Classifications of Nuclear Waste

What's high? What's low? How are classifications decided?

For more information on radioactive waste, a critique of current policies, and suggestions for an alternative approach to radioactive waste management, see IEER's publication: High-Level Dollars Low-Level Sense

Radioactive Waste: In general, radioactive waste classes are based on the waste's origin, not on the physical and chemical properties of the waste that could determine its safe management. Other categories of radioactive waste not listed here include mixed waste and NARM wastes (Naturally-Occurring and Accelerator-Produced Radioactive Materials). One common factor for all categories of nuclear waste is the presence of at least some amount of long-lived radionuclides.

Some Classifications of Radioactive Waste	Category of Radioactive Waste	Definition
	High-Level Waste (HLW)	1. *Spent Fuel:* fuel 2. *Reprocessi* solvent extr Also the so have been c Department reprocessin Regulatory spent fuel **a**
	Transuranic Waste (TRU)	Waste containing e (number of protons number of uranium "above uranium.") material that conta half-lives greater th greater than 100 na concentrations of t it is possible for wa but not be classifie TRU waste.
	Low-Level Waste (LLW)	Defined by what it classified as high-l byproduct material LLW has four subc Greater-Than Class average, Class A is the least hazardous hazardous.
	Class A	On average the leas

	classes. Primarily c radionuclides. (ave curies/cubic foot)
Class B	May be contaminat “short-lived” radio concentration: 2 cu
Class C	May be contaminat long-lived and sho A or B. (average co
GTCC	Most radioactive o concentration: 300 *300 figure is based higher figure repre 2020, including so*

A Few Notes:

- Radioactive waste is produced by a number of sources, but by far the largest quantities — in terms of both radioactivity and volume — are generated by the commercial nuclear power and military nuclear weapons production industries, and by nuclear fuel cycle activities to support these industries such as uranium mining and processing.
- Although all elements up to and including uranium are found in nature, no elements with atomic numbers great than uranium — that is, no transuranic elements — are naturally occurring. [1] Thus, transuranic elements are the artificial elements. All transuranic elements are unstable (and thus radioactive), many of them are alpha-emitters, and many (although not all) have very long half-lives.
- Since “low-level” radioactive waste is defined by what it is not, it thus includes everything from slightly radioactive trash (such as mops, gloves, and booties) to highly radioactive activated metals from inside nuclear reactors. It includes both short-lived and long-lived radionucldes.
- In both the commercial and military sectors, some of the radioactive wastes generated are mixed with hazardous substances, such as organic solvents or other toxic chemicals. Much of this waste (especially the transuranic waste) contains substantial quantities of long-lived radionuclides, such as plutonium-239 and technetium-99. The radioactive components of mixed wastes are regulated under the Atomic Energy Act by the Nuclear Regulatory Commission for commercial sources, and by the Department of Energy for military sources. The hazardous components, however, are subject to regulation by the Environmental Protection Agency according to an environmental law known as the Resource Conservation and Recovery Act (RCRA).
- NARM wastes (Naturally-Occurring and Accelerator-Produced Radioactive Materials) are orphan wastes not consistently regulated under any current federal standard. NARM includes such materials as radium-226 and thorium-230 produced outside the nuclear fuel-cycle, and radionuclides produced by particle accelerators. NARM wastes are generated by both federal and non-federal facilities.
- One of the major problems associated with radioactive waste is the fact that much of it will be radioactive — and thus will require isolation from the human environment — for hundreds of thousands, if not millions, of years. Since this is a time period far longer than all of recorded

history, the problem of waste disposal presents an enormous challenge.

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Notes:

1. Although at least one instance is known in which a small quantity of plutonium (long since decayed away) and fission products must have been created naturally about 2 billion years ago in a “natural’ reactor at an underground location in what is now Gabon, West Africa. This phenomenon was made possible by a high concentration of uranium and by the fact that the percentage of uranium-235 was much higher so long ago than the 0.7 percent found in today’s uranium ores. (Eisenbud 1987, p.171.) ? Return

Published on 1996-04-29
Last modified on 2012-05-10