

## **Intermediate Depth Disposal of Radioactive Waste: The Safety Basis and its Realization**

The difficulties in developing waste disposal facilities in many countries due to socio-political influences have led to arrangements for extended storage having to be made. Whilst storage can be undertaken safely in the short to medium term, it is not a sustainable option in the longer term and disposal is necessary.

In giving consideration to national radioactive waste management strategies suitable options for disposal of all waste types have to be determined. Many waste disposal facilities developed to date have been for waste arising from the back end of the nuclear fuel cycle and certain waste generated from the manufacture and use of radioisotopes. These are often based on quite large inventories of waste and make use of near surface disposal or disposal at depth.

Some types of radioactive waste, in particular waste containing higher levels of longer lived radionuclides of both natural and anthropogenic origin do not meet waste acceptance criteria for near surface disposal. This is often related to potential consequences of human intrusion into disposal facilities at very shallow depth, over the long time frames involved. An alternative option for such waste is geological disposal in stable host geological environments at depths of several hundred metres. Such facilities are generally contemplated for high level waste such as spent fuel, when considered as waste, or vitrified waste from reprocessing of spent fuel. The WIPP facility in the USA is an example of such, but for longer lived non-heat generating waste.

Whether the degree of containment and isolation provided by geological disposal at great depth is necessary for all waste types which do not comply with acceptance criteria is, however, a legitimate question. Accordingly a number of countries have been contemplating the development of disposal facilities at intermediate depths between a few tens and a few hundred metres below grade. Such facilities may provide an option for disposal for waste such as graphite containing carbon-14, radium bearing waste or higher activity radiation sources, including spent high activity radioactive sources (SHARS). It is also been recognized that the availability of such facilities could assist with the future decommissioning of reactors in which substantial amounts of graphite was used.

A number of disposal facilities have been developed at such depths, but the waste disposed in them is generally not long lived waste, rather it is low level waste and intermediate level waste with limited content of longer lived radionuclides.

International consensus has been developed on safety standards for near surface radioactive waste disposal and for geological disposal. No such consensus has been developed for intermediate depth disposal and/or for disposal of intermediate level waste. In view of the increasing interest in such facilities it has been deemed expedient to focus international discussion on the conceptual basis and potential

utility for such facilities and to explore if there is a need to develop international safety standards or additional IAEA technical and safety reports for such facilities.