Waste Isolation
Pilot Plant

.. a critical step toward solving the nation's nuclear waste disposal problem

What Is Plutonium?

Plu-to-ni-um *n. Symbol* **Pu** (plōō-tō'nē-əm)

> A radioactive, silvery, metallic transuranic element, produced artificially by neutron bombardment of uranium, having 15 isotopes with masses ranging from 232 to 246 and half-lives from 20 minutes to 76 million years. It is a radiological poison, specifically absorbed by bone marrow, and is used, especially the highly fissionable isotope Pu239, as a reactor fuel and in nuclear weapons.
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> *The American Heritage Dictionary, Second College Edition*

The U.S. Department of Energy's Carlsbad Field Office is responsible for the management, transportation, and permanent disposal of large amounts of the transuranic wastes left over from both World War II and the Cold War. Plutonium and the other radioactive wastes destined for permanent disposal at the Waste Isolation Pilot Plant (WIPP), are scientifically well understood and easily managed. The purpose of the National Transuranic Waste Program is to manage the disposal of the transuranic waste generated at the nation's defense production facilities. Various sites around the nation have transuranic wastes stored above ground in temporary storage facilities. In that nuclear waste, there are numerous plutonium isotopes that will be entombed 2,150 feet below ground at the WIPP near Carlsbad, New Mexico.

Plutonium is one of the principal elements destined for disposal at the WIPP. Dr. Glenn T. Seaborg and three colleagues discovered it in 1941 at the University of California at Berkeley. In general terms, it is a radioactive metal about 50 percent heavier than lead. In its pure form at room temperature, plutonium is a solid.

Plutonium -- an element that can be easily split to generate large amounts of energy, quickly -- is valuable as a fuel for nuclear reactors and as a key ingredient for nuclear weapons. With the end of the Cold War, the national need for plutonium has decreased. However, the need for plutonium handling technologies has increased. Scientists and engineers are today working to find scientific solutions for stabilizing, cleaning up, and securing excess and waste plutonium. The WIPP plays a key role in today's technology. It will safely, effectively, and permanently dispose of trash contaminated with traces of plutonium and other transuranic isotopes that have no value.

Plutonium has often been called the most toxic element known to man. However, in the normal meaning of "toxic" -- that is, a poison with a fairly fast, often fatal, effect -- scientists do not consider plutonium as very toxic at all. It is not comparable, for instance, to botulism, poison mushrooms, or certain chemicals,

where very small amounts will cause immediate death. In referring to small amounts of radioactive materials, such as plutonium, the words “toxic” and “toxicity” are used to describe their relative abilities to damage biological material rather than to kill rapidly. The effects of low-level exposures to plutonium, as well as other radioactive material, may not be detected for many years, if at all.

The principal radiation from plutonium is the alpha particle. Alpha radiation is totally stopped by a single sheet of paper or even an inch of air. These alpha particles cannot penetrate the outer layer of one’s skin. Therefore, plutonium outside the body is considered harmless. Even ingestion of these materials is of relatively low risk to humans. The greatest risk is in inhaling plutonium particles.

The risk of plutonium, particularly that which is maintained in temporary above ground storage facilities around the country, is that it and other transuranic isotopes have the potential to be inadvertently released to the biosphere. Without proper control and permanent disposal, plutonium can be of great risk if it were accidently released and dispersed with subsequent exposure to nearby populations.

It is a fact that after fifty years of careful handling of plutonium by humans in the nuclear industry and the nation’s weapons programs, there have been no fatalities due to plutonium exposure. The risks to humans from inhalation or ingestion of plutonium are calculated from scientific study of the effects of relatively large quantities of other radioactive materials in humans. Risks from low levels of internally deposited radioactive materials are simply not measurable but, rather are calculated using conservative assumptions.

Transportation of transuranic waste to the WIPP poses a vanishingly small risk from radiation to either employees or the public. The National Academy of Science has termed the transportation system to be used for moving these wastes to the WIPP as the “safest transportation system for hazardous materials in this country.” The benefits of transporting waste to the WIPP for permanent disposal far outweigh any risk. For example, the radiation exposure from the shipping container is almost impossible to detect. The amount of radiation one would receive walking within 30 feet of a TRUPACT-II container can only be mathematically calculated at .00001 millirem, which is less than ten-millionth of the yearly dose received by an average person from the natural background radiation all around us.

For more information:

http://www.wipp.ws or call 1-800-336-WIPP

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