Docket Nos.: 50-269, 50-270
and 50-287

APR 30 1987

Mr. H. B. Tucker, Vice President
Nuclear Production Department
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr. Tucker:

Subject: Review of Duke Power Company Response to the Safety System Functional Inspection of the Emergency Feedwater System (TACs 63303/63304/63305)

Re: Oconee Nuclear Station, Units 1 and 2

We have reviewed your October 1, 1986 response to the Office of Inspection and Enforcement (I&E) Safety System Functional Inspection (SSFI) findings for the Oconee Units 1, 2 and 3 emergency feedwater system (EFW). Enclosed are our comments arranged to correspond to the item number for the SSFI report. Our comments are confined only to those issues identified by the SSFI on the EFW design and functional requirements. Based on our review, we conclude that you have provided a satisfactory response to the concerns raised by the I&E inspection team.

Sincerely,

ISI

B. J. Youngblood, Director
Project Directorate II-3
Division of Reactor Projects-I/II

Enclosure: As stated

cc: See next page

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Oconee Nuclear Station
Units Nos. 1, 2 and 3

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REVIEW OF DUKE POWER COMPANY RESPONSE
TO I&E SAFETY SYSTEM FUNCTIONAL INSPECTION
OF THE OCONEE UNITS 1, 2 AND 3
EMERGENCY FEEDWATER SYSTEM

The following are the staff's comments on the Duke Power Company response (letter dated October 1, 1986) to the I&E Safety System Functional Inspection (SSFI) findings on the Oconee Units 1, 2 and 3 emergency feedwater (EFW) system. Our comments correspond to the SSFI item numbers as discussed in the licensee's letter.

Item 2.1.1 Use of the Motor Driven EFW Pumps for Long Term Cooling

The SSFI determined that the motor driven EFW pumps in Units 2, and 3 could not utilize the backup water supply provided by the condenser hotwell. Further, in order to utilize the condenser as a water source, vacuum must be broken thereby requiring that the manually operated atmospheric dump valves be used for establishing a steam relief path (heat sink). These valves had apparently never been demonstrated operable under high differential pressure.

In response to the concern regarding utilization of the condenser hotwell as a backup EFW water supply, the licensee

noted that other sources of EFW supply and means of providing flow to the steam generators are available without reliance on the condenser hotwell. Further, a modification already implemented on Units 1 and 2 will be installed in Unit 3 to provide additional water from the hotwell for delivery by the motor driven EFW pumps. The staff concurs with the licensees response on this issue.

In response to the concern regarding use of the manual atmospheric dump valves, the licensee indicated that they believe the atmospheric dump valves could be opened despite the lack of a demonstration test at high differential pressure based on experience with valves in similar circumstances. Further, the condenser can be used as a heat sink without vacuum if necessary. In addition, to improve atmospheric dump capability, the licensee is installing a pressure equalizing line around the first isolation valve thereby providing greater assurance that the manual dump valve can be operated. The modification is completed on Unit 2 and will be installed during the next refueling outages on Units 1 and 3. The staff concurs with the licensees response on this issue.

Item 2.1.2 Turbine-Driven EFW Pump Reliability

The SSFI determined that a portion of the steam supply line to the turbine-driven EFW pump could be overpressurized in the

event the steam pressure regulating valve failed open. In response, the licensee stated that a reanalysis indicated that although the original design rating was incorrect, because of the margin in the piping design, there was no concern for failure of the line. However, the licensee is determining a course of action to correct the inappropriate design rating. The staff concurs with the licensee's response.

The SSFI also noted a significant number of corrective maintenance work requests relating to the Unit 3 EFW pump turbine. The staff has no comment on this issue, as it is not related to design considerations.

Item 2.1.3 No Runout Protection for EFW Pumps

The SSFI determined that EFW pump runout (excessive flow leading to cavitation and or vibration) could occur at steam generator pressures as high as 700 to 900 psig and that these conditions could be compounded in the event of a steam or feedwater line break or if the EFW flow control valves fail open as designed.

In response, the licensee stated that their more recent detailed analysis of EFW pump runout concerns indicated that EFW function would not be threatened by runout except at somewhat lower pressures than identified by the SSFI in nearly all cases. Further, the licensee indicated that sufficient time and indication are

available to the operator to take the necessary action to preclude loss of EFW function due to pump runout. Procedure revisions and training were completed to alert the operators to high EFW flow conditions based on simulator experience. In addition, the licensee is investigating potential system modifications to reduce the burden on the operator for coping with runout and thereby reduce the chance of resulting pump damage. The staff concurs with the licensees response to this issue.

