

Dr. Ross
H. Denton



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

JUL 12 1982

MEMORANDUM FOR: Satish K. Aggarwal
Electrical Engineering Branch
Division of Engineering Technology, RES

FROM: Richard C. DeYoung, Director
Office of Inspection and Enforcement

SUBJECT: RESPONSE TO MR. CHILK'S MEMORANDUM PERTAINING TO
SECTION 50.49 TO 10 CFR PART 50, ENVIRONMENTAL
QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO
SAFETY FOR NUCLEAR PLANTS

We have reviewed the draft Commission Paper and the "final draft" of the subject rule, and have no significant comments regarding the subject Commission Paper.

Richard C. DeYoung
Richard C. DeYoung, Director
Office of Inspection and Enforcement

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

ACTION

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JUN 30 1982

Taylor
(Chalmer D. Taylor)

MEMORANDUM FOR: V. Stello
H. Denton
R. DeYoung
R. Minogue
G. Cunningham
P. Norry

FROM: Satish K. Aggarwal
Office of Nuclear Regulatory Research

SUBJECT: RESPONSE TO MR. CHILK'S MEMORANDUM PERTAINING TO
SECTION 50.49 TO 10 CFR PART 50, "ENVIRONMENTAL
QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO
SAFETY FOR NUCLEAR POWER PLANTS"

Enclosed for your review is a draft of Commission Paper and the "final draft" of the subject rule. This version incorporates the Commission directives, as outlined in the draft Commission Paper.

Since I plan to obtain Office Directors' concurrence on July 12, 1982, I will appreciate receiving your comments by July 9, 1982.

S. K. Aggarwal
Satish K. Aggarwal
Office of Nuclear Regulatory Research

Enclosures:

1. Draft Commission Paper.
2. Federal Register Notice (Final Rule).

cc w/encl:
S. Hanauer
R. Mattson
W. Besaw
J. Felton
J. Taylor
D. Ross
G. Arlotto
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CF

DRAFT

For: The Commissioners

From: William J. Dircks
Executive Director for Operations

Subject: FINAL RULE, "ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO SAFETY FOR NUCLEAR POWER PLANTS"

Purpose: To revise the Final Rule based on the Commission directives [Staff Requirement Memorandum (SRM)] dated June 25, 1982 from Mr. Chilk to Mr. Dircks.

Discussion: Based on SRM dated June 25, 1982, Enclosure 1, Notice of Final Rulemaking, SECY-82-207A dated June 9, 1982, has been modified as follows:

1. The title of the final rule has been changed to read "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants." The statement of considerations (pages 5 and 6 of Enclosure 1) has also been modified as directed.
2. Paragraph 50.49(c) (pages 18-19 of Enclosure 1) pertaining to the scope has been appropriately modified.
3. Two options in the area of replacement parts have been included (see paragraph 50.49(1) - page 26 of Enclosure 1).
4. A new paragraph has been added to page 5 of Enclosure 1 to indicate that there is no relaxation of the requirements of CLI 80-21, except as noted.

Contact:
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DRAFT

5. Category I requirements (IEEE 323-1974) will apply to nuclear power plants for which the construction permit safety evaluation report was issued after July 1, 1974 (Commanche Peak and later plants). (See page 4 of Enclosure 1.)

The codified portion of the final rule does not make any distinction between Category I and Category II requirements of NUREG-0588. Methods of implementation which are too prescriptive are contained in Standard Review Plan and R.G. 1.89. The Director, NRR, will insure that operating licenses will not be granted for Commanche Peak and later plants unless they satisfy the requirements of IEEE 323-1974 (Category I of NUREG-0588).

6. The requirement to qualify equipment located inside the containment, which is needed to complete one path of achieving and maintaining a cold shutdown condition following design basis events, has been added to the final rule (see page 18 of Enclosure 1), as an option.

Enclosed is a list of operating plants who have stated in their submittals, that one train of equipment to accomplish cold shutdown has been qualified. NRC staff has made no evaluation of their claims. (Enclosure 2.)

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7. SECY-82-207A dated June 9, 1982, incorporates all comments received at the June 1, 1982 Commission meeting on this subject.

Staff suggests that Enclosure 2, Analysis of Public Comments, will be revised after the Commission has voted on this rule and made decisions on (1) replacement parts and (2) qualification of equipment needed for cold shutdown. The revised analysis of public comments can be revised and resubmitted to the Commission within one day subsequent to the majority decision.

Scheduling: Affirmation of this rule as early as possible.

William J. Dircks
Executive Director for Operations

Enclosures:

1. Federal Register Notice (Final Rule)
2. List of operating plants - Cold Shut Requirement (BY NRR)

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

Environmental Qualification of Electric Equipment
Important to Safety for Nuclear Power Plants

AGENCY: Nuclear Regulatory Commission.

ACTION: [~~Proposed~~] Final rule.

