

Focus on Low and Intermediate Level Waste

Many good practices developed over the years aim at avoiding or at least minimizing the amount of waste generated in the first place.

In broad terms, radioactive wastes are grouped into low, intermediate and high level wastes. Some countries use more detailed categorization. The common principle, however, is that the main criteria for determining the type of waste are derived from the radioactive content and half-life, i.e. the time taken for the waste to lose half of its radioactivity.

Low level waste

Low level waste contains small amounts of radioactivity. This type of waste is generated from hospitals, laboratories and industry as well as in every stage of the nuclear fuel cycle, which refers to the series of steps to produce fuel for generating electricity.

It can include many kinds of material: paper, rags, tools, clothing, shoe covers and filters. It can also include fireproof fabrics and protective plastic sheeting used in maintenance work, and equipment parts and pipes removed from a power plant.

Many good practices developed over the years aim at avoiding or at least minimizing the amount of waste generated in the first place. This means careful planning. For example, only those tools or pieces of equipment that are necessary are brought into an area where there is a risk of radioactive contamination.

It is important to prevent radioactivity from spreading. This means that places and specific work areas where contamination is possible are strictly controlled. Only trained personnel who know the radiation safety requirements are allowed to work in these controlled areas. In a nuclear power plant, every tool and item is measured for contamination before it is removed from the controlled area. If contamination is found, there are ways to decontaminate them, i.e. clean them up. If washing clothes or cleaning tools do not help and the measurements still show signs of radioactivity, these items are considered to be at the end of their life and labelled as low level radioactive waste.

To prepare low level waste for disposal, a common practice is to put the waste in a closed container and, if possible, compress it to about half of its original volume.



Transporting radioactive waste to a final disposal facility for low and intermediate level waste.



IAEA

International Atomic Energy Agency

As an indicative example, the operation of a 1000 MW(e) nuclear power reactor produces around 100 m³ of processed low level waste every year. This equates to a pool 10 metres long, 5 metres wide and 2 metres deep.

Intermediate level waste

Intermediate level waste contains higher radioactivity levels than low level waste. It requires shielding when handled. Intermediate level waste – generated during operation of a nuclear power plant – consists mostly of ion exchange resins used to clean the water circulating through the reactor. When a reactor is decommissioned, some parts of the reactor are also classified as intermediate level waste.

Intermediate level waste from reactor operation and from reprocessing of used fuel is treated and conditioned by incorporating it, for example, into cement or bitumen and then shielding it in containers.

The operation of a 1000 MW(e) nuclear power reactor produces about 20 m³ of intermediate level waste each year. This equates to a pool 5 metres long, 2 metres wide and 2 metres deep.

Final disposal

Over the lifetime of a nuclear power plant, the low level waste generated throughout the nuclear fuel cycle is about 90% of the total volume of radioactive waste. However, it contains only about 1% of the total radioactivity. As low level waste cannot be disposed of conventionally as normal rubbish, it is segregated, measured for radioactivity, processed and placed into strictly engineered and monitored waste disposal facilities, as with intermediate level waste.

In many countries, disposal sites for low and intermediate level wastes are in operation, with intermediate level waste and low level waste often disposed of in the same facility. Usually, these facilities are at or near the surface, but some intermediate level waste that contains long lived radioactivity may require disposal at greater depths, of the order of tens of metres to a few hundred metres.

Low level waste is relatively easy to handle; intermediate level waste requires more shielding.

Disposing of low level waste.

