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

JUN 1 9 1990

MEMORANDUM FOR: Edward L. Jordan, Chairman
Committee to Review Generic Requirements

FROM: Eric Beckjord, Director
Office of Nuclear Regulatory Research

SUBJECT: CRGR REVIEW OF PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE B-56, "DIESEL RELIABILITY"

The purpose of this memorandum is to request that the revised proposed resolution of Generic Safety Issue B-56 be scheduled for review by the CRGR in July 1990.

We have followed through on the recommendations made by the CRGR on December 20, 1989 (Ref. CRGR Meeting Number 176) and have had discussions with NUMARC regarding the use of Appendix D of NUMARC-8700 as the principal reference for monitoring and maintaining EDG reliabilities selected for compliance with 10 CFR 50.63, "Station Blackout". NUMARC has revised NUMARC-8700, with the following changes:

1. Initiative 5 of NUMARC-8700, 10/19/87, has been revised to include monitoring of EDG reliabilities against the target reliability selected for Station Blackout (SBO), and also addresses actions for a problem EDG experiencing 4 or more failures in the last 25 demands. A copy of NUMARC's Initiative 5A is enclosed.

2. NUMARC has revised their Appendix D, "EDG Reliability Program" from the 11/6/89 draft which was discussed at CRGR Mtg. 176. The current version has been reduced in scope. The previous guidance dealing with surveillance needs, performance monitoring of important EDG parameters, data systems, maintenance, failure analysis and root cause investigation, problem closeout and methodology for determining programmatic deficiencies is now being put in a topical report titled "Effective Elements of an EDG Reliability Program." This Topical Report has not and will not be submitted to the NRC. NUMARC intends to provide this Topical Report only to utilities, as needed.

Appendix D now consists of two sections: D1, "Definitions" and D.2, "Monitoring EDG Reliability." The details of the EDG reliability program are discussed in the Topical Report. This reduction in contents does not provide a means for the direct "total endorsement" approach as recommended by the CRGR. We recommend that Revision 3 of Regulatory Guide 1.9 reference Appendix D where unambiguous reference can be made to Appendix D, and that guidance related to an on-site EDG reliability program be included in the Regulatory Guide. Revision 3 of Regulatory Guide 1.9 has been revised accordingly and is responsive to CRGR comments received.

3. The NUMARC letter (W.H. Rasin to E.S. Beckjord letter dated April 27, 1990) notes that NUMARC's Board of Directors has approved Initiative 5A and a revised Appendix D which will be incorporated into NUMARC-8700, Revision 1. NUMARC's submittal does not commit the industry to implementation of Initiative 5A or Appendix D; instead these documents are referred to as guidance. Utilities could chose not to use it. Therefore the resolution of GSI B-56 requires issuance of Regulatory Guide 1.9, Revision 3 and a 50.54(f) letter requesting identification of actions to be taken by licensees including modification of TS. A letter (Enclosure C) has been prepared, along with guidance for preparation of a license amendment request to change Technical Specifications (TS). The TS changes consist of line-item changes that are acceptable based on the implementation of programmatic requirements for monitoring and maintaining EDG reliability levels. The TS changes are a relaxation of those TS based on R.G. 1.108. Not all plants have TS based of R.G.1.108.

4. Also a draft memo to Project Managers (Enclosure G) has been prepared, with a model SER, for evaluation of the licensee response to the generic letter and proposed TS changes.

The B-56 Backfit Analysis and Federal Register Notice have been revised in response to CRGR comments. CRGR comments resulting from CRGR Meeting 176 are discussed in Enclosure A.

We feel that these changes have been responsive to CRGR's comments and will be prepared to discuss them at the next CRGR meeting. If you have questions on the enclosures please contact Al Serkiz on 492-3942.

Eric S. Beckjord
Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

ENCLOSURES:
1. W. H. Rasin to E. S. Beckjord Letter dated 5-3-90
2. Enclosure A: Responses to CRGR Comments
3. Enclosure B: Regulatory Guide 1.9, Revision 3
4. Enclosure C: Proposed Generic Letter (with Tech Spec Guidance)
5. Enclosure D: Backfit Analysis
6. Enclosure E: FRN Draft Notice
7. Enclosure F: NUMARC-8700, Rev. 1, Appendix D, 5-2-90
8. Enclosure G: Memo to Project Managers w/Model SER

NUMARC

NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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May 3, 1990

Dr. Eric S. Beckjord, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Dr. Beckjord:

The purpose of this letter is to update you on the NUMARC efforts relating to Generic Issue B-56, Diesel Generator Reliability. These efforts have been focused through the NUMARC Station Blackout Working Group, chaired by John Opeka, Executive Vice President, Engineering and Operations, Northeast Utilities. NUMARC has met numerous times over the past several months with members of the NRC Staff in seeking a comprehensive resolution to this important issue. We believe the results of these efforts as discussed in this letter provide sufficient basis for closure of B-56.

On March 7, 1990, the NUMARC Board of Directors approved a revision to one of the existing Station Blackout Initiatives. The revised Initiative 5A, Coping Assessment/EDG Performance, provides a mechanism for monitoring the EDG target reliability chosen by utilities as part of the station blackout coping assessment. This initiative also addresses a reduction in accelerated testing that will enhance long term EDG reliability while adequately demonstrating the restored performance of individual EDGs. A copy of the initiative dated March 7, 1990, is enclosed for your information.

We believe Initiative 5A establishes reasonable consensus trigger values for monitoring the EDG target reliability (0.95 or 0.975) on a plant unit basis. We further believe the initiative provides an appropriate focus on EDG performance rather than programmatic activities. This focus is supported by data compiled by EPRI and published as NSAC-108, The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants, as well as by INPO through the U.S. Industrywide Plant Performance Indicator Program. The data shows that since 1983, the industry average EDG reliability has been above 0.98. This clearly indicates that current industry practices are effective in maintaining EDG reliability at acceptable levels, and that prescriptive guidance is not warranted in this area.

With regard to the portion of Initiative 5A dealing with accelerated testing, we anticipate utilities will address this reduction through changes to current plant technical specifications. It is expected that the submitted changes will be reviewed and approved by the plant specific NRC project managers. Furthermore, the NUMARC Technical Specifications Improvement Working Group will incorporate this reduction in accelerated testing into its efforts on electrical power systems. Discussions are currently underway with the appropriate members of the NRR staff. However, because accelerated testing is one element of a more comprehensive set of technical specification improvements, we believe a generic communication, e.g., the generic letter that addresses closure of the B-56 issue, may be appropriate to identify NRC's acceptance of the reduction in accelerated testing and further expedite the approval process.

In addition to Initiative 5A, the Station Blackout Working Group has revised NUMARC 87-00, Appendix D, EDG Reliability Program. A copy dated May 2, 1990, is also enclosed for your information. This revision provides a framework for monitoring and maintaining EDG reliability. It includes guidance on utilizing the trigger values noted in the initiative and on taking remedial actions when these values are exceeded. We believe these remedial actions provide reasonable assurance that the EDG target reliability is maintained consistent with the intent of the Station Blackout Rule, 10CFR50.63. The revised Appendix D has been distributed to all NUMARC Members and may be used to support each utility's implementation of Initiative 5A. As noted previously, Appendix D has also been the subject of various discussions with the NRC Staff. Based on these discussions, it is our understanding that revision 3 of Regulatory Guide 1.9 will contain specific language accepting NUMARC 87-00, Appendix D, as an adequate means of monitoring and maintaining EDG reliability.

In summary, we believe that Initiative 5A and the revised NUMARC 87-00, Appendix D, coupled with the high average EDG reliability in the nuclear industry since 1983, provide a comprehensive resolution to Generic Issue B-56. It is our plan to proceed with printing a revision to NUMARC 87-00 that incorporates errata, questions/answers from the Station Blackout Seminars, the revised Appendix F addressing equipment operability, supplemental clarifying questions/answers, Initiative 5A, and the revised Appendix D. A copy of the bound version will be forwarded to you after printing is complete.

Please contact me if you have any questions. If your staff has any questions relative to the enclosures, they may contact Alex Marion or Tony Pietrangelo of the NUMARC staff.

Dr. Eric S. Beckjord
May 3, 1990
Page 3

Consistent with past practice we understand this transmittal will be placed in the Public Document Room.

Sincerely,

William H. Rasin

William H. Rasin
Director, Technical Division

AM/ARP
Enclosures

cc: C. J. Heltemes, Jr., NRC
W. Minners, NRC
A. C. Thadani, NRC
A. W. Serkiz, NRC
J. F. Opeka, Northeast Utilities

INITIATIVE 5A - COPING ASSESSMENT/EDG PERFORMANCE

EACH UTILITY WILL ASSESS THE ABILITY OF ITS PLANT(S) TO COPE WITH A STATION BLACKOUT. PLANTS UTILIZING ALTERNATE AC POWER FOR STATION BLACKOUT RESPONSE WHICH CAN BE SHOWN BY TEST TO BE AVAILABLE TO POWER THE SHUTDOWN BUSSES WITHIN 10 MINUTES OF THE ONSET OF STATION BLACKOUT DO NOT NEED TO PERFORM ANY COPING ASSESSMENT. REMAINING ALTERNATE AC PLANTS WILL ASSESS THEIR ABILITY TO COPE FOR ONE-HOUR. PLANTS NOT UTILIZING AN ALTERNATE AC SOURCE WILL ASSESS THEIR ABILITY TO COPE FOR FOUR HOURS. FACTORS IDENTIFIED WHICH PREVENT DEMONSTRATING THE CAPABILITY TO COPE FOR THE APPROPRIATE DURATION WILL BE ADDRESSED THROUGH HARDWARE AND/OR PROCEDURAL CHANGES SO THAT SUCCESSFUL DEMONSTRATION IS POSSIBLE.

AS PART OF THE COPING ASSESSMENT, UTILITIES ARE REQUIRED TO CHOOSE AN EDG TARGET RELIABILITY (0.95 OR 0.975) AND ARE REQUIRED TO MAINTAIN THAT CHOSEN RELIABILITY. ACCORDINGLY, EACH UTILITY WILL EMPLOY THE FOLLOWING EXCEEDENCE TRIGGER VALUES (ON A PLANT UNIT BASIS) AS THE MECHANISM FOR MONITORING EDG TARGET RELIABILITY AND TO SUPPORT CLOSURE OF GENERIC ISSUE B-56:

SELECTED EDG TARGET RELIABILITY	FAILURES IN 20 DEMANDS	FAILURES IN 50 DEMANDS	FAILURES IN 100 DEMANDS
0.95	3	5	8
0.975	3	4	5

ADDITIONALLY, EACH UTILITY, IN RESPONSE TO AN INDIVIDUAL EDG EXPERIENCING 4 OR MORE FAILURES IN THE LAST 25 DEMANDS, WILL DEMONSTRATE RESTORED EDG PERFORMANCE BY CONDUCTING SEVEN (7) CONSECUTIVE FAILURE FREE START AND LOAD-RUN TESTS. THIS FORM OF ACCELERATED TESTING SHALL BE CONDUCTED AT A FREQUENCY OF NO LESS THAN 24 HOURS AND OF NO MORE THAN SEVEN (7) DAYS BETWEEN EACH DEMAND. EACH UTILITY WILL, IF APPLICABLE, ADDRESS THIS REDUCTION IN ACCELERATED TESTING THROUGH CHANGES TO TECHNICAL SPECIFICATIONS OR OTHER APPROPRIATE MEANS.

NOTE: Boldface type represents additions to original Initiative 5

3/7/90

ENCLOSURE A
5-29-90

RESPONSES TO CRGR COMMENTS
(REF. CRGR MEETING NO. 176)

Comment 1: Following discussions related to guidance provided in NUMARC's revised Appendix D (Enclosure F to the transmittal memorandum) and Regulatory Guide 1.9, Rev 3 (Enclosure B to the transmittal memorandum), the Committee reached a consensus that NUMARC's Appendix D provided acceptable guidance for monitoring EDG reliability and an EDG reliability program, provided that licensees committed to implementing such a program and monitoring procedures. Appendix D could be adopted by reference in the regulatory guide (as an industry standard). Regulatory Positions C.3, C.4, C.5 and C.6 would be reduced in size through reference to Appendix D.

The RES staff tentatively agreed, subject to the understanding that a thorough review of the Appendix D would be needed to verify the acceptability of Appendix D as formally submitted. Final determination of the contents of the regulatory guide, generic letter, and Federal Register Notice would then be made.

Response: NUMARC's revised Appendix D does not have the scope and informational content discussed at CRGR Meeting No. 126. Appendix D (5-2-90) deals with monitoring EDG reliability and corrective actions to be taken if trigger values are exceeded, with only brief mention to an EDG reliability program. Guidance for activities associated with an EDG reliability program are now in a Topical Report which was not submitted by NUMARC; nor does NUMARC intend to submit this report.

NUMARC's submittal (see Enclosure F) has been reviewed by the staff and modifications have been made to Revision 3 of Regulatory Guide 1.9 as appropriate, per CRGR direction. Because of the reduced scope of Appendix D (4-6-90), an adoption by reference (in total) is not supportable.

Comment 2: The consensus discussed in Item 1 above was subject to the condition that NUMARC agree with the approach, adopt the draft standard as a final standard and make the final standard available to the public.

Response: Copies of NUMARC-8700, Revision 1, Appendix D can be obtained from NUMARC and such notification is included in Revision 3 of Regulatory Guide 1.9. Adoption by reference as a standard (such as IEEE Std 387-1984) is not supportable for the reason noted above.

Comment 3: The Committee reached a consensus that the generic letter transmitting the guide would not need to cite 10 CFR 50.54f if NUMARC would get industry agreement and have licensees submit letters committing to the industry standard. It was agreed that NRR would contact NUMARC to initiate pursuit of this approach. If the commitments were not forthcoming the generic letter should cite 10 CFR 50.54f.

Response: NUMARC's submittal encourages, but does not commit utilities to comply with initiative 5A and Appendix D. Therefore, the generic letter cites 10 CFR 50.54f and requests a statement of intent to implement Initiative 5A and utilization of guidelines provided in Appendix D, or identification of alterative methods to be employed (see Enclosure C).

Comment 4: The CRGR considered issuance of the regulatory guide to be a backfit, (regardless of whether or not licensees committed to the industry standard as discussed in item 3 above) since issuance of the guide would apply a new staff position to operating plants.

Response: The staff agrees with this CRGR point of view and a backfit analysis based on NUMARC's submittal is enclosed (see Enclosure D).

Comment 5: With regard to backfitting, it was recognized that the conclusions on substantial safety improvement and cost justification had been made for the overall generic issue in connection with issuance of the blackout rule. This regulatory guide revision was considered a necessary final step although additional explanation for this action was needed. The backfit discussion in the proposed generic letter and the proposed backfit analysis should be revised accordingly.

Response: The issuance of the Station Blackout Rule in 53FR23217 June 21, 1988, identified that GSI B-56 was an outstanding safety issue related to USI A-44 and that resolution of GSI-56 would provide specific guidance for use by the staff and industry to review the adequacy of diesel generator reliability programs. The backfit analysis has been revised to more clearly reflect this relationship to USI A-44, and it also notes the applicability of A-44 conclusions to this regulatory guide revision. The A-44 analysis was based upon costs and benefits/values associated with actions to be implemented through activities such as described NUMARC's Appendix D (5-2-90) and Regulatory Guide 1.9, Revision 3. Therefore, no separate backfit analysis needs to be done.

