



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO SAFETY

1.0 INTRODUCTION

Equipment which is used to perform a necessary safety function must be demonstrated to be capable of maintaining functional operability under all service conditions postulated to occur during its installed life for the time it is required to operate. This requirement, which is embodied in General Design Criteria 1 and 4 of Appendix A and Sections III, XI, and XVII of Appendix B to 10 CFR Part 50, is applicable to equipment located inside as well as outside containment. More detailed requirements and guidance relating to the methods and procedures for demonstrating this capability for electrical equipment have been set forth in 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants," NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" (which supplements IEEE Standard 323 and various NRC Regulatory Guides and industry standards), and "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors" (DOR Guidelines).

2.0 BACKGROUND

On February 8, 1979, the NRC Office of Inspection and Enforcement (IE) issued to all licensees of operating plants (except those included in the systematic evaluation program (SEP)) IE Bulletin (IEB) 79-01, "Environmental Qualification of Class 1E Equipment." This Bulletin, together with IE Circular 78-08 (issued on May 31, 1978), required the licensees to perform reviews to assess the adequacy of their environmental qualification programs.

On January 14, 1980, NRC issued IEB 79-01B which included the DOR Guidelines and NUREG-0588 as attachments 4 and 5, respectively. Subsequently, on May 23, 1980, Commission Memorandum and Order CLI-80-21 was issued and stated that the DOR Guidelines and portions of NUREG-0588 form the requirements that licensees must meet regarding environmental qualification of safety-related electrical equipment in order to satisfy those aspects of 10 CFR 50, Appendix A, General Design Criterion (GDC) 4. Supplements to IEB 79-01B were issued for further clarification and definition of the staff's needs. These supplements were issued on February 29, September 30, and October 24, 1980.

In addition, the staff issued orders dated August 29, 1980 (amended in September 1980) and October 24, 1980 to all licensees. The August order required that the licensees provide a report, by November 1, 1980, documenting the qualification of safety-related electrical equipment. The October order

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required the establishment of a central file location for the maintenance of all equipment qualification records. The central file was mandated to be established by December 1, 1980. The staff subsequently issued a Safety Evaluation Report (SER) on environmental qualification of safety-related electrical equipment to the licensee (Rochester Gas and Electric Corporation) on June 1, 1981. This SER directed the licensee to "either provide documentation of the missing qualification information which demonstrates that safety-related equipment meets the DOR Guidelines or NUREG-0588 requirements or commit to a corrective action (requalification, replacement (etc.))." The licensee was required to respond to NRC within 90 days of receipt of the SER. In response to the staff SER issued in 1981, the licensee submitted additional information regarding the qualification of safety-related electrical equipment. This information was evaluated for the staff by the Franklin Research Center (FRC) in order to: 1) identify all cases where the licensee's response did not resolve the significant qualification issues, 2) evaluate the licensee's qualification documentation in accordance with established criteria to determine which equipment had adequate documentation and which did not, and 3) evaluate the licensee's qualification documentation for safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation. A Technical Evaluation Report (TER) was issued by FRC on May 28, 1982. A Safety Evaluation Report was subsequently issued to the Rochester Gas and Electric Corporation December 13, 1982, with the FRC TER as an attachment.

A final rule on environmental qualification of electric equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, Section 50.49 of 10 CFR Part 50, specifies the requirements of electrical equipment important to safety located in a harsh environment. In accordance with this rule, equipment for Ginna may be qualified to the criteria specified in either the DOR Guidelines or NUREG-0588, except for replacement equipment. Replacement equipment installed subsequent to February 22, 1983 must be qualified in accordance with the provisions of 10 CFR 50.49, using the guidance of Regulatory Guide 1.89, unless there are sound reasons to the contrary.

