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EVALUATION OF FUEL ROD LEAKAGE MECHANISMS SUMMARY REPORT

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Objectives: The objective of this project is to evaluate fuel rod leakage mechanisms, to determine remedial actions, and to evaluate the performance of Vantage-5 rods.

Comments: To achieve a zero fuel defect goal, utilities have identified failed fuel rods and determined failure causes using a combination of poolside UT (Ultrasonic Testing) and visual inspection. Hot cell examinations have helped resolve the status of leaking rods for which there appeared to be no apparent cause of failure. Utilities can incorporate the findings of this project into their poolside fuel inspection planning and fuel quality requirements.

Potential for dose limitation: Poolside NDE (Non-Destructive Examination) previously identified four leakage mechanisms for which corrective actions have been implemented: debris-induced fretting, grid-rod fretting, fuel rod collapse at sections with missing fuel, and incomplete endplug girth welds. Current hot cell examination of failed rods having no apparent primary defects revealed endplug piping, random hydrogenous contamination, and a potential seal weld anomaly at the upper endplug as additional leakage mechanisms. These defects were manufacturing-related, and corrective actions have now been implemented. Various forms of hydride damage and accelerated corrosion of the cladding were also found.

UT overcalls were identified for five of the rods examined at the hot cell. The overcalls were related to bonding of fuel chips on the cladding, suggesting that hard contact or bonding of fuel pellets with the cladding may have contributed to distortion of the UT signals.

References: EPRI TR-104721, Final Report, December 1994.

Duration: from: 1992 to: 1994

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