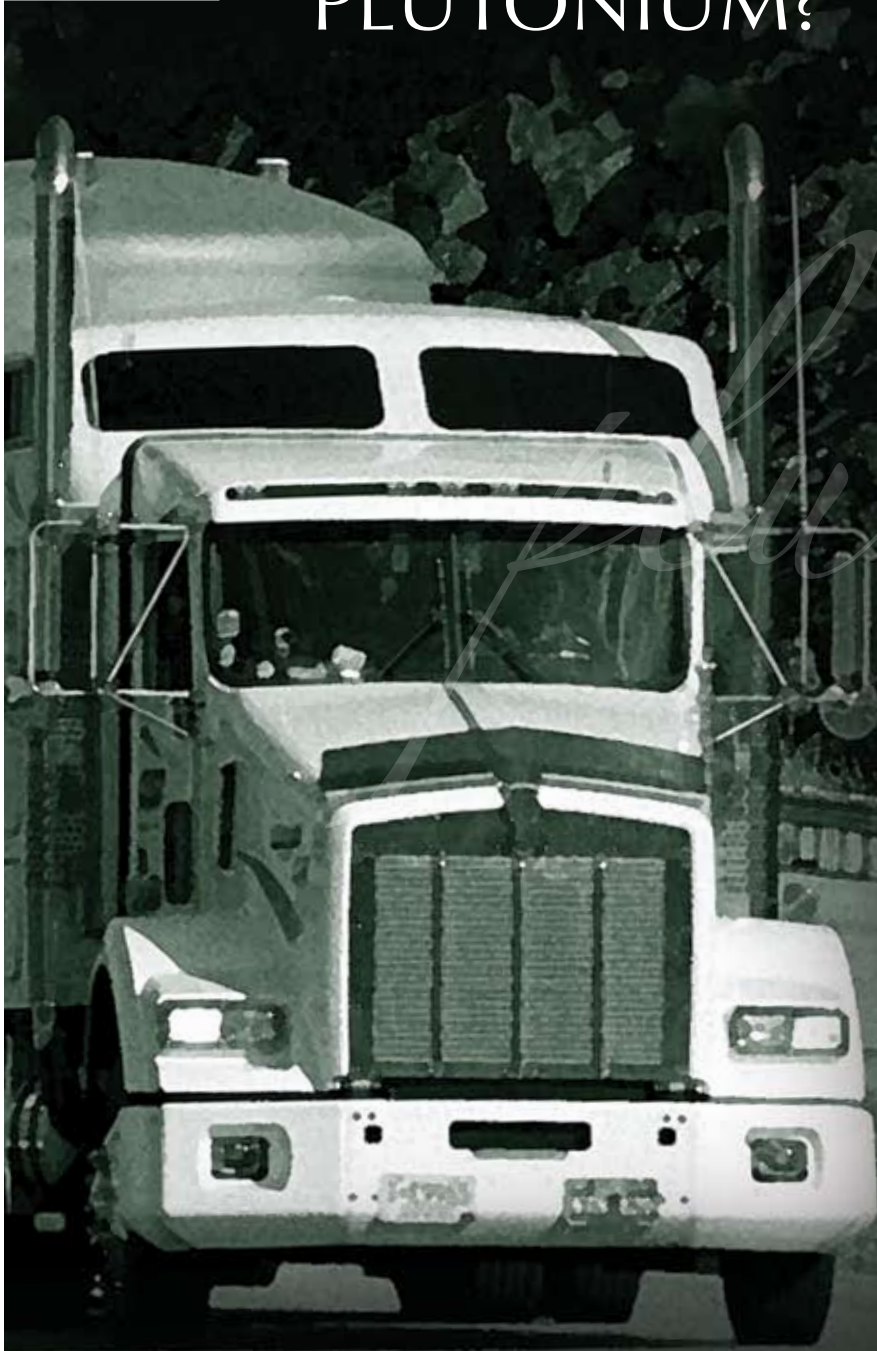


WHAT ARE THE HAZARDS OF PLUTONIUM?



A truck carries plutonium-contaminated waste from the INL, where it has been stored temporarily, to a permanent repository in New Mexico.

Plutonium, in its various elemental forms, poses some serious health concerns. That's why the U.S. Department of Energy and its contractors are committed to handling it with great care. Inhalation or ingestion of small amounts of plutonium can cause cancer, but it certainly is not a given that someone who breaths or swallows a small amount of plutonium will get cancer. Nonetheless, at the INL we work very hard to protect workers and the public from exposure to plutonium, and other radioactive and hazardous substances we work with on a regular basis.