SUMMARY: The [~~Nuclear-Regulatory~~] Commission is [~~proposing-to~~] amending its regulations applicable to nuclear power plants to clarify and strengthen the criteria for environmental qualification of electric equipment important to safety. Specific qualification methods currently contained in national standards, regulatory guides, and certain NRC publications for equipment qualification have been given different interpretations and have not had the legal force of an agency regulation. This amendment [~~the-proposed rule-would~~] codifies the[se] environmental qualification methods and criteria that meet the [~~and-clarify-the~~] Commission's requirements in this area.

EFFECTIVE DATE: [UPON publication in the Federal Register]

[~~DATES:~~ Comment period expires (60 days after publication in the Federal Register): Comments received after ----- will be considered if it is practical to do so; but assurance of consideration cannot be given except as to comments received on or before this date:

ADDRESSES: Written comments and suggestions may be mailed to the Secretary of the Commission; Attention: Booketing and Service Branch;

U-5: Nuclear Regulatory Commission; Washington; B-6: 20555; or hand-delivered to the Commission's Public Document Room at 1717 H Street NW; Washington; B-6; between the hours of 8:30 a.m. and 4:45 p.m. on normal work days.]

FOR FURTHER INFORMATION CONTACT: Satish K. Aggarwal, Office of Nuclear Regulatory Research, [Electrical Engineering Branch;] U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Telephone (301)443-5946.

SUPPLEMENTARY INFORMATION:

Previous Notice

On January 20, 1982, NRC published in the Federal Register a notice of proposed rulemaking on environmental qualification of electric equipment for nuclear power plants (47 FR 2876). The comment period expired March 22, 1982. A total of 69 comment letters raising 10 major issues were received by April 6, 1982. An additional 10 comment letters were received by April 21, 1982, but no new issues were raised. The major issues are discussed below.

Nature and Scope of the Rulemaking

Nuclear power plant equipment important to safety must be able to perform [the] its safety functions throughout its installed life. This requirement is embodied in General Design Criteria 1, 2, 4, and 23 of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities"; in Criterion III, "Design Control," and Criterion XI, "Test Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel

Reprocessing Plants," to 10 CFR Part 50; and in paragraph 50.55a(h) of 10 CFR Part 50, which incorporates by reference IEEE 279-1971,^{1,2} "Criteria for Protection Systems for Nuclear Power Generating Stations." This requirement is applicable to equipment located inside as well as outside the containment.

The NRC has used a variety of methods to ensure that these general requirements are met for [~~safety-grade~~] electric equipment important to safety. Prior to 1971, qualification was based on the fact that the electric components were of high industrial quality. For nuclear plants licensed to operate after 1971, qualification was judged on the basis of IEEE 323-1971. For plants whose Safety Evaluation Reports were issued since July 1, 1974, the Commission has used Regulatory Guide 1.89, "Qualification of Class IE Equipment for Light-Water-Cooled Nuclear Power Plants," which endorses IEEE 323-1974,² "IEEE Standard for Qualifying Class IE Equipment for Nuclear Power Generating Stations," subject to supplementary provisions.

Currently, the Commission has under way a program to reevaluate the qualification of electric equipment in all operating nuclear power plants. As a part of this program, more definitive criteria for environmental qualification of electric equipment important to safety have been developed by the NRC. A document entitled "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" (DOR Guidelines) was issued in November 1979. In addition, the NRC has

¹Incorporation by reference approved by the Director of the Office of Federal Register on January 1, 1981.

²Copies may be obtained from the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, N.Y. 10017.

issued NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," which contains two sets of criteria: the first for plants originally reviewed in accordance with IEEE 323-1971 and the second for plants reviewed in accordance with IEEE 323-1974.

By its Memorandum and Order CLI-80-21 dated May 23, 1980, the Commission directed the staff to proceed with a rulemaking on environmental qualification of safety-related equipment and to address the question of backfit. The Commission also directed that the DOR Guidelines and NUREG-0588 form the basis for the requirements licensees and applicants must meet until the rulemaking has been completed. This [proposed] rule is ~~[generally] based on [the requirements of the Division of Operating Reactors]~~ ^(DOR) Guidelines and NUREG-0588. The Commission recognizes the qualification efforts of the industry as a result of CLI-80-21. Therefore the rule provides relief to operating nuclear power plants (see paragraph (k) of the final rule.). Regualification of electric equipment in accordance with this rule will not be required for equipment qualified or being qualified in accordance with DOR Guidelines or NUREG-0588 provided the qualification of electric equipment has commenced prior to [insert effective date of this amendment]. Those nuclear power plants that are currently under review and are qualifying safety-related electric equipment in accordance with NUREG-0588 (Category I or II) will satisfy the requirements of this rule. Category I requirements (IEEE 323-1974) apply to nuclear power plants for which the construction permit safety evaluation report was issued after July 1, 1974, and Category II requirements (IEEE 323-1971) apply to nuclear power plants for which the construction permit safety evaluation report was issued prior to July 1, 1974.

