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EVALUATION OF CUMULATIVE USAGE FACTOR ON PRESSURIZER VESSEL NOZZLE DUE TO UNEXPECTED OPERATION DETECTED VIA FATIGUE MONITORING SYSTEM

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Abstract: As nuclear power plants operating in Argentina where commissioned around the 70´s and early 80´s, they are reaching their end of life. Due to economic reasons, the government decided to perform life extension on them. In order to gather information for life extension regarding fatigue, detailed temperature monitoring system was installed in several locations that were considered to be critical from the fatigue standpoint. One of the critical points of measurement is the ´spray line´ which consists basically on a pipe that runs cold water into the pressurizer vessel when the pressure of the primary heat transport system needs to be reduced. As a counterpart, when the pressure needs to be increased, electrical heating is turned on in the same vessel. Due to malfunction of the electrical heating system, the ´spray line´ needed to go into service more than expected in order to maintain the pressure steady. In the periodic review of data, it was found that the conservative cumulative usage factor was well above acceptable values. In order to continue operation, a detailed finite element model was developed. In this model, detailed information of material, geometry, measured transients, boundary conditions and loads where taken into consideration. Moreover, the effect of environmental fatigue was included and finally the cumulative usage factor for the event was reduced to acceptable values.