Comment 6: The CRGR indicated that it would review the revised regulatory guide at a future meeting and would at least circulate the revised generic letter to the members. Further, it would review the basis for the action (backfit discussion and backfit analysis) at a future meeting.

Response: Enclosures B, C, D, E, and F are provided to facilitate CRGR review of the principal documents related to the resolution of GSI B-56.

Comment 7: It was noted that the industry standard was more detailed than normal regulatory guidance, and NRC inspectors should not focus on the finer details in the standard. It was agreed that NRR should provided appropriate guidance to the inspectors for this area in accordance with normal procedures.

Response: Since NUMARC has noted that the Appendix D Topical Report is not to be used for on-site inspections, Revision 3 of Regulatory Guide 1.9 has retained the general guidance on EDG reliability program activities, but with modification through suitable reference to guidance provided in NUMARC's Appendix D.

Comment 8: On page 9 the proposed guide, footnote 3 should be removed and reference to INPO should be removed from footnote 2.

Response: References to INPO have been removed.

ENCLOSURE B

Revision 3
6/14/90
Working Draft

REGULATORY GUIDE 1.9
(TASK RS 802-5)

SELECTION, DESIGN, QUALIFICATION, TESTING, AND RELIABILITY OF EMERGENCY DIESEL GENERATOR UNITS USED AS CLASS 1E ONSITE ELECTRIC POWER SYSTEMS AT NUCLEAR POWER PLANTS

A. INTRODUCTION

Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that onsite electric power systems have sufficient independence, capacity, capability, redundancy, and testability to ensure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents, assuming a single failure.

Criterion 18, "Inspection and Testing of Electric Power Systems," of Appendix A to 10 CFR 50 requires that electric power systems important to safety be designed to permit appropriate periodic inspection and testing to assess the continuity of the systems and the condition of their components.

Criterion XI, "Test Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR 50 requires that (1) measures be provided for verifying or checking the adequacy of design by design reviews, by the use of alternative or simplified calculational methods, or by the performance of a suitable testing program and (2) a test program be established to ensure that systems and components perform satisfactorily and that the test program include operational tests during nuclear power plant operation.

Section 50.63, "Loss of All Alternating Current Power," of 10 CFR Part 50 requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (i.e., loss of offsite and onsite emergency ac power system) for a specified duration. The reliability of onsite emergency ac power sources is one of the main factors contributing to risk of core melt resulting from station blackout.

Diesel generator units have been widely used as the power source for onsite electric power systems. This regulatory guide provides guidance acceptable to the NRC staff for complying with the Commission's requirements that diesel generator units intended for use as onsite emergency power sources in nuclear power plants be selected with sufficient capacity, be qualified, and be maintained to ensure availability of the required emergency diesel generator performance capability for station blackout and design basis accidents.

This guide has been prepared for the resolution of Generic Safety Issue B-56, "Diesel Generator Reliability," and is related to Unresolved Safety Issue (USI) A-44, "Station Blackout." The resolution of USI A-44 established a need for an emergency diesel generator (EDG) reliability program that has the capability to achieve and maintain the emergency diesel generator reliability levels in the range of 0.95 per demand or better to cope with station blackout.

This guide recognizes that unless emergency diesel generators are properly maintained, their capabilities to perform on demand may degrade. The condition of the diesel units must be monitored during test and maintenance programs, and appropriate parametric trends must be noted to detect potential failures; appropriate preventive maintenance should be performed.

All previous licensing commitments based on Regulatory Guides 1.9 and 1.108 are considered to be in effect until a licensee revises plant technical specifications.

[Insert for ACRS approval will be added later]

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 50, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 50 have been cleared under OMB Clearance No. 3150-0011.

B. DISCUSSION

An emergency diesel generator unit selected for use in an onsite electric power system should have the capability to (1) start and accelerate a number of large motor loads in rapid succession while maintaining voltage and frequency within acceptable limits, (2) provide power promptly to engineered safety features if a loss of offsite power and an accident occur during the same time period, and (3) supply power continuously to the equipment needed to maintain the plant in a safe condition if an extended loss of offsite power occurs.

IEEE Std 387-1984,[1] "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," delineates principal design criteria and qualification and testing guidelines that, if followed, will help ensure that selected diesel generator units meet performance requirements. (IEEE Std 387-1977 was endorsed by Revision 2 of Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants.") IEEE Std 387-1984 was developed by Working Group 4.2C of the Nuclear Power Engineering Committee (NPEC) of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), approved by NPEC, and subsequently approved by the IEEE Standards Board on March 11, 1982. Std 387-1984 is supplementary to IEEE Std 308-1974, "IEEE Standard Criteria for Class 1E Power Systems and Nuclear Power Generating Stations," and specifically amplifies paragraph 5.2.4, "Standby Power Supplies," of IEEE Std 308 with respect to the application of diesel generator units. IEEE Std 308-1974 is endorsed, with certain exceptions, by Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants."

IEEE Std 387-1984 also references other standards that contain valuable information. Those referenced standards not endorsed by a regulatory guide or incorporated into the regulations, if used, are to be used in a manner consistent with current regulations.

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[1]Copies may be obtained from the Institute of Electrical and Electronics Engineers, Inc., IEEE Service Center, 445 Hoes Lane, P. O. Box 1331, Piscataway, NJ 08855.

A knowledge of the characteristics of each load is essential in establishing the bases for the selection of an emergency diesel generator unit that is able to accept large loads in rapid succession. The majority of the emergency loads are large induction motors. This type of motor draws, at full voltage, a starting current five to eight times its rated load current. The sudden large increases in current drawn from the diesel generator resulting from the startup of induction motors can result in substantial voltage reductions. The lower voltage could prevent a motor from starting, i.e., accelerating its load to rated speed in the required time, or could cause a running motor to coast down or stall. Other loads might be lost because of low voltage if their contractors drop out. Recovery from the transient caused by starting large motors or from the loss of a large load could cause diesel engine overspeed that, if excessive, might result in a trip of the engine, i.e., loss of the Class 1E power source. These same consequences can also result from the cumulative effect of a sequence of more moderate transients if the system is not permitted to recover sufficiently between successive steps in a loading sequence.

Generally it has been industry practice to specify a maximum voltage reduction of 10 to 15 percent when starting large motors from large-capacity power systems and a voltage reduction of 20 to 30 percent when starting these motors from limited-capacity power sources such as diesel generator units. Large induction motors can achieve rated speed in less than 5 seconds when powered from adequately sized emergency diesel generator units that are capable of restoring the bus voltage to 90 percent of nominal in about 1 second.

Protection of the emergency diesel generator unit from excessive overspeed, which can result from an improperly adjusted control system or governor failure, is afforded by the immediate operation of a diesel generator unit trip, usually set at 115 percent of nominal speed. Similarly, in order to prevent substantial damage to the generator, the generator differential current trip must operate immediately upon occurrence of an internal fault. There are other protective trips provided to protect the emergency diesel generator units from possible damage. However, these trips could interfere with the successful functioning of the unit when it is most needed, i.e., during accident conditions. Experience has shown that there have been numerous occasions when these trips have needlessly shut down emergency diesel generator units because of spurious operation of a trip circuit. Consequently, it is important that measures be taken to ensure that spurious actuation of these other protective trips does not prevent the emergency diesel generator unit from performing its function.

The uncertainties inherent in estimates of safety loads at the construction permit stage of design are sometimes of such magnitude that it is prudent to provide a substantial margin in selecting the load capabilities of the emergency diesel generator unit. This margin can be provided by estimating the loads conservatively and selecting the continuous rating of the emergency diesel generator unit that exceeds the sum of the loads needed at any one time. A more accurate estimate of safety loads is possible during the operating license stage of review, because detailed designs have been completed and component test and preoperational test data are usually available.

The reliability of diesel generators is one of the main factors affecting the risk of core damage from a station blackout event. Thus, attaining and maintaining high reliability of emergency diesel generators at nuclear power plants is necessary to reduce the probability of station blackout. In Regulatory Guide 1.155, "Station Blackout," the reliability of the diesel generator is one of the factors to be used to determine the length of time a plant should be able to cope with a station blackout. If all other factors (redundancy of emergency diesel generators, frequency of loss of offsite power, and probable time needed to restore offsite power) remain constant, a higher reliability of the diesel generators will result in a lower probability of a total loss of ac power (station blackout) with a corresponding coping duration for certain plants according to Regulatory
Guide 1.155.

High reliability should be designed into the emergency diesel generator units and maintained throughout their service lifetime. This can be achieved by appropriate testing, maintenance, operating programs, and institution of a reliability program designed to monitor, improve, and maintain reliability at selected levels.

This guide provides explicit guidance in the areas of preoperational testing, periodic testing, reporting requirements, and valid demands and failures. The preoperational and periodic testing provisions set forth in this guide provide a basis for taking corrective actions needed to maintain high inservice reliability of installed diesel generator units. The data developed will provide an ongoing demonstration of performance and reliability for all emergency diesel generator units after installation and during service.

This revision of Regulatory Guide 1.9 integrates into a single regulatory guide pertinent guidance previously addressed in Revision 2 of Regulatory Guide 1.9, Regulatory Guide 1.108, and Generic Letter 84-15, and it references, as appropriate, guidelines set forth in IEEE Std 387-1984. In addition, this guide describes a means for meeting the minimum diesel generator reliability goals in Regulatory Guide 1.155. This guide also provides guidance for an emergency diesel generator reliability program designed to monitor and maintain EDG reliability levels.

In addition, new Standard Technical Specifications (STS) are being developed by NRC and industry as a joint effort. The periodic testing guidance provided herein reflects progress made to date to define EDG surveillance requirements in the new STS. Upon NRC endorsement, those new STS surveillance requirements will supersede guidance on periodic testing provided in this regulatory guide.

Concurrent with the development of this regulatory guide, the Nuclear Management and Resources Council (NUMARC) has revised NUMARC-87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors." NUMARC-8700, Revision 1, Appendix D, "EDG Reliability Program," which (4-6-90) provides for monitoring nuclear unit EDG reliability levels and remedial actions to restore EDG reliability to above those values selected for station blackout. The NRC staff has reviewed NUMARC's revised Appendix D and finds it acceptable for monitoring and maintaining EDG reliability levels. Table 1 of this regulatory guide provides a cross reference between Revision 3 of Regulatory Guide 1.9 and NUMARC 8700, Revision 1, Appendix D.

C. REGULATORY POSITION

Conformance with the guidelines in IEEE Std 387-1984 "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," is a method acceptable to the NRC staff for satisfying the Commission's regulations with respect to design, qualification, and periodic testing of diesel generator units used as onsite electric power systems for nuclear power plants subject to the following:

1. DESIGN CONSIDERATIONS

The guidelines of IEEE Std 387-1984 should be supplemented as follows:

1.1 Section 1.2, "Inclusions," of IEEE Std 387-1984 should be supplemented to include diesel generator auto controls, manual controls, and diesel generator output breaker.

1.2. When the characteristics of the required emergency diesel generator loads are not accurately known, such as during the construction permit stage of design, each emergency diesel generator unit of an onsite power supply system should be selected to have a continuous load rating (as defined in Section 3.7.1 of IEEE Std 387-1984) equal to or greater than the sum of the conservatively estimated loads (nameplate) needed to be powered by that unit at any one time. In the absence of fully substantiated performance characteristics for mechanical equipment such as pumps, the electric motor drive ratings should be calculated using conservative estimates of these characteristics, e.g., pump runout conditions and motor efficiencies of 90 percent or less and power factors of 85 percent or lower.

1.3. At the operating license stage of review, the predicted loads should not exceed the continuous rating (as defined in Section 3.7.2 of IEEE Std 387-1984) of the diesel generator unit.

1.4. Section 5.1.2, "Mechanical and Electrical Capabilities," of IEEE Std 387-1984 pertains, in part, to the starting and load-accepting capabilities of the diesel generator unit. In conformance with Section 5.1.2, each diesel generator unit should be capable of starting and accelerating to rated speed, in the required sequence, all the needed engineered safety feature and emergency shutdown loads. The diesel generator unit design should be such that at no time during the loading sequence should the frequency decrease to less than 95 percent of nominal nor the voltage decrease to less than 75 percent of nominal (a larger decrease in voltage and frequency may be justified for a diesel generator unit that carries only one large connected load). Frequency should be restored to within 2 percent of nominal in less than 60 percent of each load-sequence interval for step-load increase and in less than 80 percent of each load-sequence interval for disconnection of the single largest load, and voltage should be restored to within 10 percent of nominal within 60 percent of each load-sequence time interval. (A greater percentage of the time interval may be used if it can be justified by analysis. However, the load-sequence time interval should include sufficient margin to account for the accuracy and repeatability of the load-sequence timer). During recovery from transients caused by the disconnection of the largest single load, the speed of the diesel generator unit should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip setpoint or 115 percent of nominal, whichever is lower. Furthermore, the transient following the complete loss of load should not cause the speed of the unit to attain the overspeed trip setpoint.

1.5. Emergency diesel generator units should be designed to be testable as discussed in Regulatory Position C.2. The design should include provisions so that testing of the units will simulate the parameters of operation (manual start, automatic start, load sequencing, load shedding, operation time, etc.), normal standby conditions, and environments (temperature, humidity, etc.) that would be expected if actual demand were to be placed on the system. If prewarm systems designed to maintain lube oil and jacket water cooling at certain temperatures or prelubrication systems or both are normally in operation, this would constitute normal standby conditions for that plant.

1.5.1. The units should be designed to automatically transfer from the test mode to an emergency mode upon receipt of emergency signals.

1.6. Design provisions should include the capability to test each emergency diesel generator unit independently of the redundant units. Test equipment should not cause a loss of independence between redundant diesel generator units or between diesel generator load groups.

1.6.1 Testability should be considered in the selection and location of instrumentation sensors and critical components (e.g., governor, starting system components). Instrumentation sensors should be readily accessible and designed so that their inspection and calibration can be verified in place. The overall design should include status indication and alarm features.

1.7 Section 5.5.3.1, "Surveillance Systems," of IEEE Std 387-1984 pertains to status indication of diesel generator unit conditions. The guidance in this section should be supplemented as follows:

1.7.1 A surveillance system should be provided with remote indication in the control room for displaying emergency diesel generator unit status, i.e., under test, ready-standby, lockout. A means of communication should also be provided between diesel generator unit testing locations and the main control room to ensure that the operators are cognizant of the status of the unit under test.

1.7.2 In order to facilitate trouble diagnosis, the surveillance system should indicate which of the emergency diesel generator protective trips has been activated first.

1.8 Section 5.5.4, "Protection," of IEEE Std 387-1984, which pertains to bypassing emergency diesel generator protective trips during emergency conditions, should be interpreted as follows:

The emergency diesel generator unit should be automatically tripped on an engine overspeed, low oil pressure, and generator-differential overcurrent. All other diesel generator protective trips should be handled in one of two ways: (1) a trip should be implemented with two or more measurements for each trip parameter with coincident logic provisions for trip actuation, or (2) a trip may be bypassed under accident conditions provided the operator has sufficient time to react appropriately to an abnormal diesel generator unit condition. The design of the bypass circuitry should include the capability for (1) testing the status and operability of the bypass circuits, (2) alarming in the control room for abnormal values of all bypass parameters (common trouble alarms may be used), and (3) manually resetting the trip bypass function. Capability for automatic reset is not acceptable.

