FEBRUARY 1 8 1983

Dockets Nos. 50-269, 50-270 and 50-287

> Mr. H. B. Tucker Vice President - Nuclear Production Department Duke Power Company P. O. Box 33189 422 South Church Street Charlotte, North Carolina 28242

Dear Mr. Tucker:

HOrnstein EReeves

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RWright SUBJECT: COMPLETION OF VALVE OPERABILITY REVIEWS FOR LARGE PRATT BUTTERFLY VALVES USED FOR PURGE OR VENT OF CONTAINMENTS

Re: Oconee Nuclear Station, Units Nos. 1, 2 and 3

In our letter of November 28, 1978 we identified the generic concerns of purging and venting of containment to all operating reactor licensees and requested your response to these concerns. Our review of your response was interrupted by the TMI accident and its demands on staff resources. Consequently, an Interim Position on containment purging and venting was transmitted to you by letter dated October 23, 1979. You were requested to implement short-term corrective actions to remain in effect pending completion of our longer term review of your response to our November 28, 1978 letter.

One of the remaining interim corrective actions (and the subject of this letter) still in place while our longer term review is being completed is tto:

"Maintain the containment purge and vent isolation valves closed whenever the reactor is not in the cold shutdown or refueling mode until such time as you can show that:

a. All isolation valves greater than 3" nominal diameter used for containment purge and venting operations are operable under the most severe design basis accident flow condition loading and can close within the time limit stated in your Technical Specifications, design criteria or operating procedures. The operability of butterfly valves may, on an interim basis, be demonstrated by limiting the valve to be no more than 30 to 50 open (90 being full open). The maximum opening shall be determined in consultation with the valve supplier. The valve opening must be such that the critical valve parts will not be damaged by DBA-LOCA loads and that the valve will tend to close when the fluid dynamic forces are introduced."

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USGPO: 1981-335-960

Mr. H. B. Tucker

Your letters of December 19, 1979 and May 20, 1980 provided your commitment to operate in conformance with this Interim Position pending completion of our long-term review of valve operability.

However, recent information concerning the operability of large-diameter Pratt butterfly valves (of the generic family RIA or NRIA) in the event of a DBA-LOCA has raised concern whether your justification for operability provides the required assurance that these valves will close. The enclosure provides the background information and the bases for our concern.

We understand that you are continuing the 31 day verification that the containment purge valves are closed as documented in your letter dated January 2, 1981. We further acknowledge your interim commitment to keep these purge valves closed except when in the cold shutdown and refueling modes per your letter of September 13, 1982. In recent discussions with your staff, we were informed that motor operated containment isolation (inside) valve breakers are racked out and that DC control circuit links were removed from the air operated (outside) valves during all modes of operation except cold shutdown and refueling (excluding fuel movement) per operating procedures. This deactivation of the containment purge valves has no adverse affect on the control room indication of valve positions. If the above understandings are incorrect, please notify us within 30 days after receipt of this letter.

The reporting and/or recordkeeping requirements necessary for any response to this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P. L. 96-511.

Sincerely,

"URIGINAL SIGNED BY JOHN F. STOLZ

John F. Stolz, Chief Operating Reactors Branch #4 Division of Licensing

Enclosure: As Stated

cc w/enclosure: See next page

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Duke Power Company

cc w/enclosure(s):

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ENCLOSURE

Background

On August 3, 1982, the evaluation was completed for the 48 inch Pratt butterfly purge values at Three Mile Island 1 (TMI-1). The qualification on these values was found to be insufficient to demonstrate the ability of these values to close in the event of a LOCA accident. The major reason for this finding was the determination that the shaft stress would exceed allowable stress when experiencing worst case LOCA torque loads.

