

Utilization of RevospECT sw for NPP VVER type - fully automated process of analysis SG tubes

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Nuclear Power Plants VVER type in Slovakia or in Czech Republic provides the periodic inspection of steam generator tubes (the leak) to prevent the penetration of radioactive water from the primary to the secondary circuit. The heated water proceeds from the reactor through the main circulation pumps and shutoff valves into the steam generators, where it gives its heat energy to second circuit (steam generation). This runs inside the tube bundle consisting of 5536 tubes (or 11000 tubes) with a length of 8-12 meters. Inspection of the one tube is carried out in two directions - from the hot collector and from the cold collector. At present time any of our NPP is providing the inspection of the 100 percent of the steam generator tubes each six years. Currently, during scheduled shutdowns in NPP are inspected all steam generator tubes by ECT (only Bobbin probe inspection). The acquisition - scans of all tubes are recorded and then they are analyzed. This primary analysis is carried out either by its own staff or by external service companies. Data acquisition is carried out by the double probe pusher. Comparing to the data acquisition time, the analysis isn't fast enough to evaluate data online (lack of analysts). An overall analysis of the data is always dependent on the subjective decision of the analyst (final protocol - primary analysis). The human factor can always cause errors in data acquisition as well as in the analysis. Some indications are not detected (miss indications), exists subjective assessment of some indications, there is a poor interpretation of the results and some mistakes produced unconsciously, because it depends on analyst experience. The final report is assembled from reports of different analysts, different individual calibration groups (subjective assessment only). Any tube leakage (not detectable indication) poses a problem, threatening to cut off electricity (due to unplanned downtime repair / blinding of defective tubes). To increase probability of detection of defects at steam generator (SG) tubes is a priority for nuclear safety. Within VVER type NPPs we established secondary (auto) analysis - which increases the probability of detection (POD), reveals irregularities in previous inspections. It will guarantee the accuracy of the defect identification – by the comparison of historical and current data (HDC - Historical Data Compare). Secondary data analysis of the SG tubes is being provided by software at fully automatic analysis of the data, it's consistent configuration - uses real documentation - individual layout of SG, set of samples. Within our project we implemented a fully automated process of analysis. Using qualified software RevospECT we managed process of on-line inspection of SG tubes. The results were compared with primary analysis. The result of this comparison is more reliable analysis of the recorded data which will ensure more credible results of the inspection. We will inform about practical application of this full automatic analysis at two SG VVER types and we will give you evidence about key benefits - the cutting of analysis time, improvement of inspection accuracy and control from the start to finish acquisition and analysis. Project promoters can use the outputs of the project for the supply and installation of secondary (auto) analysis (performed as an independent assessor) for analysis same types of steam generator tubes (VVER reactor) in other countries.