Section 5.5.4(2) of IEEE Std 387-1984, on retaining all protective devices during emergency diesel generator testing, does not apply to a periodic test that demonstrates diesel generator system response under simulated accident conditions per Regulatory Positions C.2.2.5, C.2.2.6, and C.2.2.12.

2. DIESEL GENERATOR TESTING

Section 3, "Definitions," Section 6, "Testing,"[2] and Section 7, "Qualification Requirements," in IEEE Std 387-1984 should be supplemented as discussed below.

2.1 Definitions

The following definitions[3] are applicable to the positions of this regulatory guide that address testing, reliability calculations, recordkeeping, and reporting of performance.

Start demands: All valid and inadvertent start demands, including all start-only demands and all start demands that are followed by load-run demands, whether by automatic or manual initiation. A start-only demand is a demand in which the emergency generator is started, but no attempt is made to load the emergency diesel generator. See "Exceptions" below.

Start failures: Any failure within the emergency generator system that prevents the generator from achieving specified frequency (or speed) and voltage is classified as a valid start failure. (For the monthly surveillance tests, the emergency diesel generator can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to reach rated speed and voltage in the precise time required by technical specifications, the start attempt is not considered a failure if the test demonstrated that the generator would start and run in an emergency). See "Exceptions" below. Any condition identified in the course of maintenance inspections (with the EDG in the standby mode) that would definitely have resulted in a start failure if a demand had occurred should be counted as a valid start demand and failure.

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[2]Additional useful information on testing and test definitions can be found in the ASME O&M Part 16, "Inservice Testing and Maintenance of Diesel Drives at Nuclear Power Plants." Copies can be obtained by contacting the American Society of Mechanical Engineers (ASME), United Engineering Center, 345 East 47th Street, New York, NY 10017.

[3]These definitions are taken from NUMARC-8700, Revision 1, Appendix D, May 2, 1990.

Load-run demands: To be valid, the load-run attempt must follow a successful start and meet one of the following criteria: (See "Exceptions" below.)

- A load-run of any duration that results from a real (e.g., not a test) automatic or manual signal.

- A load-run test to satisfy the plant's load and duration test specifications.

- Other operations (e.g., special tests) in which the emergency diesel generator is planned to run for at least one hour with at least 50 percent of design load.

Load-run Failures: A load-run failure should be counted when the emergency diesel generator starts but does not pick up load and run successfully. Any failure during a valid load-run demand should be counted. See "Exceptions" below. (For monthly surveillance tests, the emergency diesel generator can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to load in the precise time required by technical specifications, the load-run attempt is not considered a failure if the test demonstrated that the generator would load and run in an emergency.) Any condition identified in the course of maintenance inspections (with the EDG in the standby mode) that definitely would have resulted in a load-run failure if a demand had occurred should be counted as a valid load-run demand and failure.

Exceptions: Unsuccessful attempts to start or load-run should not be counted as valid demands or failures when they can be definitely attributed to any of the following:

- Spurious operation of a trip that would be bypassed in the emergency operation mode (e.g. high cooling water temperature trip)

- Malfunction of equipment that is not required to operate during the emergency operating mode (e.g., synchronizing circuitry).

- Intentional termination of the test because of alarmed or observed abnormal conditions (e.g., small water or oil leaks) that would not have ultimately resulted in significant emergency generator damage or failure.

- Component malfunctions or operating errors that did not prevent the emergency diesel generator from being restarted and brought to load within a few minutes i.e., without corrective maintenance or significant problem diagnosis).

- A failure to start because a portion of the starting system was disabled for test purposes, if followed by a successful start with the starting system in its normal alignment.

Each emergency diesel generator failure that results in the emergency diesel generator being declared inoperable should be counted as one demand and one failure. Exploratory tests during corrective maintenance and the successful test that is run following repair to verify operability should not be counted as demands or failures when the EDG has not been declared operable again.

2.2 Test Descriptions

The following test descriptions are to be used with Regulatory Positions C.3 and C.4. Table 2 describes the sequence of qualification and surveillance testing. There should be detailed procedures for each test defined in Regulatory Position C.2.2. The procedures should identify special arrangements or changes in normal system configuration that must be made to put the EDG under test. Jumpers and other nonstandard configurations or arrangements should not be used subsequent to initial equipment startup testing.

2.2.1 Slow-Start Test: Demonstrate proper startup from standby conditions, and verify that the required design voltage and frequency is attained. For these tests, the emergency diesel generator can be slow-started, be prelubricated, have prewarmed oil and water circulating, and should reach rated speed on a prescribed schedule that is selected to minimize stress and wear.

2.2.2 Slow Load-Run Test: Demonstrate 95 to 100 percent of the continuous rating of the EDG, for an interval of not less than 1 hour and until temperature equilibrium has been attained. This test may be accomplished by synchronizing the generator with offsite power. The loading and unloading of an emergency diesel generator during this test should be gradual and based on a prescribed schedule that is selected to minimize stress and wear on the diesel generator.

2.2.3 Fast-Start and Load Test: Demonstrate that each emergency diesel generator unit starts from standby conditions (if a plant has normally operating prelube and keep-warm systems, this would constitute its standby conditions),and verify that the emergency diesel generator reaches standby required voltage and frequency within acceptable limits and time as defined in the plant technical specifications.

2.2.4 Loss-of-Offsite-Power (LOOP) Test: Demonstrate by simulating a loss of offsite power that (1) the emergency buses are deenergized and the loads are shed from the emergency buses and (2) the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency and energizes permanently connected loads within acceptable limits and time, energizes the auto-connected shutdown loads through the load sequencer, and operates for a minimum of 5 minutes.

2.2.5 SIAS Test: Demonstrate that on a safety initiation actuation signal (SIAS), the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency within acceptable limits and time, and operates on standby for greater than or equal to 5 minutes.

2.2.6 Combined SIAS and LOOP Tests: Demonstrate that the EDG can satisfactorily respond to a loss of offsite power (LOOP) in conjunction with SIAS in whatever sequence they might occur (e.g. LOCA followed by delayed LOOP or LOOP followed by LOCA). A simultaneous LOOP/LOCA event would be demonstrated by simulating a LOOP and SIAS an verifying that (1) the emergency buses are deenergized and loads are shed from the emergency buses and (2) the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency and energizes permanently connected loads within acceptable limits and time, energizes auto-connected loads through the load sequencer, and operates while loaded with the auto-connected loads for greater than or equal to 5 minutes.

2.2.7 Single-Load Rejection Test: Demonstrate the emergency diesel generator's capability to reject a loss of the largest single load and verify that the voltage and frequency requirements are met and that the unit will not trip on overspeed.

2.2.8 Full-Load Rejection Test: Demonstrate the emergency diesel generator's capability to reject a load equal to 95 to 100 percent of it's continuous rating and verify that the voltage requirements are met and that the unit will not trip on overspeed.

2.2.9 Endurance and Margin Test: Demonstrate full-load carrying capability for an interval of not less than 24 hours, of which 2 hours should be at a load equal to 105 to 110 percent of the continuous rating of the emergency diesel generator, and 22 hours at a load equal to 95 to 100 percent of it's continuous rating. Verify that voltage and frequency requirements are maintained.

2.2.10 Hot Restart Test: Demonstrate hot restart functional capability at full-load temperature conditions by verifying that the emergency diesel generator starts on a manual or auto-start signal, attains the required voltage and frequency within acceptable limits and time, and operates for longer than 5 minutes.

2.2.11 Synchronizing Test: Demonstrate the ability to (1) synchronize the emergency diesel generator unit with offsite power while the unit is connected to the emergency load, (2) transfer this load to the offsite power, and (3) restore the EDG to ready-to-load status.

2.2.12 Protective-Trip Bypass Test: Demonstrate that all automatic emergency diesel generator trips (except engine overspeed, oil pressure, and generator differential) are automatically bypassed upon a safety injection actuation signal. This test may be performed in conjunction with Regulatory Position 2.2.6.

2.2.13 Test Mode Change-Over Test: Demonstrate that with the emergency diesel generator operating in the automatic test mode while connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the emergency diesel generator to standby operations and (2) automatically energizing the emergency loads from offsite power.

2.2.14 Redundant Unit Test: Demonstrate that, by starting and running both redundant units simultaneously, potential common failure modes that may be undetected in single emergency diesel generator unit tests do not occur.

2.3 Pre-Operational and Surveillance Testing

Table 2 relates pre-operational and surveillance tests to the anticipated schedule for performance (e.g., pre-operational, monthly surveillance, 6-month, scheduled refueling period, and 10-year testing).

All planned tests should be preceeded by a prelube period and should be in general accordance with the manufacture's recommendations for reducing engine wear, including cool-down operation at reduced power followed by postoperation lubrication.

2.3.1 Pre-Operational Testing: A pre-operational test program should be implemented for all emergency diesel generator systems following assembly and installation at the site. This program should include the tests identified in Table 2, and the tests described in Regulatory Position C.2.2 should be carried out.

In addition, demonstrate through a minimum of 25 valid start-and-load demands (or tests) without failure on each installed emergency diesel generator unit that an acceptable level of reliability has been achieved to place the new EDG into an operational category.

2.3.2 Surveillance Testing: After the plants are licensed (after fuel load), periodic surveillance testing of each emergency diesel generator must demonstrate continued capability and reliability of the diesel generator unit to perform its intended function. When the EDG is declared operational in accordance with plant technical specifications, the following periodic test program should be implemented.

2.3.2.1 Monthly Testing: After completion of the emergency diesel generator unit reliability demonstration during preoperational testing, periodic testing of diesel emergency generator units during normal plant operation should be performed. Each diesel generator should be started and loaded as described in Regulatory Positions C.2.2.1 or C.2.2.3 and loaded as described in 2.2.2 at least once in 31 days (with maximum allowable extension not to exceed 25 percent of the surveillance interval).

2.3.2.2 Six-Month (or 184 days) Testing:[4] In order to demonstrate the capability of the EDG to start from standby and provide the necessary power to mitigate the loss-of-coolant accident coincident with loss of offsite power, once every 6 months each diesel generator should be started from standby conditions as described in C.2.2.3 to verify that the diesel generator reaches stable rated voltage and frequency within acceptable limits and time as specified in the plant technical specifications. Following this test the EDG should be loaded as described in Reg. Position C.2.2.2. (See also Table 2).

2.3.2.3. Refueling Outage Testing: Overall emergency diesel generator unit design capability should be demonstrated at every refueling outage by performing the tests identified in Table 2.

2.3.2.4. Ten-Year Testing: Demonstrate that the trains of standby electric power are independent once every 10 years (during a plant shutdown) or after any modifications that could affect emergency diesel generator independence, whichever is the shorter, by starting all redundant units simultaneously to help identify certain common failure modes undetected in single diesel generator unit tests.

2.3.3 Corrective Action Testing: If an individual EDG experiences 4 or more failures in the last 25 demands, then following completion of corrective actions performed through the nuclear unit EDG reliability program, the restored performance of the problem EDG must be demonstrated by conducting seven consecutive failure-free start and load-run demand tests (at a frequency of no less than 24 hours and of no more than seven days between each demand). All starts and load-run tests performed during this period should be included in the nuclear unit EDG reliability data set so long as the EDG is declared operable.

3. EDG RELIABILITY GOALS AND MONITORING

Reliability goals for emergency diesel generators and their monitoring are as follows:

3.1 Reliability Goals for Station Blackout

In order to comply with 10 CFR 50.63, "Loss of All

[4]This test may be substituted for a monthly test.

Alternating Current Power," and the guidance in Regulatory Guide 1.155, "Station Blackout," the minimum EDG reliability should be targeted at 0.95 or 0.975 per demand for each EDG for plants in emergency ac (EAC) Groups A, B, and C and at 0.975 per demand for each EDG for plants in EAC Group D (see Table 2 of Regulatory Guide 1.155).

EDGs credited to each nuclear unit's station blackout coping assessment should be monitored and maintained at or above the target reliabilities selected for compliance with 10 CFR 50.63.

3.2 EDG Reliability Monitoring

The monitoring of EDG reliability should be based on valid demands, valid starts, and valid load-run tests as defined in Regulatory Position 2.1, and surveillance tests as defined in Regulatory Position 2.3. The determination of adequate EDG performance should be based on a reliability indicator utilizing the performance data from the last 20, 50, and 100 demands.

The calculation of the performance and reliability indicators for individual EDGs comprises two components: (1) the start reliability and (2) the load-run reliability. Since not all EDG demands include both start and load-run demands, data on these two reliability components should be gathered and evaluated individually and then combined. An equal number of start demands and load-run demands may not occur in the same time interval. These reliability components are defined as follows:

1) Start Reliability (SR) is defined as:

$$SR = \frac{\text{Number of Successful Starts}}{\text{Total Number of Valid Start Demands}}$$

2) Load-run Reliability (LR) is defined as:

$$LR = \frac{\text{Number of Successful Load-runs}}{\text{Total Number of Valid Load-Run Demands}}$$

3) EDG Reliability = (SR) * (LR)

The above equations produce point estimates of individual EDG reliabilities with attendant uncertainties. Care should be taken in using such numbers in comparing plant performance with the EDG trigger values, particularly when using the last 20 demands data set.

Estimates of EDG reliability for a nuclear unit should utilize individual EDG performance data, which are then combined in a manner representative of the EDGs assigned to a specific nuclear unit. NUMARC-8700, Revision 1, Appendix D, Table D.2-1, provides guidance for combining data from individual EDG performance to arrive at a nuclear unit reliability estimate.

3.3 Maintaining EDG Reliability:

Maintaining EDG reliability should include the following:

(1) maintaining data on successful and failed EDG start and load-run demands.

(2) evaluating nuclear unit reliability indicators for the last 50 and the last 100 demands as well as individual EDG performance over the last 20 demands.

(3) relating calculated EDG performance and reliability indicators to trigger values established for selected target reliabilities.

(4) taking remedial actions for individual failures and for exceeding one or more trigger values.

The sample size and action levels are based on the assumption that the minimum surveillance testing interval for each EDG is once per month.

The following failure rate triggers should be used to assess EDG performance and to determine corrective actions to be taken:

EDG TRIGGER VALUES

Selected Target Reliability	Failures in 20 Demands	Failures in 50 Demands	Failures in 100 Demands
0.95	3	5	8
0.975	3	4	5

The selected target reliability is that selected for the station blackout coping analysis. This value represents the underlying nuclear unit EDG reliability needed for determining the coping duration for a station blackout. Figure 1 defines actions that should be undertaken as an integral part of an ongoing EDG reliability program when one or more of the triggers shown above are exceeded. A more detailed discussion of actions related to exceeding one or more of these triggers can be found in Section D.2.4 of NUMARC's Appendix D.

3.4 Problem EDG

A problem diesel generator is defined as an individual EDG that has experienced 4 or more failures in the last 25 demands. Should this case arise, the actions taken in response to exceeding a single trigger value as defined in Figure 1 would apply.

Following completion of reliability program corrective actions, restored performance of the problem EDG should be demonstrated by conducting seven consecutive failure-free start and load-run demand tests per Regulatory Position 2.3.3. The monthly surveillance test schedule should not be resumed until the seven consecutive tests are successfully completed. All starts and load-runs performed during this period should be included in the nuclear unit EDG reliability data set so long as the EDG is declared operable.

This process of evaluating recent demands and taking appropriate action on the individual EDG experiencing recurring failures is a key element in providing reasonable assurance that EDG performance is restored to an acceptable level.

