

DECOMMISSIONING AND DISMANTLING OF NUCLEAR RESEARCH FACILITIES IN SWITZERLAND: LESSONS LEARNED

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Paul Scherrer Institute is the largest research institute for natural and engineering science in Switzerland. It operated various nuclear facilities from 1960 to 2011: Research reactors DIORIT, SAPHIR and PROTEUS, and an incineration plant for low and medium level radioactive waste.

SAPHIR research reactor:

Operation from 1958 to 1993, planning of decommissioning from 1998 to 2000. Decommissioning work started in 2004. Finishing is planned for 2019.

DIORIT research reactor:

Operation as DIORIT I (20MW_{th}) from 1960 to 1967, then reconstruction to DIORIT II (30MW_{th}) and operation from 1970 until 1977. Planning of decommissioning from 1992 to 1994. Decommissioning work started in 1994 and was finished in 2012.

PROTEUS research reactor:

Operation from 1966 to 2011. Planning of decommissioning from 2013 to 2014. Starting of decommissioning work is planned for 2017, finishing is planned for the end of 2018

Incineration plant:

In operation from 1974 to 2002. Planning of decommissioning from 2011 to 2012. Starting of decommissioning work in 2016. Finishing planned for end of 2019.

Treatment of various material categories from dismantling

Aluminum: Because of the production of H₂ during solidification in concrete, it was necessary to minimize the surface area. When dismantling research reactors, the aluminum removed was melted in an induction furnace and poured into a 4.5m³ concrete container to solidify. Cutting the metal and handling it was largely accomplished remote control, using conventional technology.

Steel/Cast-iron: The storage containers to be filled determined the method used for reducing the size of these materials, and the technique used for handling them. The goal was to optimize the packing density to reduce repository costs. The selected method of reducing the size of components is to cut them up using diamond-tipped tools, like saw blades.

Graphite: For graphite, grinding was the selected option to mix it with inactive filling material.

Concrete: The disposal of this category of material is less of a problem. Mixing it as a filler material in containers with steel/cast-iron suggested itself, because of the storage volume saving which could be obtained.

Treatment of various hazardous materials from dismantling

Asbestos: Asbestos was widely used in the years before 1970, so PSI was confronted with a large amount of asbestos containing components in all nuclear facilities. These components had to be treated in a professional way. So, a black zone had to be established in each case.

PCB: Polychlorinated biphenyl was also widely used, especially in coats of paint, which had to be treated respectively.