The dates specified in this rule for completion of environmental qualification of ~~safety-related~~ electric equipment ^{important to safety} apply to all licensees and applicants and supersede any date previously imposed. No changes to licenses or technical specifications are necessary to reflect these new completion dates.

The final rule provides no relaxation of requirements contained in Commission Memorandum and Order CLI-80-21, except as follows:

- (1) Qualification of electric equipment located in mild environment.
- (2) Upgrading the qualification of replacement parts.*

[The Commission's Memorandum and Order CLI-80-21 directed that the environmental qualification of electric equipment in operating nuclear power plants be completed by June-30, 1982. However, on September-23, 1981, the Commission considered the petition (SECY-81-486) to extend this deadline. The proposed rule covers the same electric equipment as CLI-80-21 and implements SECY-81-486 by incorporating the extension dates recommended by the Chairman in his memorandum dated September-30, 1981. Included in the proposed rule is a requirement that each holder of or each applicant for a license to operate a nuclear power plant identify and qualify the electric equipment needed to complete one path of achieving and maintaining a cold shutdown condition. The Commission specifically requests comment on this proposed additional requirement.]

The scope of the [proposed] final rule [does-not-include-all-electric equipment-important-to-safety-in-its-various-gradations-of-importance--it] [includes] covers that portion of equipment important to safety commonly

*Delete or retain depending upon the option on replacement parts approved by the Commission.

referred to as "safety-related" (which Commission interprets as essentially "Class 1E" equipment defined in IEEE 323-1974) [or "Class 1E" equipment in IEEE national standard-s] and some additional non-Class 1E equipment and systems whose failure under extreme environmental conditions could prevent the satisfactory accomplishment of safety functions by accident-mitigating equipment. Safety-related structures, systems and components are those that are relied upon to remain functional during and following design basis events to assure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shutdown the reactor and maintain it in a safe shutdown condition, and (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guidelines of 10 CFR Part 100. Design basis events are defined as conditions of normal operation, including anticipated operational occurrences, design basis accidents, external events, and natural phenomena for which the plant must be designed to assure functions (1) through (3) above. Also covered in the scope of the final rule is certain postaccident monitoring equipment specified as "Category 1 and 2" in Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident" (Revision 2).

Included in the [proposed] final rule are specific technical requirements pertaining to (a) qualification parameters, (b) qualification methods, and (c) documentation. Qualification parameters include temperature, pressure, humidity, radiation, chemicals, and submergence. Qualification methods include (a) testing as the principal means of qualification and (b) analysis and operating experience in lieu of testing. The [proposed] final rule would require that the qualification program include synergistic effects, aging,

marginally, radiation, and environmental conditions. Also, a record of qualification must be maintained. Proposed Revision 1 to Regulatory Guide 1.89 [is being revised to] which has been issued for public comment, will include methods acceptable to the NRC for meeting the provisions of this proposed rule and [to] will include a list of typical equipment covered by it [of the proposed]. Revision 1 [is being published for public comment concurrently with the proposed rule:] to Regulatory Guide 1.89 will be issued after resolution of public comments.

[Also included in the proposed rule is a requirement, which is consistent with Commission Memorandum and Order, CEI-88-21, for submission of an analysis by licensees to ensure that the plant can be safely operated pending completion of the environmental qualification of electric equipment. The Commission expects that, for each of the currently operating power plants, this analysis and its evaluation by the NRC staff will be completed well in advance of the effective date of this rule. If the licensees of operating power plants fail to provide these analyses in a timely manner, the Commission expects the NRC staff to take the appropriate steps to require that the information be provided and to enforce compliance with this requirement. This requirement has been included in this proposed rule to provide a regulatory basis for enforcement.]

NRC will generally not accept analysis alone in lieu of testing. Experience has shown that qualification of equipment without test data may not be adequate to demonstrate functional operability during design basis event conditions. Paragraph 50.49(f) provides four methods for qualification. Testing will be preferred. Justification for qualification of the remaining three methods must meet NRC approval. To ensure in

of a testing program, the same piece of equipment must be used throughout the complete test sequence. [~~Analysis may be acceptable if testing of the equipment is impractical because of size, or limitation due to the state of the art. The proposed rule takes into consideration the prior qualification history of the operating power plants. For example, the proposed rule recognizes that for those plants which are not committed to either IEEE-323-1971 or IEEE-323-1974 for equipment qualification, and have been tested only for high temperature pressure, and steam, some equipment may not need to be tested again to include other service conditions such as radiation and chemical sprays. The qualification of equipment for these service conditions may be established by analysis.~~]

The [proposed] final rule [would] requires that each holder of an operating license provide a list of electric equipment important to safety previously qualified based on testing, analysis, or a combination thereof and a list of equipment that has not been qualified. These lists and the schedule for completion of equipment qualification [would have to] must be submitted [written] by by [Insert a date 90 days after the effective date of this amendment]. [~~rule: However, this time period will be adjusted during the final rule-making process to allow reasonable time for licensees to evaluate NRC's safety reviews that are currently underway.~~]