4. RECORDKEEPING GUIDANCE[5]

Guidance from Section 7.5.2, "Records and Analysis," of IEEE Std 387-1984 should be supplemented as follows:

Utilities should retain the following information from monthly surveillance tests related to the trigger values and remedial actions taken in response to exceeded trigger values:

(1) Data on valid demands and failures that are used to calculate the performance and reliability indicators.

[5]Licensees should also retain data relevant to the fast start tests required by Technical Specifications.

(2) The corrective actions taken in response to individual failures.

(3) A description of the actions taken in response to exceeding a single trigger.

(4) A description of the EDG reliability program improvements in response to exceeding the triggers for 50 and 100 demands.

(5) The schedule of planned and in-progress improvements.

5. REPORTING CRITERIA

When reporting EDG failures, all plants should conform with the provisions of 10 CFR 50.72, 10 CFR 50.73, 10 CFR 21, plant technical specifications, and other current NRC reporting regulations.

6. EMERGENCY DIESEL GENERATOR RELIABILITY PROGRAM

Regulatory Guide 1.155 describes a means acceptable to the NRC staff for meeting the requirements of 10 CFR 50.63 and identifies the need for an EDG reliability program designed to maintain and monitor EDG reliability levels to ensure that selected reliability levels are being achieved. Regulatory Guide 1.155 also provides brief guidance on typical elements or activities associated with an EDG reliability program.

This section provides guidance for a reliability program based on proven industry practices. It is also recognized that there are other existing programs that have proven effective at maintaining high EDG reliability levels. Therefore, this guidance is not intended to replace or supplement such programs.

The principal elements of an EDG reliability program (or activities) should encompass the following:

1. <u>Monitoring</u> nuclear unit EDG <u>reliability levels</u> against those selected for station blackout (see also Regulatory Position C.3).

2. A <u>surveillance plan</u> that identifies EDG support systems and subsystems, describes frequency and scope of testing, and incorporates manufacturer recommendations.

3. <u>Performance monitoring</u> of important parameters on an ongoing basis to obtain information on the condition of the EDG and key components so that precursor conditions can be identified prior to failure.

4. A <u>maintenance program</u> designed for both preventive and corrective actions based on operating history and past maintenance activities, vendor recommendations, spare parts considerations, and the results of surveillance monitoring.

5. <u>Failure analyses</u> and root cause investigation to assist in developing corrective actions to prevent recurrence of failures.

6. An <u>EDG problem closeout process</u> to ensure that the resolution of a failure or a problem is properly implemented and successful.

7. An EDG <u>reliability data system</u> to ensure the availability and retrievability of important data and information related to EDG reliability.

These principal elements of an EDG reliability program are provided as guidelines. Other reliability programs that include the same or similar activities may also be used, such as the TDI Owner's Group maintenance and surveillance activities.[6] Such programs should be reviewed for consistency with Regulatory Guide 1.155 and this regulatory guide.

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[6]Revision 2, Appendix 2, "Design Review/Quality Validation" report submitted 5/1/86, J. George(TDI) to H. Denton (NRC) was utilized in revising plant-specific technical specifications.

6.1 Monitoring Diesel Generator Reliability

Monitoring of nuclear unit EDG reliability should be based on periodic surveillance testing as discussed in Regulatory Position C.3 and corrective actions undertaken when one or more triggers are exceeded. (See also NUMARC-8700, Rev. 1, Appendix D). The reliability program should provide the means for failure evaluation, corrective action, and demonstration of its effectiveness.

6.2 EDG Surveillance Plan

A surveillance plan should consider the following factors:

1. The effect that EDG support and auxiliary systems have on overall EDG reliability.
2. Failures caused by surveillance.
3. Frequency and nature of surveillance testing effects on EDG reliability and unavailability.
4. The types of failures that can be detected by a surveillance program.
5. Detection of failures by parameter monitoring versus testing.
6. The ability of specialized tests to simulate actual operating conditions.

Figure 2 illustrates typical components and support systems that should be considered when defining an EDG boundary. Those components whose function is solely to support the EDG are to be viewed as within the EDG boundary. The systems that provide support to the EDG and perform other plant functions are shown outside the boundary, with the understanding that the boundary interface function must be maintained.

IEEE Std 387-1984 and ANSI/ASME OM-16 provide similar definitions of components and system boundaries and may also be used as guidance.

Tables 3 and 4 list types of periodic surveillance activities that have proven effective. When performing such surveillance, it is important to capture the actual values of critical parameters since such data would be extremely useful for failure analyses, as well for long-term EDG condition monitoring.

6.3 EDG Performance Monitoring

Performance monitoring should be applied to equipment that is run on a continual or a near-continual basis. The purpose is to monitor certain parameters on an ongoing basis in order to obtain information about the state of physical conditions that may potentially impact the operability of a piece of equipment and that could be used for trending purposes. These trends may signal a degradation in a particular condition. Such evaluation may detect onset of failure and allow corrective actions to be taken before failure occurs.

Equipment that is normally in a standby condition, such as an EDG, can only be monitored on a limited basis. Monitoring critical operating parameters is usually performed during monthly operational testing. In order for this monitoring to be effective, it should be applied to the following conditions:

1. The characteristic or parameter should be a measurable condition that is known to be related to an important failure mode.

2. The characteristic or parameter should be able to be measured conveniently and practically.

3. The characteristic or parameter should be accurately monitored.

4. Parameters recorded should be measured under the same conditions (i.e., load) to the extent possible.

The actual values of the conditions should be recorded rather than simply verifying that they are within a specific range. A comparison between the values obtained from successive readings can then be made to ascertain the possibility of a degrading condition.

6.4 EDG Maintenance Program

An important contributor to EDG reliability is the manner in which both preventive and corrective maintenance are performed.

Generally speaking, an EDG maintenance program should be based on the following:

1. Vendor-recommended maintenance actions and schedule for implementation.

2. Maintenance actions should be prioritized based on such factors as repair time, severity, likelihood of reoccurrence.

3. The reliability characteristics of the EDG subsystems and components should be considered when planning EDG preventive maintenance.

4. Maintenance activities should interface with the overall EDG reliability program.

The maintenance program should have both a preventive and a corrective element. The preventive program should be tailored to specific EDG types. Table 5 shows typical examples of preventive maintenance activities.

6.5 EDG Failure Analysis and Root Cause Investigation

An EDG reliability program should include failure analysis procedures designed to systematically reduce problems or failures to corrective actions. Failure analysis starts from the most apparent symptoms and progresses to determination of underlying causes or incipient conditions. Root cause analysis goes further and attempts to find underlying causes related to design, engine operation, or maintenance. Figure 3 is an example of a systematic approach to failure and root cause analyses.

When performing a root cause analysis, the method of categorizing underlying causes is important so that corrective action can be integrated into both plant activities and the EDG reliability program. A typical classification system should consider the following:

a. Manufacturing and design

b. Quality control

d. Training

e. Communication

f. Human factors

6.6 EDG Problem Closeout

Attention should be given to procedures and controls used to ensure the resolution or "closeout" of a particular problem. The closeout of a failure or problem that is detected during maintenance or surveillance should be closed out by means of a formal procedure. A formal plant-specific procedure offers a means to prevent recurrence of the particular failure or problem.

The problem closeout procedure should be based on the following considerations:

1. Criteria for closeout

2. Closeout review

3. Closeout monitoring

4. Data system interface

A more detailed discussion of problem closeout considerations can be found in NUMARC's Appendix D Topical Report.

6.7 EDG Reliability Data System

An EDG reliability program should have a data collection, storage, and retrieval system that can be accessed by personnel assigned to monitoring and maintaining the EDGs and satisfying Regulatory Position C.5. The data system does not need to be a special purpose dedicated system, but access to "current" information should be a major consideration.

Typical types of information that should be considered in the formation of a data system are:

1. Surveillance test results

2. EDG failure history

3. Failure and root cause analysis results

4. Manufacturer's recommendations

5. Input from the preventive maintenance program

6. Input from the corrective maintenance program

7. Industry operating experience

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant proposes an acceptable alternative method for complying with the specified portions of the Commission's regulations, the methods described in Regulatory Positions C.1 and C.2 of this guide will be used by the NRC staff in evaluating selection, design, qualification, and testing of diesel generator units used as onsite electric power systems for the following nuclear power plants:

1. Plants for which the construction permit is issued after the issue date of the final guide,

2. Plants for which the operating license application is docketed 6 months or more after the issue date of the final guide,

3. Plants for which the licensee commits to the provisions of this guide.

The NRC Staff intends to use Regulatory Positions C.3, C.4, C.5, and C.6 of this regulatory guide to review the monitoring of EDG reliability levels, record keeping, reporting of failures, and existing or proposed EDG reliability programs.

Implementation of this regulatory guide by the NRC staff will in no case be earlier than (270 days after issuance).

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. The regulatory analysis prepared for the station blackout rule, NUREG-1109, "Regulatory/Backfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout," provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of NUREG-1109 is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Copies of NUREG-1109 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7802; or from the National Technical Information Service, Springfield, VA 22161.

TABLE 1

CROSS-REFERENCE BETWEEN REGULATORY GUIDE 1.9, REV. 3
AND NUMARC-87-00, APPENDIX D (3-8-90)

RG 1.9,REV 3 SECTION	NUMARC-8700 APPENDIX D
Section A, Introduction	None (Use RG 1.9,Rev.3)
Section B, Discussion	None (Use RG 1.9,Rev.3)
Section C, Regulatory Position	
1 Design Considerations	None (Use RG 1.9,Rev.3)
2 Diesel Generator Testing	
2.1 Definitions	D.1
2.2 Test Descriptions	None (Use RG 1.9,Rev.3)
2.3 Preoperational and Surveillance Testing	None (Use RG 1.9,Rev.3)
3 EDG Reliability Goals and Monitoring	D.2
3.1 Reliability Goals for SBO	Introduction
3.2 EDG Reliability Monitoring	D.2.3
3.3 Maintaining EDG Reliability	D.2.1,D.2.3,D.2.4,D.2.5
3.4 Problem EDG	D.2.4.4
4 Record keeping Guidance	D.2.4.6
5 Reporting Criteria	Use RG 1.9, Rev. 3
6 EDG Reliability Program	Introduction
6.1 Monitoring EDG Reliability	None (Use RG 1.9,Rev.3)
6.2 EDG Surveillance Plan	None (Use RG 1.9,Rev.3)
6.3 EDG Performance Monitoring	None (Use RG 1.9,Rev.3)
6.4 EDG Maintenance Program	None (Use RG 1.9,Rev.3)
6.5 EDG Failure Analysis and Root Cause Investigation	None (Use RG 1.9,Rev.3)
6.6 EDG Problem Close-out	None (Use RG 1.9,Rev.3)
6.7 EDG Reliability Data System	None (Use RG 1.9,Rev.3)
Section D, Implementation	Introduction (Initiative 5A)

TABLE 2. PRE-OPERATIONAL AND SURVEILLANCE(a) TESTING 6-14-90

Refer to Regulatory Position C.2.2 for Description	Pre-Operational Test Program	Monthly Periodic Tests	Refueling Outage 6-Month Tests	18 Month Tests	10-Year Tests
2.2.1 Start Test	X (b)	X			
2.2.2 Load-Run Test	X (b)	X			
2.2.3 Fast-Start and Load Test	X (c)		X(c)	X(c)	
2.2.4 Loss-of-Offsite Power (LOOP) Test	X			X	
2.2.5 SIAS Test	X			X	
2.2.6 Combined SIAS & LOOP Test	X			X	
2.2.7 Single-Load Rejection Test	X			X	
2.2.8 Full-Load Rejection Test	X			X	
2.2.9 Endurance and Margin Test	X			X	
2.2.10 Hot Re-start Test	X			X	
2.2.11 Synchronizing Test	X			X	
2.2.12 Protective-Trip Bypass Test	X			X	
2.2.13 Test Mode Change-Over Test	X			X	
2.2.14 Redundant Unit Test	X				X

(a) Tech Spec requirements take precedence to this table.
(b) Included in each of the 25 tests described in Regulatory Position 2.3.1.
(c) Utilities should retain data for fast starts required by Tech Specs.
This test may be substituted for a monthly surveillance test.

TABLE 3. EDG SHIFT OR DAILY SURVEILLANCE (EXAMPLE)

Lube Oil System

Lube oil inlet temperature
Lube oil outlet temperature
Lube oil sump level
Lube oil strainer/filter differential pressure
Visual inspection for leaks

Fuel Oil System

Day tank level
Storage tank level
Bleed fuel oil filters
Visual inspection for leaks
Bleed fuel oil filters*

Jacket Water System

Jacket water inlet temperature
Jacket water outlet temperature
Expansion tank level
Visual inspection for leaks

Starting Air System

Air receiver pressure
Blowdown air receiver
Compressor oil level
Aligned to appropriate power

Governor System

Governor oil level
Verify load limit settings
Governor setting in Auto/Manual

Diesel/Generator

Oil Level of pedestal bearing
Turbo oil level
Intercooler leak inspection
Turbocharger lube oil level
Drain moisture from exhaust silencers
Verify alarms clear
Diesel starting selector switches in remote
EDG breaker remote-local select switch in remote
Verify auto-manual regulators set in normal range
Check water and fuel hoses
Check starter motors
Check exhaust

Electrical*

Auto/Manual start switch in auto
Appropriate breakers racked in
Power to Breaker Verified Check operation of compressor traps source
Fault Indicator

*Weekly surveillance

TABLE 4A. MONTHLY EDG SURVEILLANCE (EXAMPLE)

Diesel/Generator

Visually inspect fuel system for leaks
Visually inspect for exhaust leaks
Drain water from crankcase vent piping
Verify generator synchronization
Engine coolant level
Mainfold pressure
Crankcase pressure
Air inlet temperature
Turbo temperature
Intercooler outlet temperature
operability
Ventilation fan operability
Cylinder exhaust temperatures
Cooling water supply temperature
Stator temperature
Gen frequency
Gen voltage
Gen Amps
Gen KW

Jacket Water System
Inspect for leaks
Check water treatment
HX outlet temperature
Engine outlet temperature
System pressure
Turbo outlet temperature

Governor System

Inspect linkage for looseness
Verify all control settings
Check actuator oil level
Check automatic shutdown
Filter DP
Inspect for leaks
Day tank level
Storage tank level
Verify transfer pumps

Fuel oil pressure
(inlet/outlet)

Lube Oil System
Check lube oil for dilution
Lube oil chemical analysis
Inspect for leaks
LO filter DP
LO pressure
LO level
Turbo LO pressure
LO inlet temperature
LO outlet temperature

In addition to the above surveillances there are other less frequent inspections that may be considered. Examples of these include the following:

TABLE 4B. LESS FREQUENT EDG SURVEILLANCES (EXAMPLE)

Periodic Surveillance:

Lubrication oil Chemical Analysis	Once every quarter
Fuel Oil Chemical Analysis	Once every quarter
Non-Periodic Surveillances:	
Chemical analysis of new fuel oil	Upon delivery and prior to use
Chemical analysis of new lubrication Oil	Upon delivery and prior to use

TABLE 5. TYPICAL PREVENTIVE MAINTENANCE ACTIVITIES (EXAMPLE)

Engine Lube Oil System:

Clean and inspect lube oil strainer
Replace lube oil filters
Replace turbocharger filter element
Inspect lube oil cooler

Engine Cooling System:

Inspect cooling water pump
Drain and replace coolant
Inspect expansion tank

Fuel Oil System:

