

JUN 18 1985

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

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

Dear Mr. Tucker:

SUBJECT: SEISMIC QUALIFICATION OF EMERGENCY FEEDWATER SYSTEM

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

We have reviewed your April 9, 1985 letter and found that it did not adequately respond to all the staff's concerns as stated in our December 26, 1984 letter. The areas for which we need additional information are listed in Enclosure 1. We would like to meet with your staff in June 1985 to discuss these items further. Based on the information discussed in the meeting and on previous correspondence, the staff will write its Safety Evaluation and finalize its position on the adequacy of Oconee's emergency feedwater system with respect to its seismic qualification. This request for information affects fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

[Signature]
John F. Stolz

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

Enclosure:
As Stated

cc w/enclosure:
See next page

8507260187 850711
PDR ADOCK 05000269
P PDR

REQUEST FOR INFORMATION
OCONEE NUCLEAR PLANT, UNITS 1, 2 AND 3
050-269, 270 AND 287

Seismic Qualification of the Auxiliary Feedwater System

1. In your April 9, 1985 submittal, you state that a single failure is not assumed to include the changing of safely positioned manual valves to the unsafe position. This assumption is correct only if the following conditions exist:
 - a. the valves are seismic Category 1;
 - b. the valve position is inspected every 30 days or after valve position changes or repairs; and
 - c. the circuit breaker to any electrical controls for the valve operator is opened and the breaker position is inspected every 30 days or after position change or repairs.

Verify that these conditions are satisfied by all the valves you assumed to fail as is or do not change position due to a single active failure.

2. Two plant heating lines attached to each upper surge tank (UST) below water level are not documented to withstand an SSE. Either verify by analysis that these lines can withstand an SSE or verify that the failure of these lines will not result in the loss of the auxiliary feedwater system function.
3. The low pressure service water system (LPSW) provides cooling water to the two electric motor driven pumps in the auxiliary feedwater system. Portions of the system are seismically qualified and other portions have no safety function. The safety-related portions of the system are designed to operate even with the non-safety portions operating, so several isolation valves between these positions are normally open. This statement is acceptable only if the non-safety related portions remain intact after a seismic event; therefore, either verify by analysis that these lines can withstand an SSE or verify that the failure of these lines will not result in the loss of the auxiliary feedwater system function.
4. Switchover procedures (OP/O/A/1600/11 and EP/O/A/1800/14) were developed and implemented to supply flow to the steam generators with the standby shutdown facility (SSF) through use of the SSF auxiliary service water system as an alternate method for feeding steam generators. Since the SSF auxiliary service water system contains only one train and one pump, the switchover procedures must restrict the use of the SSF auxiliary service water system to one unit for each accident or event. Failure to restrict the use of the SSF auxiliary service water system would result in the violation of General Design Criteria 5, "Sharing of Structures, Systems and Components." Verify that the switchover procedures restrict the use of the SSF auxiliary service water system to one unit for each accident or event.

EFW SEISMIC QUALIFICATION
NRC REQUEST FOR INFORMATION

1. VALVES

A. SEISMIC?

- MOST VALVES ARE QUALIFIED
- UNQUALIFIED VALVES WILL BE QUALIFIED OR WILL BE REPLACED

B. POSITION VERIFICATION?

- INDEPENDENT VERIFICATION
- FREQUENCY: MAINTENANCE, REPAIRS, EACH REFUELING OUTAGE
- EFW FLOW PATH VERIFICATION QUARTERLY
- IMPLEMENTED BY PROCEDURES
- CONSISTENT WITH OTHER SAFETY SYSTEMS

C. BREAKERS OPENED?

- BREAKERS CLOSED FOR ALTERNATE EFW ALIGNMENT
- BOUNDARY REMAINS PROTECTED - VALVES ARE CLOSED

2. PLANT HEATING LINES

- ANALYSIS TO BE PERFORMED; MODIFICATIONS MADE AS REQUIRED

3. LOW PRESSURE SERVICE WATER

- COOLS NUMEROUS SYSTEMS; PORTIONS ARE SSE QUALIFIED & OTHERS HAVE NO SAFETY FUNCTION
- EFW PORTION QUALIFIED
- NON-SAFETY PORTION PER ANSI B31.1
- CAPABLE OF SSE, THOUGH NO DETAILED ANALYSIS
- INDUSTRY EXPERIENCE
- SQUG RESEARCH
- ADDED ASSURANCE: SEVEN TRAINS OF FEEDWATER, HPSW BACKUP

