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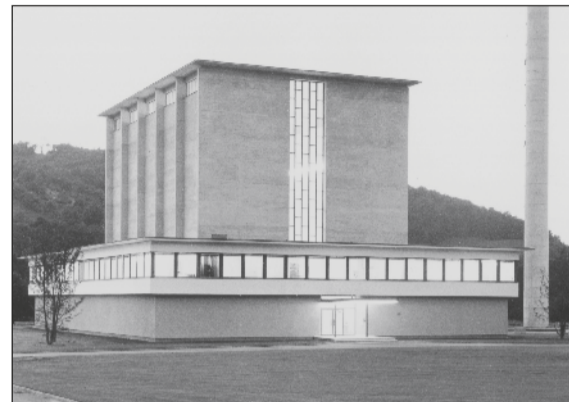
CASTOR Ic-DIORIT Cask 21 Years After Its Commissioning

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A SUCCESSFUL SOLUTION TO A LONG-TERM PROBLEM

The CASTOR Ic-DIORIT transport and storage cask is the oldest cask under continuous normal operation worldwide and has now completed over 21 years of storage without a single problem since its commissioning in April 1983. This is the result of extensive studies made at the Paul Scherrer Institut since 1979 including international know-how exchange and the start of the assessments for the dry storage of 349 spent fuel elements of the former PSI reactor DIORIT, which was closed down in 1977 for final decommissioning.



The Reactor DIORIT was a Heavy Water Moderated and Cooled Reactor developed in Switzerland. It used natural and enriched Uranium and was operated for a period of 17 years.



View of the Dry Loading of the Fuel by using:
A) a mobile Transfer Cell
B) a transfer Flask
C) the CASTOR cask (bellow the transfer cell)

NOVEL DRY LOADING TECHNOLOGY

Due to the lack of space at the reactor water pool, the CASTOR cask was loaded indirectly by using a novel transfer flask and a mobile loading cell technology under wet and dry conditions supported by indirect optical and remote controlled systems; because of the lack of sufficient crane capacity, the cask was handled by using a mobile crane and air cushion system. In spite of all these difficulties, the use of those novel technologies allowed the complete project to be finalised in only 22 months.

LONG-TERM DRY STORAGE EXPERIENCE

The leak-tightness controls of the cask were done before its delivery to PSI in 1982, after the loading and commissioning with the fuel in 1983, at its storage place in the reactor DIORIT, 2 years later in 1985 at a completely independent storage location at PSI, and again in August 2004 after its transport from PSI to the central Swiss interim storage facility ZWILAG for spent fuel and nuclear wastes. In August 2004, the leak-tightness measurements of the cask confirmed the measurements made in 1982, 1983 and 1985 without any deviation ($3.7 \text{ E}^{-10} \text{ Pa m}^3/\text{s}$, inter-lid space control). The cask has been continuously connected to a passive pressure control system and never showed any deviation of its design pressure limit values. This PSI project was carried out among others with the support of GNB/GNS. The ZWILAG supported the transport of the cask to the Swiss central interim storage facility.



The CASTOR cask was stored at PSI from 1983 until mid-2004. It has been continuously monitored: passive leak-tightness control of the closure lids as well as the surface dose and temperature.



The transport to the Swiss Central Interim Storage Facility ZWILAG in August 2004 was performed by using a mobile crane (400t capacity) and the ZWILAG special truck



The cask was transported to the ZWILAG by a transport team charged with the handling, transport, safety and security tasks.

PROJECT ACHIEVEMENTS AND CONCLUSIONS

This project can be summarised as a successful technical and full-scale solution of a very important step in the nuclear fuel cycle, and its impact is reflected in the following achievements:

- Consolidation of Spent Fuel by a Factor of Two
- Handling of Cask with a Mobile Crane and Air Cushions
- Wet Transfer and Dry Loading of Spent Fuel into the Cask
- Remote Loading Control, using Video and Glass Optics
- Loading of Cask in 12 Days
- Licensing of the Cask Outside the Country of Origin
- Interim Storage of Cask at Reactor and Away From Reactor

Meantime there are more than 750 similar casks worldwide in operation, including casks with different types of fuels and highly active waste at more than 35 sites, including central storage facilities as well as at reactor sites. In the frame of these activities, the CASTOR Ic-DIORIT cask has proved to be a pioneer milestone on the way to the solution of nuclear waste management in the long-term perspective.

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