

**This fact sheet answers the most frequently asked health questions (FAQs) about natural and depleted uranium. For more information, call the ATSDR Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.**

**HIGHLIGHTS: Natural uranium is a naturally occurring chemical substance that is mildly radioactive. Depleted uranium is a manmade mixture of natural uranium isotopes that is less radioactive. Everyone is exposed to low amounts of uranium through food, water, and air. Exposure to high levels of natural or depleted uranium can cause kidney disease. Uranium has been found in at least 67 of 1,699 National Priorities List sites identified by the Environmental Protection Agency (EPA).**

### What is uranium?

Uranium is a naturally occurring radioactive element. It is naturally present in nearly all rocks and soils and can be released into the environment through wind and water erosion and volcanic eruptions. Natural uranium is a mixture of three isotopes:  $^{234}\text{U}$ ,  $^{235}\text{U}$ , and  $^{238}\text{U}$ . The most common isotope is  $^{238}\text{U}$ ; it makes up over 99% of natural uranium. All three isotopes behave the same chemically, but they have different radioactive properties. The half-lives of uranium isotopes (the amount of time needed for half of the isotope to give off its radiation and change into a different element) are very long. The least radioactive isotope is  $^{238}\text{U}$  with a half life of 4.5 billion years. Depleted uranium is a mixture of the same three uranium isotopes except that it has very little  $^{234}\text{U}$  and  $^{235}\text{U}$ . It is less radioactive than natural uranium.

Uranium is almost as hard as steel and much denser than lead. Natural uranium is used to make fuel for nuclear power plants; depleted uranium is the leftover product. Depleted uranium is used as a counterbalance on helicopters rotors and airplane control surfaces, as a shield to protect against ionizing radiation, as a component of munitions to help them penetrate enemy armored vehicles, and as armor in some parts of military vehicles.

### What happens to uranium when it enters the environment?

Natural and depleted uranium exist as dust in the air and can settle onto water, land, and plants. Uranium deposited

on land can be reincorporated into soil, washed into surface water, or adsorbed onto plant roots. Uranium in surface water can be transported large distances.

### How might I be exposed to uranium?

- Food and drinking water are the primary sources of intake for the general public. Very low levels of uranium are found in the air.
- Root crops such as potatoes, parsnips, turnips, and sweet potatoes contribute the highest amounts of uranium to the diet. Because uranium in soil can stick to these vegetables, the concentrations in these foods are directly related to the concentrations of uranium in the soil where the foods are grown.
- In most areas of the United States, low levels of uranium are found in the drinking water. Higher levels may be found in areas with elevated levels of naturally occurring uranium in rocks and soil.
- People may be exposed to higher levels of uranium if they live near uranium mining, processing, and manufacturing facilities. People may also be exposed if they live near areas where depleted uranium weapons are used.

### How can uranium enter and leave my body?

Most uranium leaves the body within a few days in the urine.

### How can uranium affect my health?

Natural uranium and depleted uranium have the identical chemical effect on your body. The kidney is the most

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sensitive target for uranium toxicity following inhalation, oral, or dermal exposure. If inhaled, uranium can also damage the respiratory tract.

Studies in animals have shown that oral exposure to uranium compounds will result in kidney effects. In male rats and mice, exposure to uranium has been shown to decrease fertility. Uranium compounds on the skin caused skin irritation and mild skin damage in animals.

Health effects of natural and depleted uranium are due to chemical effects and not to radiation.

#### How likely is uranium to cause cancer?

Neither the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC) nor the EPA have classified natural uranium or depleted uranium with respect to carcinogenicity.

#### How can uranium affect children?

The health effects seen in children from exposure to toxic levels of uranium are expected to be similar to the effects seen in adults.

Exposure of animals to high levels of uranium during pregnancy, which caused toxicity in the mothers, has induced early deaths and birth defects in the young. It is not clear if this can happen in the absence of effects on the mother. We do not know whether uranium can cause birth defects in people. There are some studies that suggest that exposure to depleted uranium increased the frequency of birth defects, but the studies are deficient to allow valid conclusions.

#### How can families reduce the risk of exposure to uranium?

❑ Avoid eating root vegetables grown in soils with high levels of uranium. At least consider washing fruits and vegetables grown in that soil and discard the outside portion of root vegetables.

❑ Consider having your water tested if you suspect that your drinking water might have elevated levels of uranium; if elevated levels are found, consider using bottled water.

#### Is there a medical test to determine whether I've been exposed to uranium?

Natural uranium is in your normal diet, so there will always be some level of uranium in all parts of your body. If depleted uranium is present, it adds to the total uranium level. Uranium can be measured in blood, urine, hair, and body tissues. Most tests are for total uranium; however, expensive tests are available to estimate the amounts of both natural uranium and depleted uranium that are present.

#### Has the federal government made recommendations to protect human health?

The government has made recommendations for uranium which apply to natural and depleted uranium combined.

The EPA established a maximum drinking water contaminant level of 0.03 mg/L.

The Occupational Safety and Health Administration (OSHA) has limited workers' exposure in air to an average of 0.05 mg U/m<sup>3</sup> for soluble uranium and 0.25 mg U/m<sup>3</sup> for insoluble uranium over an 8-hour workday.

The National Institute for Occupational Safety and Health (NIOSH) recommends workers exposure be limited to 0.05 mg U/m<sup>3</sup> of air for soluble uranium and 0.2 mg U/m<sup>3</sup> for insoluble uranium averaged over a 10-hour workday and recommends that exposure to soluble uranium not exceed 0.6 mg U/m<sup>3</sup> for more than 15 minutes.

#### References

Agency for Toxic Substances and Disease Registry (ATSDR). 2011. Toxicological Profile for Uranium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, 1600 Clifton Road NE, Mailstop F-62, Atlanta, GA 30333. Phone: 1-800-232-4636, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