[~~The proposed rule will codify the Commission's current requirements for the environmental qualification of electric equipment. Upon publication of a final rule, the BBR guidelines and NUREG-0588 will be withdrawn.~~]

The general requirements for seismic and dynamic qualification for electric equipment are contained in the General Design Criteria. Further guidance is provided in Regulatory Guide 1.100, "Seismic Qualification of Electric Equipment for Nuclear Power Plants" (Revision 1) and NUREG-0800,

X "Standard Review Plan." [Pending developments of specific requirements in this area; the general requirements will continue to apply:] NRC is considering to ^{including} include [expansion of the scope of this rule to include additional] all electric equipment important to safety and the requirements for seismic and dynamic qualification of electric equipment [This matter will be the subject of] in future rulemaking.

[Additional views of Commissioner Bradford:-- Commissioner Bradford believes that the proposed deadline (second refueling outage after March 31, 1982) for qualification is much too relaxed; given the fact that licensees and the NRC have been aware of the problems in this area since 1978:-- The proposed deadline extends as much as two and one-half years beyond the June 30, 1983 date by which the Atomic Industrial Forum concluded that nearly all electrical equipment could be qualified. Given the more generous deadline, he also believes that the rule should have contained requirements for seismic and dynamic qualification:-- While the general design criteria contain requirements in this area; clarification now would ensure that equipment to be replaced in the near term will not have to be ripped out in a few years because it was not properly seismically qualified:

Commissioner Gittinsky has agreed with these views:]

Comments On The Proposed Rule

The Commission received and considered the comments on the proposed rule contained in the 69 letters received from the public by April 6, 1982. Copies of those letters and a staff response to each comment are available for public inspection and copying for a fee at the Commission's Public Document Room at 1717 H Street NW., Washington, D.C.

The major issues raised by the comments and NRC staff responses are as follows:

(1) Seismic and Dynamic Qualification - Paragraph 50.49(a)

Issue: Seismic and dynamic qualifications are an integral part of environmental qualification. It is therefore inappropriate to codify these requirements separately.

Response: Electric equipment at operating nuclear power plants was generally qualified for environmental and seismic stresses separately, i.e., by using separate prototypes for environmental and seismic qualification tests. The Commission has decided, after considerable deliberation ~~to pursue this issue~~ ^{*the issue of seismic and dynamic qualification*} at a future date through the issuance of an advance notice of proposed rulemaking. A future seismic rule may not require testing for environmental stresses because a single prototype was not used during the original qualification. [#] (2) Scope - Cold Shutdown Requirement - Paragraph 50.49(c)

Issue: The rule introduces a new requirement to qualify "equipment needed to complete one path of achieving and maintaining a cold shutdown condition." A change of this magnitude, at this advanced stage of the industry's qualification effort, most certainly introduces significant new costs and obligations with no demonstrated improvement in safety.

Response: The Commission agrees that this requirement may introduce significant costs. The licensing basis of the majority of operating reactors does not require that all electric equipment and systems necessary to bring the reactor from normal operating conditions to cold shutdown be designed to Class 1E standards. Therefore, to require that all plants environmentally qualify the electric equipment and systems needed

to complete one path of achieving and maintaining a cold shutdown condition may require the upgrading of a significant amount of equipment and systems that do not currently meet Class 1E standards for operating reactors. However, electric equipment and systems necessary to shut down the reactor and maintain it in a safe shutdown condition are required to meet Class 1E standards and therefore would be covered by the rule.

The Commission is currently studying the requirements for shutdown decay heat removal under Unresolved Safety Issue (USI) A-45. The overall purpose of A-45 is to evaluate the adequacy of current licensing requirements to ensure that failure to remove shutdown decay heat does not pose an unacceptable risk. Under A-45 a comprehensive and consistent set of shutdown cooling requirements for existing and future plants are being developed. The final resolution of A-45 is presently scheduled for October 1984.

The Commission believes it would [not]* be premature at this time to impose the requirement to environmentally qualify electric equipment and systems necessary to achieve and maintain cold shutdown prior to the final resolution of A-45. Therefore, this requirement is [not]* included in the final rule.

(3) Scope - Equipment in a Mild Environment - Paragraph 50.49(c)

Issue: The rule makes no distinction between equipment located in a harsh or mild environment. The stresses for equipment in a mild environment are less severe than for those in a harsh environment.

*Appropriate corrections must be made after the Commission has made a decision.

Response: The final rule does not cover the electric equipment located in a mild environment. The Commission has concluded that the general quality and surveillance requirements applicable to electric equipment as a result of other Commission regulations, including 10 CFR Part 50, Appendix B (see for example, Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Revision 3) are sufficient to ensure adequate performance of electric equipment important to safety located in mild environments. Since it has been concluded that no further environmental qualification requirements are needed for such equipment provided they fully satisfy all other applicable regulations, the Commission has determined that no additional requirements are necessary with respect to electric equipment important to safety located in mild environments in order for licensees to satisfy, with respect to such equipment, existing license conditions or technical specifications calling for qualification of safety-related electric equipment in accordance with DOR Guidelines or NUREG-0588.