A number of operating plants have Pratt butterfly valves of the same generic family (RIA or NRIA) and approximate size as the 48 inch RIA butterfly valves at Three Mile Island 1. Some of these plants have agreed to maintain these valves sealed closed in operating modes above cold shutdown. A larger number of plants, however, do operate these valves for some period of time during operating modes, opening the valve to a limited maximum opening. The limitation on maximum valve opening has been determined by the licensees in consultation with the valve vendors in accordance with the Staff Interim Position of October 23, 1979. The basis for this position was that for most butterfly valves the highest torque loads under flow would occur at the higher angles of opening. Subsequent testing has revealed that for some valve installations downstream of an elbow the higher torques may be experienced at smaller angles of opening but for the large majority of valve installations the higher torque at higher angles is valid.

-For most of the butterfly valves used for purging and venting operations a maximum opening limitation of 50 degrees has produced sufficient confidence in the valve's ability to close in the event of a LOCA to allow continued use of these valves while qualification was progressing. In June 1981, however, Henry Pratt Valves began to inform utilities operating with 48 inch and larger R1A and NR1A model valves that additional restrictions might be required for these valves in order to assure the ability of these valves to close under LOCA loads. According to Pratt analyses, the valve restrictions would be a maximum opening of 30 degrees to 55 degrees, depending on the individual valve or operator. Since that time, a number of qualification reports for these valves have been submitted for NRC staff review. The majority of these reports have been performed for valves closing from the full open (90 degrees) position. These analyses have shown the valves to be overstressed for this angle of opening. Pratt has recommended smaller maximum angles of opening for these valves but no analysis has been done to show the acceptability of operating the valves at the lower angles of opening. Two of the licensees have submitted reports calculating valve and operator stresses at the lower angles of opening. These reports were the Turkey Point 3 and 4 report submitted September 17, 1982 by Florida Power and Light (FP&L) and the

Three Mile Island (TMI-1) report submitted by General Public Utilities (GPU). As previously stated, the TMI-1 report was evaluated on August 3, 1982 and found insufficient to qualify the values to close against LOCA loads.

The Turkey Point 3 and 4 report was for 48 inch and 54 inch Pratt RIA butterfly valves. These valves were to be blocked to 35 degrees and 30 degrees respectively. The peak containment pressure was not used in qualifying these valves but rather a percentage of that pressure by taking credit for the fact that these valves would begin to close before the containment would reach its peak pressure. Enveloping static seismic loads of gx = 3, gy = 3 and gz = 4 were used in analyzing the 48 inch valve but actual required seismic loads of gx = 1.5, gy = 1.5 and gz = 1.15 were used in analyzing the 54 inch valve.

The calculated shaft stresses for the Turkey Point 48 inch and 54 inch valves were 27,861 psi and 26,534 psi respectively. The analysis used a shaft stress allowable of 30,000 psi. This value was based on the ASME allowable of 1.5 Sm for pressure retaining code parts. Effectively, 30,000 psi would be a minimum yield strength. At this point a small amount of permanent deformation would be experienced. The calculated values are 93 percent and 88 percent of this yield point leaving small margins. In addition, the values calculated were determined on the basis of straight line approach flow. The actual installations of these valves have elbows and bends upstream which would distort the flow profile to these valves and change the torques experienced by these valves. Tests performed on other model valves have shown the effect of upstream elbows as increasing the torque by as much as 100 percent. As no information has been submitted to date on the effects of upstream elbows on this model valve, it is uncertain what the magnitude of the increase on torque would be on this valve. The small margins remaining for the shaft stress for these valves is inadequate to cover the concern of upstream elbows. Consequently, the qualification submitted for the Turkey Point 3 and 4 valves is insufficient to demonstrate the ability of these valves to close against LOCA loads.

Although there are some design differences in the RIA series of butterfly valves installed in purge and vent systems of operating nuclear plants, the inadequacy of the analysis submitted to qualify these valves to close, in conjunction with the fact that the analyses submitted for the TMI-1 and Turkey Point 3 and 4 were for the lowest angles of opening, indicates that the Interim Position of October 23, 1979 is insufficient to provide adequate assurance that the RIA series Pratt butterfly valves used for purging and venting in nuclear plants will close in the event of a LOCA.