

## Nuclear waste

Nuclear power stations, as with any other nuclear industry, produce nuclear waste. Depending on its level of radioactivity, waste is divided into three groups - low-level and intermediate-level waste, and used or spent fuel. It can be in solid, liquid or gaseous form.

Type of waste	Volume %	Radioactive %	Quantities produced by Koeberg per year	Disposal site
Low-level waste	90	1	500 drums	Vaalputs
Intermediate-level waste	7	4	150 drums	Vaalputs
High-level waste	3	95	32 tons	Koeberg

### Low level waste

Low level waste contains low traces of radioactive contamination, and typically consists of day-to-day refuse such as paper, gloves, insulation material, plastics and disposable overalls. This waste is generated in the controlled radiological areas of the power station.

Low level waste is compressed into sealed, clearly marked, steel drums and stored on site until they are moved, by road, to the designated waste disposal site at Vaalputs.



On average 500 steel drums and 150 concrete drums are shipped to Vaalputs every year. Vaalputs is the national disposal site for nuclear waste and is situated approximately 600km north of Cape Town near Springbok.

*Drums containing low-level waste are covered with a layer of clay and then top soil.*

## Intermediate level waste

Intermediate level waste consists of purification sludge, radioactive resins, spent filter cartridges and irradiated scrap metal pieces from routine maintenance work. It is more radioactive than low-level waste but less radioactive than spent fuel.

Intermediate-level waste is solidified by mixing it with cement and pouring it into concrete drums. It is also transported to the waste disposal site at Vaalputs.

Even if one of these concrete drums should fall off the truck and break open, the radioactive materials inside will never be exposed as it is sealed inside the concrete.



*Cross section of a drum containing intermediate-level waste*



*Concrete drums are covered with layers of clay and top soil.*

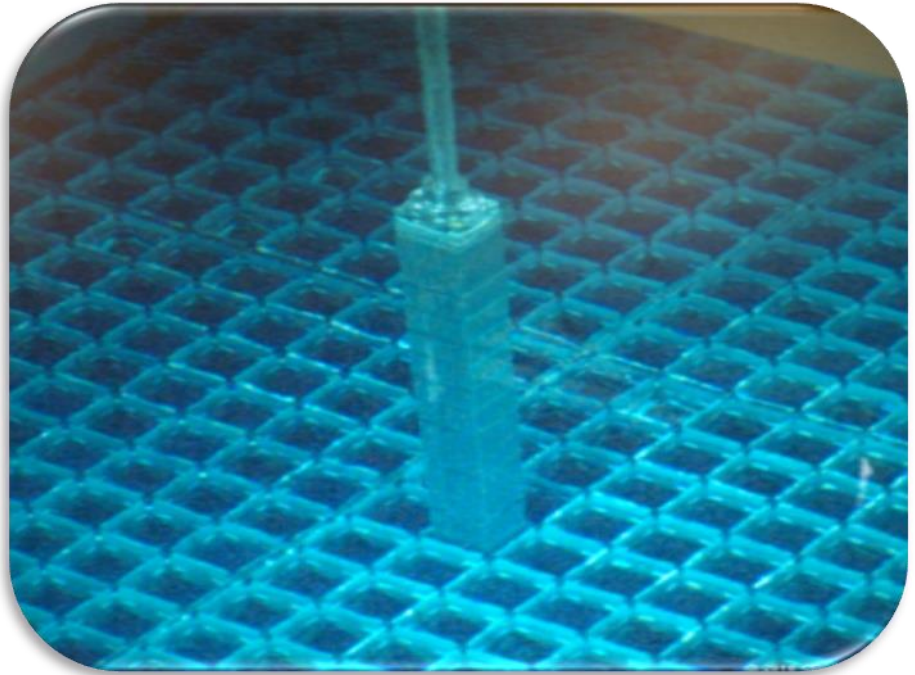
## Used or spent fuel

Spent fuel assemblies consist of nuclear fuel that has been irradiated in a nuclear reactor (usually at a nuclear power plant) to the point where it is no longer able to sustain a nuclear reaction.

