

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

March , 1985

IE INFORMATION NOTICE NO. 85-XX: DEFICIENCIES IN EQUIPMENT QUALIFICATION  
TESTING AND CERTIFICATION PROCESS

Addressees:

All holders of a nuclear power reactor operating license (OL) or construction permit (CP).

Purpose:

This information notice is to alert licensees that quality-related deficiencies in the qualification documentation, review, approval, and certification process have been identified by the Vendor Program Branch (VPB) of the NRC during its review of qualification activities. NRC observations suggest that some vendor qualification activities and practices may not provide a sufficient basis for qualification certification.

It is suggested that recipients review this information for specific and generic applicability to ensure that documentation supporting environmental qualification of safety-related equipment at their facilities is complete. Suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or response is required.

Description of Circumstances:

10 CFR 50.49, Regulatory Guide 1.89 (Revision 1, June 1984), IEEE Std. 323-1974 and 323-1983 each require auditable information demonstrating qualification to provide continuing assurance to licensee management and the NRC that equipment in use is qualified for the entire period during which it is installed in the nuclear power plant. 10 CFR 50, Appendix B, provides quality assurance requirements for the generation of all elements of qualification files. IEEE Std. 323-1974, Section 8 (endorsed by Regulatory Guide 1.89), requires that individual elements of qualification files be reviewed and approved by the licensee. Since July 1982, the VPB has actively inspected vendor qualification efforts for compliance to these NRC requirements. Inspections have been performed at manufacturing facilities, independent testing laboratories, architect engineers, and NSSS suppliers.

NRC observations at the vendor level provide examples where more active licensee participation in the qualification effort should have occurred. In some cases,

certification of qualification is now difficult to justify because of documentation and test practices employed by vendors. Some examples of NRC findings follow.

1. Inadequate Reporting by Vendors of Qualification Procedures and Test Results

Several examples of poor reporting of qualification procedures and test results by vendors have been observed. For example, an Ebasco specification to American Insulated Wire (AIW) Corporation (NRC Inspection 99900399/84-01) required flame test samples to be subjected to simulated aging and irradiation before the flame test was conducted. During the NRC inspection, no evidence of aging and/or irradiation was available. AIW ethylene-propylene rubber (EPR) wire tested by Franklin Institute Research Laboratory (FIRL) was reported by FIRL to have been preaged by AIW to a 40-year simulated life before undergoing the FIRL test. No records demonstrating preaging were available during the NRC audit of AIW. AIW submitted time versus temperature plots, using the Arrhenius equation, on elongation data for AIW EPR insulation. This data was used to determine accelerated aging to simulate 40-year life at 80° C and 90° C. When a request was made by the NRC for the raw data used to generate the above, AIW stated this information was supplied by DuPont; however, no DuPont letter or engineering data sheet was available during the NRC audit.

During inspections at Rockbestos (NRC Inspections 99900277/83-01, 83-02, and 83-04), the NRC discovered evidence of poor reporting practices. For example, Rockbestos Company qualification report QR 3803 did not accurately represent the temperature and pressure profile achieved during a qualification test. Accuracies and calibration ranges for test equipment also were misquoted in the qualification report.

NRC inspections at General Electric (NRC Inspections 99900911/84-01 and 84-02) and Wyle (Norco) (NRC Inspection 99900905/83-02) identified reporting deficiencies. A Wyle test plan and the initial GE qualification report listed Brand Rex wiring as test specimens. In response to NRC inspection activities, GE determined that Brand Rex wiring was not included in the qualification test effort.

BIW Cable Systems (NRC Inspection 99900283/83-02) indicated to Stone & Webster that its "qualification program is submitted in accordance with... IEEE Standards #283-1974 and #323-1974" as well as the Stone & Webster purchase specification. During the NRC inspection of BIW, it was determined that documentation files did not include test plans, test procedures, test equipment lists, calibration record references, or data to support that qualification of the identified cable had been satisfactorily accomplished.

2. Vendor Documentation to Support the Validity of the Qualification Effort Not Maintained for the Installed Lifetime of Class 1E Equipment

Several examples where vendors did not maintain documentation to support the validity of the qualification effort also have been identified. Neither Rockbestos Company nor its test laboratory, Franklin Research Center (FRC) (NRC Inspections 99900277/83-04 and 99900921/83-02), retained supporting test data

for 11 FRC final qualification test reports that recorded testing performed from 1969 through 1974. FRC retains supporting test data for 5 years and then offers it to the customer. If the customer does not accept this data it is destroyed. As a result, many FRC final qualification reports could not be audited to determine the technical adequacy of testing as well as the quality assurance controls administered during such testing.

NRC inspections at BIW Cable Systems (NRC Inspection 99900283/83-02) found no documentation to show calibration of test equipment used for qualification testing performed in 1976. These test results were being employed in 1982 to satisfy current purchase specifications. Test equipment lists also were not available. Test plans and procedures (per Section 6.3 of IEEE Std. 323-1974) had not been developed by BIW prior to testing and thus were not retained as part of the qualification documentation per IEEE Std. 323-1974, Section 8, requirements.

