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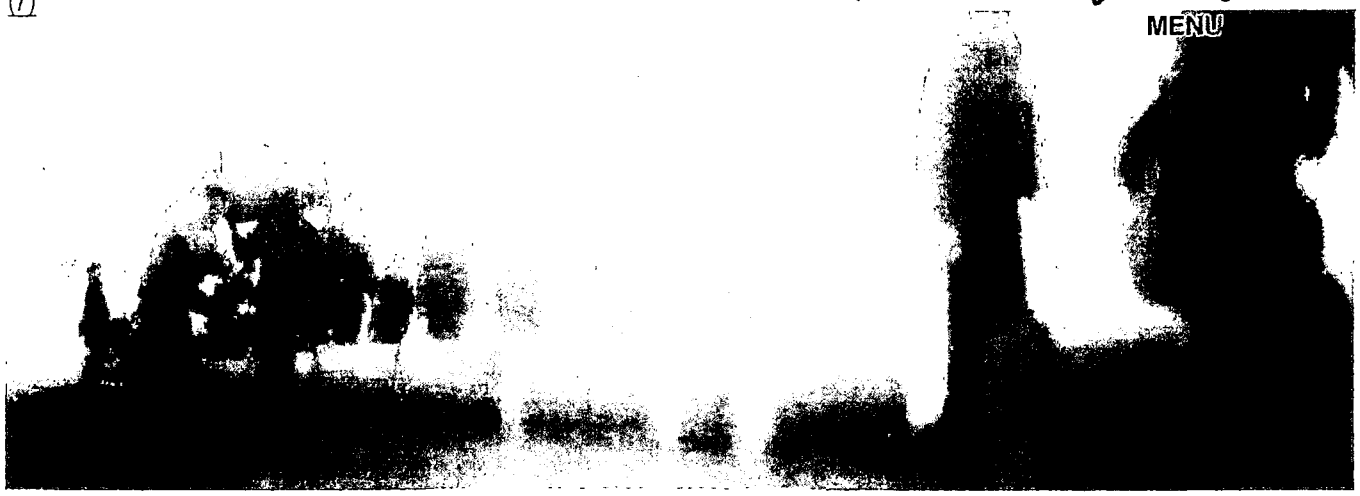

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Nuclear waste

Radioactive waste is the lethal byproduct of the nuclear age.

Waste

About 95 % of all the radioactivity created, from all sources including nuclear weapons production, is contained in the irradiated fuel - or high-level radioactive waste - from commercial nuclear power reactors. Yet even "low-level" nuclear waste can contain lethally-radioactive and long-lived elements, such as Plutonium-239, Strontium-90 and many others. The storage - permanent and temporary - and transport of radioactive waste is perhaps the most controversial aspect of the nuclear power issue. No nation has yet solved the problem of what to do with this material, which must be shielded from the environment for millennia.

Splitting atoms to make electricity has created an enormous problem: waste containing 95 % of the toxic radioactivity produced during the Atomic Age. Nuclear weapons production, industrial activity, research and medicine combined, create only 5 % of this problem. Every nuclear power reactor annually generates 20-30 tons of high-level nuclear waste since the irradiated fuel itself is the waste when removed from the reactor core. Like fuel, the waste is a solid ceramic pellet, stacked inside a thin metal tube or 'cladding.' In addition to residual uranium, the waste is about 1 % plutonium that is formed inside the fuel rods by the reactor. The waste also contains about 5 % highly radioactive fission products like cesium, strontium and iodine, making it millions of times more radioactive than "fresh"

uranium fuel. Unshielded, it delivers a lethal dose in seconds and will remain a hazard for at least 12,000 human generations. High-level waste is piling up at reactor sites, stored outside of containment in pools, and in large dry containers called casks. A growing security threat, storage has been repeatedly approved to enable continued reactor operation, and therefore continued nuclear waste production, making risks greater.

Reprocessing

It is technically possible to reprocess the waste: The fuel rods are taken out of the assemblies, chopped up and then dissolved in nitric acid. The resulting highly radioactive and caustic stew is then processed to remove the plutonium and the uranium, leaving the highly radioactive fission products in the liquid. While there are methods to attempt to re-stabilize this material, there has been a fundamental loss in the stability of the dry ceramic pellet in the metal clad fuel rod.

> Reprocessing is NOT recycling: the formation of fission products in the fuel rods makes high-level waste fundamentally different from the uranium it came from. It is not possible to remake the original fuel again from high-level waste – thus it is not a cycle.
> Reprocessing does not reduce radioactivity: no credible expert says reprocessing reduces total radioactivity; some less informed sources imply this.
> Reprocessing does change not the amount of radioactivity – except to smear it around a large surface area, thereby diluting it without any actual reduction of radioactivity.
> Reprocessing does not reduce waste volume: to the contrary, fuel pellet volume is magnified by a factor of 100–100,000. The resulting "dilution" allows the reclassification from "high-level," to the so-called "low-level" waste category, which is still deadly.

A stated goal of reprocessing is to use plutonium for reactor fuel. The most common form is MOX (short for 'mixed oxide'), made from plutonium and uranium 238 (depleted uranium). While today's reactors can use MOX fuel, it is both riskier and more hazardous: MOX is harder to control, and twice as deadly as uranium fuel if control is lost. MOX does not "solve" the waste problem since reprocessing MOX fuel is even harder than reprocessing uranium fuel, and not widely done. Princeton's Dr. Frank Von Hippel likens MOX use to "kicking the can down the road"–not dealing with the waste problem at all. High-level nuclear waste contains so much lethal radioactivity that the plutonium inside the waste fuel rods is effectively safeguarded. Separating out the plutonium makes it available

for weapons use. Far from putting the atomic genie back in the bottle, reprocessing creates millions of gallons of highly radioactive, caustic, destabilized high-level waste that history shows will leak.

Tags: information (/taxonomy/term/21) Nuclear waste (/labels/nuclear-waste)

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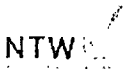

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