DEC 26 1984

DMB 016

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

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

Dear Mr. Tucker:

SUBJECT: SEISMIC QUALIFICATION OF THE AUXILIARY FEEDWATER SYSTEM

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

Enclosed is a copy of our status report on the subject item, multiplant action C-14. Attached to the status report is the 1982 Technical Evaluation Report (TER) developed by our consultant, Lawrence Livermore National Laboratory (LLNL). Subsequent to the LLNL review, we requested in a letter dated September 8, 1982, that you review the TER and provide any comments relevant to our reaching a safety conclusion. You responded with a letter dated October 13, 1982. We have reviewed this supplemental information and our consultant's TER, and our findings are summarized in the enclosed status report. The open items involve the following areas:

1. Capability of the auxiliary feedwater (AFW) system and/or Safe Shutdown Facility (SSF) to withstand a safe shutdown earthquake concurrent with a single active failure;

2. Switchover procedures for transferring the AFW function to the SSF;

3. Requirements for the isolation boundary between the AFWS and the SSF; and

4. Walkdown of the currently nonseismically qualified areas of the AFWS.

By Generic Letters dated October 21, 1980, and February 10, 1981, the NRC staff announced its position that PWR's be upgraded via further analysis or modifications as may be necessary to provide adequate AFW capability following a Safe Shutdown Earthquake. The staff has determined that it is important that the staff position be satisfied for the three Oconee plants. Accordingly, we request that you provide your commitment to resolve the problem areas in the enclosed report in a timely manner.

NRC procedures provide an opportunity for an appeal by a licensee to NRR management when the staff imposes new requirements on a licensee (backfit) and the licensee objects to the position. Since our position concerning the

open items is a potential backfit requirement for Oconee, Units Nos. 1, 2 and 3, you may wish to appeal our position to the NRR management. If you decide to appeal to NRR management to have the staff's position modified, please indicate in writing that (a) you object to the staff's position; (b) you wish to appeal the staff's position to NRR management to have it modified; and (c) your proposed modification. Should you have any additional questions regarding the staff's position or the appeal process, please contact the NRR project manager.

Please respond within 60 days of the date of this letter either by providing a commitment to resolve the open items or appealing to NRR management to have the staff's position modified.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents, therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

*ORIGINAL 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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*See previous white for concurrences.

12/19/84 - ISSUE ASAP

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open items is a potential backfit requirement for Oconee, Units Nos. 1, 2 & 3, you may wish to appeal our position to the NRR management. If you decide to appeal to NRR management to have the staff's position modified, within 30 days of receipt of this letter, please indicate in writing that (a) you object to the staff's position; (b) you wish to appeal the staff's position to NRR management to have it modified; and (c) your proposed modification. Should you have any additional questions regarding the staff's position or the appeal process, please contact the NRR project manager.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents, therefore, OMB clearance is not required under P.L. 96-511.

Sincerely.

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

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Duke Power Company

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STATUS REPORT
OCONEE UNITS 1, 2 AND 3
SEISMIC QUALIFICATION OF THE
AUXILIARY FEEDWATER SYSTEM

Introduction

Since the accident at Three Mile Island, attention has been focused on the ability of pressurizer water reactors to provide reliable decay heat removal. While it is recognized that alternate methods may be available to remove decay heat following transients or accidents, heat removal via the steam generators is the first choice for accomplishing a safe shutdown of the plant. Therefore, there should be reasonable assurance that the auxiliary feedwater system (AFW) can withstand the postulated Safe Shutdown Earthquake (SSE).

To address this concern, the NRC developed and initiated Multiplant Action C-14, "Seismic Qualification of Auxiliary Feedwater Systems." The objective of this plan is to increase, to the extent practicable, the capability of those plants without seismically qualified AFW to withstand earthquakes up to the SSE level. This program was implemented with the issuance of NRC Generic Letter 81-14, dated February 10, 1981. Our review of the licensee's responses to this letter is the subject of this evaluation.

Evaluation

The enclosed report was prepared for us by our consultant, Lawrence Livermore National Laboratory, as part of our technical assistance contract program. The report provides their technical evaluation of the licensee's conformance to the requirements of Generic Letter 81-14. The consultant's reports indicates that the AFW may not continue to function during and following a seismic event as great as the Safe Shutdown Earthquake. This conclusion is based upon cited weaknesses in the pumps, piping, valves, power supplies, and structures/housing. The TER also indicates that the licensee did not conduct a walkdown of the AFW system and did not describe any alternate methods currently available to remove decay heat.