Replace fuel oil filters
Clean and inspect fuel oil strainers
Test fuel condition

Starting Air System:

Clean and inspect air strainer
Replace compressor oil
Inspect compressor drive belts

Engine Maintenance:

Replace inlet air filter oil
Inspect and clean inlet air filter
Inspect air box drains
Inspect air box cooling system
Check cylinder head to piston clearances
Inspect cylinder liners
Inspect rod bearings
Inspect main bearings
Inspect piston rings

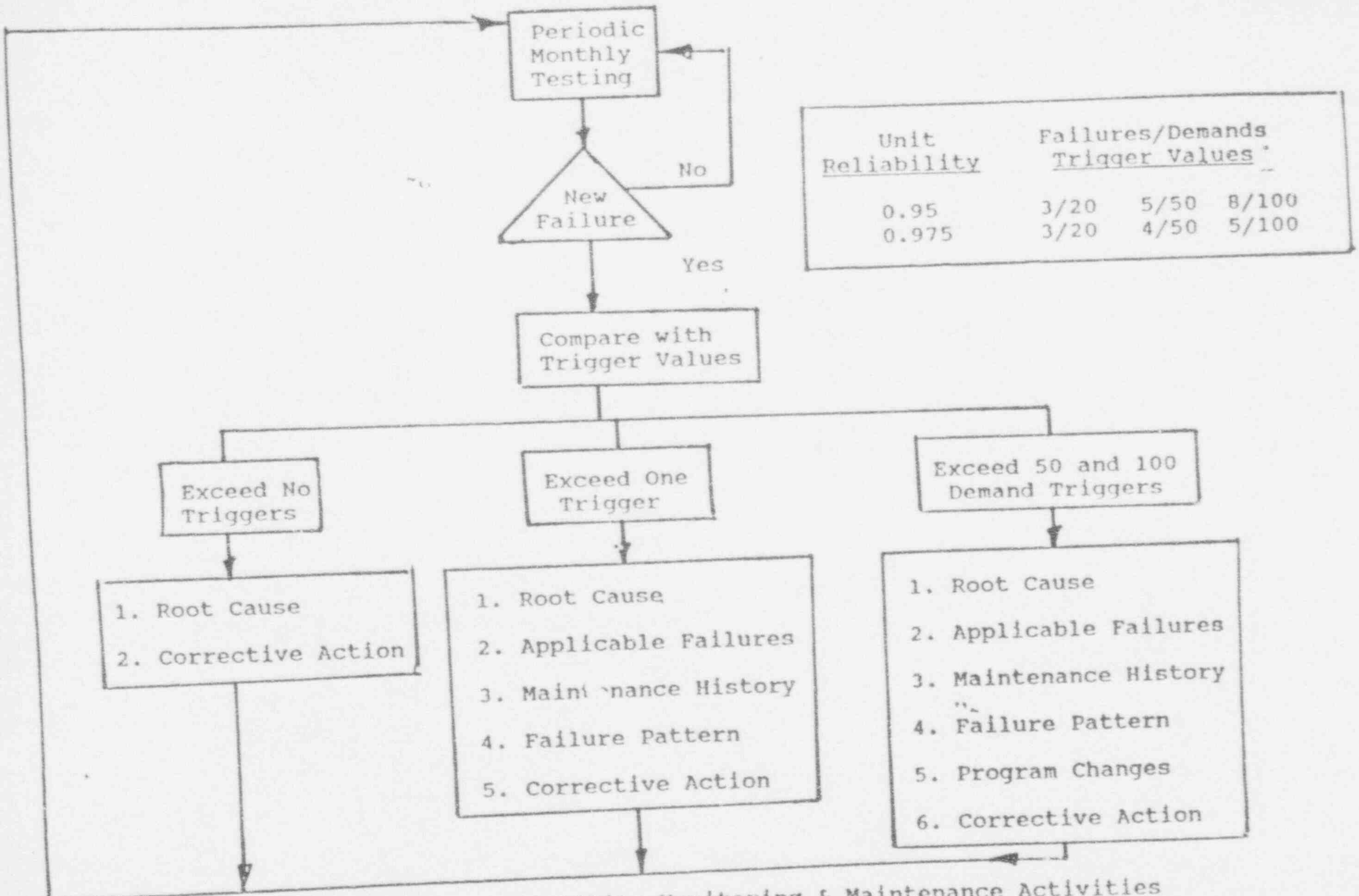


Figure 1, Reliability Monitoring & Maintenance Activities

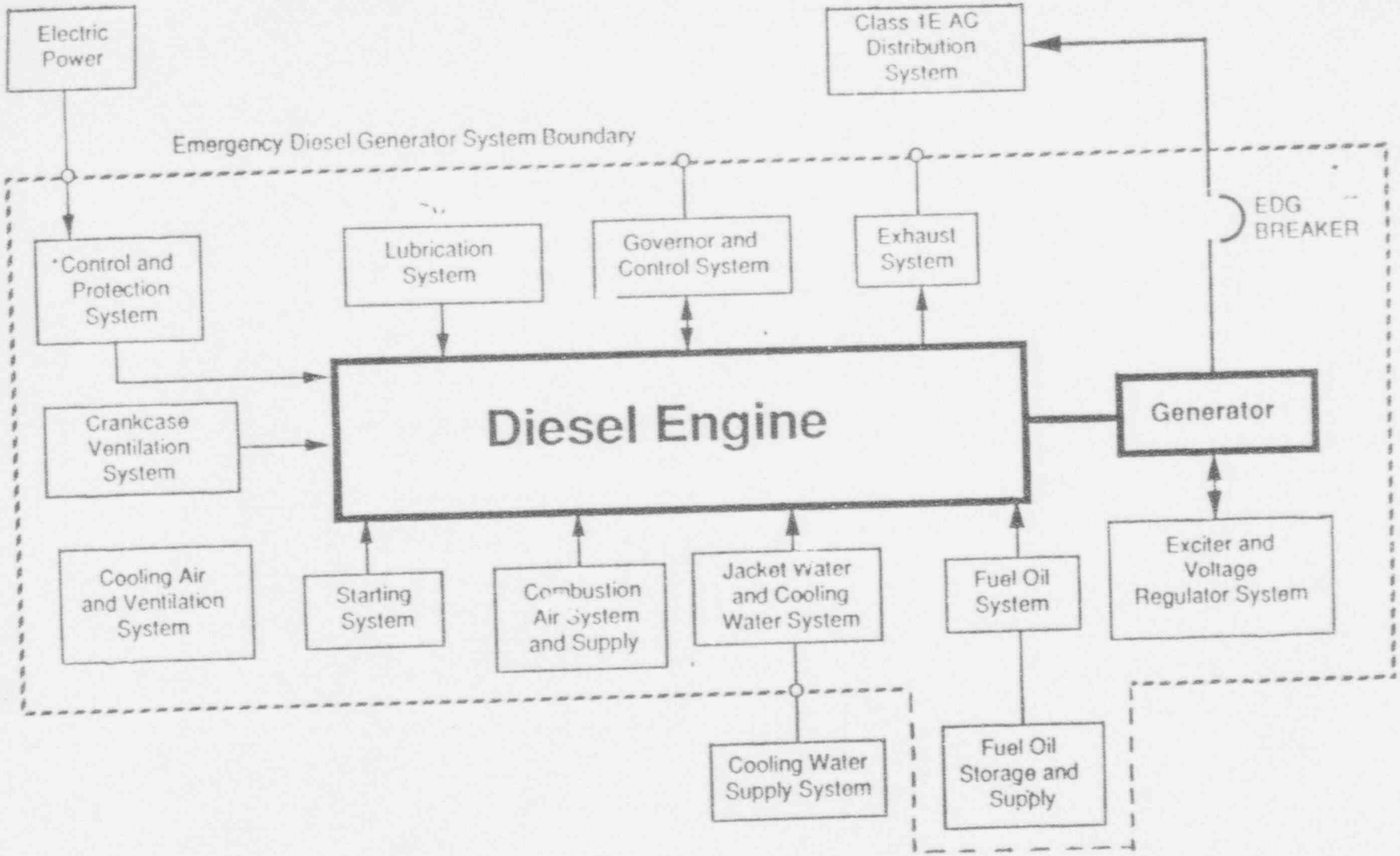


Figure 2 - Emergency Diesel Generator Systems, Boundary and Support Systems

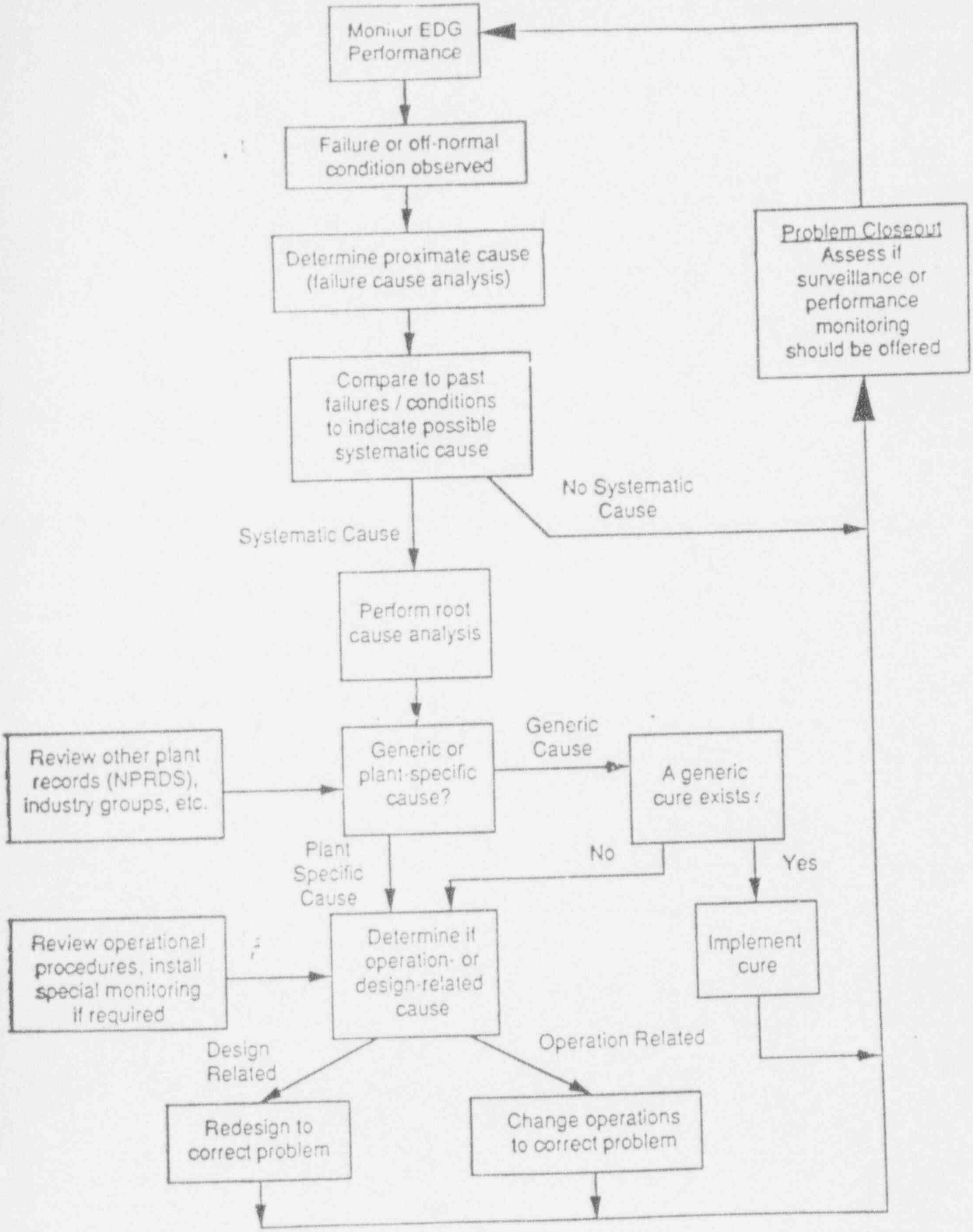


Figure 3- Failure and Root Cause Analysis Logic

ENCLOSURE C

6-15-90 Draft

PROPOSED GENERIC LETTER (REFERENCE GSI B-56)

TO: ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR NUCLEAR POWER REACTORS.

SUBJECT: REQUEST FOR ACTION PURSUANT TO 10 CFR 50.54(f) RELATED TO THE RESOLUTION OF GENERIC SAFETY ISSUE (GSI) B-56, "DIESEL GENERATOR RELIABILITY" (GENERIC LETTER 90-)

PURPOSE AND BACKGROUND:

This generic letter is being sent to all licensees of operating nuclear power reactors and to all construction permit holders to determine whether licensees will voluntarily implement NUMARC's Initiative 5A, "Coping Assessment/EDG Performance,"[(1)] (see Enclosure C.1), the guidance for monitoring and maintaining Emergency Diesel Generator (EDG) reliability provided in NUMARC 8700, Revision 1, Appendix D and an EDG reliability program such as described in Regulatory Position C.6 of Regulatory Guide 1.9, Revision 3.

The Staff has issued Revision 3 of Regulatory Guide 1.9, "Selection, Design, Qualification, Testing and Reliability of Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" for the technical resolution of GSI B-56. This revision integrates into a single document guidance on EDG selection, design, qualification and testing previously addressed (or provided) in Revision 3 of Regulatory Guide 1.108, Revision 2 of Regulatory Guide 1.9, and Generic Letter 84-15. Reporting of EDG failures in conformance with 10 CFR Parts 50.72 and 50.73 will continue. Licensees are also encourage to continue to report EDG failures to NPDRS.

REQUESTED ACTIONS TO BE TAKEN BY ADDRESSEES:

In order to determine whether any operating license or construction permits for facilities covered by this request should be modified, suspended or revoked, you are required, pursuant to Section 182 of the Atomic Energy Act and 10 CFR 50.54(f), to provide the NRC within 180 days of the date of this letter a statement as to your plans and the schedule for implementation at each facility to comply with Initiative 5A and Appendix D of NUMARC 8700, Revision 1 and with Regulatory

*(1) NUMARC 87-00, Revision 1 (5-2-90)

Positions C.3, C.4, C.5 and C.6 of Revision 3 to RG 1.9 as your method for monitoring and maintaining EDG reliability levels for compliance with 10 CFR 50.63. If you do not plan to implement Initiative 5A and regulatory positions noted above, in full or part, the statement shall identify with specificity the portions of the Initiative and Regulatory Guide which you do not intend to implement and the basis therefore. If you plan to use a different method for monitoring and maintaining EDG reliability levels, your response should detail your approach and the schedule for that approach, and a schedule for implementation at each facility within 270 days from the date of this letter. Your response should be submitted to the NRC, signed under oath and affirmation. You should retain all documentation supporting this statement consistent with the records retention program for your facility.

Licensees that implement NUMARC Initiative 5A, Appendix D and Regulatory Positions, C.3, C.4, C.5, and C.6 of Revision 3 of Regulatory Guide 1.9 may include a request to change their plant Technical Specifications (TS) to incorporate the line-improvements noted in Enclosure C.2. These line-item TS improvements are a result of the implementation of programmatic requirements for monitoring and maintaining EDG target reliability. Guidance for the preparation of a proposed license amendment to implement these line-item TS improvements is provided in Enclosure C.2. Conforming amendment requests will be expeditiously reviewed by the NRC Project Manager for the facility.