One area where we are working hard to protect people and the environment is in the Subsurface Disposal Area, where plutonium-contaminated waste was buried from the early 1950s until 1970. Most of this waste material was generated as part of the production of nuclear weapons at the Rocky Flats Plant in Colorado, and was shipped to the INL for disposal in pits and trenches. The Snake River Plain Aquifer sits nearly 600 feet below that disposal area. Scientists involved in the decision to bury the waste there did not believe plutonium would migrate significantly, and that it therefore posed no threat to the aquifer.

A rigorous ongoing subsurface monitoring and sampling program has shown that small quantities of plutonium have reached a soil interbed about 110 feet below the burial ground. The soil underneath the burial site between the waste layer and the aquifer is largely porous volcanic rock, but there are two interbed layers of compacted clay and soil in between the lava rock – at the 110 foot and 240 foot levels. An even smaller amount of plutonium was discovered at the 240-foot interbed, but our researchers have never been able to duplicate that finding and believe the plutonium may have been carried down by drilling equipment.



Plutonium-contaminated Rocky Flats waste that arrived at INL from late-1970 until 1989 was stored. Workers are now shipping the post-1970 waste to a permanent repository in New Mexico called the Waste Isolation Pilot Plant.

In an effort to minimize the threat of plutonium in the buried waste from reaching the aquifer, our cleanup contractor has been digging up targeted waste from specific areas and packaging it for disposal at the permanent repository in New Mexico. The goal is to eliminate the largest concentrations of plutonium and a hazardous solvent from the buried waste. Under terms of the federal law that governs cleanup activities, the contractor is also studying how to best remediate the remainder of the buried waste.

Some of the waste buried at the INL contains the plutonium-239 isotope, a material that can sustain a chain reaction and was used in nuclear warheads. The radiation that Pu-239 emits is mostly alpha radiation, which can be safely shielded by a piece of paper or your skin. Trace quantities of Pu-239 are present in soil, sediments and water throughout the world, as the result of fallout from above-ground nuclear weapons testing done in several countries during the 1950s and 1960s. Half-life is the time required for one half the atoms of a given amount of a radioactive substance to disintegrate. Pu-239 has a half-life of more than 24,000 years, which means it will remain hazardous for a very long time.

Plutonium and other actinides (radioactive isotopes) were present in waste from spent nuclear fuel reprocessing and reactor operations conducted at the INL site. Therefore, small quantities of plutonium were present in the wastes injected into the aquifer decades ago at the Idaho Nuclear Technology and Engineering Center, the Reactor Technology Complex and Test Area North, all on the INL site. Plutonium is present in some contaminated soils at the Idaho Nuclear Technology and Engineering Center. Plutonium was also present in reactor waste disposed decades ago in unlined ponds at the Reactor Technology Complex and the Materials and Fuels Complex.

For many years, the INL and its regulators, the state of Idaho and the Environmental Protection Agency, have worked together to remediate these past releases. Remediation means taking the actions necessary to limit the risks posed by contaminants that have been, or may be released to the environment. Remediation can include actions like removing contaminants, or putting a cap or cover in place, to prevent the contamination from getting into the water or air. Remediation of the soil and groundwater contamination at the Reactor Technology Complex and the Materials and Fuels Complex is complete. Remediation continues at the Idaho Nuclear Technology and Engineering Center and for Test Area North groundwater. Monitoring will continue at all release sites. All releases from current operations are regulated and must meet federal Safe Drinking Water Act standards.

While some plutonium has been released into the environment, most plutonium at INL is safely contained in spent nuclear fuel assemblies, waste tanks, bin sets, and waste boxes and drums.

In addition to Pu-239, the INL also handles the plutonium-238 isotope, which is used to provide heat and energy for deep space missions. Pu-238 is much more radioactive than Pu-239. As a result, it generates significant quantities of heat. This heat is converted into electricity for systems deployed in harsh, remote environments that require a long-term, dependable source of energy. Pu-238 has a half-life of about 88 years.

Because the biggest health threat from plutonium is inhalation, whenever we handle it at the site we take special precautions to make sure it doesn't get airborne, and our workers use special protective equipment when handling it. We have been safely handling this material for many years at the INL. We remain dedicated to protecting workers, the public and the environment from the potential hazards of plutonium and any other radioactive or hazardous material.