

SPENT FUEL MANAGEMENT AND STORAGE DEVELOPMENT IN THE UK

P.N.Standring

Spent Fuel Management Technical Department,
Sellafield Ltd,
Sellafield, Seascale, Cumbria,
United Kingdom.

E-mail address of presenter: paul.n.standring@sellafieldsites.com

Spent fuel management (SFM) in the United Kingdom (UK) is mainly associated with fuel discharged from its three generations of nuclear power plants (NPPs). Namely: Magnesium alloy clad uranium metal fuel from Magnox Reactors; Stainless steel clad uranium dioxide fuel from Advanced Gas Cooled Reactors (AGR); Zircaloy clad uranium dioxide fuel from the Pressurised Water Reactor (PWR).

Total nuclear power generation in the UK represents around 19% of electrical power consumption. To maintain this capability, due to Magnox and subsequently AGR NPPs being taken out of service, the Secretary of Energy and Climate announced ten sites for potential nuclear build in 2009. Three companies have expressed an interest in building on these sites.

In addition, spent fuel is also managed as part of overseas reprocessing contracts and legacy fuel from the UK's power generation development programme; for example Dounreay Fast Reactor (DFR) fuel. Due to the experimental nature of the power development programme a wide variety of fuels were irradiated ranging from standard fuel to what is termed 'Exotic'; i.e. non-standard cladding, high enrichments, mixed oxides, carbides.

The current SFM strategies adopted for UK origin fuel are:

- PWR - Open Cycle
- Magnox - Closed Cycle
- AGR - Closed Cycle (Until end of Thorp Operations)
- Open Cycle (Non-reprocessed AGR fuel)
- Exotics – Mixture (fuel type dependent)
- New Build - Closed Cycle (Planning assumption)

With the formation of the Nuclear Decommissioning Authority (NDA) in 2005 the ownership of a number of these fuels was transferred to the government. A commitment was made in 2006 by the NDA to review the SFM strategies in the UK. This strategic review is currently at the 'Define Credible Options' stage.

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Examples of storage development activities in the UK include:

PWR (British Energy- EDF)– Sizewell B Storage Options

The current wet AR pool at Sizewell B is projected to be full by 2015. The options for managing Sizewell B's PWR fuel have been evaluated and shared through public consultation. The preferred option is to dry store the fuel in casks. Holtec International has since been contracted to assist with safety case preparation.

Magnox (Sellafield Ltd)– Contingency Development for wetted Magnox fuel.

A contingency option, for deployment, in the event reprocessing was no longer available is in the process of being evaluated. The project is building on the Hanford MCO experience which was deployed for degraded metal fuel. An engineered canister for Magnox fuel has been designed and work is underway to close out technical uncertainties; for example canister chemistry evolution.

AGR (Sellafield Ltd)– Alternative corrosion inhibitor development for AGR fuel to facilitate interim co-storage with LWR fuels.

AGR fuel is mainly stored in sodium hydroxide storage pools at Sellafield to prevent corrosion; the exception is Thorp Receipt & Storage (TR&S). Sodium Hydroxide cannot be used in TR&S due to materials compatibility with Boral. Sodium Nitrate has been identified as an alternative. To date sodium nitrate has been tested inactively, actively (Laboratory scale) and is currently being evaluated with spent fuel.