BACKFIT DISCUSSION

In Revision 3 of Regulatory Guide 1.9, the actions proposed by the NRC staff in Regulatory Positions C.3, C.4, C.5, and C.6 represent new staff positions and are considered a backfit in accordance with NRC procedures. A backfit analysis of the type described in 10CFR 50.109(a)(3) and 10 CFR 50.109(c) was performed and a determination was made that there will be a substantial increase in overall protection of the public health and safety, and that the costs are justified in view of this increased protection. The staff also believes that this approach is the most cost effective method for maintaining emergency diesel generator reliability since the prposed actions are consistant with practices developed by the nuclear industry.

The backfit analysis is included in the Federal Register Notice for the issuance of Revision 3 of Regulatory Guide 1.9, and will be made available in the Public Document Room along with the minutes of the 171st, 176th and _____ meetings of the Committee to Review Generic Requirements that discussed the resolution of this generic issue.

PAPERWORK REDUCTION ACT REQUIREMENTS

This request is covered by Office of Management and Budget Clearance Number 3150-0011, which expires __________. The estimated average burden hours is 120 person-hours per license response, including assessing the new recommendations, searching data sources, gathering and analyzing data, and the required reports. These estimated average burden hours pertain only to these identified response-related matters and do not include the time for actual implementation of requested actions. Estimates of implementation of an EDG reliability program are reported in NUREG-1109, "Regulatory/BAckfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout." Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to the U.S. Office of Management and Budget, Executive Office Building, Washington, D.C. 20503, and to the Nuclear Regulatory Commission, Records and Reports Management Branch, Office of Administration and Resources Management, Washington, D.C. 20555.

If you have any questions on this matter, please contact your project manager.

Sincerely,

James G. Partlow, Associate
Director for Projects
Office of Nuclear Regulation

Enclosures:
1. C.1 NUMARC Initiative 5A
2. C.2 Guidance for the Preparation of License Amendments

NUMARC INITIATIVE 5A
"COPING ASSESSMENT/EDG PERFORMANCE"
(Ref. NUMARC-8700, Rev. 1, May 2,1990)

The following verbatim quote of NUMARC's Initiative 5A is provided for convenience :

"Each Utility will assess the ability of its plant(s) to cope with a "Station Blackout." Plants utilizing alternate AC power for "Station Blackout" response which can be shown by test to be available to power the shutdown busses within 10 minutes of the onset of "Station Blackout" do not need to perform any coping assessment. Remaining alternate AC plants will assess their ability to cope for one-hour. Plants not utilizing an alternate AC source will assess their ability to cope for four hours. Factors identified which prevent demonstrating the capability to cope for the appropriate duration will be addressed through hardware and/or procedural changes so that successful demonstration is possible.

As part of the coping assessment, utilities are required to choose an EDG target reliability (0.95 or 0.975) and are required to maintain that chosen reliability. Accordingly, each utility will employ the following exceedence trigger values (on a plant unit basis) as the mechanism for monitoring EDG Target Reliability and support closure of Generic Issue B-56:

SELECTED EDG TARGET RELIABILITY	FAILURES IN 20 DEMANDS	FAILURES IN 50 DEMANDS	FAILURES IN 100 DEMANDS
0.95	3	5	8
0.975	3	4	5

Additionally, each utility, in response to an individual EDG experiencing 4 or more failures in the last 25 demands, will demonstrate restored EDG performance by conducting seven (7) consecutive failure free start and load-run tests. This reduced form of accelerated testing shall be conducted at a frequency of no less than 24 hours and of no more than seven (7) days between each demand. Each utility will, if applicable, address this reduction in accelerated testing through changes to technical specifications or other appropriate means."

Enclosure C.2
5-31-90 Draft

GUIDANCE FOR THE PREPARATION OF A LICENSE AMENDMENT REQUEST TO MODIFY EMERGENCY DIESEL GENERATOR SURVEILLANCE, ACTION, AND REPORTING REQUIREMENTS

BACKGROUND

A program for monitoring and maintaining the reliability of emergency diesel generators (EDGs) is an essential element for assuring that the selected EDG target reliability for compliance with the station blackout rule (10 CFR 50.63) is met. The establishment of this program in accordance with the guidance in Regulatory Positions C.3, C.4, C.5 and C.6 of Revision 3 to Regulatory Guide 1.9 will permit a reduction in the accelerated frequency of EDG monthly surveillance requirements that are applcable to most operating plants. For the remaining plants, the implementation of an accelerated frequency for monthly EDG surveillance requirements, consistant with a commitment to NUMARC Initiative 5A, constitutes a backfit. Also, a relaxation in the reporting requirements for EDG failures, consistent with Regulatory Position C.5 of Revision 3 of Regulatory Guide 1.9 is appropriate. Consistent with the NRC policy on Technical Specification (TS) improvements, this guidance is provided for a license amendment request to implement these line-item TS improvements.

DISCUSSION

Current plant TS typically require an accelerated frequency of once per 7 days for conducting EDG monthly surveillance requirements when the number of failures exceeds 1 in the last 20 or 5 in the last 100 valid tests on a per diesel generator basis. With the implementation of a EDG reliability program conforming to the guidelines of Revision 3 to Regulatory Guide 1.9, the staff has concluded that 4 or more failures in the last 25 valid tests is acceptable for imposing an accelerated test frequency for monthly surveillance requirements. Furthermore, the accelerated testing may be suspended following 7 consecutive failure-free tests provided the time interval between consecutive tests is no less than 24 hours.

An acceptable alternative to the existing requirements of TS Table 4.8.1.1.2-1 is the following:

Table 4.8.1.1.2-1
DIESEL GENERATOR TEST SCHEDULE

NUMBER OF FAILURES IN LAST 25 VALID TESTS*	TEST FREQUENCY
≤ 3	Once per 31 days
≥ 4	Once per 7 days** (but no less than 24 hours)

* Criteria for determining number of failures and valid demands shall be in accordance with Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3, where the number of demands and failures is determined on a per diesel generator basis. The criteria are based upon counting only those failures that have an impact on the capability of the EDG to respond to a station blackout. However, the ACTION requirements must be met for those fast start failures that are excluded for determining the number of failures in the last 25 valid tests.

** This test frequency shall be maintained until 7 consecutive failure-free start and load-run demands have been performed. If subsequent to the 7 failure free tests 1 or more additional failures occur such that there are again 4 or more failures in the last 25 tests, the testing interval shall again be reduced as noted above and maintained until 7 consecutive failure-free tests have been performed.

The changes to Table 4.8.1.1.2-1 are in the number of failures in the last 25 valid tests. The * footnote is changed to reflect the updated criteria on valid tests and failures provided in Regulatory Position C.2.1 of Revision 3 to Regulatory Guide 1.9. The criteria are based upon counting only those failures that have an impact on the capability of the EDG to respond to a station blackout. Therefore, it is noted that the ACTION requirements must be met for those fast start failures that are excluded for determining the number of failures in the last 25 valid tests. The ** footnote is changed to reflect testing requirements noted in Regulatory Position C.3.4 of Regulatory Guide 1.9 and Initiative 5A of NUMARC 87-00. Individual plant TS may have other notes relating to reducing the previous failure count to zero following a complete diesel overhaul. With the change in the requirements for initiating and terminating the accelerated frequency for monthly surveillance requirements, notes related to reducing the previous failure count to zero following a complete diesel overhaul are no longer appropriate and should be deleted.

The "Bases" Section for TS 3/4.8.1 should be updated to note that the basis for this TS also includes this generic letter.

Finally, with the implementation of recordkeeping requirements on EDG failures as a part of the above noted programmatic requirements for monitoring and maintaining EDG reliability, the staff has concluded that a special report for all EDG failures is no longer necessary . Accordingly, the following provides an acceptable alternative for TS 4.8.1.1.3. This is consistent with Regulatory Position C.5 of Revision 3 to Regulatory Guide 1.9:

> 4.8.1.1.3 Reports - Reports on failures of the emergency diesel generators, pursuant to the requirements of 10 CFR 50.73, shall include the information noted in Regulatory Position C.5 of Regulatory Guide 1.9, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, ________ 1990.

SUMMARY

The alternative to the requirements of Table 4.8.1.1.2-1 will permit a reduction in the accelerated frequency of EDG monthly surveillance requirements. Finally, a reduction in the reporting requirements for EDG failures is also appropriate with the implementation of recordkeeping requirements noted above.

ENCLOSURE D
5-30-90
DRAFT

BACKFIT ANALYSIS

GI B-56, "DIESEL RELIABILITY"

Background:

The NRC staff has issued Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," constitutes resolution of Generic Safety Issue B-56, "Diesel Generator Reliability." Revision 3 of Regulatory Guide 1.9, integrates into a single regulatory guide pertinent guidance previously addressed in Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Regulatory Guide 1.9, Revision 2, and Generic Letter 84-15. Guidance provided in Revision 3 of Regulatory Guide 1.9 supersedes Regulatory Guide 1.108, and Regulatory Guide 1.108 is hereby withdrawn. Withdrawal of Regulatory Guide 1.108, however, does not alter any prior or existing licensing commitments based on Regulatory Guides 1.108 and 1.9 and Generic Letter 84-15. These are still considered to be in effect until a licensee changes plant Technical Specifications.

In addition, the nuclear power industry has revised Appendix D of NUMARC-8700, which provides guidance for monitoring nuclear unit EDG reliability levels and for remedial actions to restore reliability levels above the target reliability selected for station blackout. The NRC staff has reviewed Appendix D and finds it's guidance acceptable for monitoring and maintaining EDG reliability levels, and they have referenced this guidance (as applicable) in Regulatory Guide 1.9, Revision 3. Table 1 of this regulatory guide cross-references the guide and NUMARC 8700, Revision 1, Appendix D (5-2-90).

The resolution of USI A-44, "Station Blackout" identified GSI B-56, "Diesel Generator Reliability" an oustanding safety issue related to USI A-44, and also noted that the resolution of B-56 would provide guidance for use by the staff and industry for reviewing diesel generator reliability programs. The regulatory analysis for USI A-44 is contained in NUREG-1109, "Regulatory/ Backfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout", June 1988. This regulatory analysis evaluated costs associated with implementation of EDG reliability programs and concluded that operation of onsite emergency AC power sources shuld be ensured by a reliability program designed to monitor and maintain EDG reliability levels consistant with those selected for compliance with the Station Blackout Rule. The staff finds the regulatory analysis developed for USI A-44 applicable to the resolution of GI B-56, and therefore a new regulatory analysis will not be developed for GI B-56.

The following information is provided in answer to specific requirements of paragraph (c) of 10 CFR 50.109.

(1) Statement of specific objectives that the proposed backfit is to achieve.

The objectives for issuing Revision 3 of Regulatory Guide 1.9 are as follows:

(a) To provide guidance on monitoring EDG reliability levels selected for compliance with 10 CFR 50.63, "Station Blackout," and reviewing EDG reliability programs.

(b) To incorporate guidance into a single regulatory guide that has been addressed through two regulatory guides (1.108 and 1.9, Rev. 2) and Generic Letter GL 84-15.

The first objective involves a backfit, the second objective does not.

(2) General description of activity that would be required by the licensee or applicant to complete the backfit.

A generic letter will be sent to all licensees of operating nuclear power plants and all construction permit holders who currently rely upon EDGs to comply with 10 CFR 50.63. The letter will request a statement of plans and schedule for monitoring and maintaining EDG reliability levels per guidelines contained in NUMARC's Initiative 5A, NUMARC-8700, Revision 1, Appendix D (5-2-90) and Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9, Revision 3 or identification and justification of an alternative plan. The generic letter also identifies a need for revisions to plant Technical Specifications as determined by the course of action selected.

The licensee or applicant will need to review current methods for monitoring and maintaining EDG reliability levels and determine if current practices are consistent with the guidelines noted above, or if an alternative approach is desireable. Since most plants have reliability programs similar that described in the guide and NUMARC's guidance, it is likely that only confirmation would be required.

Revisions to plant Technical Specifications will require plant specific reviews since some existing Technical Specifications pre-date Regulatory Guides 1.108, 1.9, Revision 2 and GL 84-15. Committment to the use of guidance based on current industry-wide practices and the relaxation of accelerated testing per NUMARC's Initiative 5A and Regulatory Guide 1.9, Revision 3 will therefore be licensee specific. NUMARC has indicated that they anticipate utilities will address this reduction in accelerated testing through revisions to current plant Technical Specifications.

(3) Potential change in the risk to the public from accidental offsite release of radioactive material.

The USI A-44 backfit analysis (NUREG-1109) identified the risk reduction for 100 operating reactors to be 145,000 person-rem and thereby supported the Commission's conclusion that 10 CFR 50.63 provided a substantial improvement in the level of public health and safety protection. Inherent in the above finding was the understanding that adequate EDG reliability levels would be maintained (see Regulatory Guide 1.155) and that further guidance would be provided through the issuance of Revision 3 of Regulatory Guide 1.9 which constitutes the resolution of GI B-56, "Diesel Generator Reliability."

Implementation of the guidance provided in Regulatory Positions 3, 4, 5 and 6 in Revision 3 of Regulatory Guide 1.9, as taken from NUMARC's revised Appendix D, will provide the staff and industry with common guidance for monitoring and maintaining EDG reliability levels selected for compliance with 10 CFR 50.63. The improvement in the level of public health and safety estimated for USI A-44 is thereby further ensured.

(4) Potential impact of radiological exposure of facility employees.

No radiological exposure is projected since the monitoring of EDG reliability and implementating an EDG reliability program is not expected to require personnel to be exposed to radiation.

(5) Installation and continuing costs associated with the backfit, the cost of facility downtime, or the cost of construction delay.

No facility downtime or startup delays from construction or installation are envisioned with the issuance of Revision 3 of Regulatory Guide 1.9

since no facility modifications are needed. The continuing costs associated with maintaining a diesel reliability program should be small, since operating plants currently conduct monthly surveillance tests to monitor EDG reliability and have some form of an EDG maintenance program. Cost estimates for improving EDG reliability, if necessary, were estimated to be \$150,000 to \$400,000 per reactor (NUREG-1109).

It is also noted that industry information provided by NUMARC indicates that industry-wide EDG reliability levels are currently 97% to 98%, so it is expected that the actual cost of implementation beyond those measures currently employed will be less than noted above. In view of the present EDG reliability levels and use of recommended industry practices, impact on licensee resources should be small or negligible.

In addition, NUMARC's revised Initiative 5A, "Coping Assessment/EDG Performance" from NUMARC-8700, Revision 1, 5-2-90, states that utilities should maintain EDG reliability at target levels chosen for compliance with 10 CFR 50.63. The staff has interacted with NUMARC's B-56 working group in the development of Revision 3 of Regulatory Guide 1.9 and NUMARC's Appendix D.

(6) The potential safety impact of changes in plant or operational complexity, including the relationship to proposed and existing regulatory requirements.

Regulatory Positions C.3, C.4, C.5, and C.6 will not introduce additional operational complexity since monthly surveillance testing of EDGs has been implemented for some time by all licenses. Monthly surveillance testing will be the basis for monitoring EDG reliability levels and assessing the effectiveness of the on-site EDG reliability program. The relaxation of accelerated testing (from that in RG 1.108, Rev. 2) through focusing on the problem EDG should enhance life expectancy of EDGs. Therefore, there will be no adverse impact on plant safety from implementating the proposed actions.

(7) The estimated resource burden on the NRC associated with the proposed backfit and the availability of such resources.

