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PARKER,W.O. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director
REID,R.W. Operating Reactors Branch 4

SUBJECT: Forwards addl info re standby shutdown facility,in response to NRC 801027 request.SRP items addressed include seismic subsystem analysis & dynamic testing & analysis of sys components.Final response will be sent in Mar 1981.

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JF

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WILLIAM O. PARKER, JR.
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373-4083

February 16, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: R. W. Reid, Chief
Operating Reactors Branch No. 4

Re: Oconee Nuclear Station
Docket Nos. 50-269. -270, -287

Dear Sir:

In response to your letter dated October 27, 1980, requesting additional information on the Standby Shutdown Facility at the Oconee Nuclear Station, please find the attached. The responses to questions 2(b) and 2(c), SRP Section 3.9.2 II.1 and 3.9.3 II.4 respectively, are currently under review. These responses will be provided to your office in March, 1981.

My letters of December 1, 1980 and January 15, 1981 addressed the delays in the preparation of this response.

Very truly yours,

William O. Parker, Jr.

JLJ:pw
Attachment

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REQUEST FOR ADDITIONAL INFORMATION

OCONEE NUCLEAR STATION

DUKE POWER COMPANY

DOCKET NOS. 50-269, 50-270, 50-287

1. Provide a summary in sufficient detail to demonstrate that the proposed Standby Shutdown Facility Reactor Coolant Makeup System and Auxiliary Service Water System have been designed in accordance with the rules of the ASME Codes, Section III, Class 2 and Class 3. Specifically, include justification of the design loading combinations considered in the analysis and design of the above systems.

   Response

   See Reference 2 Section 3.1 and 4.1. Piping Systems for the Standby Shutdown Facility were designed in accordance with the appropriate ASME Code based on Regulatory Guide 1.26. The SSF RC Makeup System is under Quality Group B and was designed in accordance with ASME Code Section III Class 2. The SSF Auxiliary Service Water System has a portion (crossover between emergency feedwater lines) in each Reactor Building that is under Quality Group B and was designed to ASME Code Section III Class 2. The remainder of the SSF Auxiliary Service Water System is under Quality Group C and was designed in accordance with ASME Code Section III Class 3 since this is an Auxiliary Feedwater System.

   The 1974 Edition of the ASME Boiler and Pressure Vessel Code with addenda through the Summer of 1975 addendum was used.

   These systems are considered Seismic Category I.

   The design load combinations will be discussed in the following response to SRP Section 3.9.3 II.1.

2. As required by the NRC letter of December 29, 1978, from R. W. Reid to W. O. Parker, Jr., which provided conceptual approval of the proposed system, we request that you identify and justify those portions of the design not meeting NUREG 75-087. Specifically, with respect to the information presented in the system design criteria for the proposed Standby Shutdown Facility, identify any deviations from applicable portions of the following NRC Standard Review Plans:

   A. SRP Section 3.7.3, "Seismic Subsystem Analysis".

   B. SRP Section 3.9.2, "Dynamic Testing and Analysis of Mechanical Components".

   C. SRP Section 3.9.3, "ASME Code Class 1, 2 & 3 Components, Component Supports and Core Support Structures".

   D. SRP Section 3.9.6, "Inservice Testing of Pumps and Valves".

A. SRP SECTION 3.7.3 "SEISMIC SUBSYSTEM ANALYSIS", ORIGINAL ISSUE

Portions of the SSF RC Makeup and SSF Auxiliary Service Water piping systems in the Reactor Building and Auxiliary Buildings were analyzed using the techniques described in Reference 1. This was necessary for the new analysis to be compatible with the analysis of the existing pipe.

Analysis of portions of these piping systems in the SSF Building are analyzed using techniques satisfying the intent of applicable portions of SRP 3.7.3. The following clarification is provided where the exact wording of 3.7.3 is not met:

3.7.3 II.1

All modes with frequencies less than 30 cps are included in the analysis. The effects of higher frequency modes are included by static techniques using the spectral acceleration of 30 cps.

3.7.3 II.2 thru II.12

All requirements are satisfied.

3.7.3 II.13

The location of the Standby Shutdown Facility Non-Category I piping has been reviewed to determine those areas of proximity to Category I piping or safety related equipment. Where Category I piping or safety related equipment is in the proximity area, the Non-Category I SSF piping has been seismically qualified and supported or rerouted out of the problem area.

3.7.3 II.14

Does not apply to the SSF concept.

3.7.3 II.15

Modal damping ratios are consistent with Regulatory Guide 1.61.