(4) Scope - Previous Qualification Efforts - Paragraph 50.49(c)

Issue: The rule does not recognize that operating plants have just completed qualification of equipment to the DOR Guidelines or NUREG-0588. Without such recognition, industry efforts, manpower, and billions of dollars will go down the drain.

Response: The final rule has been expanded to alleviate this concern. See Paragraph 50.49(k).

(5) Humidity - Paragraph 50.49(e)(2)

Issue: The effects of time-dependent variations of relative humidity during normal operation cannot be considered for all equipment. There are no detailed standards for how this type of testing should be performed.

Response: The Commission agrees. Humidity variations during normal operation are difficult to predict. It has not been demonstrated that the time-dependent variation in humidity will produce any differences in degradation of electric equipment. The words "Time-dependent variation of relative" have been deleted from Paragraph 50.49(e)(2).

(6) Aging - Paragraph 50.49(e)(5)

Issue: The requirement that ongoing qualifications be done using "prototype equipment naturally aged" is overly restrictive. Use of accelerated aging to define a qualified life is not technically feasible.

Response: Preconditioning by accelerated aging is technically feasible for simple electric equipment for plant life and for complex electric equipment for shorter designated life. Commission recognizes that state-of-art technology will be utilized in any aging program. Reference to qualified life has been deleted from paragraph 50.49(e)(5).

(7) Margins - Paragraph 50.49(e)(8)

Issue: The margins applied in addition to known conservatisms lead to excessive stress that could lead to failures of equipment in unrealistic qualification tests.

Response: The Commission agrees. This requirement could have caused excessive margins. The paragraph has been modified to recognize conservatisms that can be quantified.

(8) Analysis and partial test data - Paragraph 50.49(f)(4)

Issue: If partial type test data that adequately support the analytical assumptions and conclusions are available, their analysis should be allowed to extrapolate or interpolate these results for equipment, regardless of purchase date.

Response: The Commission agrees. Reference to "purchase date has been deleted.

(9) Requirement for a central file - Paragraph 50.49(j)

Issue: The requirement for a central file should be deleted since it is not cost effective and has no safety benefit.

Response: The Commission agrees. This requirement has been subject to different interpretations. A record of qualification must be maintained in an "auditable form" but not necessarily in a central file, for the entire period during which the covered item is installed in a nuclear power plant. Recordkeeping requirement of 10 CFR Part 50 Appendix B must be met. Certain records can be kept at the vendors shop.

(10) Justification of continued operation for operating plants.

Issue: The requirement to submit justification for the continued operation of operating plants should be deleted since this information has been previously submitted to NRC.

Response: This requirement has been satisfactorily met and Paragraph 50.49(j) of the proposed rule has been deleted in its entirety from the final rule.

In addition, Paragraph 50.49(g) of the proposed rule has been deleted from the final rule since it is too prescriptive. It will be included in Regulatory Guide 1.89.

Effective Date:

This rule is effective upon publication in the Federal Register. ~~The Commission has determined that the final rule should take immediate effect upon publication because it relieves a restriction under subsection (d)(1) of Section 553 of the Administrative Procedure Act. This~~

~~is so because all operating reactor licensees are currently under a June 30, 1982, deadline to complete environmental qualification of safety-related electric equipment. The final rule's implementation schedule, as explained above, supplants this date and thus gives licensees additional time to complete environmental qualification of safety-related electric equipment. In addition, The Commission finds that there is good cause-- pursuant to subsection (d)(3) of Section 553--to make the rule's requirements effective upon publication. The first licensee actions under the rule are not required until 90 days after the effective date of the rule. This 90-day period is intended to include the statutory 30 days and allow 60 additional days to make the submittal required by Paragraph 50.49(g) of the rule. The overall effect of making the rule effective on publication is to relieve licensees of the June 30, 1982, deadline and to provide a sufficient period after the effective date of the rule for licensees to achieve compliance with the near-term requirements of the rule.~~

Paperwork Reduction Act

The [proposed] final rule contains recordkeeping requirements that are subject to review by the Office of Management and Budget (OMB). As required by P.L. 96-511, these ~~proposed~~ ^{final} rule [will be] was submitted to OMB ^{and} for clearance of the recordkeeping requirements was submitted.