The principal cost to the NRC would be associated with reviewing EDG reliability programs at selected plant sites, as needed. It is estimated that such efforts would not exceed 0.5 person-month per site. Using an estimated cost of \$12,000 per staff month and 15 sites, the total cost would be $150,000.

The development of guidelines by staff and industry representatives which resulted in Revision 3 of Regulatory Guide 1.9, and of NUMARC-8700, Rev. 1, Appendix D provides for uniform guidance and conformity of approaches, thereby reducing NRC review costs.

(8) The potential impact of differences in facility type, design, or age on the relevance and practicality of the proposed backfit.

Differences in facility type, design, or age will not have any significant effect on the relevance or practicality of complying with the EDG reliability monitoring program.

In addition, Revision 3 of Regulatory Guide 1.9 and NUMARC-8700, Rev. 1, Appendix D have been subjected to extensive discussions with NUMARC's B-56 working group and also issued for external review to solicit a wide spectrum of review and ensure conformity with proven practice, thereby further reducing potential impacts.

(9) Whether the proposed backfit is interim or final and, if interim, the justification for imposing the proposed backfit on an interim basis.

The proposed action is final.

ENCLOSURE E

5-29-90
[7590-01]

DRAFT FEDERAL REGISTER NOTICE
(Ref. Resolution GSI B-56)

NUCLEAR REGULATORY COMMISSION
Regulatory Guide; Issuance, Availability

The Nuclear Regulatory Commission has issued a revision to a guide in its Regulatory Guide Series. This series has been developed to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits and licenses.

The issuance of Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," constitutes resolution of Generic Safety Issue B-56, "Diesel Generator Reliability." Revision 3 of Regulatory Guide 1.9, integrates into a single regulatory guide pertinent guidance previously addressed in Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Regulatory Guide 1.9, Revision 2, and Generic Letter 84-15. Guidance provided in Revision 3 of Regulatory Guide 1.9 supersedes Regulatory Guide 1.108, and Regulatory Guide 1.108 is hereby withdrawn. Withdrawal of Regulatory Guide 1.108, however, does not alter any prior or existing licensing commitments based on Regulatory Guides 1.108 and 1.9 and Generic Letter 84-15. These are still considered to be in effect until a licensee changes plant Technical Specifications.

Regulatory Positions C.3, "EDG Reliability Goals and Monitoring" and C.6, "Emergency Diesel Generator Reliability Program" of Revision 3 of Regulatory Guide 1.9, will be used by the staff, in conjunction with NUMARC-8700, Revision 1, Appendix D (5-2-90), for monitoring and maintaining EDG reliability levels against those selected for compliance with 10 CFR 50.63, "Loss of all alternating current power" and for reviewing EDG reliability programs. Compliance with these regulatory positions is a backfit. A backfit analysis for this aspect of the regulatory guide is included here.

Comments and suggestions in connection with (1) items for inclusion in guides currently being developed or (2) improvements in all published guides are encouraged at any time. Written comments may be submitted to the Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Regulatory guides are available for inspection at the Commission's Public Document Room, 2120 L Street NW., Washington, DC. Copies of issued guides may be purchased from the Government Printing Office at the current GPO price. Information on current GPO prices may be obtained by contacting the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082, telephone (202) 275-2060 or (202)275-2171. Issued guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161.

(5 U.S.C. 552(a))

Dated at ________________ this ________ day of ____________ 1989.

For the Nuclear Regulatory Commission

____

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

ENCLOSURE F

NUMARC 87-00

GUIDELINES AND TECHNICAL BASES FOR NUMARC INITIATIVES ADDRESSING STATION BLACKOUT AT LIGHT WATER REACTORS

REVISION 1

MAY 2, 1990

APPENDIX D

EDG RELIABILITY PROGRAM

~~8809290097~~

INTRODUCTION

Utilities are required to ensure that the Emergency Diesel Generators (EDGs) credited in each facility's station blackout coping assessment are maintained at or above the target reliability selected per Section 3.2.4. Initiative 5A presents triggers values for 20, 50 and 100 demands that were developed as the mechanism to monitor nuclear unit reliability levels. This appendix provides guidance on monitoring these levels in accordance with Initiative 5A, along with guidance on remedial actions that may be considered in response to exceedance of the trigger values. These remedial actions are designed to restore nuclear unit reliability levels above the selected target reliability.

This appendix consists of two sections. Section D.1 provides definitions of key terms related to the EDG Reliability Program. The terminolgy and concepts presented in this section are consistent with the methodology of the Industrywide Plant Performance Indicator Program (PPIP) managed by the Institute of Nuclear Power Operations (INPO).

Section D.2 provides guidance on methods to monitor nuclear unit EDG reliability levels and on remedial actions to restore reliability above the selected target reliability. The remedial actions set forth in this section are derived from current industry practices that have proven effective in maintaining EDG reliability.

The associated Topical Report to this appendix provides additional information on root cause analysis, recognized analytical and quality improvement techniques, and further detail on the elements (critical review elements) of an EDG reliability program. These elements are:

(1) Surveillance that identifies EDG support systems and subcomponents, frequency and scope of testing, and incorporates manufacturer's recommendations.

(2) Performance monitoring of important parameters on an ongoing basis to obtain information on the condition of the EDG and key components so that precursor conditions can be identified prior to failure.

(3) Maintenance designed for both preventive and corrective actions based upon operating history and past maintenance activities, vendor recommendations, and the results of surveillance testing.

(4) Failure analysis and root cause investigation to assist in developing effective corrective actions to prevent recurrence of failures.

(5) EDG problem closeout process to ensure the resolution of a failure or a problem is properly implemented and successful.

(6) EDG reliability data system to ensure the availability and retreivability of important data and information relating to EDG reliability.

This appendix represents one approach to EDG reliability. It is recognized that there are existing programs that have proven extremely successful at maintaining high EDG reliability. This appendix is not intended to replace or supplant such programs, but simply to provide guidance to address declining EDG reliability for utility use, as appropriate.

D.1 DEFINITIONS

NUMBER OF START DEMANDS

All valid and inadvertent start demands, including all start-only demands and all start demands that are followed by load-run demands, whether by automatic or manual initiation. A start-only demand is a demand in which the emergency generator is started, but no attempt is made to load the generator. See "Exceptions" below.

NUMBER OF START FAILURES

Any failure within the emergency generator system that prevents the generator from achieving specified frequency (or speed) and voltage is classified as a valid start failure. (For the monthly surveillance test, the generator can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to reach rated speed and voltage in the precise time required by technical specifications, the start attempt is not considered a failure if the test demonstrated that the generator would start in an emergency.) See "Exceptions" below. Any condition identified in the course of maintenance inspections (with the emergency generator in the standby mode) that definitely would have resulted in a start failure if a demand had occurred should be counted as a valid start demand and failure.

NUMBER OF LOAD-RUN DEMANDS

To be valid, the load-run attempt must follow a successful start and meet one of the following criteria: (See "Exceptions" below.)

- o a load-run of any duration that results from a real (e.g., not a test) automatic or manual signal
- o a load-run test to satisfy the plant's load and duration test specifications
- o other operations (e.g., special tests) in which the emergency generator is planned to run for at least one hour with at least 50 percent of design load

NUMBER OF LOAD-RUN FAILURES

A load-run failure should be counted when the emergency generator starts but does not pick up load and run successfully. Any failure during a valid load-run demand should be counted. See "Exceptions" below. (For monthly surveillance tests, the generator can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to load in the precise time required by technical specifications, the load-run attempt is not considered a failure if the test demonstrated that the generator would load and run in an emergency.) Any condition identified in the course of maintenance inspections (with the emergency generator in the standby mode) that definitely would have resulted in a load-run failure if a demand had occurred should be counted as a valid load-run demand and failure.

EXCEPTIONS

Unsuccessful attempts to start or load-run should not be counted as valid demands or failures when they can be definitely attributed to any of the following:

- spurious operation of a trip that would be bypassed in the emergency operation mode (e.g., high cooling water temperature trip)
- malfunction of equipment that is not required to operate during the emergency operating mode (e.g., synchronizing circuitry)
- intentional termination of the test because of alarmed or observed abnormal conditions (e.g., small water or oil leaks) that would not have ultimately resulted in significant emergency generator damage or failure
- component malfunctions or operating errors that did not prevent the emergency generator from being restarted and brought to load within a few minutes (i.e., without corrective maintenance or significant problem diagnosis)
- a failure to start because a portion of the starting system was disabled for test purposes, if followed by a successful start with the starting system in its normal alignment

Each emergency generator failure that results in the generator being declared inoperable should be counted as one demand and one failure. Exploratory tests during corrective maintenance and the successful test that is run following repair to verify operability should not be counted as demands or failures when the EDG has not been declared operable again.

UNIT EDG RELIABILITY: The average reliability of all EDGs being combined at an individual nuclear unit.

EXCEEDENCE TRIGGER VALUE: The value (based on number of failures during a comparative number of demands) at which additional actions to review the effectiveness of EDG reliability efforts are initiated.

CORRECTIVE MAINTENANCE: Maintenance performed to correct a component or subcomponent which is determined to be incapable of performing its function.

PREVENTATIVE MAINTENANCE: Maintenance performed with the expectation of preventing a component or subcomponent from failing to perform its function.

D.2 MONITORING EDG RELIABILITY

This section provides methodology to monitor, maintain, and improve unit EDG reliability. The methodology utilizes samples of EDG test and operating data and compares this data with predetermined values (trigger values) to determine a proper course of action to support EDG reliability goals. It should be noted that a reliability value derived from a sample is only an approximate indication of an EDG's true underlying reliability. This is because the r liability from samples will vary from the true underlying reliability due to statistical variations based upon the sample sizes. The trigger values take into account such statistical variations. Therefore, the comparison of the reliability indicators against the trigger values provides an accurate indication of reliability levels from which to base remedial actions. The method of calculating these reliability indicators is given in Section D.2.2.

The methodology in this section consists of four parts:

(1) maintaining data on successful and failed EDG start and load-run demands

(2) evaluating the unit EDG reliability indicators for the last 50 and last 100 demands as well as EDG performance over the last 20 demands via the prescribed methodology

(3) relating the calculated EDG performance and reliability indicators to trigger values established for the selected target reliability

(4) taking remedial actions for individual failures and for exceedence of one or more trigger values

The sample size and action levels are based on a surveillance testing interval for each EDG of once per month. Details of each step are presented in the sections that follow.

D.2.1 Maintaining EDG Reliability Data

Utilities should maintain records on EDG demands, successes and failures. Each success or failure should be characterized using the Industrywide Plant Performance Indicator Program (PPIP) methodology to establish valid demands, successful starts and successful load-runs. The rules governing the INPO methodology are similar to the intent of NSAC 108, The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants [Wyckoff].

D.2.2 Determining Performance and Reliability Indicators

The calculation of the performance and reliability indicators of a nuclear unit is comprised of two components: (1) the start reliability and (2) the load-run reliability. Since not all EDG demands include both start and load-run demands, data on these two reliability components should be gathered and evaluated individually and then combined. An equal number of start demands and load-run demands may not occur in the same time interval.

D.2.2.1 Determining Unit EDG Performance Indicator for Last 20 Demands

Determining the unit EDG performance indicator for the last 20 demands is accomplished by summing the number of failures observed in the last 20 start demands and the number of failures observed in the last 20 load-run demands for all of the EDGs serving as standby power supplies to that unit.

D.2.2.2 Determining Unit EDG Reliability Indicator for Last 50 Demands

Determining the unit EDG reliability indicator for the last 50 demands is accomplished by summing the number of failures observed in the last 50 start demands and the number of failures observed in the last 50 load-run demands for all of the EDGs serving as standby power supplies to that unit. A time limit of four years is suggested on the data.

Example: Determining the plant unit EDG reliability indicator for the last 50 demands

A site has one nuclear unit which has two EDGs (EDG-1 and EDG-2). The last 50 start demands consisted of 30 start demands on EDG-1, and 20 start demands on EDG-2. The last 50 load-run demands consisted of 25 load-run demands on EDG-1, and 25 load-run demands on EDG-2.

EDG-1 has experienced two starting related failures in its last 30 EDG-1 start demands and EDG-2 has experienced no starting related failures in its last 20 start demands. Thus, the unit has experienced two starting failures in the last 50 start demands.

EDG-1 has experienced one load-run failure in its last 25 load-run demands, and EDG-2 has experienced one load-run failure in its last 25 load-run demands. Thus, the unit has experienced two load-run failures in the last 50 load-run demands.

Reliability Indicator - The total number of nuclear unit EDG failures experienced in the last 50 demands is four (two start failures for the unit plus two load-run failures for the unit). Therefore the reliability indicator is four out of 50.

D.2.2.3 Determining Unit EDG Reliability Indicator for Last 100 Demands

Determining the unit EDG reliability indicator in the last 100 demands is accomplished by summing the number of failures observed in the last 100 start demands and the number of failures observed in the last 100 load-run demands for all of the EDGs serving as standby power supplies to that unit. A time limit of four years is suggested on the data.

D.2.2.4 Special Conditions

The evaluation of a nuclear unit's EDG performance and reliability indicators should take into account the demand and failure experience of all EDGs which provide standby power for the the unit. For nuclear units with fully shared EDGs between nuclear units (for example, four EDGs serving two units), the same evaluation based on all the EDGs should be performed. For units with some dedicated and some shared EDGs, the failure experience of the EDG serving the specific nuclear unit are to be included.

Example: For a two unit plant with one EDG dedicated to the first unit, one EDG dedicated to the second unit and a third EDG shared between units, the EDG reliability indicator for the first unit should consider only the failure experience of its dedicated diesel and the shared diesel. Likewise, the EDG reliability indicator for the second unit should consider the failure experience of its dedicated EDG and the shared EDG. The shared EDG is applied to both units.

Some units have EDGs of different designs which serve the function of providing standby power supplies. EDGs that have different designs, operating procedures and maintenance procedures may be evaluated separately if desired. In this case a unit would have more than one set of reliability indicator evaluations to perform and to compare to program triggers.

Example: A two nuclear unit site has five EDGs. Three are of the same manufacturer and design. Two of these three serve the emergency busses of one of the nuclear units and the third serves as a swing between nuclear units. The remaining two EDGs are of a different manufacturer and design than that of the first three. These remaining two serve the emergency buses of the second nuclear unit. Since each of these EDGs have the capability to provide for safe shutdown, they are roughly equivalent from a station blackout risk perspective. One set of 20, 50 and 100 demand indicators is calculated using the combined experience of three EDGs of the same type and a second set of indicators is calculated using the combined experience of the other two EDGs. The results of these separate evaluations are to be compared to appropriate reliability triggers as described in Section D.2.3.

Table D.2-1 provides methods that can be used for combining unit EDG experience for different EDG configurations.

Table D.2-1

METHODS FOR COMBINING UNIT EDG EXPERIENCE

EDG Configuration	Method for Combining
2,3,4 EDGs dedicated to a unit	Use combined failures of all EDGs
2,3,4 EDGs shared between units for all units	Use combined failures of all EDGs
1 dedicated EDG at each unit and 1 shared between units	Each unit uses the combined failures of its dedicated EDG and the shared EDG
2 dedicated EDGs at each unit and 1 shared between units	Each unit uses the combined failures of its dedicated EDGs and the shared EDG
2 dedicated EDGs and 1 or more diverse EDGs within the same unit	Use the combined failures of all EDGs or separately consider the failures of different EDGs

D.2.3 Relating the Calculated Unit EDG Performance and Reliability Indicators to Trigger Values for Selected Target Reliability

D.2.3.1 Use of the Exceedence Trigger Values

Failure rate triggers are used to indicate when EDGs do not meet the selected target reliabilities. This sub-section incorporates the trigger values presented in Initiative 5A for the selected target reliabilities. Table D.2-2 provides the trigger values for 20, 50 and 100 demands based on the selected EDG target reliability of 0.95 or 0.975. The selected EDG target reliability is the allowed underlying EDG target reliability selected in Section 3.2.4 and used in Table 3.8 on page 3-19 to establish the coping duration category for a station blackout.