STANDBY SHUTDOWN FACILITY (SSF)

- An Alternate And Independent Means To Achieve And Maintain A Hot Shutdown Condition For Oconee Units Following Postulated Fire, Sabotage And Flooding Events.
- A Seismically Qualified Additional Backup To Existing Redundant Safety Systems.
- As Noted By SER Dated April 28, 1983:
"The SSF Auxiliary Service Water Subsystem (SSFASW) Is A High Head, High Volume System Designed To Provide Sufficient Steam Generator Inventory For Adequate Decay Heat Removal For All Three Units During A Loss of AC Power In Conjunction With The Loss Of The Normal And Emergency Feedwater Systems".
- SSF Design And Switchover Procedures For Whole Plant And More Than One Event In Addition To The Existing Safety Systems.
- SSF Meets General Design Criterion 5.

SUMMARY

- GL 81-14: "REASONABLE ASSURANCE... [AFW SYSTEMS] ARE ABLE TO FUNCTION FOLLOWING...THE DESIGN SSE"
- OCONEE EFW REVIEWED, IDENTIFIED DEFICIENCIES, COMMITTED TO MODIFICATIONS FOR ASSURANCE
- DUKE'S OPINION: ASSURANCE HAS BEEN PROVIDED
- HIGH CONFIDENCE IN AVAILABILITY OF FEEDWATER
- SEVEN TRAINS, FOUR QUALIFIED, FIFTH MOSTLY
- ANY FAILURE UNLIKELY: SQUG

LPSW SYSTEM

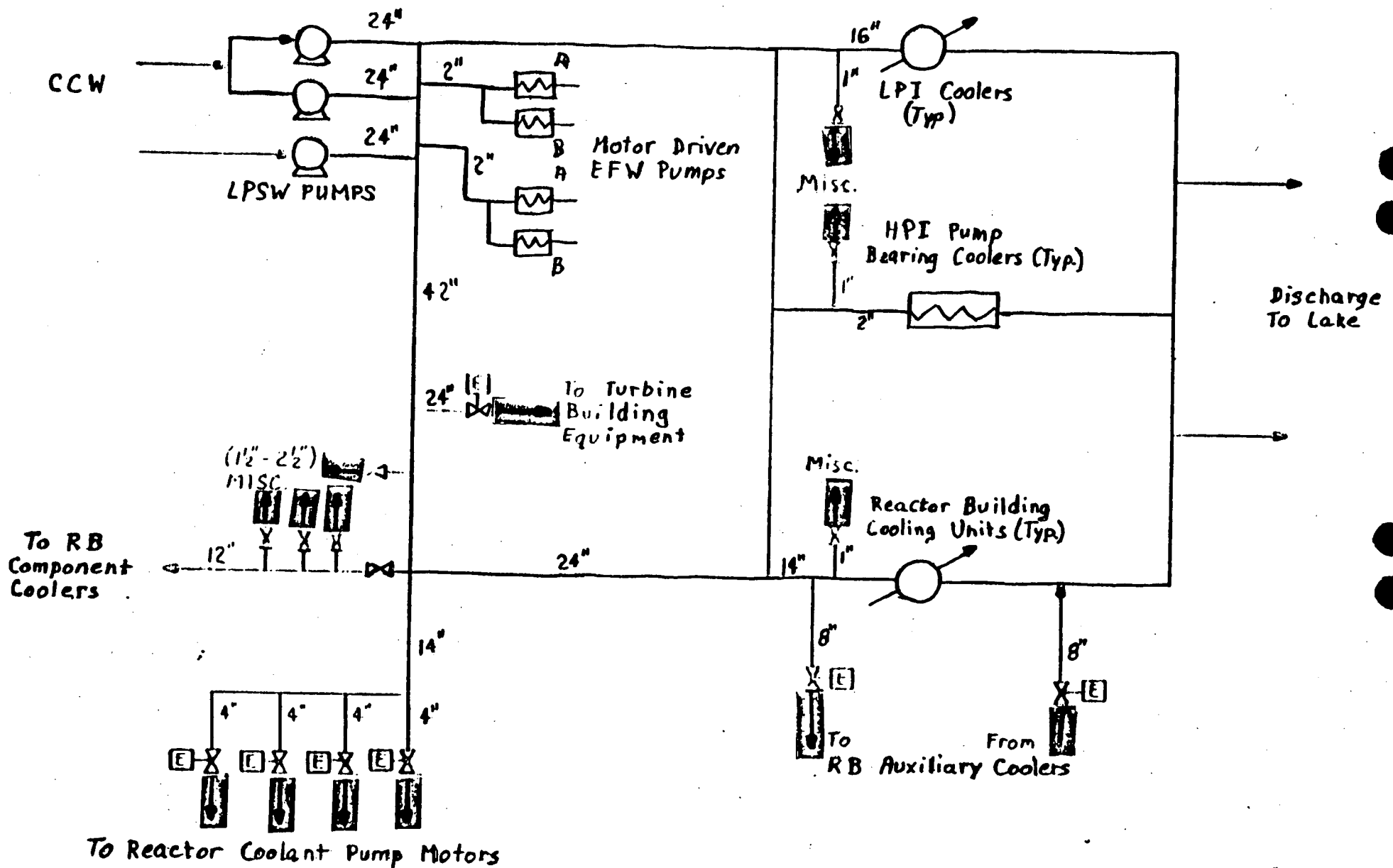
(TYPICAL)

