EPA Facts About Cobalt-60

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What is cobalt-60?

The most common radioactive form of cobalt is cobalt-60 which is produced commercially and used as a tracer and radiotherapeutic agent. It is produced in a process called activation, when materials in reactors, such as steel, are exposed to neutron radiation.

What are the uses of cobalt-60?

Cobalt-60 is widely used as a medical and industrial radiation source. Medical use consists primarily of cancer radiotherapy. Industrial uses include testing of welds and castings, and a large variety of measurement and test instruments including leveling devices and thickness gauges. It is also used to sterilize instruments, and to irradiate food to kill microbes and prevent spoilage.

How does cobalt-60 change in the environment?

Cobalt-60 decays by beta and gamma emission to non-radioactive nickel.

Most of the radiation from the decay of cobalt-60 is in the form of gamma emissions; some is in the form of beta particles. Beta particles are generally absorbed in the skin and do not pass through the entire body. Gamma radiation, however, can penetrate the body.

The time in which half the atoms of a radioactive substance disintegrate to another nuclear form is known as the half-life. The half-life of cobalt-60 is about 5.2 years.

How are people exposed to cobalt-60?

Most exposure to cobalt-60 takes place intentionally during medical tests and treatments. Such exposures are carefully controlled to avoid adverse health impacts. Cobalt-60 is produced as a result of weapons testing or in other nuclear reactions. Since cobalt-60 has a short half-life there is no significant presence of the isotope in the general environment at this time. Exposures have occurred as the result of improper disposal of medical radiation sources, and the accidental melting of cobalt-60 sources by metal recycling facilities.

How does cobalt-60 get into the body?

The major concern posed by cobalt-60 is from external exposure to gamma radiation. Cobalt-60 can be swallowed with food or inhaled in dust. Once in the body, some of it is quickly eliminated in the feces. The rest is absorbed into the blood and tissues, mainly the liver, kidney, and bones. This cobalt leaves the body slowly, mainly in the urine.

Is there a medical test to determine exposure to cobalt-60?

Cobalt in the body can be detected in the urine. In addition, a procedure known as whole-body counting can measure the amount of gamma ray-emitting radioactive material in the body such as the amount of cobalt-60 that has been inhaled and is still in the lungs. Other techniques that may be used include the taking of blood or fecal samples, then measuring the level of cobalt-60. These tests are more sensitive and more accurate if done shortly after exposure.

How can cobalt-60 affect people's health?

Because cobalt-60 releases gamma rays, it can affect the health of people nearby even if they do not ingest or inhale it. Exposure to low levels of gamma radiation over an extended period of time can cause cancer. The magnitude of the risk of adverse health effects is depends on the quantity of cobalt-60 involved and on exposure conditions, such as time of exposure, distance from an the source (for external exposure), and whether the cobalt-60 was ingested or inhaled.

What recommendations has the Environmental Protection Agency made to protect human health?

Please note that the information in this section is limited to recommendations EPA has made to protect human health from exposure to cobalt-60. General recommendations EPA has made to protect human health, which cover all radionuclides including

cobalt-60, are summarized in the Introduction section of this booklet.

EPA has established a Maximum Contaminant Level (MCL) of 4 millirem per year for beta particle and photon radioactivity from man-made radionuclides in drinking water. Cobalt-60 would be covered under this MCL. The average concentration of cobalt-60 which is assumed to yield 4 millirem per year is 100 picocuries per liter (pCi/l). If other radionuclides which emit beta particles and photon radioactivity are present in addition to cobalt-60, the sum of the annual dose from all the radionuclides shall not exceed 4 millirem/year.

For more information about how EPA addresses cobalt-60 at Superfund sites, please contact either:

EPA's Superfund Hotline
1-800-424-9346 or 1-800-535-0202
or EPA's Superfund Radiation Webpage
http://www.epa.gov/superfund/resources/radiation