Subsequent to the consultant's review, we requested the licensee, in a letter dated September 8, 1982, to review the consultant's report and provide any comments relevant to our reaching a safety conclusion. The licensee's response, dated October 13, 1982, emphasized their belief that the AFW does have substantial seismic capability in that it would remain functional following a Operating Basis Earthquake (i.e., half the level of the SSE). The response also requested additional consideration of a fully seismically qualified, dedicated shutdown facility, and provided specific comments and information. We have reviewed this supplemental information provided by the licensee, our consultant's technical evaluation, and have performed our own review of the licensee's responses to Generic Letter 81-14 and our request for additional information. Our summary findings are described below.

Pumps and Motors

The turbine-driven AFW pump could fail during a seismic event due to the loss of one of its support systems. There is no retreivable documentation on the seismic capability of the turbine oil system, although the turbine, as a whole, was certified by its manufacturer. The other trains of the AFW include two full capacity seismic Category I electric motor-driven pumps per reactor. Therefore, the potential seismic failure of the turbine-driven AFW train is acceptable on the basis of sufficient unaffected redundancy. (That is, the two motor-driven pumps will be operable). The housing of the pumps in the turbine building is discussed later.

Piping

The piping for the AFW systems is seismically qualified to the SSE level out through the first isolation valves, which are normally closed. Piping beyond these boundary points is not currently seismically qualified. The licensee indicates that this situation is consistent with other safety-related systems at the Oconee station.

Generic Letter 81-14 requests licensees to consider the AFW systems as including piping up to an including the second valve which is normally closed, or capable of automatic closure when the isolation function is required. This system boundary definition is intended to assure that the safety function of the AFW will not be lost during a seismic event, assuming that the seismic event causes the failure of the nonqualified piping concurrent with a single failure in the isolation valve.

The licensee has not identified the particular piping protected by a single valve or offered any justification supporting the adequacy of a single isolation valve. Therefore, we are forced to conclude that to conform to the Generic Letter, the licensee must either provide double-valve protection on all AFW piping or provide a technical analysis that demonstrates that the intent of the Generic Letter, as stated above, is satisfied.

Valves and Actuators

The following are the only valves in the AFW that are not qualified for the SSE.

1. The oil valves in AFW support systems are not qualified for an SSE.
2. The air-operated valves are not fully qualified.
3. Some motor-operated valves (MOVs) do not have retreivable qualification documentation.

The licensee has indicated that the areas lacking qualification have no effect on the operability of the AFW. It is likely that all the oil valves that support the AFW are related to the turbine-driven pump. If this is the situation, these valves would be acceptable on the basis that, given no other equipment failures, the plant can be placed in the cold shutdown conditiions without the turbine-driven pump. The licensee should confirm that all the oil support valves involved are for service to the turbine-driven pump.

With regard to the potential failure of air-operated valves the licensee has stated that the air-operated valves will fail to the open position, except for the flow control valves for which a backup bottled nitrogen system is provided. The licensee has also stated that all motor-generated-valves are pre-positioned and fail as-is upon loss of power, thus permitting auxiliary feedwater to flow to the steam generators. While we agree that the failure resulting from a loss of air or power will not lead to loss of safety function, we remain

concerned that seismically induced failures in the internal mechanical portions of the valves may result in either blockage of the flow path or loss of control of the flow leading to steam generator overfilling. If mechanical failure causes flow blockage, it is not clear that either handwheels on the valves will be effective in establishing AFW flow or that the time available before the once-through-steam-generator (OTSG) boils dry is sufficient to allow credit for manual operator actions at locations outside the control room. Therefore, the licensee should reanalyze and/or modify the system to demonstrate an SSE-level of seismic capability for the AFW valves.

Power Supplies

Electric power to some of the motor-operated valves and pneumatic sources for air-operated valves are not seismically qualified. For the MOVs, the licensee stated that electric power is not essential since the MOVs fail as-is and are not required to change position to establish flow. While we agree that establishing AFW flow is acceptably independent of electric power, we remain concerned regarding control of AFW flow. We do not find that manual operation of the valves locally is an acceptable substitute for seismically-qualified power sources and cabling to the components. Although we are not closing out the licensee's option to attempt to convince us of the acceptability of local manual controls in lieu of an adequate power source, we believe the licensee should provide a seismically qualified power source to all AFW components that are necessary to control OTSG water level.