Normally Open Seismic / Non-Seismic Boundaries

Units 1/2; Unit 3 Similar

Seismic —

Non-Seismic ████████



Duke Power Company
Oconee Nuclear Station

Response to the NRC Request for Information on
Seismic Qualification of the Auxiliary Feedwater System

The following is Duke's response to each item addressed in the NRC Request for Information on Seismic Qualification of the Emergency Feedwater (EFW) System of Oconee Nuclear Station, dated June 18, 1985:

1. "In your April 9, 1985 submittal, you state that a single failure is not assumed to include the changing of safely positioned manual valves to the unsafe position. This assumption is correct only if the following conditions exist:

- a. the valves are seismic Category I;"

Response: All of the normally closed boundary valves are seismically qualified except those noted below. These will be shown capable of withstanding an SSE or will be replaced with qualified valves. Valves in this category are: AS-85, -87, -93, -95; C-209, C-182, C-183.

- "b. the valve position is inspected every 30 days or after valve position changes or repairs;"

Response: All safety-related valve positions, once set, are independently verified. Position-verification is always performed after maintenance and repairs. All valve positions are verified each refueling outage, and once every quarter valve positions are inspected to insure a flow path exists for Emergency Feedwater.

This position-verification policy is implemented by procedure and is consistent with other safety-related systems at Oconee.

"and

- c. the circuit breaker to any electrical controls for the valve operator is opened and the breaker position is inspected every 30 days or after position change or repairs.

Verify that these conditions are satisfied by all the valves you assumed to fail as is or do not change position due to a single active failure."

Response: The three MOV's that are normally closed boundary valves have closed breakers so that alternative flow paths for Emergency Feedwater can be aligned quickly if needed. This does not compromise EFW reliability; the valves remain closed on loss of power and continue to protect the boundary.

2. "Two plant heating lines attached to each Upper Surge Tank (UST) below water level are not documented to withstand an SSE. Either verify by analysis that these lines can withstand an SSE or verify that the failure of these lines will not result in the loss of the auxiliary feedwater system function."

Response: These lines will be analyzed and supports will be revised as required to insure the lines will withstand an SSE.

3. "The Low Pressure Service Water System (LPSW) provides cooling water to the two electric motor driven pumps in the auxiliary feedwater system. Portions of the system are seismically qualified and other portions have no safety function. The safety-related portions of the system are designed to operate even with the non-safety portions operating, so several isolation valves between these portions are normally open. This statement is acceptable only if the non-safety related portions remain intact after a seismic event; therefore, either verify by analysis that these lines can withstand an SSE or verify that the failure of these lines will not result in the loss of the auxiliary feedwater system function."

Response: The LPSW System is judged to be capable of withstanding an SSE and supporting the EFW function even though this is not verified by detailed analysis. Flexibly supported piping systems are naturally resistant to failure due to seismic loading. Industry experience* has shown flexible piping systems (including those designed and supported in accordance with ANSI B31.1) are extremely resistant to damage by earthquakes of a magnitude several times larger than the Oconee SSE. The Oconee LPSW System is a flexible piping system, is designed and supported in accordance with ANSI B31.1, and is considered fully satisfactory for an SSE event.

