

TECHNICAL EVALUATION REPORTDonald C. Cook Nuclear Plant Units 1 and 2SEISMIC QUALIFICATION OF AUXILIARY FEEDWATER SYSTEM1. 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 Qualification 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 nonseismically 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 D.C. Cook Nuclear Plant Units 1 & 2 responded with a letter dated August 28, 1981 [Ref. 3]. The licensee's response was found not to be complete and a Request for Additional Information (RAI) was issued by the NRC, dated April 5, 1982 [Ref. 4]. The licensee provided a supplemental response in a letter dated June 15, 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 modifications 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 Description of the AFW system boundary.
- o Status of compliance with seismic related NRC Bulletins and Information Notices.
- o Results of partial walk-down of the non-seismically qualified piping, and schedule for the ongoing field verification of the remaining non-seismically piping.
- o Additionally, diagrams of the AFW system.
- o Additionally, description of methodologies and acceptance criteria for seismically qualified components.

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 those applicable to other safety-related systems in the plant. Presently, those items identified by the licensee as not being fully qualified seismically are evaluated below:

- o Pumps/Motors - None
- o Piping - (a) The condensate storage tank associate piping was designed to seismic Class II criteria. The condensate storage tank itself is seismic Class II and was designed to the OBE level. However, a seismic Class I secondary water source, i.e., the essential service water system, exists at the plant. Therefore, we judge that this piping is not essential to the safety related function of the AFW system. (b) The main feedwater piping upstream from the check valve to the motor operated valve is classified as seismic Class III, but was designed to the USAS B 31.1, 1967 edition and to withstand the OBE. Additionally, this segment of piping is part of licensee's ASME B&PV Code, Section XI, Code Class 2 Surveillance Program. Since the portion of the main feedwater piping discussed in (b) above is required to accomplish the AFW system function, we conclude that the AFW system piping possesses a seismic capability of the OBE level although the AFW system piping itself is seismically qualified to the SSE level.
- o Valves/Actuators - None

- o Power Supplies - Licensee indicated that the 4KV switchgear cabinets T11A to D, the 600V switchgear cabinets 11A to D, and the reactor trip and bypass breaker cabinets were found to be inadequately installed against overturning during the SSE. However, the permanent modification of the anchorage has been completed by August 28, 1981, and we therefore conclude that the power supplies now possess a seismic capability that will withstand an SSE.
- o Water Source(s) - The primary water source, i.e., the condensate storage tank, is seismic Class II and was designed to the OBE level. The secondary water source is the seismic Class I essential service water system. The procedure to switch the AFW pump suction to the essential service water system exists and is in place at the plant. Details of the procedure were described in licensee's letter to NRC dated March 28, 1980, No. AEP:NRC:0307A, and the procedure was accepted by NRC via S. Varga's letter of October 6, 1980 to the licensee. We conclude that the water sources possess an SSE level of seismic capacity.
- o Initiation/Control Systems - None
- o Structures - On the suction side, close to the condensate storage tank, the first valve and about three feet of piping are seismic Class I but do not have a seismic Class I enclosure. The enclosure provided is a fabricated sheet metal enclosure and the licensee did not discuss its seismic capacity. We judge that the structures possess an OBE level of overall seismic capacity. However, it is not clear to us whether the portion of the piping protected by the non-seismically qualified enclosure is part of the primary water source and path. If this is the case, the failure of the enclosure should not affect the safety related function of the AFW system.

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

o	<u>Pumps/Motors</u>	None
o	<u>Piping</u>	OBE
o	<u>Valves/Actuators</u>	None
o	<u>Power Supplies</u>	None
o	<u>Water Source(s)</u>	None
o	<u>Initiation/Control Systems</u>	None
o	<u>Structures</u>	None*

\*The level becomes OBE if the segment of piping protected by the non-seismically qualified enclosure structure is not part of the primary water source and path.

