

## A SHORT STATEMENT

from the **GEOLOGICAL SOCIETY of LONDON**

on the **GEOLOGICAL DISPOSAL of RADIOACTIVE WASTE**

Based on the position paper *Geoscience Verdict on Waste Disposal, March 29 1999*.

This is a naturally radioactive planet, in a naturally radioactive universe. All life forms are subjected to significant natural background radiation. This cannot be eliminated. However, radioactive waste requires containment to limit the escape of potentially harmful radionuclides into environments where they may be harmful to humans and other life.

Britain's nuclear legacy stems back 50 years or so to times when the principal driver was the development of nuclear technology for weapons and civil purposes. Future clean-up requirements were not focused on at the time and today's effort to deal with nuclear waste involves both the nuclear legacy and projected future waste.

Unlike many other toxic wastes, the hazard from radioactive waste declines with time. The longer the containment, the lower the actual hazard. For Intermediate Level Waste<sup>1</sup>, approximately 80% of initial radioactivity will have been lost after 100 years and only a negligible amount will still remain after 100,000 years. However, neither storage nor disposal at surface are acceptable long-term solutions because surface sites are vulnerable to natural and man-made hazards. There is also a continuing need, over long time-scales, to re-package and possibly re-site wastes.

Informed geoscientific opinion is united around a central belief that only deep geological disposal can provide a long-term, safe and sustainable solution for radioactive waste. Geoscientists with appropriate experience and expertise believe that geological disposal of long-lived waste needs to be at depths of at least several hundred metres. Deep storage may be a stage in our disposal options; one that would much reduce the influence of surface processes on the integrity of waste packages, permit monitoring - and retrieval if necessary. Very deep disposal, in boreholes over 1500m deep, may be appropriate for some specific types of waste.

Over very long, "geological" time-scales, possibly long enough not only to exceed the existence of our present civilization, but also of our species, negligible amounts of radionuclides from any surface or deep disposal facility located onshore will eventually discharge into subsurface waters and then to the sea. In planetary terms, the sea cannot be totally isolated from any disposal or storage concept. Nevertheless, it is a widely shared view that the requirements for characterising a suitable repository site, and the engineering techniques for the packaging, storage and containment of intermediate and high level wastes, are well known, well rehearsed, and have been for about 20 years.

For a more in-depth survey of the geoscientific consensus on deep disposal, visit <http://www.geolsoc.org.uk/template.cfm?name=Radwaste>.

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<sup>1</sup> Radioactive waste in the UK is classified into four categories:

- *High Level Waste (HLW)*, also known as heat-generating waste, consists mainly of a nitric acid solution containing fission products separated from irradiated nuclear fuel during reprocessing. These are stored for at least 50 years to cool (currently liquid, soon in glass) before long-term disposal in a suitable geological location for tens of thousands of years.
- *Intermediate Level Waste (ILW)* consists mainly of metals, with smaller quantities of organic materials, inorganic sludges, cement, graphite, glass and ceramics. ILW mainly arises from the dismantling and reprocessing of spent fuel and from the general operation of nuclear plants. 5,000m<sup>3</sup> pa is produced, and is stored temporarily pending a permanent solution.
- *Low Level Waste (LLW)* includes metals (redundant equipment) and organic materials (laboratory equipment, clothing and paper towels). The organic materials mainly come from areas where radioactive materials are used –e.g. hospitals and research establishments. 40,000 m<sup>3</sup> pa is produced: this is stored in concrete lined trenches at Drigg, Sellafield.
- *Very Low Level Waste (VLLW)* covers waste with very low concentrations of radioactivity, and mainly arises from hospitals and non-nuclear industry. This is disposed of with other commercial municipal and industrial refuse.

(Definition from the Royal Town Planning Institute. See:

<http://www.rtpi.org.uk/resources/publications/environment/guide/guide%20051%20radioactive%20waste.pdf> for further info.)