August 27, 1982

TECHNICAL EVALUATION REPORT
OCONEE NUCLEAR STATION UNITS 1, 2, AND 3
SEISMIC QUALIFICATION OF AUXILIARY FEEDWATER SYSTEM

1. INTRODUCTION

Since the accident at Three Mile Island, considerable attention has been focused on the capability of nuclear power plants to reliably remove decay heat. The NRC has recently undertaken Multiplant Action Plan C-14 "Seismic Qualification of AFW Systems" [Ref. 1], which is the subject of this evaluation.

To implement the first phase of Action Plan C-14, the NRC issued Generic Letter No. 81-14 "Seismic Qualificaton of AFW Systems" [Ref. 2], dated February 10, 1981, to all operating PWR licensees. This letter requested each licensee (1) to conduct a walk-down of non-seismically qualified portions of the AFW system and identify deficiencies amenable to simple actions to improve seismic resistance, and (2) to provide design information regarding the seismic capability of the AFW system to facilitate NRC backfit decisions.

The licensee of Oconee Nuclear Station responded with a letter dated January 28, 1982 [Ref. 3]. The licensee's response was found not to be complete and a Request for Additional Information was issued by the NRC, dated April 8, 1982 [Ref. 4]. The licensee provided a supplemental response in a letter dated May 25, 1982 [Ref. 5].

This report provides a technical evaluation of the information provided in the licensee's responses to the Generic Letter, and includes a recommendation regarding the need for additional analysis and/or upgrading modification of this plant's AFW system.

2. EVALUATION

Information provided in licensee's responses included:

- o Specification of the overall seismic capability of the AFW system.
- o Identification of AFW system components that are currently non-seismically qualified for SSE.
- o Discussion of levels of seismic capability of non-seismically qualified components.
- o Specification of overall seismic capability of the Standby Shutdown Facility (SSF) system which will serve as an alternate decay heat removal system.
- o Description of methodologies and acceptance criteria for the seismic design of the SSF system, which is determined to be seismically qualified for the SSE level by the licensee.
- o Description of the AFW and SSF system boundary.
- o Status of compliance with seismic related NRC Bulletins and Information Notices.
- o Additionally, schematic sketches of the AFW and SSF systems.
- o Additionally, identification of areas of modification of the AFW system that will be performed under the SSF project.
- o Additionally, description of methodologies and acceptance criteria for seismically qualified components of the AFW system.

We have reviewed the licensee's responses, and a point-by-point evaluation of licensee's responses against Generic Letter's requirements is provided below.

(1) Seismic Capability of AFW System

Except for those items identified in the following, the AFW system has been designed, constructed and maintained to withstand an SSE utilizing methods and acceptance criteria consistent with that applicable to other safety-related systems in the plant. Presently, those items identified by the licensee as not being fully seismically qualified are evaluated below:

- o Pumps/Motors - Portions of the turbine-driven pump oil system and oil cooling system, including the oil pumps and water cooling pumps do not have retrievable seismic documentation. However, we judge by experience that the pumps/ motors possess a less than OBE level of seismic capacity.
- o Piping - The portion of all connected branch piping beyond the first valve is currently non-seismically qualified. We believe that the AFW system piping is likely to possess an OBE level of seismic capacity.
- o Valves/Actuators - (a) Oil valves in the support system. However, the licensee indicated that credit for seismic design is not necessary because they are equipped with handwheels for manual operations. (b) Pneumatic control valves and their backup nitrogen bottles. However, the licensee indicated that these valves will fail open upon loss of gas pressure or they can be bypassed by aligning the AFW flow through the main feedwater startup line into the normal or AFW steam generator nozzles on either steam generator.
  (c) Certain valves do not have retrievable seismic documentation. The licensee stated, however, that such valves were built to at least the ANSI B 31.1.0 criteria and were modeled into the stress analyses as equivalent pieces of pipe for structural purposes. Based on the above information, we believe that the valves/actuators are likely to possess an OBE level of seismic capacity.
- o Power Supplies - Power to the electric motor-operated valves and pumps, except for the motor-driven AFW pumps and the lower pressure service water pumps, is currently non-seismically qualified. However, the licensee stated that seismic design credit is not necessary for the power to the electric motor-operated valves because these valves can be manually operated with handwheels. We judge that the power supplies possess a less than OBE level of seismic capacity.
- o Water Source(s) - None
- o Initiation/Control Systems - 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 lines 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. We therefore judge that the initiation/control systems possess the capacity to withstand an SSE.