Item 2.1.4 EFW System Reliance on Non-Safety-Related Equipment

The SSFI determined that some of the EFW system instrumentation and control equipment relied on by the operator is not safety related. The SSFI was concerned that because this equipment was important to EFW system operation and received less rigorous maintenance and design control than safety related components, its reliability may not be sufficiently high.

In response, while the licensee acknowledged use of non-safety related equipment in control and operation of the EFW system, the licensee indicated that the design process and maintenance practices are essentially the same for both safety and non-safety related components. Upgrading of some non-safety related maintenance procedures was completed in order to maintain a comparable standard for equipment reliability. In addition, the

licensee undertook an investigation of the reliance on the use of non-safety related equipment and operator actions for the EFW system in order to verify the acceptability of this practice. The staff concurs with the licensees response to this issue.

Item 2.1.5 Reliability of Nitrogen Backup System for EFW Air-Operated Valves

The SSFI determined that the non-safety related backup nitrogen supply system for the EFW air operated flow control valves was sized based on 1-hour of operation rather than 2 hours per the licensees commitment. Further, post-installation and periodic testing of the backup nitrogen system was considered inadequate. Uncontrolled/unidentified isolation valves were also found in the nitrogen supply system.

In response, the licensee acknowledged the error in not maintaining a 2-hour backup nitrogen supply for the EFW flow control valves but indicated that the EFW system safety function was not affected based on a fail open (safe position) for these valves on loss of air/nitrogen supply. The licensee further stated that appropriate actions are being taken to ensure a 2-hour nitrogen supply for the EFW flow control valves. The staff concurs with the licensees response to this issue. However, the staff notes that the issue of proper failure position for the EFW flow control valves on loss of air is a key aspect of the

Babcock & Wilcox (B&W) Owners Group review of instrument air systems under the Safety and Performance Improvement Program (SPIP). The staff recommends that the licensee consider the recommendations of the SPIP and make any further improvements in instrument air/backup nitrogen supply capability which are warranted.

With regard to the inadequacy of testing of the backup nitrogen supply, the licensee stated that post-installation functional testing to verify proper function of the EFW flow control valves was satisfactorily completed. Full flow nitrogen supply testing was not performed since acceptable response was achieved with the instrument air supply, and no difference was expected with nitrogen. The licensee also indicated that periodic functional testing of the EFW flow control valves for the nitrogen supply will be conducted during each refueling outage. The staff concurs with the licensees response to this issue.

In response to the concern involving unidentified/uncontrolled isolation valves in the backup nitrogen supply system, the licensee stated that these valves were installed to provide instrument air isolation during the nitrogen supply system modification and have been retained to facilitate maintenance. Failure to properly control their addition was a oversight and appropriate controls have now been implemented. The staff concurs with the licensees response to this issue.

Item 2.1.6 Ability of EFW System to Respond to a Main Steam Line Break

The SSFI determined that blowdown of two steam generators and loss of the turbine driven EFW pump can occur in the event of a main steam line break with concurrent failure of either of two check valves to backseat in the turbine driven pump steam supply line. Testing of these check valves in the backflow direction has never been done.

In response to the above, the licensee acknowledged that the check valves in the turbine driven pump steam supply line have not been tested for seating in the backflow direction but indicated that the Oconee inservice testing program per ASME Section XI does not require such testing. Further, industry experience has shown that normally closed check valves such as these are less vulnerable to a failure to close than are check valves which are normally open. In addition, the licensee correctly noted that failure of the remote manual isolation valve to close in the steam supply line to the turbine driven pump concurrent with a check valve failure in the same line following a main steam line break is beyond the licensing design basis for Oconee and the current single failure criterion. The staff concurs with the licensees response to this issue.

Item 2.1.7 Ability of the EFW System to Respond to a Seismic Event

The SSFI determined that contrary to the Final Safety Analysis Report (FSAR), significant portions of the EFW system were not qualified to the maximum hypothetical earthquake (MHE). Further, the batteries for Keowee hydroelectric plant, the Oconee emergency power supply, were not installed to meet seismic requirements.

In response, the licensee acknowledged that some portions of the EFW system were found not to be qualified to the MHE as indicated in LER 269/86-02 (letter dated March 5, 1986) and as required by the FSAR. Corrective actions were also identified by the licensee in the above letter, and it was concluded that the EFW system would be in compliance with the FSAR commitment for qualfication to the MHE.

