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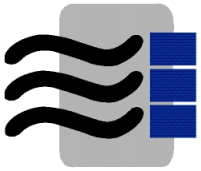

DRY STORAGE OF SPENT RESEARCH REACTOR FUEL IN CASTOR BR3® CASKS AT BELGOPROCESS IN BELGIUM

Author: Marnix BRAECKEVELDT, National Agency for Radioactive Waste and Enriched Fissile Materials (NIRAS/ONDRAF), Kunstlaan 14, B-1210 Brussel, Belgium
Co-authors: Luc OOMS, SCK•CEN, Boeretang 200, B-2400 Mol, Belgium
Gustaaf GEENEN, Belgoprocess, Gravenstraat 73, B-2480 Dessel, Belgium

ABSTRACT :

The BR3 reactor (10.5 MWe) at the Nuclear Research Center SCK•CEN was the first PWR plant installed in Europe and has been shut down in 1987. The BR3 reactor is from 1989 in a decommissioning stage and most of the spent fuel is presently still stored in the deactivation pool of the BR3 plant and has to be evacuated. The BR3 was used as a test-reactor for new fuel types and assemblies (Mixed Oxide (MOX) fuel, fuel rods containing burnable poison (Gd_2O_3) and other types of fuels). Some fuel rods, having undergone a destructive analysis, are stored in different laboratories at the SCK•CEN. In total, the BR3 spent fuel comprises the equivalent of almost 200 fuel assemblies corresponding to some 5000 fuel rods.

Beside the spent BR3 fuel, a limited number of spent fuel rods, with equivalent characteristics as the BR3 fuel but irradiated in research reactors outside Belgium and stored in other buildings at the SCK•CEN nuclear site, were added to the inventory of spent fuel to be evacuated.

Various options such as reprocessing and intermediate storage awaiting final disposal were evaluated against criteria as available techniques, safety, waste production and overall costs. Finally the option of an AFR (away-from-reactor) intermediate dry storage of the BR3 and other spent fuel in seven CASTOR BR3® casks was adopted. As the SCK•CEN declared this spent fuel as radioactive waste, NIRAS/ONDRAF, the Belgian radioactive waste management agency became directly involved and the decision was taken to construct a small building at the Belgoprocess nuclear site for storing the CASTOR BR3® casks. Loading at the SCK•CEN followed by transport to Belgoprocess and storage is scheduled to take place at the end of 2001. The CASTOR BR3® cask weighing some 25 tonnes, consists of a monolithic body and has two independent lids with metal seals guaranteeing the long term leak-tightness of the cask. The CASTOR BR3® cask is designed for transport and the intermediate storage of at least 50 years.

Although a defect of the leaktightness of a CASTOR BR3® cask is very unlikely to occur, an intervention scenario had to be developed. As no pool is present at the Belgoprocess nuclear site to unload the fuel, an innovative procedure is developed that consists of transferring the basket, containing the spent fuel, into another CASTOR BR3® cask. This operation can be performed in the hot cell of the existing storage building for high level waste at the Belgoprocess site.