NUCLEAR WASTE

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

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. These items are 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 nuclear waste disposal site for nuclear waste and is situated approximately 600 km north of Cape Town.

Intermediate level waste
Intermediate level waste consists of purification sludge, radioactive resins, spent filter cartridges and irradiated scrap metal pieces from normal maintenance work. It is more radioactive than low-level waste but less radioactive than spent fuel. Intermediate-level waste is solidified by combining it with a cement mix, which is poured into concrete drums and also transported to the waste disposal site at Vaalputs.

The nature of the concrete used is such that should a drum fall off a truck or break open the radioactive materials inside could not harm the public due to it being sealed inside the concrete.

Used or spent fuel
Spent fuel assemblies are nuclear fuel that has been irradiated in a nuclear reactor (usually at a nuclear power plant) to the point where it is no longer useful in sustaining a nuclear reaction. The spent fuel assemblies are stored underwater in storage racks in the spent fuel pools. 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.

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 finally sealed into stainless steel flasks (casks) to be buried in the range of 500 - 1 000 metre deep at waste repositories. Nuclear waste storage sites are situated in remote, geologically stable areas where little seismic activity has been recorded for millions of years and where agricultural and mineral potential is minimal

A pressurised water reactor type power station like Koeberg generates approximately 32 tons of spent fuel each year. Over a 40-year lifetime that would add up to 1 280 tons.

Vaalputs
Vaalputs, which is managed by NECSA (South African Nuclear Energy Corporation), is South Africa's 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 for the future. The waste is stored in trenches 10 m deep. Radiation at the surface is almost at natural levels and does not constitute a health hazard. However, for safety reasons, the area is fenced off and monitored

NECSA's own low and intermediate level waste is currently being stored at Pelindaba, west of Pretoria, but negotiations could lead to permission to dispose of this material at Vaalputs as well.

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