DISMANTLING OF THE SVAFO RESEARCH REACTORS R2 & R2-0 IN SWEDEN

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Abstract

The R2 and R2-0 reactors were part of the Swedish government's research program on nuclear power from the early 1960s. Both reactors were shut down in 2005 following a decision by former operator Studsvik Nuclear AB.

The decommissioning of the R2 and R2-0 reactors is divided into three phases. *The first phase – awarded to AREVA – involved dismantling of the reactors and associated systems in the reactor pool, treatment of the disassembled components as well as draining, cleaning and emptying the pool.* In the second phase, the pool structure itself will be dismantled, while removal of remaining reactor systems, treatment and disposal of materials and clean-up will be carried out in the third stage. The entire work is planned to be completed before the end of this decade.

The paper describes the several steps of phase 1 - starting with the team building, followed by the dismantling operations and covers challenges encountered and lessons learned as well.

The reactors consist of 5.400kg aluminum, 6.000kg stainless steel restraint structures as well as, connection elements of the mostly flanged components (1.000kg).

The most demanding - from a radiological point of view - was the R2-0 reactor that was limited to app. 1m³ construction volumes but with an extremely heterogeneous activation profile. Based on the calculated radiological entrance data and later sampling, nuclide vectors for both reactors depending on the real placement of the single component and on the material (aluminum and stainless steel) were created. Finally, for the highest activated component from R2 reactor, 85Sv/h were measured.

The dismantling principles - adopted on a safety point of view - were the following:
The always protected base area of the ponds served as a flexible buffer area for waste components and packaging. Specific protections were also installed on the walls to protect them from mechanical stress which may occur during dismantling work.
A specific work platform was installed for the dismantling and sawing works closer to the water surface. This was the main working place used for the cutting of disassembled components under sufficient water cover.
Further safety related equipment was a special developed pneumatically balancer for a sensitive handling of components – mainly the two highly activated restraint structures - under confined dismounting conditions close to the pool liner. A water cleaning system was used to collect the generated saw chips and fine particles mobilized during cutting

Nearly all the reactor components were flanged. For dismounting a remote handled hydraulic impact wrench was used. In some cases some special cardanic prolongations were necessary to reach all nuts and screws. For intervention reasons, a contact arc metal cutting tool was prepared.

The work was finished in 2015 to the full satisfaction of all parties. 24 cassettes for intermediate and 7 small cylindrical casks for high active waste were filled. Neither accidents nor pool leakages occurred. The collective dose was more than 50% lower than estimated.