3. Qualification Activities by Vendors not Performed under a Quality Assurance Program Consistent with 10 CFR 50, Appendix B

NRC inspections have documented examples of qualification activities by vendors that were not performed under an appropriately controlled quality assurance program. The Rockbestos Company (NRC Inspection 99900277/83-02), BIW Cable Systems (NRC Inspection 99900283/83-01), American Insulated Wire (NRC Inspection 99900399/84-01), and Anaconda Cable and Wire (NRC Inspection 99900230/83-01) are examples where testing was not conducted under the control of an appropriate QA program. NRC Inspection 99900921/83-02 documents examples where Rockbestos imposed no quality or technical requirements on its test laboratory, FRC. FRC was not required to test in accordance with any established requirements except an "implicit understanding that FRC would apply their highly regarded professional ethics, experience, and skills in the performance of testing."

4. Inadequate Review, Approval, or Certification by Vendors of Qualification Test Results

Inadequate review, approval, or certification by vendors has been noted during NRC inspections. Rockbestos (NRC Inspection 99900277/83-01) submitted to Bechtel a qualification report and a certificate of compliance signed by a Rockbestos professional engineer. During an audit of Rockbestos, the NRC established that Rockbestos' review and approval process for this qualification program was inadequate. Discrepancies between the final qualification report and the supporting data were noted. Test equipment and instrumentation were observed to have inadequate resolution to record loss-of-coolant-accident (LOCA) test parameters and functioning of test specimens during the testing. Test equipment was neither properly calibrated nor under the control of the calibration system.

During an NRC inspection at Franklin Research Center (NRC Inspection 99900921/83-01), the director of nuclear engineering indicated that an engineer had not been technically qualified to perform an appropriate review for a qualification test plan on which the engineer acted as reviewer.

NRC also has noted that vendors sometimes certify that the intent of applicable standards was satisfied rather than certify that vendor qualification efforts fulfill acceptance criteria as stated in applicable standards and specifications. For example, during NRC inspections at FRC (NRC Inspection 99900921/83-02) regarding Rockbestos cable qualification activities, it was noted that FRC did not certify to meeting all the requirements and failure criteria of IEEE Stds. 323 and 383, but stated instead that the objective of the test was "to demonstrate performance of electrical cables for Class 1E service in nuclear power generating stations in accordance with guidelines presented in IEEE Stds. 323-1974 and 383-1974." This is not a certification that the test met any of the requirements of these standards.

FRC also performed qualification testing of Brand Rex cable (NRC Inspection 99900325/84-01) but did not make a certification statement that the equipment met test criteria/requirements of IEEE Stds. 323-1974 and 383-1974. The FRC certification simply states that this report is a true account of the test conducted and the results obtained. FRC also has performed qualification testing for AIW (NRC Inspections 99900399/84-01 and 99900921/83-02). The reports state that IEEE Stds. 323 and 383 will be used as guidelines. FRC cable qualification reports frequently do not equate Arrhenius aging parameters to design life, service conditions, and qualified life.

BIW Cable Systems performed generic and/or research development (R&D) testing of cable for nuclear application (NRC Inspection 99900283/83-02) and after successful testing of a product several times, the R&D results are excerpted into a qualification report and certified as meeting applicable requirements. BIW also makes reference to a qualification report for GE silicone cables and argues that its product is similar.

Detailed descriptions of NRC findings and results of these inspections are published in NUREG-0040, entitled "Licensee Contractor and Vendor Inspection Status Report," Volumes 6, 7, and 8. This NUREG is published quarterly by the NRC, and it can be obtained from the National Technical Information Service, Springfield, Virginia 22161.

Correspondence with contractors and vendors relative to the inspection data contained in NUREG-0040 is placed in the NRC Public Document Room, 1212 H Street, N. W., Washington, D.C. 20555.

#### Discussion:

The deficiencies described in this notice resulted from a review of the vendor's qualification activities against the applicable procurement document requirement or, in the case of generic qualification, against the applicable QA criteria. The extent to which these deficiencies may affect the validity of equipment qualification will depend on plant specific considerations. For example, the qualification documentation requirements for equipment qualified under DOR Guidelines may not be as extensive as for equipment qualified to the requirements of 10 CFR 50.49.



An overall assessment of identified deficiencies suggests that some vendor qualification activities may not adequately support the applicable NRC requirements and emphasizes the need for increased licensee attention to the adequacy of their vendor procurement control practices for qualification activities, and the definition of responsibilities and interfaces in the qualification process.

In accordance with the requirements of Criteria IV, VII, and XVII of 10 CFR 50, Appendix B, licensees are reminded of the following: (1) licensee (and vendor) procurement documents should clearly identify any certification responsibilities to each vendor and subvendor; (2) licensee audits of vendors should monitor the vendor certification process and ensure that certifications are supported by adequate qualification facilities, qualification documentation, and quality assurance practices; and (3) requirements concerning record retention (duration), location, storage, preservation, and safekeeping as specified in the equipment specifications, purchase orders, and testing contracts also should be verified.

