

CONFORMANCE TO REGULATORY GUIDE 1.97
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NOS. 1 AND 2

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ABSTRACT

This EG&G Idaho, Inc., report reviews the submittals for Regulatory Guide 1.97, Revision 3, for Unit Nos. 1 and 2 of the Shearon Harris Nuclear Power Plant and identifies areas of nonconformance to the regulatory guide. Exceptions to Regulatory Guide 1.97 are evaluated and those areas where sufficient basis for acceptability is not provided are identified.

FOREWORD

This report is supplied as part of the "Program for Evaluating Licensee/Applicant Conformance to RG 1.97," being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Systems Integration, by EG&G Idaho, Inc., NRC Licensing Support Section.

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1. INTRODUCTION

On December 17, 1983, Generic Letter No. 82-33 (Reference 1) was issued by D. G. Eisenhut, Director of the Division of Licensing, Nuclear Reactor Regulation, to all licensees of operating reactors, applicants for operating licenses and holders of construction permits. This letter included additional clarification regarding Regulatory Guide 1.97, Revision 2 (Reference 2) relating to the requirements for emergency response capability. These requirements have been published as Supplement No. 1 to NUREG-0737, "TMI Action Plan Requirements" (Reference 3).

Carolina Power and Light Company, the applicant for the Shearon Harris Nuclear Power Plant, Unit Nos. 1 and 2, provided a response to the generic letter on April 15, 1983 (Reference 4). The letter with their position with respect to Regulatory Guide 1.97 was submitted on September 6, 1983 (Reference 5). Additional information was submitted on June 3, 1985 (Reference 6).

This report provides an evaluation of these submittals.

2. REVIEW REQUIREMENTS

Section 6.2 of NUREG-0737, Supplement No. 1, sets forth the documentation to be submitted in a report to NRC describing how the applicant complies with Regulatory Guide 1.97 as applied to emergency response facilities. The submittal should include documentation that provides the following information for each variable shown in the applicable table of Regulatory Guide 1.97.

1. Instrument range
2. Environmental qualification
3. Seismic qualification
4. Quality assurance
5. Redundance and sensor location
6. Power supply
7. Location of display
8. Schedule of installation or upgrade

Furthermore, the submittal should identify deviations from the regulatory guide and provide supporting justification or alternatives.

Subsequent to the issuance of the generic letter, the NRC held regional meetings in February and March 1983, to answer licensee and applicant questions and concerns regarding the NRC policy on this subject. At these meetings, it was noted that the NRC review would only address exceptions taken to Regulatory Guide 1.97. Furthermore, where licensees or applicants explicitly state that instrument systems conform to the regulatory guide it was noted that no further staff review would be

necessary. Therefore, this report only addresses exceptions to Regulatory Guide 1.97. The following evaluation is an audit of the applicant's submittals based on the review policy described in the NRC regional meetings.

3. EVALUATION

The applicant provided a response to Section 6.2 of NRC Generic Letter 82-33 on September 6, 1983 and additional information on June 3, 1985. This evaluation is based on these submittals.

3.1 Adherence to Regulatory Guide 1.97

The applicant states that their submittal provides a detailed account of the conformance of the Shearon Harris Nuclear Power Plant, Unit Nos. 1 and 2, to the recommendations of Revision 3 of Regulatory Guide 1.97 (Reference 7). The applicant further states that the information provided in their submittal meets the requirements of Supplement No. 1 to NUREG-0737, Section 6. Therefore, we conclude that the applicant has provided an explicit commitment on conformance to Regulatory Guide 1.97. Exceptions to and deviations from the regulatory guide are noted in Section 3.3.

3.2 Type A Variables

Regulatory Guide 1.97 does not specifically identify Type A variables, i.e., those variables that provide information required to permit the control room operator to take specific manually controlled safety actions. The applicant classifies the following instrumentation as Type A.

1. Reactor coolant system (RCS) hot leg water temperature
2. RCS cold leg water temperature
3. RCS pressure
4. Core exit temperature
5. Neutron flux

6. Containment water level
7. Containment hydrogen concentration
8. Containment pressure
9. Refueling water storage tank (RWST) level
10. Pressurizer level
11. Steam generator level (narrow range)
12. Steamline pressure
13. Auxiliary feedwater flow
14. Condensate storage tank (CST) level
15. Containment spray additive tank level

The above variables meet the Category 1 recommendations consistent with the requirements for Type A variables, except as noted in Section 3.3.

3.3 Exceptions to Regulatory Guide 1.97

The applicant identified deviations and exceptions from Regulatory Guide 1.97. These are discussed in the following paragraphs.

3.3.1 Neutron Flux

In Reference 5, the applicant indicated that their source and intermediate range neutron flux monitors that do not meet Category 1 requirements as recommended by Regulatory Guide 1.97. The applicant stated that this variable was still under investigation.

In Reference 6, the applicant committed to the installation of Category 1 instrumentation for this variable in accordance with Regulatory Guide 1.97.

3.3.2 RCS Soluble Boron Concentration

Regulatory Guide 1.97 recommends a range of 0 to 6000 ppm for this variable. The applicant has instrumentation that covers a range of 0 to 5000 ppm. The applicant's justification is that this boron meter is adequate for any anticipated boron concentration.

The applicant deviates from Regulatory Guide 1.97 with respect to post-accident sampling capability. This deviation goes beyond the scope of this review and is being addressed by the NRC as part of their review of NUREG-0737, Item II.B.3.

3.3.3 RCS Hot and Cold Leg Water Temperature

The Shearon Harris reactors are three loop reactors. Each reactor loop has an indication of temperature for both the hot leg and the cold leg; however, in Reference 5, the applicant states that only temperatures of two loops are continuously displayed while the temperatures of the third loop is displayed on demand at the Emergency Response Facilities Information System (ERFIS) computer.

