Primer on Radionuclides Commonly Found at Superfund Sites

What is the purpose of these fact sheets?

The information in these fact sheets is intended to help the public understand more about the various radionuclides commonly found at Superfund sites.

What information is in these fact sheets?

These fact sheets answer questions such as:

- How can a person be exposed to the radionuclide?
- How can it affect human health?
- How does it enter and leave the body?
- What levels of exposure result in harmful effects?
- What recommendations has the U.S. Environmental Protection Agency (EPA) made to protect human health from exposure to radionuclides?

How does EPA calculate risks to human health from radiation exposure at Superfund sites?

EPA assesses the health effects of radiation by calculating **excess cancer risk** caused by radioactive contamination. Excess cancer risk is the probability that a person exposed to the contamination will develop cancer over a lifetime.

EPA considers excess cancer risk to be any risk above the **protective range**. The protective range is a probability that a person exposed to radioactive and chemical contaminants will have between a one in 10,000 and a one in a million chance of developing cancer, known as the 10^{-4} to 10^{-6} cancer risk range.

It is important to note that even in the protective range, most people will have less of a chance of developing cancer than these numbers would indicate. The actual change is lower because EPA uses assumptions about exposure levels that are higher than most people's actual exposure.

EPA may also calculate health risk from exposure to radiation in dose per year, measured in **millirems per year**. Some regulations at Superfund sites are based on what EPA has calculated to be acceptable dose limits per year.

What is an Applicable or Relevant and Appropriate Requirement (ARAR)?

An ARAR is an environmental law or regulation from the federal government or a state government that addresses conditions or a particular cleanup technology at a Superfund site.

All actions to clean up contamination at Superfund sites must be protective of human health and the environment and comply with ARARs, unless a waiver is justified. ARARs are often the deciding factor in establishing cleanup levels at Superfund sites.

What radionuclides are listed in these fact sheets?

The following radionuclides are those most frequently encountered at EPA Superfund sites and are described in a series of EPA fact sheets.

Americium-241

Cesium-137

Cobalt-60

Iodine isotopes

Plutonium isotopes

Radium isotopes

Radon

Strontium-90

Technetium-99

Thorium isotopes

Tritium

Uranium isotopes

What if I want More Information?

If you have questions about the radionuclides described in this document, you can contact Stuart Walker of EPA by e-mail at walker.stuart@epa.gov or by telephone at (703) 603-8748.