B. SRP SECTION 3.9.2 "DYNAMIC TESTING AND ANALYSIS OF SYSTEMS, COMPONENTS, AND EQUIPMENT", REVISION 1.

3.9.2 II.1

The response to this question will be provided to your office March, 1981.

3.9.2 II.2

Pumps: One RC Makeup Pump will be seismic and operability tested on a "shaker table". All remaining code pumps were seismic and operability qualified analytically. In the past we have equally accepted either testing or analysis based on production design and cost effectiveness. All code pumps are shop performance tested.

Valves: For the Class 2 and 3 valves used in the Standby Shutdown Systems the following qualifications were required and certified.

Loading conditions for analysis:

a) Upset mode which includes the effects of the Operational Basis Earthquake (OBE).

b) Faulted mode which includes the effects of the Safe Shutdown Earthquake (SSE).

c) Each of the above was considered in combination with all other concurrent loadings on the valve.

Seismic Input Criteria

a) For the SSE, a Seismic Load Factor (SLF) of 3.0 was applied in each of two orthogonal horizontal directions in combination with an SLF of 2.0 g in the vertical direction, all acting simultaneously.

b) The SLF values for the OBE was taken as 8/15 of the respective values for the SSE. The piping connected to the valve is supported such that these limits are not exceeded.

Seismic Qualification Procedure

The active SSF valves were seismically qualified by analysis using the aforementioned loading conditions and seismic input criteria. This analysis was done to determine that the valve and operator act as a rigid structure such that it has no natural frequencies less than 33 Hz.

For this analysis, the valve was considered in the worst possible orientation (highest stress/deformation level in each valve component) with respect to the total combined loading conditions. Also, the valve was considered to be supported only at the inlet and outlet ends by its piping system.

Static Deflection Testing

The static deflection test was performed on all active valves to verify operability under specified static loading conditions. Verification was based on seat leakage and unrestricted stroking of the valve under design pressure and worst case static loading conditions.

Piping Loads

The following two criteria were met to verify the capability of the valve with respect to piping loads.

a) To ensure that the torsional and bending moment capability of the valve body is greater than that of the adjacent piping, the product of the minimum section modulus of the valve body perpendicular to the run of the valve and the yield strength of the valve body material was verified to be at least 1.2 times the same product for the adjacent piping.

b) To ensure operability of the valve while subjected to maximum piping loads, valve operation was shown not to be impaired due to a bending moment, $M = Z \times Sy$, or a torsional moment, $T = 1.2\ Z \times Sy$, each applied singularly at the ends of the valve.

General Considerations

In addition to the aforementioned seismic criteria, all requirements of the ASME Section III have been met.

Environmental Qualifications

The valves were certified to their capability to withstand their maximum ambient operating conditions of temperature, exterior pressure, radiation level and humidity.

3.9.2 II.3 thru II.6

Does not apply to the SSF concept.

c. SRP SECTION 3.9.3 "ASME CODE CLASS 1, 2 & 3 COMPONENTS, COMPONENT SUPPORTS AND CORE SUPPORT STRUCTURES", ORIGINAL ISSUE.

3.9.3 II.1

The load combinations and stress limits contained in the requirements of this SRP and referenced in Regulatory Guide 1.48 are met except Regulatory Guide 1.48 addresses the 1972 Winter addendum of the code which does not give faulted allowables. Code case 1606 will be used for the faulted load combination. This is consistent with later editions of the Code.

3.9.3 II.2

See Section 3.9.2 II.2

3.9.3 II.3

All requirements are satisfied.

3.9.3 II.4

The response to this question will be provided to your office March, 1981.

D. SRP SECTION 3.9.6 "INSERVICE TESTING OF PUMPS AND VALVES", REVISION 1.

3.9.6 II.1 thru 3

During the initial review of the SSF and its components, Duke recognized that no codes or standards specific to testing requirements of this type facility existed. The decision was then made to develop an Oconee site specific testing program for the SSF addressing the requirements of Regulatory Guides 1.68 and 1.108. Additionally, all inservice testing of pumps and valves will be done in accordance with the provisions of ASME Section XI, Subsections IWP and IWV. The inservice inspection of the diesel-generator is based on Sections 6.4 and 6.5 (Site Testing) of IEEE Standard 387-1977.

REFERENCES

1. Oconee FSAR

2. Information in Support of Standby Shutdown Facility, Duke Power Company, Oconee Nuclear Station, March 28, 1980.