For the air-operated valves, which includes the normal flow control-valves (FCV's) for the AFW, the licensee has provided an automatic bottled nitrogen system which can serve as an alternate to the air source. However, in that this backup source is not either designed or installed in a SSE-qualified manner either, we are forced to assume that the postulated seismic event could lead to loss of pneumatic power. In such a case the air-operated valves would fail to the full-open positions, which assures AFW flow but does not fully eliminate the questions regarding adequate flow control.

Initiation and Control

The control to the motor-operated valves other than those in the auto-initiation and auto-control of the AFW system is not seismically qualified. This includes the control to the branch line isolation valves off the main steam header and the electric motor-operated valves in the AFW suction and discharge line which are normally aligned for AFW operation but not normally required to operate. However, the licensee stated that no actuation is required of the motor-operated valves for the AFW flow and the valves will fail as-is upon loss of power. Therefore, we conclude that the initiation/control systems possess the capacity to perform its safety function during a SSE.

Structures

The turbine building which houses portions of the AFW system is seismic Class II. Therefore, the licensee should re-analyze and provide a discussion as to how the turbine-building might be modified to attain a demonstrated SSE level of seismic capability.

In summary, our evaluation concludes that the licensee's AFW system does not possess an overall seismic capability for withstanding an SSE.

Standby Shutdown Facility

The Standby Shutdown Facility (SSF) system, which has been constructed to provide a dedicated separate train of auxiliary feedwater, will provide an alternate decay heat removal system when it becomes operational. No procedure is available at this time to switch from the AFW system to the SSF system. Such procedure will be developed on a schedule commensurate with the SSF system startup. The licensee did not indicate the startup date of the new SSF system.

The SSF system is designed to withstand the SSE. Structures supporting or housing the SSF system components include the reactor building and auxiliary building and are seismic Class I. The licensee provided a description of the methodologies and acceptance criteria used for seismic qualification of the SSF system, referring to applicable sections of the FSAR and licensee's letters of March 28, 1980; February 16, 1981; March 31, 1981; and April 13, 1981.

Regarding the AFW system boundary, all connected branch piping and crossover connections among the three units are seismically qualified only through the first valve. We conclude that the AFW system boundary does not fully meet the requirements defined in the Generic Letter.

Regarding the system boundary, some small piping vents and drains, capped lines, tank vents, and a recirculation line from the diesel fuel oil storage tank either have only one normally closed valve or are seismically designed only through the first valve. We conclude that the SSF system boundary does not conform to the definition of boundary specified in the Generic Letter. Furthermore, we feel that this deviation needs to be evaluated and corrected in order to assure the required safety function of the SSF system.

Our consultant has made the following conclusions regarding the SSF:

1. The licensee did not perform a walk-down of the currently nonseismically qualified areas of the AFW system because the SSF system, is designed to withstand the SSE and to serve as the alternate decay heat removal system.

2. The switchover procedure from the AFW to the SSF system will be established commensurate with the startup operation of the SSF system.

3. Both the AFW and SSF system boundaries do not fully meet the definition specified in GL 81-14.

We do not fully concur with our consultant's conclusion, that the SSF is a substitute for the AFWS. In order for the SSF to be considered a substitute for the AFW it would have to be capable of withstanding an SSE concurrent with a single active failure.

Since the licensee has not demonstrated that the SSF is capable of withstanding a single active failure, we would propose the following conditions:

1. Demonstrate that the SSF is capable of withstanding a single active failure.
2. Establish the switchover procedure from the AFW to the SSF system commensurate with the startup operation of the SSF system; and
3. Meet the boundary requirements specified in GL 81-14 for the AFW and SSF system boundaries.

If the licensee can not meet the above conditions, then we would propose the following actions as a solution:

1. Perform a walkdown of the currently nonseismically qualified areas of the AFW system;
2. Upgrade the non-seismic portions of at least one train of the AFW system to seismic Category I;
3. Establish the switchover procedure from AFW to the SSF system commensurate with the startup operation of the SSF system; and
4. Meet the boundary requirements specified in GL 81-14 for the AFW and SSF system boundaries.