The spent fuel assemblies are stored underwater in storage racks in the spent fuel pools in the power station. Water cools the fuel and serves as an effective shield to protect workers in the fuel storage building from radiation.

Radiation starts decreasing immediately after the fission reaction has stopped and within approximately 10 years has decreased by more than 95%.

Spent fuel will either be sent to a reprocessing facility when uranium extraction becomes economically viable, or it will be disposed of at an approved repository.



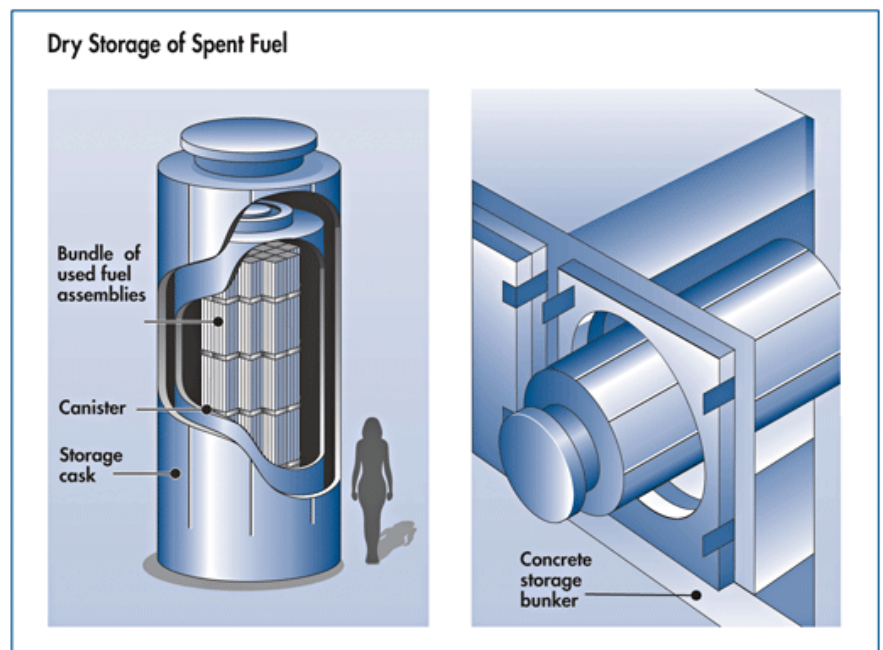
*Spent fuel being stored under water in the Spent Fuel Pools*

## High level waste

This is what remains when the spent fuel has been chemically processed to remove usable plutonium and uranium. At present, it is not economically viable to undertake reprocessing. In the meantime, spent fuel will be stored in the spent fuel pools at Koeberg.

After reprocessing, high-level waste, in synthetic-rock form, will be sealed in stainless steel casks and buried in underground repositories between five hundred to one thousand metres deep. Nuclear waste storage sites are situated in remote, geologically stable areas where little seismic activity has been recorded and where agricultural and mineral potential is minimal.

A pressurised water reactor type power station like Koeberg generates approximately thirty-two tons of spent fuel each year. Over a forty year lifetime that will amount to 1 280 tons.



## Vaalputs



Vaalputs is managed by the National Radioactive Waste Disposal Institute (NRWDI). It is South Africa's official disposal site for nuclear waste. Vaalputs is situated in Namaqualand, approximately 600km north of Cape Town. In this area the annual evaporation exceeds the annual rainfall. In this way, even if radioactivity should escape, it could not contaminate ground water that might find its way to the surface.

The area allocated for burial of metal drums and concrete containers measures 700 m x 300 m. This area is sufficient for storing the nuclear waste of three power stations the size of Koeberg. The waste is stored in trenches ten metres deep. Radiation at the surface is almost at natural levels and does not pose a health hazard. However, for safety reasons, the area is fenced off and monitored

Produced by: **Generation Division**  
**Communication and Stakeholder Management**  
**NU 0002 Revision 11 (March 2021)**

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