A meeting was held with each licensee of plants for which a TER had been prepared for the staff by FRC in order to discuss all remaining open issues regarding environmental qualification, including acceptability of the environmental conditions for equipment qualification purposes, if this issue had not yet been resolved. On April 17, 1984, a meeting was held to discuss Rochester Gas and Electric's proposed method to resolve the environmental qualification deficiencies identified in the December 13, 1982 SER and May 28, 1982 FRC TER. Discussions also included Rochester Gas and Electric's general methodology for compliance with 10 CFR 50.49, and justification for continued operation for those equipment items for which environmental qualification is not yet completed. The minutes of the meeting and proposed method of resolution for each of the environmental qualification deficiencies are documented in May 29 and August 30, 1984 submittals from the licensee.

### 3.0 EVALUATION

The evaluation of the acceptability of the licensee's electrical equipment environmental qualification program is based on the results of an audit review performed by the staff of: (1) the licensee's proposed resolutions of the environmental qualification deficiencies identified in the December 13, 1982 SER and May 28, 1982 FRC TER; (2) compliance with the requirements of 10 CFR 50.49; and (3) the assurance that justification for continued operation (JCO) is not necessary for those equipment items for which the environmental qualification is deemed complete.

#### Proposed Resolution of Identified Deficiencies

The proposed resolutions for the electric equipment environmental qualification deficiencies, identified in the December 13, 1982 SER, and the FRC TER enclosed with it, are described in the licensee's May 29 and August 30, 1984 submittals. During the April 17, 1984 meeting with the licensee, the staff discussed the proposed resolution of each deficiency for each equipment item identified in the FRC TER and found the licensee's approach for resolving the identified environmental qualification deficiencies acceptable. The majority of deficiencies identified were documentation, similarity, aging, qualified life and replacement schedule. All open items identified in the SER dated December 13, 1982 were also discussed and the resolution of these items has been found acceptable by the staff.

The approach described by the licensee for addressing and resolving the identified deficiencies includes replacing equipment, performing additional analyses, utilizing additional qualification documentation beyond that reviewed by FRC, obtaining additional qualification documentation and determining that some equipment is outside the scope of 10 CFR 50.49, and therefore not required to be environmentally qualified, e.g., located in a mild environment. We discussed the proposed resolutions in detail on an item by item basis with the licensee during the April 17, 1984 meeting. Replacing or exempting equipment, for an acceptable reason, are clearly acceptable methods for resolving environmental qualification deficiencies. The more lengthy discussions with the licensee concerned the use of additional analyses or documentation. Although we did not review the additional analyses or documentation, we discussed how analysis was being used to resolve deficiencies identified in the FRC TER, and the content of the additional documentation in order to determine the acceptability of these methods. The staff determined that the analysis method and procedures being used by the licensee to implement the results of the analysis acceptable. In addition, the licensee's equipment environmental qualification files will be audited by the staff during follow-up inspections to be performed by Region I, with assistance from IE Headquarters and NRR staff as necessary.

Since a significant amount of documentation has already been reviewed by the staff and FRC, the primary objective of the file audit will be to verify that the files contain the appropriate analyses and other necessary documentation to support the licensee's conclusion that the equipment is qualified. The inspections will verify that the licensee's program for surveillance and maintenance of environmentally qualified equipment is adequate to assure that this equipment is maintained in the as analyzed or tested condition. The method used for tracking periodic replacements parts, and implementation of the licensee's commitments and actions, e.g., regarding replacement of equipment, will also be verified.

Based on our discussions with the licensee and our review of its submittal, we find the licensee's approach for resolving the identified environmental qualification deficiencies acceptable.

#### Compliance With 10 CFR 50.49

In its August 30, 1984 submittal, the licensee has described the approach used to identify equipment within the scope of paragraph (b)(1) of 10 CFR 50.49, equipment relied upon to remain functional during and following design basis events. The licensee states that a series of evaluations were performed for the Ginna Plant during the SEP, of all high and moderate energy line breaks and cracks, and equipment failures, which could result in a harsh environment inside and outside containment including the effects of flooding. Reference documents used to generate the list of required equipment included the FSAR, Technical Specifications, Emergency Operating Procedures, P&ID's, and electrical distribution diagrams. The results of all these analyses were evaluated in the designation of appropriate design basis conditions for RG&E's environmental qualification program. The complete list of safety-related electrical equipment considered by RG&E to require environmental qualification for a harsh environment is included in the May 28, 1982 TER except as supplemented by TMI items in RG&E's March 30, 1984 submittal.

