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FACIL:50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light C 05000261
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VAUGHN,G.E. Carolina Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Confirms that insp program established in accordance w/ Action Item 1 & initial thimble tube insp performed re NRC Bulletin 88-009, "Thimble Tube Thinning in Westinghouse Reactors." No corrective actions required.

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FEB 8 1991

SERIAL: NLS-91-024

G. E. VAUGHN
Vice President
Nuclear Services Department

United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RESPONSE TO NRC BULLETIN NO. 88-09

Gentlemen:

NRC Bulletin No. 88-09, "Thimble Tube Thinning in Westinghouse Reactors," was issued dated July 26, 1988. The Bulletin required establishment and implementation of a thimble tube inspection program prior to restart from the next refueling outage unless an alternative schedule was granted.

Due to the relative uniqueness of the double tube design and a lack of operating history and testing methodology, Carolina Power & Light Company (CP&L) requested an alternative schedule by letter dated October 12, 1988 to complete the Bulletin requirements in Refueling Outage No. 13, the current outage. A CP&L letter dated November 28, 1988 documented the NRC concurrence with our schedule.

In accordance with Bulletin Reporting Requirement No. 3, we hereby confirm that an inspection program has been established in accordance with Action Item No. 1 and that the initial thimble tube inspection has been performed; no corrective actions were required. The enclosure to this letter discusses the requirements of Action Item No. 1 in detail.

Questions regarding this matter may be referred to Mr. R. W. Prunty at (919) 546-7318.

Yours very truly,

G. E. Vaughn

JSK/jbw (972RNP)

Enclosure

G. E. Vaughn, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

Lisa M. Randall
Notary (Seal)

LISA RANDALL NOTARY PUBLIC COUNTY, N.C.

My commission expires: 6-7-93

cc: Mr. S. D. Ebneter
Mr. L. Garner (NRC-HBR)
Mr. R. Lo



150048

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ATTACHMENT

NRC BULLETIN NO. 88-09 REQUIRED ACTIONS

Description of HBR2 System

The H. B. Robinson Unit 2 reactor was originally built with single-wall thimble tubes. These were replaced with double-wall thimble tubes using a nonconcentric alignment of two tubes during the 1987 refueling outage. A normal calibration tube (0.237" ID) is used for passage of the neutron flux detector, with two thermocouples (0.037" diameter) permanently attached to the exterior of the calibration tube. Enclosing this calibration tube/thermocouple assembly is a second outer tube. This outer tube protects the thermocouples, but it is still the calibration tube which provides the reactor coolant pressure boundary. The thimble tube extends from the seal table, which is located at the elevation of the reactor head mating flange, through a guide in the reactor lower internals instrumentation columns, into the reactor vessel, and to the top of the reactor fuel. This allows dry passage for the miniature fission chamber which senses the neutron flux in the fuel, but it also means that the thimble tube is exposed to reactor coolant pressure on its exterior surface and atmospheric pressure on its interior surface.

Requirement 1. " . . . the establishment, with technical justification, of an appropriate thimble tube wear criterion . . ."

Response

To evaluate the stresses in a worn combination thimble tube, Westinghouse has performed finite element structural analysis (reference: WCAP-12202, Bottom-Mounted Instrumentation Double-Wall Flux Thimble Tube Combination Thimble Tube Wear Program) using a tube geometry similar to that of the H. B. Robinson Plant. The wear scar was assumed to be flat-bottomed and to cover approximately 90° of the calibration tube circumference. A 1" length was assumed for the scar. This analysis was used to determine the maximum wall loss of the calibration tube which would still result in stresses below ASME Code material allowables when the tube is subjected to design conditions. The outer tube was considered to be completely worn through. The results of this analysis show that the calibration tube at HBR2 can lose 65 percent of its wall thickness without exceeding ASME Code material allowables under design condition. Currently, very little wear data for double-wall thimble tubes exist. As wear data accumulates for the double-wall thimble tubes, an appropriate criterion will be developed to assure that the thimble tubes will not be expected to experience more than 65 percent wear prior to the next inspection.

Requirement 2. " . . . the establishment, with technical justification, of an appropriate inspection frequency."

Response

The initial inspection was completed on January 5, 1991. Preliminary data indicated no measurable wear indications on the inner wall of the double-wall flux thimble combination. Westinghouse has reviewed data from plants similar to HBR2 (three-loop Westinghouse PWRs using a 12-foot core). Of the nine plants for which data was reviewed, no thimble wear greater than 60 percent wall loss was

observed for less than five fuel cycles of operation. All nine of the plants had single-wall thimble tubes. Westinghouse has determined that the wear rate of the 0.42" OD double-wall thimble tube used at HBR2 is 53 percent that of 0.313" OD single-wall thimble tubes. Based on the wear rate of double-wall thimbles with respect to the single-wall thimbles and the double thimble wear data presently available, HBR2 plans to repeat the eddy current inspection of the incore neutron monitoring system thimble tubes at a frequency of every other refueling outage. This would be subject to change as the knowledge pertaining to double-wall thimble tubes accumulates and if wear becomes evident on the HBR2 thimble tubes.

Requirement 3. " . . . the establishment of an inspection methodology that is capable of adequately detecting wear of the thimble tubes."

Response

The examination was performed using eddy current methodology. The initial examination was performed using multifrequency/multiparameter data collection equipment, an Echoram Remote Acquisition Unit, operating at 10, 65, 140, and 300 kHz and associated Echoram HPIB Interface Unit and DCR-6700 Data Cartridge Recorder. Preliminary data indicated no measurable wear indications on the inner wall of the double-wall flux thimble combination. A final report is expected from Westinghouse within four weeks after the completion of the examination. The analysis notes and results of the examination will be available for inspection on-site.