Regulatory Flexibility Statement

In accordance with the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission hereby certifies that this rule[;--if-promulgated;] will not have a significant economic impact on a substantial number of small entities. This [proposed] final rule affects the method of qualification of electric equipment by utilities. Utilities do not fall within the

definition of a small business found in Section 3 of the Small Business Act, 15 U.S.C. 632. In addition, utilities are required by the Commission Memorandum and Order CLI-80-21, dated May 23, 1980, to meet the requirements contained in the DOR "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," (November 1979) and NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," which form the basis of this [proposed] rule. Consequently, this rule codifies existing requirements (and imposes no new costs or obligations on utilities).*

List of Subjects in 10 CFR Part 50

Antitrust, Classified information, Fire prevention, Intergovernmental relations, Nuclear power plants and reactors, Penalty, Radiation protection, Reactor siting criteria, Reporting requirements.

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and section 553 of title 5 of the United States Code, [notice-is-hereby-given-that-adoption-of-the] the following amendment to Title 10, Chapter I, Code of Federal Regulations, Part 50, [10-CFR-Part-50-is-contemplated] is published as a document subject to codification.

10 CFR Part 50

1. The authority citation for Part 50 continues to read as follows:

AUTHORITY: Secs. 103, 104, 161, 182, 183, 189, 68 Stat. 936, 937, 948, 953, 954, 955, 956, as amended (42 U.S.C. 2133, 2134, 2201, 2232,

*Delete if qualification requirement for cold shutdown equipment is included in the final rule.

2233, 2239); secs. 201, 202, 206, 88 Stat. 1243, 1244, 1246 (42 U.S.C. 5841, 5842, 5846), unless otherwise noted.

Section 50.78 also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152). Sections 50.80-50.81 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234). Sections 50.100-50.102 issued under sec. 186, 68 Stat. 955 (42 U.S.C. 2236).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273), §§50.10(a), (b), and (c), 50.44, 50.46, 50.48, 50.54, and 50.80(a) are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); §§50.10(b) and (c) and 50.54 are issued under sec. 161i, 68 Stat. 949, as amended (42 U.S.C. 2201(i)); and §§50.55(e), 50.59(b), 50.70, 50.71, 50.72, and 50.78 are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

2. A new § 50.49 is added to read as follows:

§ 50.49 Environmental qualification of electric equipment important to safety for nuclear power plants.

(a) Requirements for seismic and dynamic qualification of electric equipment important to safety are not included in this section. Also not included are the requirements for electric equipment important to safety located in a mild environment. A mild environment is an environment that would at no time be significantly more severe than the environment that would occur during normal plant operation including during anticipated operational occurrences.

(b) Each holder of or each applicant for a license to operate a nuclear power plant shall establish a program for qualifying the electric equipment as defined in paragraph (c) of this section.

(c) Electric equipment and systems important to safety covered by this section are safety related electric equipment and systems as defined in paragraph (c)(1) and some additional electric equipment whose failure under extreme environmental conditions could prevent the satisfactory accomplishment of safety functions by accident mitigating equipment. [~~include electric equipment and systems that are essential to emergency reactor shutdown; containment isolation; reactor core cooling; and containment and reactor heat removal or that are otherwise essential in preventing significant release of radioactive material to the environment; included is equipment (1) that performs the above functions automatically; (2) that is used by the operator to perform these functions manually; and (3) whose failure can prevent the satisfactory accomplishment of one or more of the above safety functions.~~ [Also included is equipment located in containment which is needed to complete one path of achieving and maintaining a cold shutdown condition.]^{following design basis events} * (1) Safety-related electric equipment and systems are those equipment and systems relied upon to remain functional during and following design basis events to assure (1) the integrity of the reactor coolant pressure boundary, (2) the capability to shut down the reactor and maintain it in a safe shutdown condition, and (3) the capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the 10 CFR Part 100 guidelines. Design basis events are defined as conditions of normal operation including anticipated operational occurrences, design basis accidents, external events, and natural phenomena for which the plant must be designed to assure functions (1) through (3) above. Specifically, electric equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor

*Delete, if appropriate, after the Commission has made a decision.

core cooling, and containment and reactor heat removal or that are otherwise essential in preventing significant release of radioactive material to the environment.

(d) The applicant or licensee shall prepare a list of all safety-related electric equipment ^{important to safety} covered by this section. [~~and maintain it in an auditable form:--This list of equipment must, as a minimum, include:~~]

In addition, the applicant or licensee shall include the following information for electric equipment important to safety in a qualification file:

(1) The performance specifications [~~and structural integrity requirements~~] under conditions existing [~~during normal and abnormal operation and~~] during and following design basis events. [~~and afterwards and the lengths of the periods during which the integrity must be maintained:~~]

(2) [~~The range of~~] The voltage, frequency, load, and other electrical characteristics for which the performance specified in accordance with paragraph (d)(1) of this section can be ensured.

(3) The environmental conditions, including temperature, pressure, humidity, radiation, chemicals, and submergence [~~and the predicted variations of these environmental conditions with time~~] at the location where the equipment must perform as specified in accordance with paragraphs (d)(1) and (2) of this section.