In Reference 6, the applicant has committed to provide continuous indication of the temperature of the third loop on the main control board for these variables.

3.3.4 Radioactivity Concentration or Radiation Level in Circulating Primary Coolant

The applicant has a Category 3 gross failed fuel detector that monitors delayed neutron precursors. The applicant states that if the detector is not available, grab samples may be taken via the post-accident sampling system (PASS) for laboratory analysis.

Based on the alternate instrumentation provided by the applicant, we conclude that the instrumentation supplied for this variable is adequate and, therefore, acceptable.

3.3.5 Accumulator Tank Level and Pressure

Regulatory Guide 1.97 recommends Category 2 instrumentation for these variables with a level range that monitors 10 to 90 percent of volume. The applicant has provided instrumentation that, except for environmental qualification, is Category 2. The level range monitored is between 64.1 and 71.2 percent of the accumulator volume. The applicant states that the tank level and pressure are monitored in accordance with technical specifications during normal operation. The applicant does not expect any post-accident operator action based on these variables and states that the tank status can be inferred from the RCS pressure.

The existing instrumentation is not acceptable. An environmentally qualified instrument is necessary to monitor the status of these tanks. If pressure is the key variable, and is environmentally qualified, the existing level range is acceptable. If accumulator level is considered the key variable then the range should be expanded to meet the regulatory guide recommendation in addition to being environmentally qualified.

3.3.6 Quench Tank Temperature

Regulatory Guide 1.97 recommends a temperature range of 50 to 750°F for this variable. The applicant has provided a range of 50 to 250°F. The

applicant states, in Reference 5, that the tank design pressure and rupture disk relief pressure are 100 psig. This corresponds to a saturation temperature of approximately 338°F. In Reference 6, the applicant states that this tank is non-safety and only provides a reservoir for several radioactive fluids. Direct position indication of the pressurizer safety and relief valves is provided, along with temperature indication on the discharge header from the pressurizer relief and safety valve discharge lines.

Based on the justification and alternate instrumentation provided by the applicant, we conclude that the instrumentation supplied for this variable is adequate and, therefore, acceptable.

3.3.7 Steam Generator Level

In Reference 5, the applicant lists 0 to 100 percent for the range of both narrow and wide range level instrumentation. No reference is made as to what part of the steam generator these instruments are monitoring. The applicant states that the wide-range transmitters may be supplemented by the redundant narrow range transmitters on each steam generator. The applicant also states that diversity is provided by use of steamline pressure and auxiliary feedwater flow. In Reference 6, the applicant states that their wide range steam generator level instrumentation meets the range recommended by Regulatory Guide 1.97

3.3.8 Makeup Flow-In Letdown Flow-Out Volume Control Tank Level

The applicant takes exception to the environmental qualification recommendation of Regulatory Guide 1.97 for these variables. The justification provided by the applicant for this deviation is that these variables are not required for safe plant shutdown and the system is isolated by plant protection signals.

As these variables are not utilized in conjunction with a safety system, we find that the instrumentation provided is acceptable.

3.3.9 Component Cooling Water (CCW) Flow to Engineered Safety Features (ESF) System

Regulatory Guide 1.97 recommends Category 2 instrumentation for this variable. Category 3 instrumentation is provided. The applicant considers CCW flow to be a backup variable to the existing Category 2 key variables which demonstrate CCW flow. These key variables are CCW heat exchanger outlet temperature and pressure, CCW pump status and CCW flow leaving the containment from the reactor coolant pumps. These variables are monitored on the main control board.

We find the applicant's justification acceptable. The temperature and pressure indication in conjunction with the CCW pumps status and the reactor coolant pump cooling water flow status adequately monitor this system.

4. CONCLUSIONS

Based on our review, we find that the applicant either conforms to or is justified in deviating from Regulatory Guide 1.97, with the following exception:

1. Accumulator tank level and pressure--environmental qualification should be addressed in accordance with 10 CFR 50.49. If accumulator level is determined to be the key variable the range should be expanded (Section 3.3.5).

5. REFERENCES

1. NRC letter, D. G. Eisenhut to All Licensees of Operating Reactors, Applicants for Operating Licenses, and Holders of Construction Permits, "Supplement No. 1 to NUREG-0737--Requirements for Emergency Response Capability (Generic Letter No. 82-33)," December 17, 1982.
2. Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, Regulatory Guide 1.97, Revision 2, U.S. Nuclear Regulatory Commission (NRC), Office of Standards Development, December 1980.
3. Clarification of TMI Action Plan Requirements, Requirements for Emergency Response Capability, NUREG-0737 Supplement No. 1, NRC, Office of Nuclear Reactor Regulation, January 1983.
4. Carolina Power and Light Company Letter, E. E. Utley to Director, Office of Nuclear Reactor Regulation, April 15, 1983.
5. Carolina Power and Light Company Letter, M. A. McDuffie to Director, Office of Nuclear Reactor Regulation, September 6, 1983.
6. Carolina Power and Light Company Letter, S. R. Zimmerman to H. Denton, Office of Nuclear Reactor Regulation, NRC, "Compliance with Regulatory Guide 1.97," June 3, 1985, Serial No. NLS-85-109.
7. Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, Regulatory Guide 1.97, Revision 3, U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Regulatory Research, May 1983.

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13 ABSTRACT (200 words or less)

This EG&G Idaho, Inc. report provides a review of the Shearon Harris Nuclear Power Plant, Unit Nos. 1 and 2, submittal for Regulatory Guide 1.97 and identifies areas of nonconformance to the guide. Any exception to the guidelines are evaluated and those areas where sufficient basis for acceptability is not provided are identified.

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