FPL

FLORIDA POWER & LIGHT COMPANY

JUL 8 1986

L-86-266

Dr. J. Nelson Grace
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, N.W. Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

RE: **St. Lucie Units 1 and 2**
Docket Nos. 50-335 and 50-389
Special Report on Reactor Coolant Pump Anti-Reverse Rotation Device Pins
Inspector follow-up Item 335, 389/85-31-01

As requested by NRC, attached please find, part 2 of the subject Special Report.

Very truly yours,

C. O. Woody
Group Vice President
Nuclear Energy

COW/SAV/eh

attachment

cc: Document Control Desk, USNRC, Washington, D.C.
Harold F. Reis, Esquire

PS1:1

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SPECIAL REPORT TO NRC

BACKGROUND

During a St. Lucie Unit 2 outage on 31 August 1985, it was observed that the 2A2 Reactor Coolant Pump (RCP) had many of the anti-reverse rotation device (ARRD) pins stuck in their retaining ring. Further investigation revealed that the other RCP's also had stuck pins.

Observations of the stuck pins showed that the molybdenum-disulphide impregnated synthetic tips (FERLON ^{R}) were worn to the point that metal to metal contact between the pins and the backstop ratchet had occurred. This metal to metal contact resulted in the pins mushrooming and eventually wedging in their retaining ring.

The ARRD pins were replaced and the Unit was returned to service on 7 September 1985. On 10 September 1985 the Unit was again in an outage due to a manual reactor trip. The ARRD pins were inspected during this outage, and again, a significant number were stuck. After a discussion with the RCP motor vendor, Siemen-Allis Engineering, a two part approach to solve the problem was agreed upon. New replacement pins were alternately exchanged with the existing ARRD pins. In addition, half of all the pins were modified. The bottom outer edge of the pins was chamfered. It was felt that this taper would reduce the mushrooming of the pins. Unit 2 was returned to service on 21 September 1985.

St. Lucie Unit 1 RCP's were inspected and observed to have similar ARRD pin problems during the refueling outage in October, 1985. The pins were reinstalled with chamfered tips.

For further information, see part one of this report submitted in January, 1986.

NRC SPECIAL REPORT

EVENT SEQUENCE

On 5 April 1986, St. Lucie Unit 2 shut down for a scheduled refueling outage. An inspection of the ARRD pins in the RCP's revealed that there were no stuck pins. However, there was evidence of tip damage on some of the newer pins. Further investigation showed that the access plugs were misaligned with the ramp surface. With the access plugs not flush with the ramp, there will be sharp edges exposed.

The ARRD pins were replaced with pins of an improved design. The new pins have an increased tensile strength and incorporate the chamfering of the pin tips. The access plugs were checked for proper alignment by Quality Assurance personnel during reassembly. Lock tabs and bolts were installed to assure continued alignment.

Unit 2 returned to service on 5 June 1986.

DISCUSSION

The ARRD consists of 36 pins housed in blind holes in the lower balance ring attached to the motor rotor. These pins are free to drop by gravity onto a stationary ratchet. Each pin has a molybdenum-disulfide impregnated tip (FERLON^R) to minimize wear to the ratchet during startup and coastdown of the RCP.

When the motor starts, the ramps of the ratchet impact with and push the pins up into the rotating disk. Between 75 to 100 RPM, the centrifugal force holds the pins in position and they no longer impact with the ramps. As the motor slows below 100 RPM, the pins drop and again impact with the ramps. When the motor stops, the pins engage to stop reverse rotation.

The pins are accessed by way of a removable access plug in the stationary rotor. The top of the plug is machined so as to be flush with the surface of the stationary ratchet. The misalignment of the access plugs is believed to be the cause of the premature pin wear. With the access plug misaligned, there will be sharp edges exposed. As the FERLON^R tip traverses the access plug, it will be damaged. Eventually, the FERLON tip damage is sufficient enough to allow metal contact between the pin and the ratchet. The resulting tip mushrooming causes the pin to stick in it's retaining ring.

The modifications to the pins and the access plug locking device should stop the premature pin wear. Both Unit 1 and Unit 2 ARRD pins will be checked during their next refueling outages. Based on the results of those observations, a new pin surveillance interval will be evaluated.

07/15/86

J. N. GRACE

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