranium" http://www.who.int/ionizing_radiation/en/Recommend_Med_Officers_final.pdf