The High Pressure Service Water System serves as back-up to LPSW cooling water for the Turbine-Driven (TD) EFW pumps. This TD train plus other systems, including Auxiliary Service Water, SSF Auxiliary Service Water (and Main Feedwater), provide added assurance that feedwater flow to the steam generators will not be lost.

4. "Switchover procedures (OP/O/A/1600/11 and EP/O/A/1800/14) were developed and implemented to supply flow to the steam generators with the Standby Shutdown Facility (SSF) through use of the SSF auxiliary service water system as an alternate method for feeding steam generators. Since the SSF auxiliary service water system contains only one train and one pump, the switchover procedures must restrict the use of the SSF auxiliary service water system to one unit for each accident or event. Failure to restrict the use of the SSF auxiliary service water system would result in the violation of General Design Criteria 5, "Sharing of Structures, Systems and Components." Verify that the switchover procedures restrict the use of the SSF auxiliary service water system to one unit for each accident or event."

*Reference Seismic Qualification Utilities Group (SQUG) research reports.

Response: The Standby Shutdown Facility (SSF) includes system and components necessary to provide an alternate and independent means to achieve and maintain a hot shutdown condition for one or more of the three Oconee units. The SSF was designed to resolve the safe shutdown requirement for fire protection, turbine building flooding, and sabotage.

The SSF Auxiliary Service Water System (SSFASW) is a high-head, high-volume system designed to provide sufficient steam generator inventory for adequate heat removal for all units during a loss of normal AC power in conjunction with the loss of the main and emergency feedwater systems. The SSFASW is designed to seismic Category I and can provide 580 gpm at full system pressure to each of three units.

As a part of emergency safety systems, the Emergency Feedwater (EFW) System, as designed and described in Oconee FSAR, provides redundant and sufficient feedwater to assure a safe shutdown of the unit(s) during events resulting in the loss of main feedwater. Although the EFW system assures sufficient feedwater to the steam generators, the SSFASW can also provide an additional alternate method for EFW. However, the safety analyses in the FSAR do not take credit for SSFASW for mitigation of a loss of feedwater event. Switchover procedures OP/O/A/1600/11 and EP/O/A/1800/14 were developed and implemented to utilize the SSFASW capability as an additional means for feeding steam generators to enhance the overall safety of the plants. The SSF, by design objectives, is able to achieve and maintain a hot shutdown condition for one or more units during events such as fire, flooding, or sabotage which can affect one or more units. To restrict the use of SSFASW by procedures to one unit for each accident is contrary to the design and objectives of the SSF which has been reviewed and approved by the NRC in their SER dated April 28, 1983. Considering the SSFASW design and capabilities, Duke believes that the switchover procedures as developed and implemented are consistent with the design philosophy of the SSF as a whole plant system for more than one event and provide an additional alternate method to feeding steam generators beyond the means of normal and emergency feedwater systems. Therefore, by design objectives, the SSF as a system meets the requirements of General Design Criterion 5.

Furthermore, the present main and emergency feedwater systems consisting of two turbine-driven main feedwater pumps, one turbine-driven and two motor-driven EFW pumps, and the Auxiliary Service Water System provide redundancy and capability for decay heat removal. Utilization of the SSFASW as an additional alternate source of feedwater not only will not impair its designed safety function but will increase the margin of safety during events which could result in complete loss of main feedwater and emergency feedwater systems.

Summary

Generic Letter 81-14 was issued with the purpose "to ultimately provide reasonable assurance, where necessary, that [AFW systems] are able to function following the occurrence of earthquakes up to and including the design SSE". The Oconee EFW System has been thoroughly reviewed, deficiencies have been identified, and modifications have been committed to for assurance that the system will withstand an SSE. It is Duke's option that this assurance has been provided.

Duke Power has a high degree of confidence that feedwater flow to the steam generators will always be available during and following an SSE. Feedwater can be provided by seven different trains: two turbine-driven main feedwater trains, two motor-driven EFW trains, one turbine-driven EFW train, one Auxiliary Service Water train and one train of SSF Auxiliary Service Water. Four of these trains are considered SSE-qualified; the Turbine-Driven EFW train is mostly qualified. Failure of any of the trains is very unlikely, which is reinforced by SQUG research.

MEETING SUMMARY DISTRIBUTION

Licensee: Duke Power Company

*Copies also sent to those people on service (cc) list for subject plant(s).

Docket File

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L PDR

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ACRS-10

PMorriette

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