(e) The electrical equipment qualification program must include the following:

(1) Temperature and Pressure. The time-dependent temperature and pressure at the location of the electric equipment important to safety must be established for the most [~~limiting~~] severe [~~of the applicable postulated accidents~~] design basis events during or following which this

equipment is required to remain functional. This time-dependent temperature and pressure must be used as the basis for the environmental qualification of electric equipment important to safety.

(2) Humidity. [~~Time-dependent-variations-of-relative~~] Humidity during normal operation and design basis events must be considered.

(3) Chemical Effects. The composition of chemicals used must be at least as severe as that resulting from the most limiting mode of plant operation (e.g., containment spray, emergency core cooling, or recirculation from containment sump). If the composition of the chemical spray can be affected by equipment malfunctions, the most severe chemical spray environment that results from a single failure in the spray system must be assumed.

(4) Radiation. The radiation environment must be based on the type of radiation, the total dose [~~and-dose-rate-of-the-radiation-environment~~] expected during normal operation over the installed life of the equipment, [~~plus~~] and the radiation environment associated with the most severe design basis event during or following which the equipment is required to remain functional, including the radiation resulting from recirculating fluids for equipment located near the recirculating lines and including dose-rate effects.

(5) Aging. Equipment qualified by test must [~~practicable~~] be preconditioned by natural or artificial (accelerated) aging to its installed end-of-life condition. [~~Electromechanical-equipment-must-be operated-to-the-mechanical-wear-and-electrical-degradation-expected-during its-installed-life-~~] If Where preconditioning to an installed end-of-life condition [~~a-qualified-life-equal-to-the-installed-life~~] is not [~~possible~~] practicable and technically meaningful, the equipment may be preconditioned

to a shorter [qualified] designated life. The equipment must be replaced or refurbished at the end of [its-qualified] this designated life unless ongoing qualification [of] demonstrates [prototype-equipment-naturally-aged in-piant-service-show;-by-artificial-aging-and-type-testing] that the item has additional [qualified] life.

(6) Submergence (if subject to being submerged).

(7) Synergistic Effects. [The-preconditioning-and-testing-of-equipment-must-consider-known] Synergistic effects must be considered when these effects are [known] believed to have a significant effect on equipment performance.

(8) Margins. Margins must be applied to account for production variations and inaccuracies in test instruments. These margins are in addition to [margins-applied-during-the-derivation-of-the-environmental conditions:] any conservatisms applied during the derivation of environmental conditions unless these conservatisms can be quantified and shown to contain appropriate margins.

(f) Each item of electric equipment important to safety must be qualified by one of the following methods:

(1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.

(2) Testing a similar item of equipment with a supporting analysis to show that the equipment to be qualified is acceptable.

(3) Experience with identical or similar equipment under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.

[(4)-Analysis-in-lieu-of-testing-in-the-following-cases-:

(i)--if-type-testing-is-precluded-by-the-physical-size-of-the-equip-
ment-or-by-the-state-of-the-art:]

(4) [(ii) By] Analysis in combination with partial type test data [which] that supports the analytical assumptions and conclusions. [;-if the-equipment-purchase-order-was-executed-prior-to-May-23,-1988.

(g)--if-an-item-of-electric-equipment-is-to-be-qualified-by-test--

(1)--The-acceptance-criteria-must-be-established-prior-to-testing-

(2)--The-tests-must-be-designed-and-conducted-to-demonstrate-that the-equipment-can-perform-its-required-function-as-specified-in-accord-
ance-with-paragraph-(d)(1)-of-this-section-for-all-conditions-as-speci-
fied-in-accordance-with-paragraphs-(d)(2)-and-(3)-of-this-section--The
test-profile-(e.g.;-pressure;-temperature;-radiation-vs.-time)-must
include-margins-as-set-forth-in-paragraph-(e)(8)-of-this-section-

(3)--The-test-profile-must-be-either-(i)-a-single-profile-that
envelops-the-environmental-conditions-resulting-from-any-design-basis
event-during-any-mode-of-plant-operation-(e.g.;-a-profile-that-envelops
the-conditions-produced-by-the-postulated-spectrum-of-main-steamline
break-(MSLB)-and-loss-of-coolant-accidents-(LOCA))-or-(ii)-separate-pro-
files-for-each-type-of-event-(e.g.;-separate-profiles-for-the-MSLB-acci-
dents-and-for-LOCA):

(4)--The-same-piece-of-equipment-must-be-used-throughout-the-complete
test-sequence-under-any-given-profile:]

[(h)] (g) Each holder of an operating license issued prior to (insert the effective date of this amendment) [must,] shall, by (insert a date 90 days after the effective date of this amendment), identify the electric equipment important to safety already qualified to [the-provisions-of-this

rule] and submit a schedule for the qualification to the provisions of this rule [testing] or replacement of the remaining electric equipment important to safety. This schedule must establish a goal of final environmental qualification by the end of the second refueling outage after March 31, 1982. The Director of Nuclear Reactor Regulation may grant requests for extensions of this deadline to a date no later than November 30, 1985, for specific pieces of equipment if [such] these requests are filed on a timely basis and demonstrate good cause for the extension, such as procurement lead time, test complications, and installation problems. In exceptional cases, the Commission itself may consider and grant extensions beyond November 30, 1985, for completion of environmental qualification.

