

NEUTRON RADIATION IN ONE OF THE SIX PRIMARY COOLANT PUMP PITS AT LOVIISA VVER-440

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Personal neutron dose equivalents are measured by passive neutron thermoluminescent (TLD) dosimeters at Loviisa NPP. Loviisa NPP is of the type VVER-440 and it has six primary coolant pumps (PCP) per reactor. The PCP pits are one of the few locations where workers can be exposed to neutron radiation. Neutron detection with good accuracy by neutron ambient dose rate meters and neutron dosimeters is difficult due to the neutron energy and angle dependency of detectors. In all workplaces where neutron dosimeters are used there has to be workplace specific coefficients for the dosimeters. Generally, the coefficient is obtained from known neutron dose equivalent rate, which is measured or calculated from a neutron spectrum. In this study, neutron radiation was measured in one of the six PCP pits of the VVER-440 primary circuit of Loviisa NPP. Measurement instruments included two types of neutron ambient dose rate meters (REM and TEPC), and three types of neutron personal dosimeters (TLD albedo neutron dosimeters, normal TLD neutron dosimeters and active neutron personal dosimeter). The neutron personal dose equivalent rate, the workplace specific coefficients of neutron dosimeters and the direction of the neutron flux were determined. The main result was that the current coefficient used at Loviisa NPP underestimates the personal equivalent neutron doses in the PCP pits by a factor of 1.84 ± 0.83 .