- o Structures - The turbine building is seismic Class II. We therefore judge that the structures supporting or housing the AFW system components are capable of withstanding an OBE.

Based on our evaluation, those areas of the AFW system judged not to possess an SSE seismic capability are identified below:

o	Pumps/Motors	Less than OBE
o	Piping	OBE
o	Valves/Actuators	OBE
o	Power Supplies	Less than OBE
o	Water Source(s)	None
o	Initiation/Control Systems	None
o	Structures	OBE

In summary, our evaluation indicated that the licensee's AFW system does not possess an overall seismic capability that can withstand an SSE.

Because the primary water source is seismically qualified for the SSE, a switchover to a seismically qualified secondary water source is not involved.

The Standby Shutdown Facility (SSF) system, being 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 completion 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's 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 judge that the AFW system boundary does not fully meet the requirements defined in the Generic Letter.

Regarding the SSF 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 judge that the SSF system boundary does not conform to the definition of boundary specified in the Generic Letter. Since the existing AFW system is not fully seismically qualified, we feel that this deviation needs to be evaluated and/or corrected in order to assure the required safety function of the SSF system.

The licensee stated that both the AFW and SSF systems were included within the scope of the seismic related NRC Bulletins 79-02, 79-04, 79-07, 79-14, 80-11, and IE Information Notice 80-21.

(2) Walk-Down of Non-Seismically Qualified Portions of AFW System

The licensee stated that no walk-down was performed for the non-seismically qualified items of the AFW system due to reliance on the SSF system though the walk-down is requested by GL 81-14. We feel that a walk-down is required if the new SSF system does not become operational within a reasonable period of time.

(3) Additional Information

The licensee provided a schematic sketch of the AFW and SSF systems including the water source(s), heat sink, suction and discharge piping, major mechanical equipment, and structures supporting and housing the AFW and SSF system items.

Additionally, licensee's responses provided a description of the methodologies and acceptance criteria that were used in the design of the seismically qualified portions of the AFW system, by referring to the applicable sections in the FSAR.

The licensee identified the areas of the AFW system where modification/upgrade will be performed for the tie-in between the SSF and AFW systems. Because the construction of the SSF system is underway, the licensee stated that no additional modification to the AFW system is necessary due to reliance upon the SSF system.

3. CONCLUSIONS

The information contained in licensee's responses is complete. The licensee did not perform walk-down of the currently non-seismically qualified areas of the AFW system because the SSF system, being under construction, is designed to withstand the SSE and to serve as the alternate decay heat removal system. The switchover procedure from the AFW to the SSF system will be established commensurate with the startup operation of the SSF system. Both the AFW and SSF system boundaries do not fully meet the definition specified in GL 81-14.

Based upon the submitted information, we conclude that the AFW system does not presently possess the seismic capability to withstand an SSE. The ability of the SSF system to perform the required safety function following the occurence of an SSE is also in question because the SSF system boundary does not fully conform to the boundary definition specified in GL 81-14. In conclusion, we recommend that the NRC considers requiring the licensee (a) to submit the estimated completion date of the SSF system and perform a walk-down of the existing AFW system if it is determined that the SSF system will not become operational within a reasonable period of time and (b) to evaluate and/or correct the deviation of the SSF system boundary in order to assure the required safety related function.

REFERENCES

1. D. G. Eisenhut, U.S. Nuclear Regulatory Commission, memorandum to H. R. Denton, "Multiplant Action Plan C-14: Seismic Qualification of Auxiliary Feedwater Systems," February 20, 1981.

2. U.S. Nuclear Regulatory Commission, Generic Letter No. 81-14 to all operating pressurized water reactor licensees, "Seismic Qualification of Auxiliary Feedwater Systems," February 10, 1981.

3. W. O. Parker, Jr., Duke Power Company, letter to H. R. Denton of U.S. Nuclear Regulatory Commission, January 28, 1982.

4. J. F. Stolz, U.S. Nuclear Regulatory Commission, letter to W. O. Parker, Jr., of Duke Power Company, "Request for Additional Information on Seismic Qualification of the Auxiliary Feedwater System, Oconee Nuclear Station Units 1, 2, and 3, April 8, 1982.

5. W. O. Parker, Jr., Duke Power Company, letter to H. R. Denton, U.S. Nuclear Regulatory Commission, May 25, 1982.

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