The licensee's approach for identifying equipment within the scope of paragraph (b)(1) is in accordance with the requirements of that paragraph and, therefore, acceptable.

The method used by the licensee for identification of electrical equipment within the scope of paragraph (b)(2) of 10 CFR 50.49, non-safety-related electric equipment whose failure under postulated environmental conditions could prevent satisfactory accomplishment of safety functions, is summarized below:

1. A series of evaluations were performed for the Ginna Plant during the SEP of all high and moderate energy line breaks and cracks, and equipment failures, which could result in a harsh environment inside and outside containment including the effects of flooding. Reference documents used to generate the list of required equipment included the FSAR, Technical Specifications, Emergency Operating Procedures, P&ID's, and electrical distribution diagrams. The results of all these analyses, were evaluated in the designation of appropriate design basis conditions for RG&E's environmental qualification program.
2. RG&E has performed, through the SEP and other reviews, evaluations of the possible effects of non-safety-related equipment on safety-related functions, as defined in 50.49. These evaluations show that no adverse effect on the required safety functions will occur as a result of such interactions.
3. During the course of these evaluations, auxiliary equipment connected electrically and/or mechanically to the required safety-related equipment was reviewed to determine if failures due to the postulated environmental conditions could adversely affect the required safety functions.
4. Associated circuits were reviewed to assure that failure would not prevent the required safety functions, because of the existence of properly coordinated protective relays, circuit breakers, and fuses for electrical fault protection.

The staff finds the methodology being used by the licensee is acceptable since it provides reasonable assurance that equipment within the scope of paragraph (b)(2) of 10 CFR 50.49 has been identified.

With regard to paragraph (b)(3) of 10 CFR 50.49, the licensee states that the RG&E evaluation of Regulatory Guide 1.97 is being conducted separate from the Environmental Qualification Program, as part of the review of Supplement 1 to NUREG-0737. A letter presenting RG&E's position relative to Regulatory Guide 1.97 was sent to NRC on January 31, 1984. Post-accident monitoring equipment which RG&E presently uses to provide necessary operator information (such as required Emergency Operating Procedure indications) has previously been incorporated into the list of instrumentation within the scope of the environmental qualification review. The staff has not yet completed its review for conformance to Regulatory Guide 1.97. The staff review for Regulatory Guide 1.97 conformance may result in the licensee being required to include additional equipment in its environmental qualification program.

The staff finds the licensee's approach to identifying equipment within the scope of paragraph (b)(3) of 10 CFR 50.49 acceptable since it is in accordance with the requirements of that paragraph.

#### Justification for Continued Operation

On November 30, 1984, by telecon, and on January 24, 1985 by letter Rochester Gas and Electric Corporation stated that all installed equipment within the scope of 10 CFR 50.49 is environmentally qualified and thus, there is no need for Justifications for Continued Operation at this time.

#### 4.0 CONCLUSIONS

Based on the above evaluation, the staff concludes the following with regard to the qualification of electric equipment important to safety within the scope of 10 CFR 50.49.

- ° Rochester Gas and Electric's electrical equipment environmental qualification program complies with the requirements of 10 CFR 50.49.
- ° The proposed resolutions for each of the environmental qualification deficiencies identified in the December 13, 1982 SER and FRC TER are acceptable.
- ° Continued operation will not present undue risk to the public health and safety.

#### 5.0 ACKNOWLEDGEMENTS

This Safety Evaluation was prepared by C. L. Miller and P. Shemanski.

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