

**Dissertation Release****12.9.2019**

# The reactor pressure vessel and its internal components are suitable for long-term usage

<b>Title of the dissertation</b>	Susceptibility of boiling water reactor pressure vessel and its internals to degradation Kiehusvesireaktorin reaktoripaineastian ja sen sisäosien alttius vaurioitumiselle
<b>Contents of the dissertation</b>	<p>The dissertation investigates the susceptibility of the boiling water reactor pressure vessel and its internal components to various significant degradation mechanisms. With a thorough literature study and several computational analyses it is demonstrated that for the examined structural parts, i.e. components, the operational life can be extended from the original 40 years to at least 60 years, and in case of the reactor pressure vessel even to 80 years. The analysis targets are nuclear power plant units OL1 and OL2 located at Olkiluoto in Finland and operated by the power company TVO.</p> <p>The reactor pressure vessel is one of the most significant and safety critical components in a boiling water nuclear power plant. It contains the nuclear fuel. A tailored screening process was developed for the internal components to determine the need for the degradation potential analyses. Brittle and ductile fracture analyses were done for the reactor pressure vessel and for all internal components pointed out by the screening process. The most significant considered degradation mechanisms include irradiation embrittlement, fatigue and stress corrosion cracking. A quantitative risk assessment procedure was developed for the considered components. For all components but one the computed risk class is moderate or lower. The conclusion is that for the analysed components the structural risks are in general very small and even in the one more severe case at an acceptable level.</p>
<b>Field of the dissertation</b>	Structural mechanics, fracture mechanics, degradation potential analysis
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<b>Time of the defence</b>	18.10.2019 at 12 o'clock
<b>Place of the defence</b>	Aalto University School of Engineering, lecture hall M1, Otakaari 1, 02150 Espoo
<b>Opponents</b>	Professor Robert Tregoning, US Nuclear Regulatory Commission, US Professor Pål Efsing, KTH, Sweden
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