[(i)] (h) Each licensee shall notify the Commission of any significant equipment qualification problem that may require extension of the completion date within [30] 60 days of its discovery.

~~[(j)]--For the continued operation of a nuclear plant; each holder of an operating license issued prior to the effective date of this rule shall perform an analysis to ensure that the plant can be safely operated pending completion of the environmental qualification.--The detailed analysis for each equipment type with appropriate justification must be submitted to Director of Nuclear Reactor Regulatory by (insert the effective date of the rule) and must include; where appropriate; consideration of:~~

~~(i)--Accomplishing the safety function by some designated alternative equipment that has been adequately qualified and satisfies the single failure criterion if the principal equipment has not been demonstrated to be fully qualified;~~

(2)--The validity of partial test data in support of the original qualification:

(3)--Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified:

(4)--Completion of the safety function prior to exposure to the ensuing accident environment and the subsequent failure of the equipment does not degrade any safety function or mislead the operator:

(5)--No significant degradation of any safety function or misleading of the operator as a result of failure of equipment under the accident environment:]

[(k)] (i) The applicant for an operating license that is granted on or after [insert the effective date of this amendment] but prior to November 30, 1985, [must] shall perform an analysis to ensure that the plant can be safely operated pending completion of environmental qualification. [in accordance with paragraph (j) of this section except that this analysis] This analysis must be submitted to the Director of Nuclear Reactor Regulation for consideration prior to the granting of an operating license and must include, where appropriate, consideration of:

(1) Accomplishing the safety function by some designated alternative equipment if the principal equipment has not been demonstrated to be fully qualified.

(2) The validity of partial test data in support of the original qualification.

(3) Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified.

(4) Completion of a safety function prior to exposure to accident environmental~~y~~ resulting from a design basis event and the subsequent

failure of the equipment does not degrade any safety function or mislead the operator.

(5) No significant degradation of any safety function or misleading of the operator as a result of failure of equipment under the accident environment resulting from a design basis event.

~~(f)~~ (j) A record of the qualification including documentation in paragraph (d) of this section must be maintained in [a-central-file] an auditable form for the entire period during which the covered item is installed in the nuclear power plant or is stored for future use to permit verification that each item of electric equipment important to safety covered by this section (1) is qualified for its application and

(2) meets its specified performance requirements when it is subjected to the conditions predicted to be present when it must perform its safety function up to the end of its qualified life.

(k) Licensees are not required to qualify electric equipment important to safety in accordance with the requirements of this rule provided the following conditions are met:

(1) The operating license for the nuclear power plant was issued prior to [Insert effective date of this rule] and has the existing license conditions or technical specifications that require electric equipment to be qualified according to "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors," November 1979, or NUREG-0588 (For Comment version), "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment" and

(2) Qualification of electric equipment important to safety commenced prior to [insert effective date of this rule].

(1) Replacement parts installed after November 30, 1985 must be qualified in accordance with the provisions of this section.

OR*

Replacement parts qualified in accordance with DOR Guidelines or NUREG-0588 prior to the effective date of this rule are not required to be requalified.

Dated at _____ this _____ day of _____, 1982.

For the Nuclear Regulatory Commission.

Samuel J. Chilk
Secretary of the Commission

*Delete the option not approved by the Commission.

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September 10, 1982

FREEDOM OF INFORMATION
ACT REQUEST

FOIA-82-426
Rec'd 9-13-82

Mr. J.M. Felton, Director
Division of Rules and Records
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Felton:

On behalf of the Union of Concerned Scientists, and pursuant to the Freedom of Information Act, 5 U.S.C. §552 et seq., I request copies of the following documents related to the environmental qualification of electrical equipment. Please interpret the term "documents" to encompass any written materials in the files of the NRC, including correspondence, internal memoranda, minutes of conversations and meetings, and other writings, whether typed or handwritten.

1. All documents considered or relied upon by the Commission in promulgating the final rule on environmental qualifications published at 47 F.R. 28363 on June 30, 1982.
2. All documents considered or relied upon by the Commission in connection with the proposed rulemaking on environmental qualifications published at 47 F.R. 2876 on January 20, 1982.
3. SECY 82-207(A), (B), and (C), and any other amendments to SECY 82-207.

Please make these documents available in the Public Document Room at 1717 H Street in Washington, D.C.

If, for any reason, access to this information is denied, please describe the deleted material in detail and specify the statutory basis for exempting the material. Please separately state your reasons for not invoking your

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Mr. J.M. Felton
September 10, 1982
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discretionary powers to release the requested information
in the public interest. Such statement will be helpful in
deciding whether to appeal an adverse determination.

Sincerely,


Diane Curran