

PRIORITY ATTENTION REQUIRED MORNING REPORT - REGION I MAY 21, 1993

Licensee/Facility:

Notification:

Duquesne Light Co.
Beaver Valley 1
Shippingport, Pennsylvania

MR Number: 1-93-0051
Date: 05/20/93
RI PC

Dockets: 50-334
PWR/W-3-LP

Subject: VANTAGE 5(H) FUEL ROD DEFECTS

Reportable Event Number: N/A

Discussion:

Beaver Valley Unit 1 has identified a higher than expected number of fuel rod defects during the current (9th) refueling outage. Based on reactor coolant system activity, the licensee estimated there were at least 8 failed rods. Westinghouse Nuclear Fuels Group estimated 4 failed rods based on the same data. Ultrasonic (UT) examination of the offloaded core discovered a total of 11 failed fuel assemblies, consisting of 35 individual failed rods. A failed fuel rod is identified by the presence of reactor coolant between the fuel pellet and cladding since water within fuel rod reduces the UT signals transmitted through the cladding. All of the failed rods were found in the 'K' fuel assemblies which have experienced two reactor cycles (18 months per cycle) of exposure. All of the 'K' fuel assemblies are of the Westinghouse 17 X 17 Vantage 5 Hybrid (V5H) design. This design is characterized by the use of zircaloy grid straps vice Inconel-718. The springs on the zircaloy grid straps have a diagonal orientation vice vertical in the inconel straps. Of the 35

failed rods, 30 were located within fuel assemblies adjacent to the core baffle assembly. One fuel assembly in particular, "K-16," was found to contain 18 failed fuel rods.

High magnification visual inspection of individual fuel rods by Westinghouse is in progress. Cladding breeches due to grid-to-rod fretting have been identified. Fretting was evident on multiple grid elevations of the failed rods. Several rods which passed the UT exam also showed indication of fretting but no cladding breach. The inspectors have been informed that the wear pattern was identical to those recently identified at Salem Unit 2 (see morning report 1-93-0045). Boroscopic inspection of the fuel assembly grid straps also revealed several damaged and missing/worn grid springs. The root cause remains under investigation; however, the fretting failure appears to be due to a combination of grid design and flow induced vibration in the core baffle area.

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As corrective action, the licensee elected not to reload the core with

any of the `K' fuel assemblies. This includes even those V5H `K' fuel assemblies which did not show any indication of failed rods. The licensee has replaced the `K' assemblies with twice burned `J' assemblies which were being stored in the spent fuel pool. The `J' fuel assemblies are standard 17 x 17 fuel with Inconel grid straps. Additionally, for those `L' fuel assemblies (V5H design) which will undergo their second cycle adjacent to the baffle plate, wet annular burnable absorbers (WABAs) have been inserted into the rod cluster control assembly guide tubes. The WABAs will thus function to provide a dampening effect and reduce the potential for flow induced vibration. The burnable poisons in the WABAs have previously experienced a fuel cycle of exposure and will have minimal impact on the core reload analysis.

Unit 1 is currently in Mode 5 with a projected startup date of June 4, 1993. Unit 2 is currently operating with V5H fuel and the licensee plans on inspecting the fuel during its 4th refueling outage in September 1993. Between 4 and 6 fuel rod failures are predicted for Unit 2.

Regional Action:

This matter is currently under review by Region I, the NRC resident inspectors, and NRR. A meeting between NRR and Westinghouse to discuss V5H fuel performance is being scheduled.

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