

J32. Ringhals 2: PWR**Sweden****Up-Flow Conversion**

Description: Up-flow conversion. Extensive fuel damage due to baffle jetting. Uranium was lost into the primary system causing high contamination levels.

Comments: Extensive fuel damages due to baffle jetting and up-flow conversion.

Ringhals 2 has experienced baffle jetting since 1977. Baffle peening of 17 corners was performed in 1981 with good results. Jetting from the unpeened corners has increased gradually and solid zircaloy rods have therefore been installed instead of fuel rods in the corners where water jets could be expected. In the 1987 and 1988 outages severe damages in the dummy rods were discovered but also extensive damages in fuel rods. It has been calculated that 120 grams of Uranium was lost into the RCS 1987. The damaged fuel rods resulted 1988 in up to 500 Bq/kg of alpha activity (mostly Cm-242, Pu-238, Pu-239, Am-241, and Cm-244) in the reactor coolant system (RCS).

It was anticipated before the shut-down of 1988 that the high levels of fission products in the RCS would result in higher dose rates and problems with hot spots and "fleas." The dose rates in the station were only marginally higher than 1986 and no problems with fleas were experienced. Through an effective contamination control during the whole outage it was also possible to keep the station clean and avoid internal contamination.

During the outage 1988 it was decided that the only option for continued operation was to perform an up-flow conversion. This work was done in nine days by Westinghouse with a total exposure of 60 mmanSv.

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