



FACTS

ABOUT THE SAVANNAH RIVER SITE

Health Effects of Tritium

Tritium

Tritium is a radioactive form of hydrogen. An atom of normal hydrogen has one negative particle, called an electron, and one positive particle, called a proton. An atom of tritium also contains two neutral particles, called neutrons. These extra particles make the tritium atom unstable and cause it to emit a very low-energy form of beta radiation.

Like normal hydrogen, tritium can bond with oxygen to form water. When this happens, the resulting water (called tritium oxide or tritiated water) is also radioactive. Because tritium oxide is chemically identical to normal water, it cannot be filtered out of the water.

Exposure to Tritium

Any possible health effects from tritium are the result of the beta radiation it emits. Because tritium's radiation cannot penetrate the skin, the only real exposure a person receives is the radiation received while tritium is inside the body.

Exposure time — and thus the possibility of health effects — depends on the form of tritium present, elemental tritium gas or tritium oxide. While people can inhale tritium gas, only about 0.004 percent is retained more than a minute or so, so it is an insignificant exposure hazard.

Tritium oxide can enter the body in various ways. It can be inhaled as water vapor, absorbed by the skin or consumed. Regardless of the way it enters the body, tritium oxide immediately mixes with the body fluids and is eliminated like normal water. The rate of elimination, naturally, varies from person to person. In general, however, half of the tritiated water is eliminated in 10 days. This can be sped up by drinking larger quantities of liquids.

Tritium in the food chain follows the same pattern. Tritiated water goes through an animal's body and is eliminated with the other fluids, rather than settling in the creature's body. Depending on the size of the animal, this time can be days, hours or minutes.

Possible Effects of Radiation

Beta radiation is a type of ionizing radiation. Ionizing refers to radiation that, when it passes through matter, has the potential to strip away electrons. When it passes through a human body, it can produce permanent changes in cells. There are three principal potential health effects: cancer, genetic effects and effects on fetuses.

All of the evidence of the ill effects of radiation comes from studies of individuals exposed to very high doses, such as the World War II atomic bomb survivors. Data on the risk from low levels of exposure, such as the

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exposure from Savannah River Site (SRS) operations, come from mathematical models. Scientists have never observed any health effect in human populations from radiation doses less than 10,000 mrem. This may be because these effects occur too infrequently to be distinguished from normal occurrences, or it may be that there are no effects from these low levels because the body repairs itself. A 1990 National Institutes of Health study of populations living near nuclear facilities (including SRS) found no evidence that an excess occurrence of cancer had resulted from living near these facilities.

September 2005

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