

SG Tubing Loose Part Detectability and Characterization by Eddy Current Evaluation

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The loose parts on the secondary side of steam generator (SG) act as factors affecting structural integrity and leakage potential of the overall nuclear steam supply system (NSSC). Especially, at domestic and overseas nuclear power plants, Indications of loose part wear on the secondary side of the SG tubing have been detected and even loose part induced leakage has been reported as well. The loose parts were mainly detected at the top of the tube, but recently they have also been confirmed in the tube support structure. This is made possible by the application of diversified and structured SG Tube Eddy Current Test (ECT) signal evaluation system including enhanced data analysts ability specified for loose part signal detection. In this paper, two methods to accurately identify the position and orientation of loose parts at the TSP (Tube Support Plate) location of the OPR-1000 SG tubing were presented. Those methods are as follows. 1) One is a technique for accurately estimating the position of loose parts and support structures of egg-crate by using tie rod signals. 2) The other is applying cross-talk (XT) signal. This XT signal is one of the electro-magnetic interference signals occasionally appearing in eddy current testing. The loose part information obtained through this study can establish an effective loose part identification and removal plan, saving inspection time and economic loss, and ultimately prevent excessive exposure of the inspection personnel. It can also provide the information necessary for the identification of root cause of tubing degradation mechanisms, such as denting or bulge and sludge accumulation.