



EPA Facts about Cobalt-60

What is cobalt-60?

The most common radioactive form of cobalt is cobalt-60. It 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 source of radiation. Medical use consists primarily of cancer radiotherapy. Industrial uses include testing welds and castings and a large variety of measurement and test instruments, such as 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 required for a radioactive substance to lose 50 percent of its radioactivity by decay is

known as the half-life. The half-life of cobalt-60 is about 5.3 years.

How are people exposed to cobalt-60?

Most exposure to cobalt-60 takes place intentionally during medical tests and treatments. These 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 a 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 collecting 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. Health risks increase with the amount of cobalt-60, duration of exposure, distance from the source (for external exposure), and whether the cobalt-60 was ingested or inhaled.

What recommendations has the U.S. 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 at Superfund sites (the 10^{-4} to 10^{-6} cancer risk range), which cover all radionuclides including cobalt-60, are summarized in the fact sheet "Primer on Radionuclides Commonly Found at Superfund Sites."

EPA has established a Maximum Contaminant Level (MCL) of 4 millirems 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 that is assumed to yield 4 millirems per year is 100 picoCuries per liter (pCi/L). If other radionuclides that emit beta particles and photon radioactivity are present in addition to cobalt-60, the sum of the annual dose from all the radionuclides cannot exceed 4 millirems/year

For more information about how EPA addresses cobalt-60 at Superfund sites

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or visit EPA's Superfund Radiation Webpage:

<http://www.epa.gov/superfund/resources/radiation/>