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SWEDEN **R-442**

REACTOR VESSEL DECONTAMINATION AND OTHER DOSE REDUCTION INITIATIVES AT THE OSKARSHAMN

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Objectives: To carry out a full-system decontamination at the Swedish BWR Oskarshamn-1, replace the final feedwater risers inside the RPV, and verify the condition of the vessel. There had been problems with clogged suction strainers in the ECCS, cracks in cold-bended pipes which needed to be replaced, cracks in feedwater risers inside the RPV required repair, the reactor internals had to be removed to analyze the cause of the damage. The repair work of the final feedwater inlet pipes and inspection of all connections to the lower part of the RPV lead to the decision to perform a full-system decontamination. The systems decontaminated were the lower part of the reactor pressure vessel (RPV), the four main recirculation loops, the RHR and the RWCU systems. All RPV internals, including fuel, were removed. The CORD process was chosen and the decontamination was successfully performed with an activity release of 2,300 GBq, mainly Co-60. 27 kg of metal, equivalent to 39 kg of metal oxide, were removed. The waste volume was 3.7 m3 of ion exchange resin. At the bottom of the RPV a decontamination factor varying between 200 and 1000 was obtained.

Comments: The area to be treated was 450 m2, the volume was 156 m3. The CORD process is based on Permanganic acid (250 ppm), Oxalic acid (2000 ppm) and hydrogen peroxide, the operating temperature being 95 °C. The technique was verified for decontamination efficiency impact on materials, waste quality and quantity and plant compatibility before the decontamination was initiated. The total time required for the decontamination, including rinsing, was 200 hours. The goal of a decontamination factor (DF) of 10 was reached within a margin.

In order to enable the manual work inside the pressure vessel a telescopic radiation shield was installed. The total radiation protection program included shielding, safety concept, education, survey and estimation of the radiological environment and mock up program for personnel and equipment.

Remarks: Safety was improved during this project by special attention to:

- Communication technique
- Supervision
- Monitoring
- Dose/dose rate control technique

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- Transportation technique
- Personnel protection equipment
- Emergency evacuation
- Routines in and out RPV area

Simultaneously, an education program was developed for the project, which included the following items:

- Information about the aim and goal of the project
- Radiation physics and radiation biology
- Industrial welfare and fire protection
- Information about personnel and instrumentation equipment
- Mock up training using protective equipment

References: Hermansson, A., B. Johansson and J. Lejon "Reactor Vessel Decontamination at Oskarshamn-1 BWR," Proceedings, EPRI Radiation Field Control and Chemical Decontamination Seminar, Tampa, Florida, November 1995, available from EPRI Distribution Center, P.O. Box 23205, Pleasant Hill, CA 94523, Phone: (501)934-4212.

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