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SHWENCER,A. Operating Reactors Branch 1

SUBJECT: Forwards info in response to verbal request re installation of refurbished spare rotors.Westinghouse mods to reduce stress & eliminate corrosion resistance have been performed.

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FLORIDA POWER & LIGHT COMPANY

January 23, 1980
L-80-30

Office of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Schwencer:

Re: Turkey Point Unit 3
Docket No. 50-250

The enclosed information is forwarded in response to a verbal request made by members of your staff.

Very truly yours,

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/DKJ/cph

Attachment

cc: Mr. James P. O'Reilly, Region II
Harold F. Reis, Esquire

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Turkey Point Unit 3 is currently in a refueling outage. During this outage, both low pressure (LP) rotors are being replaced by refurbished spare LP rotors. While essentially of an identical design, these spare rotors have several significant design differences when compared to the original equipment LP rotors. Some of these changes are a result of recent Westinghouse rotor inspection findings and as such, address NRC concerns regarding turbine disc cracking.

Prior to their installation at Turkey Point, the spare rotors were disassembled, cleaned, inspected and refurbished (These rotors, purchased by FP&L as spares, had previously been installed in H. B. Robinson Unit 2. A historical profile of the rotors is included as Attachment 1.). All discs were removed from the rotor and magnetic particle inspected for evidence of bore, keyway, or other cracks. The rotor shaft was also magnetic particle inspected. As previously reported by Westinghouse, the only indications found were in the keyways of 2 of the 4 number 3 discs. The maximum depth reported was 0.120 inches. This result was of academic interest only in that the refurbishment called for replacement of all number 3 discs with discs of a new design for reasons unrelated to bore or keyway disc cracking (The new number 3 discs are designed to reduce hub stresses and rim stresses which have been identified as a causative factor in the steeple cracking experienced with the original design.).

A second design change incorporated modified disc keys designed to preclude the ingress of secondary side contaminants into the disc keyways. All disc keyways were enlarged to 3/4 inch diameters and the original design keys were replaced with a three-piece model which incorporates an integral teflon

seal. Following insertion into the keyway, this seal is expanded radially to seal the keyway. All keyways were dye-penetrant inspected following machining to final dimensions.

Several other modifications to the LP rotors were performed by Westinghouse which are designed to reduce stresses and increase the corrosion resistance of the rotors. As the new design significantly reduced hub and rim stresses the number 3 disc was fabricated from a lower yield strength material compared to the original, and new blades were also fitted which reduce the bending stress at the disc steeples. The lower yield strength material will reduce the susceptibility to stress corrosion and also improves the critical crack size. Larger radii were machined on the rotor shaft at the disc fit shoulders. Additionally, the disc spacer material was changed to prevent the possibility of galvanic corrosion, and the disc 1 and 2 spacer recesses were machined (skim cut) to expose fresh metal. This latter modification, which also applies to the disc keyways, is designed to remove "used" material which should reestablish any incubation period required prior to potential crack initiation.

Based on the modifications described above and in conjunction with other plant modifications and the present secondary side chemistry limits and monitoring requirements (which will substantially improve the operating environment), we believe the causative factors leading to potential disc cracking have been identified and eliminated by the modifications made to both the plant and the LP rotors currently being installed in Turkey Point Unit 3. We do not anticipate further problems in this area. The rotors removed from Unit 3 have been sent to Westinghouse's Charlotte, N. C. plant where identical

modifications will be performed prior to their installation in Turkey Point Unit 4. Installation of these rotors will be accomplished during the first scheduled outage of sufficient duration following receipt of the refurbished rotors at Turkey Point Plant.

ATTACHMENT 1

LOW PRESSURE ROTOR HISTORY

1967 - 1969 Manufactured at the Westinghouse Lester Plant

9/70 - 3/73 Assembled and operated at Carolina Power & Light, H.B. Robinson Unit 2

11/73 - 5/76 Loaned and operated in Northeast Utilities Connecticut Yankee Plant

5/76 - 4/78 In storage at Westinghouse Charlotte Plant

4/78 - 4/79 Following cleaning and minor repairs, installed and operated in H. B. Robinson Unit 2.

4/79 - 12/79 Removed from H. B. Robinson Unit 2 and returned to Westinghouse Charlotte Plant. Purchased by Florida Power & Light Company. Inspected and refurbished as follows:

* Completely disassembled (all discs removed).

* All discs were inspected by magnetic particle testing on contour, keyways and bore surfaces.

* Exit face in area of spacer recess of discs #1 and #2 machined to remove .060 inch of material to expose fresh metal. (Discs 4, 5 & 6 do not have recess).

* Rotor shaft completely inspected by magnetic particle testing.

* Larger radii machined on rotor shaft at disc fit shoulders.

* Original #3 discs scrapped and replaced with new discs of latest design.

* All key holes for discs 1, 2, 4, 5 & 6 were enlarged to remove at least 1/16 inch of material surface (diameter increased by 1/8"). The new #3 disc has standard 3/4" diameter key.

* New design keys installed on all discs.

12/79 - 1/80 Installed in Turkey Point Unit 3.