In summary, our evaluation indicated that the majority of the AFW system at D. C. Cook Nuclear Plant Units 1 and 2 presently possess a level of seismic capability that can withstand an SSE with the exception of a portion of the main feedwater piping connected to the AFW system and, possibly, one piping enclosure structure as discussed above.

The primary water source and supply path is not seismically qualified and, therefore, switchover to the seismically qualified secondary water source and supply path, i.e., the essential service water system, is required. The switchover procedure is available at the plant and was accepted by the NRC.

The seismic qualification information for any alternate decay heat removal system was not provided in the licensee's responses. This information was requested by the Generic Letter if substantial lack of seismic qualification is indicated for the AFW system. Based on the submitted information from licensee's responses, we find that the AFW system is not fully capable of performing the required safety-related function following the occurrence of an SSE. Therefore, we conclude that the licensee is required to either provide the information on seismic qualification of any alternate decay heat removal system or reanalyze/upgrade the existing AFW system to withstand the SSE.

Regarding the AFW system boundary, the licensee stated that the boundary of the AFW system as currently evaluated coincide with the boundary definition specified in GL 81-14. The licensee also stated that all work applicable to the AFW system for IE Bulletins 79-02 and 79-07 is completed; work applicable to the AFW system for IE Bulletin 79-14 and 80-11 is presently being completed; and IE Information Notice 80-21 is currently under review. The licensee also indicated that IE Bulletin 79-04 is not applicable to the AFW system re-evaluation because IE Bulletin 79-04 was issued in reference to incorrect weights for Velan swing check valves and there are no Velan valves in the AFW system for D. C. Cook Plant. We conclude that the AFW system is included within the scope of the applicable seismic related NRC Bulletins and Information Notices.

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

A walk-down of the non-seismically qualified portion of the AFW system is required. The licensee indicated that walk-down has been conducted for the non-seismically qualified piping connected to the condensate storage tanks and no deficiencies were identified. The licensee also indicated that efforts are underway to verify in the field the portion of the seismic Class III main feedwater piping upstream from the check valve to the motor-operated valve. As part of this effort, the licensee identified one valve control cabinet missing the anchorage shown on the design drawings. This deficiency was immediately repaired and reported to the NRC, Region III. The licensee will submit the results of the fieldwalk once it is completed, currently scheduled to be during the next refueling outage.

(3) Additional Information

The licensee provided a feedwater diagram and main steam diagram which illustrate the boundary of the AFW system. Additionally, licensee's responses provided a description of the methodologies, loading combinations and acceptance criteria that were used in the design of the seismically qualified portion of the AFW system





### 3. CONCLUSIONS

The information contained in licensee's responses to GI 81-14 is complete. The licensee has conducted a partial walk-down for the non-seismically qualified piping and is currently performing another field walk-down of the remaining non-seismically qualified piping scheduled to be completed during the next refueling outage.

Based on the submitted information, we judge that the AFW system at D. C. Cook Nuclear Plant, with the exception of a portion of the main feedwater piping connected to the AFW system and one enclosure structure, presently provides a reasonable assurance to perform its required safety functions following an SSE. In conclusion, we recommend that the NRC consider requiring the licensee to reanalyze and/or upgrade the AFW system to assure an overall seismic capability of the SSE level.

## 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. R. S. Hunter, Indiana & Michigan Electric Co., letter to H. R. Denton of U. S. Nuclear Regulatory Commission, August 28, 1981.
4. S. A. Varga, U. S. Nuclear Regulatory Commission, letter to R.S. Hunter of Indiana & Michigan Electric Co., "Request for Additional Information on Seismic Qualification of the Auxiliary Feedwater System, Donald C. Cook Nuclear Plant Units 1 and 2," April 5, 1982.
5. R. S. Hunter, Indiana & Michigan Electric Co., letter to H. R. Denton of U. S. Nuclear Regulatory Commission, June 15, 1982.