The staff completed its review of seismic qualification of the Oconee EFW system and provided its evaluation by letter dated January 14, 1987. In that evaluation, while the staff concludes that the licensee will make appropriate modifications to qualify the EFW system for the MHE, the staff also points out the vulnerability of the system to failure as a result of flooding caused by rupture of the non-seismically qualified condenser circulating water lines. The staff review concluded that acceptable postearthquake shutdown capability was provided by the standby shutdown facility and feed-and-bleed cooling.

The EFW seismic qualification issue was, therefore, considered resolved.

In response to the Keowee battery seismic installation concern, the licensee indicated that modifications to correct the installation error were completed at the time of the SSFI audit. Further, a subsequent seismic qualification analysis confirmed that the battery installation prior to the modification would have survived the MHE without loss of function. The staff concurs with the licensee's response to this issue.

Item 2.2.1 Primary System Feed and Bleed Cooling

The SSFI was concerned that the availability of feed and bleed cooling as an alternative to the EFW system was compromised by nonenvironmentally qualified pressurizer power-operated relief valves (PORV) and PORV block valves, and by use of an insulated stick to manually shut the PORV block valve motor contacts to maintain the valve closed.

In response, the licensee indicated that no credit for feed and bleed cooling was taken for events within the licensing design basis, and therefore, the PORV and PORV block valve are not required to be environmentally qualified per 10 CFR 50.49. Further, the use of a stick to block motor operated valves has been discontinued. In addition, the licensee notes that feed and bleed cooling through the pressurizer safety valves using

two out of three high pressure injection pumps will provide adequate decay heat removal capability without reliance on the PORV and PORV block valve. The staff concurs with the licensees response to this issue.

Item 2.2.2 Auxiliary Service Water (ASW) System

The SSFI was concerned that the routine testing of the ASW pump was inadequate since the performance test did not record suction pressure, discharge pressure, or flow. It was again noted that use of the ASW system requires manual operation of the atmospheric dump valves which were never demonstrated to be capable of opening under high differential pressure.

In response, the licensee indicated that the ASW system serves as a backup decay heat removal capability following the loss of the other means including main feedwater, emergency feedwater, standby shutdown facility (SSF) ASW, and feed-and-bleed. As such, no credit is taken for the system within the licensing basis. The licensee requested and was granted relief by the staff from the requirements of ASME Section XI to record suction pressure, discharge pressure and flow during routine testing. With regard to the atmospheric dump valves, the licensee again noted that a modification will be made to enhance their operability, and periodic testing will be performed during each refueling outage (refer to discussion under Item 2.1.1). The staff concurs with the licensees response to this issue.

Item 2.2.3 Standby Shutdown Facility (SSF) ASW System

The SSFI determined that neither design analyses nor test results for the SSF ASW pump was available to demonstrate that the pump provided sufficient discharge head to meet decay heat removal requirements. It was also noted that the SSF ASW system consisted of a single train which was of concern since seismic qualification of the EFW system to the MHE had not been demonstrated.

In response, the licensee noted that older calculations such as those for the SSF ASW system design did not receive the same formal control as current design documentation. However, SSF ASW design calculations were performed and were available. Further, regular testing of the SSF ASW pump has confirmed that the pump can deliver the required head and flow per the original calculations for decay heat removal. Formal calculations to this effect will be completed by February 1, 1987. The staff has no comment on the licensee's design control practices but concurs with the remainder of the response to this issue.

With regard to the single failure concern with the SSF ASW system, as noted previously under Item 2.1.7, in its review of the seismic qualification of the EFW system, the staff examined the need for redundancy in the SSF ASW system given the vulnerability of the EFW system to seismically induced flooding

in the turbine building. In its January 14, 1987 letter, the staff evaluation of this issue determined that such a backfit could not be supported, and the single train SSF ASW system was found to be acceptable. This issue is, therefore, considered resolved.

Item 2.3.1 Motor-Operated Valve Maintenance Program

The SSFI determined that the licensees motor-operated valve (MOV) maintenance program did not include proper control of lubricants and torque and limit switch set points, nor did it adequately address the means necessary to correct the root causes of MOV failures.

In response, the licensee described their current MOV maintenance program upgrades including the Motor Operated Valve Analyses and Testing (MOVAT) program. The staff has no comment on the licensees response as this issue does not concern EFW system design or functional capability.

Item 2.3.2 Design Change Process

The SSFI identified a number of concerns regarding the licensees design change procedure and practices particularly as they relate to the requirements of ANSI N45.2.11.

In response, the licensee described several efforts currently underway to improve design documentation control and record keeping which are scheduled for completion later in 1987. The staff has no comment on the licensees response as this issue does not concern EFW system design or functional capability.

Dated:

Principal Contributor:

H. Pastis