

July 22, 1982

TECHNICAL EVALUATION REPORT  
CRYSTAL RIVER NUCLEAR PLANT UNIT 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 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 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 Crystal River Unit 3 responded with a letter dated July 14, 1981 [Ref. 3]. The licensee's response was found not to be complete and a Request for Additional Information was issued by the NRC, dated January 7, 1982 [Ref. 4]. The licensee provided supplemental responses in letters dated February 26, 1982 [Ref. 5] and April 20, 1982 [Ref. 6].

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.

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## 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 of the AFW system.
- o Description of the AFW system boundary.
- o Status of compliance with seismic related NRC Bulletins and Information Notices.
- o Results of walk-down of non-seismically qualified areas.
- o Additionally, a schematic sketch of the AFW system.
- o Additionally, description of methodologies and acceptance criteria for seismically qualified AFW system components.
- o Additionally, results of walk-down of the seismically qualified AFW system areas.

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 - None
- o Piping - None
- o Valves/Actuators - None
- o Power Supplies - In Ref. 5, the licensee provided a partial list which identifies the turbine building motor control center that supplies power to the individual pump discharge valve, condensate

storage tank suction and main condenser suction valve. However, these valves are prepositioned to be not required for actuation for AFW system operation and are only required for maintenance or transfer of suction supply from the condensate storage tank to the non-qualified backup condenser hotwell. We therefore conclude that the turbine building motor control center is not essential to providing the safety function of the AFW system.

Later in Ref. 6, the licensee identified the remaining non-seismically qualified power supply items but did not evaluate their seismic capability. However, the licensee also stated that such power supplies will be upgraded under their overall AFW system upgrade project.

- o Water Source(s) - None
- o Initiation/Control Systems - In Ref. 5. the licensee provided a partial list which identifies (a) the automatic actuation and control system, and (b) several manual control stations located on a section of the main control board which was not seismically qualified. However, seismically qualified manual flow controls and circuits independent of the non-nuclear instrumentation (NNI) and integrated control system (ICS) are provided on a qualified section of the main control board, and hence there is no seismic related concern.

Later in Ref. 6, the licensee identified the remaining non-seismically qualified initiation/control system components, but did not evaluate their seismic capability. However, the licensee also stated that initiation/control systems will be upgraded under their general AFW upgrade project.

- o Structures - None

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

- |                                     |       |
|-------------------------------------|-------|
| o <u>Pumps/Motors</u>               | None  |
| o <u>Piping</u>                     | None  |
| 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  |

\*Note: Current seismic capability unknown, but will be upgraded.

Based on the above evaluation, we conclude that the AFW system will possess an SSE level of seismic capability upon completion of the general upgrade project.

Because the primary water source and supply path is seismically qualified, switchover to a secondary water source is not involved. Additionally, information regarding the seismic capability of any alternate decay heat removal system is not required because the AFW system will have an SSE level of seismic capability.

Regarding the AFW system boundary, with only one exception, all branch lines which are not seismically qualified and are structurally coupled to the AFW system have been analyzed out to a point of three orthogonal restraints such that all transmitted seismic loads have been considered in the AFW system qualification. The one exception is the AFW steam supply drain tank vent connection to the turbine exhaust line. This vent line is currently under review by the licensee.

The licensee stated that the AFW system was included within the scope of seismic related 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

A walk-down of the non-seismically qualified areas identified certain power supply items to be deficient. They include some inadequate cable tray supports at Elevation 95', a clamp missing from a cable tray support at Elevation 119', one loose hanger in the cable spreading room, and three loose items in the control complex electrical support room. The licensee will add steel angle braces where necessary, replace the missing clamp, and tighten all loose items. Such corrective actions will be accomplished as part of the overall AFW system upgrade, which is scheduled concurrent with the Crystal River Unit 3 refueling outage in the first half of 1983.

### (3) Additional Information

The licensee provided a schematic sketch of the AFW system including the water source, heat sink, suction and discharging lines, major mechanical equipment, connected branch lines, and structures housing and supporting the AFW system.

The licensee also provided information on the methodologies and acceptance criteria that were used in the seismic design of the seismically qualified portions of the AFW system. In addition, they stated that for floors having fundamental frequency less than 25 Hz, the vertical seismic input was taken as two-thirds of the horizontal response spectrum for the respective evaluations.

Additionally, the licensee also performed walk-down of the seismically qualified areas of the AFW system. Deficiencies were identified, corrective actions were proposed or are to be identified, and the schedule will be consistent with the overall AFW system upgrade as mentioned previously. Results of this walk-down are summarized below:

- o Piping - (a) A 4" stainless steel line tied into with a main steam line at Valve MSV-440 is supported only for deadweight. Besides, it is not properly attached to one support and a U-bolt is missing. (b) A 6" sump discharge line routed above AFW system suction line is supported only for deadweight by rod-type hangers. (c) The turbine pump exhaust line appears to be supported for deadweight only. (d) A 12" drain line routed to turbine-driven pump is supported for deadweight only by rod-type hangers. (e) The suction line from condensate hot-well is routed close to the AFW suction line from the condensate storage tank and there appears to be not enough clearance between the two lines. (f) A portion of the pump recirculation lines may not be adequately designed. (g) A line branching off the turbine pump exhaust line does not appear on drawings. (h) A lateral restraint, designed as removable support to allow future disassembly, will be added to one of the seal injection lines routed from the top of the turbine-driven pump casing to the Valve EFV-51. (i) One of two silencers hung over the suction line requires a more adequate



support. (j) A clamp is missing from the tubing run for pressure instrument EF-2-PI for the pipe routing on the motor-driven AFW pump, and it will be replaced.

- o Primary Water Source and Supply Path - (a) Some new lines have been connected to the condensate storage tank which must be reviewed for sufficient seismic support. (b) The neutralizing tank appears too close to the condensate storage tank. A review of the neutralizing tank's foundation will be done and, if necessary, a barrier between the two tanks may have to be added.

### 3. CONCLUSIONS

The information contained in licensee's responses to Generic Letter 81-14 is insufficient for us to determine the present level of seismic capability of some areas of the existing AFW system. The licensee has stated that the AFW system will be upgraded under the general upgrade project. The walk-down conducted by the licensee identified some deficiencies and corrective actions were planned with completion dates provided. Based on submitted information, we concluded that the AFW system will possess an SSE level of seismic capability upon completion of the on-going general AFW system upgrade project. In conclusion, we recommend that no further action be initiated regarding re-analysis and/or upgrading of the AFW system of this plant under NRC multiplant Action C-14.

#### 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. P. Y. Baynard, Florida Power Corp., letter to D. G. Eisenhut of U.S. Nuclear Regulatory Commission, July 14, 1981.
4. J. F. Stolz, U.S. Nuclear Regulatory Commission, letter to D. G. Mardis of Florida Power Corp., "Request for Additional Information on Seismic Qualification of the Auxiliary Feedwater System, Crystal River Nuclear Plant Unit 3, January 7, 1982.
5. D. G. Mardis, Florida Power Corp., letter to J. F. Stolz of U.S. Nuclear Regulatory Commission, February 26, 1982.
6. D. G. Mardis, Florida Power Corp., letter to J. F. Stolz of U.S. Nuclear Regulatory Commission, April 20, 1982.