Documentation from vendors and test laboratories form the basis for meeting the equipment qualification requirements of paragraphs (d), (e), (f) and (j) of 10 CFR 50.49. This documentation may include procurement specifications, test plans, test procedures, test logbooks, qualification test reports, test data, analyses and corrective action to resolve test anomalies, test configurations and interfaces, and quality assurance information. The following are areas in which this documentation has been found deficient.

1. Service requirements: Equipment operability and functional requirements during normal, accident, and postaccident conditions have not been clearly demonstrated by the qualification test report. Environmental parameters, mechanical loadings, electrical loadings, and operability time requirements postulated for accident and postaccident conditions have not been enveloped by supporting data and documented in the qualification report.
2. Testing considerations: Aging analyses have not considered dose rate and sequence (order of radiation and thermal aging) effects and normal environmental parameters along with operating conditions of the equipment being qualified. The make, model number, performance characteristics, design features, and operational requirements of the equipment being qualified are not similar to the test equipment. The "installed condition" and "associated connecting interfaces" of equipment being qualified are not similar to the mounting configuration and connecting interfaces of the test equipment. Deviations from this similarity have not been justified by the reviewer and documented in the EQ file.
3. Test anomalies: All test failures and anomalies have not been documented in the qualification test report and has resolution and/or corrective action to each failure and anomaly been evaluated. Justification has not been provided as to why the proposed resolution and/or corrective action described in the test report is applicable to the specific plant. Justification has not been provided as to why the corrective action will not create a safety hazard to the operation of the plant.

The NRC staff considers the above identified deficiencies to be representative examples of problems with vendors and test laboratories providing qualification services to other vendors and user utilities. While there may be specific problems applicable to a particular utility, the staff expects that user utilities will consider the overall applicability of the above information in establishing qualification of safety-related equipment.

No specific action or written response is required by this information notice. If you have any questions regarding this notice, please contact the Regional Administrator of the appropriate NRC regional office or this office.

Edward L. Jordan, Director  
Division of Emergency Preparedness  
and Engineering Response  
Office of Inspection and Enforcement

Technical Contact: G. T. Hubbard  
(301) 492-9759

Attachment:  
List of Recently Issued IE Information Notices

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certification of qualification is now difficult to justify because of documentation and test practices employed by vendors. Some examples of NRC findings follow.

1. Qualification Activities not performed under a QA Program consistent with 10 CFR 50, Appendix B
  - Several instances were observed when qualification testing of Class 1E equipment was conducted without appropriate QA programs (~~R&D tests used to support qualification~~).
  - No QA requirements were imposed on organizations providing safety related services (such as irradiation, calibration, analyses) associated with the qualification process.
2. Qualification Test Report conclusions not supported by test data or test data not available
  - The test profiles shown in some Qualification reports were not actually achieved during test.
  - Several reports identified specimens or materials which were different from those actually tested.
  - Some test records which were examined showed inadequate sensitivity/resolution of test equipment.
  - Documentation required by the standards referenced in the test report was not available. (Test plans, equipment lists, calibration records.)
  - In several instances, test anomalies were not adequately reported or evaluated.
  - In some cases, similarity between test specimens and items to be qualified was not established.
3. Documentation to support the validity of qualification not maintained for lifetime of the equipment
  - Supporting test data destroyed after 5 years.
4. Inadequate review, approval or certification of test results
  - Interfaces/responsibilities of organizations involved in the qualification process not clearly defined.
  - Test reports contain statements that testing satisfies the "guidelines" or "intent" of standards referenced in the specification.



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## Recent EQ Test Facility Inspection Results

The following generic EQ problems were identified during EQ inspections conducted from August 1983 thru June 1984.

- BW/W
1. A problem in the area of documentation is the absence of direct certifications or statements that components tested meet the technical requirements of IEEE 323-1971/1974 and daughter standards such as IEEE 383-1974. In some cases the certifications have been found false, in that, the vendor has certified that components and equipment met all QA and technical requirements when, in fact, they did not meet all requirements. In other cases the certification statement is written in such a loose manner that it does not certify that the requirements were met but simply certifies that the final report is a true account of the test conducted and the results obtained.
  2. A problem was identified where there was a lack of sufficient auditable supporting data for qualification reports. This fact, combined with the fact that the testing was conducted as research testing not under any QA controls raises doubt of the qualification status of the tested items. The generic question is what is the qualification status of a piece of equipment if there is not sufficient auditable data to support qualification.
- AW



3. At two A/E's the problem of how do they assure that their EQ data reviews and evaluations are based on good data when the licensee has not given them the task of performing audits on manufacturers relative to EQ activities. Based on EQs inspection experience it appears that some audits of manufacturers are being audited relative to production activities and EQ activities are excluded from the audit process. This fact is supported by the numerous times that EQS has documented in inspection reports that EQ activities are not under QA controls. If the A/E's have no way of closing the QA loop, then their evaluations are no better than the data provided by the licensee which may or may not be performing EQ audits.
4. The generic problem of vendors performing EQ activities without any documented QA control of the activities was observed again in a number of vendors inspected for the first time.

SH/CEB