Table D.2-2

EXCEEDENCE TRIGGER VALUES

Selected Target Reliability	Failures In 20 Demands	Failures In 50 Demands	Failures In 100 Demands
0.95	3	5	8
0.975	3	4	5

The exceedence trigger values for failures in 20 demands, failures in 50 demands and failures in 100 demands represent the values at which additional actions should be taken to restore the selected target reliability.

Periodic testing is normally conducted at one month intervals for each EDG. Real demands may also occur between testing intervals. After each failure of an EDG, and prior to the next scheduled periodic test, the number of unit EDG failures in the last 20, 50 and 100 demands should be compared to the exceedence trigger values for the selected target reliability.

D.2.3.2 Successful Test/Demand

If the most recent test is successful, then no additional actions are required unless already in a past exceedence category (see Section D.2.4.5).

D.2.3.3 Unsuccessful Test/Demand - No Trigger Values Exceeded

If the most recent test results in a failure and the failures in the last 20 demands, the failures in the last 50 demands, and the failures in the last 100 demands are less than the trigger values in Table D.2-2 for the selected target reliability, then the actions set forth in Section D.2.4.1, Actions for Plants That Do Not Exceed Any Trigger Value, should be followed.

Example: A unit has a selected EDG target reliability of 0.95. The most recent failure was the second failure in the last 20 demands, the third failure in the last 50 demands and the sixth failure in the last 100 demands. The two failures are less than the three failure trigger value for the failures in 20 demands, the three failures are less than the five failure trigger value for the failures in 50 demands and the six failures are less than the eight failure trigger for the failures in 100 demands. Hence, none of the trigger values were equaled or exceeded. The actions set forth in section D.2.4.1, Actions for Plants That Do Not Exceed Any Trigger Value, should be followed.

D.2.3.4 Unsuccessful Test/Demand - One Trigger Value Exceeded

If the most recent test resulted in a failure and either:

(1) the failures in 20 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

<u>OR</u>

(2) the failures in 50 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

<u>OR</u>

(3) the failures in 100 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

then the actions set forth in Section D.2.4.2, Actions For Plants Exceeding A Single Trigger, should be followed.

<u>Example</u>: A unit has a selected EDG reliability target of 0.95. The most recent failure was the third failure in the last 20 demands test, the fourth failure in the last 50 demands, and the sixth failure in the last 100 demands. The three failures equals or exceeds the three failure trigger value for the failures in 20 demands, the four failures are less than the five failure trigger value for the failures in 50 demands, and the six failures are less than the eight failure trigger value for the failures in 100 demands. Hence one trigger value was equaled or exceeded. The actions set forth in section D.2.4.2, Actions for Plants Exceeding a Single Trigger, should be followed.

D.2.3.5 Unsuccessful Test/Demand - 50 and 100 Demand Trigger Values Exceeded

If the most recent test resulted in a failure and:

(1) the failures in 50 demands are equal to or greater than the trigger value for the selected reliability target in Table D.2-2,

<u>AND</u>

(2) the failures in 100 demands are equal to or greater than the trigger value for the selected reliability target in Table D.2-2,

then the actions set forth in Section D.2.4.3, Actions For Plants That Exceed the 50 and 100 Demand Triggers, should be followed.

Example: A unit has a selected EDG target reliability of 0.975. The most recent failure was the fourth failure in the last 50 demands and the fifth failure in the last 100 demands. The four failures equals or exceeds the four failure trigger value for the failures in 50 demands and the fifth failure equals or exceeds the five failure trigger for the failures in 100 demands. Hence, both trigger values were equaled or exceeded. The actions set forth in section D.2.4.3, Actions for Plants That Exceed the 50 and 100 Demand Triggers, should be followed.

D.2.4 Actions for Individual Failures and for Exceedence of One or More Trigger Values

This section provides the response action guidelines to EDG failures or the exceedence of one or more trigger values. Figure D.2-1 illustrates the actions to be taken. The left-most flow path represents actions to be taken in response to individual EDG failures, but when no trigger values are exceeded. These actions are detailed in Section D.2.4.1. The center flow path represents the actions to be taken when the trigger value for either 20, 50 or 100 demands is exceeded. These actions are detailed in Section D.2.4.2. The right flow path represents the actions to be taken when the trigger values for both the 50 and 100 demands have been exceeded. These actions are detailed in Section D.2.4.3.

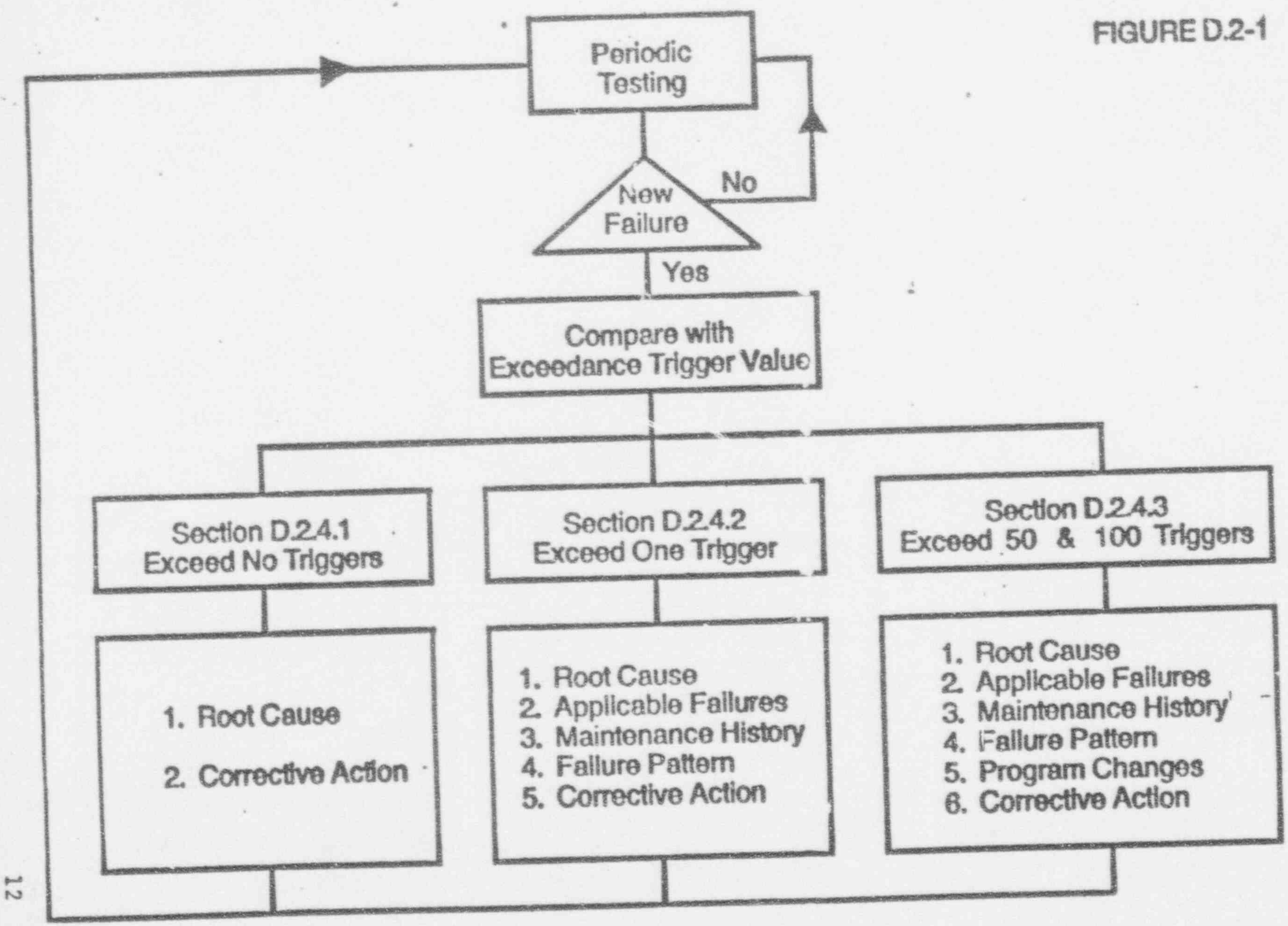
Section D.2.4.4 provides guidance on actions to address an individual EDG that has experienced 4 or more failures in the last 25 demands.

Section D.2.4.5 provides details on the duration of actions arising from exceeding one or more of the trigger values.

Section D.2.4.6 provides guidance on recordkeeping.

Section D.2.4.7 provides guidance on reporting to NRC.

FIGURE D.2-1


Periodic Testing
New Failure
No
Yes
Compare with Exceedance Trigger Value
Section D.2.4.1 Exceed No Triggers
Section D.2.4.2 Exceed One Trigger
Section D.2.4.3 Exceed 50 & 100 Triggers
1. Root Cause
2. Corrective Action
1. Root Cause
2. Applicable Failures
3. Maintenance History
4. Failure Pattern
5. Corrective Action
1. Root Cause
2. Applicable Failures
3. Maintenance History
4. Failure Pattern
5. Program Changes
6. Corrective Action

D.2.4.1 Actions for Plants That Do Not Exceed Any Trigger Value

For plants where the observed number of failures in the last 20, 50 and the last 100 demands are less than the associated trigger values for the selected target reliability, but have experienced an unsuccessful start or load-run, the following actions should be performed:

(1) determine the root cause of each new failure

(2) corrective actions

It should be noted that the reliability actions described herein following an EDG failure do not preclude any immediate actions currently docketed to fulfill regulatory requirements. Testing and response to EDG failures (corrective actions) should be consistent with current plant Technical Specifications.

The normal plant practices and procedures to accomplish the noted reliability actions do not need to be modified specifically for EDGs. The results of root cause evaluations in response to EDG failures should be incorporated into appropriate corrective actions. Details of these actions are provided below.

(1) Determine the Root Cause of Each New Failure

The cause of each new failure should be determined. A root cause analysis capability is generally agreed to be an effective part of the failure analysis process. A root cause analysis of any EDG failure should include:

a. investigating the cause of failures in sufficient detail with appropriate cause codes for tracking Corrective Maintenance (CM),

b. addressing the cause of failures to the highest level at which they can be by an applicable and effective maintenance task, testing task, procedure change, operations change, or design modification.

Additional information on root cause analysis is provided in the Topical Report.

A root cause analysis should be done to the extent necessary for determination of the cause of each failure. The threshold for performing/not performing detailed root cause analysis is a function of the failure being examined.

(2) Corrective Actions

Corrective actions should be implemented following the root cause analyses of the EDG failures. These actions, to the extent possible, should be prioritized and scheduled based on the significance of their contribution to preventing a recurring failure. Timely and proper implementation of corrective actions will reduce the likelihood of future failures and help prevent exceedence of reliability trigger values.

D.2.4.2 Actions for Plants Exceeding a Single Trigger

Nuclear units that exceed the last 20 demand failure trigger or the last 50 demand failure trigger or the last 100 demand failure trigger should take actions that focus on identifying and correcting the cause of the decrease in reliability based on the actual EDG failures experienced. The actions should be:

(1) determine the root cause of each new failure

(2) review applicable past failures

(3) evaluate the corrective maintenance tracking history

(4) assess actual failure history against critical review elements

(5) corrective actions

A detailed description of these actions is provided below.

(1) Determine Root Cause of Each New Failure

This action determines the cause of new failures as provided in Section D.2.4.1.

(2) Review Applicable Past Failures

The review of observed EDG failures associated with the trigger value exceedence should be undertaken to identify specific improvements (e.g., in EDG testing, maintenance, operational practices, design changes, etc.) that would restore target reliability. The scope of this review is all failures in the last 100 demands. This review attempts to establish a pattern in the experienced failure modes and the underlying reasons for the failures. For this review failure modes actually experienced are considered to be dominant modes. With this information it would be possible to specify actions that could be taken to preclude or minimize the recurrence of many of the observed failures. The product of this task action would be a list of effective changes that could be implemented.

NOTE: Action (2) may be performed concurrently with Action (3).

(3) Corrective Maintenance Tracking History

Nuclear units that have exceeded one trigger should evaluate the EDG Corrective Maintenance (CM) history and ongoing CM tracking. The history should identify previous CM activities to the extent appropriate based on the nature of the failures. This history should provide cognizant plant personnel with additional information that would be useful in identifying precursors to further reliability degradation. As part of this history, where available data permits, each CM related to an EDG system component failure within the last 100 demands would be evaluated and categorized in four important areas: severity of failure, functions affected, EDG subsystem involved, and failure cause classification. The severity of each CM would be classified in accordance with the IEEE Std 500 Reliability Data and the Nuclear Plant Reliability Data System (NPRDS) severity levels: immediate (catastrophic), degraded and incipient. A sample format for tracking EDG CMs is provided in Figure D.2-2. Other formats that accomplish the same purpose are acceptable.

Figure D.2-2

Corrective Maintenance Tracking History

CM # (1)	Component Involved (2)	Subsystem (3)	Immediate/ Degraded/ Incipient (4)	Function(s) Affected (5)	Description of Failure (6)	Corrective Action(s) Taken (7)

Heading Definitions:

1. **CM #:** A unique identifier for the work request or work authorization which was identified in response to the failure.
2. **Component Involved:** The unique equipment piece number(s) for the component(s) involved in the failure.
3. **Subsystem:** The EDG subsystem affected by this failure (i.e., fuel, starting air, engine, generator, cooling exhaust, lubrication or I&C).
4. **Immediate/Degraded/Incipient:** Classification of the failure according to the IEEE-500 severity index and NPRDS. Note: the immediate classification in NPRDS is equivalent to the catastrophic classification in IEEE-500.
5. **Function(s) Affected:** Identification of the function(s) of the EDG impacted by the failure (i.e., starting, loading, continued operations, shutdown, etc.).
7. **Corrective Action(s) Taken:** A brief description of action taken in response to failure (i.e., repair, replacement, redesign, etc.).

The Corrective Maintenance history and ongoing tracking should take care to distinguish between corrective maintenance actions and other actions that may use the normal plant work order system commonly used for corrective maintenance. The ongoing CM tracking should continue until the EDGs are no longer considered to be in an exceedence category as per Section D.2.4.5. After implementing the CM tracking, plant personnel would have available summaries to assist in monitoring and evaluating EDG performance over time.

(4) Assess Failure History Against Critical Review Elements

Once the specific failures have been reviewed and improvements identified, an evaluation should be performed to determine if any failure patterns identified by Actions (2) and (3) are indicative of programmatic deficiencies. The evaluation should determine whether the observed pattern of failures are related to any of the reliability program critical review elements (CRE). For each observed failure that had a root cause analysis performed, it may only be necessary to review each of these root cause analyses to determine which element if any is implicated. Information relating to each of the critical review elements is contained in the Topical Report.

(5) Corrective Actions

These actions are similar to that provided in Section D.2.4.1, except that the scope may be greater and may include programmatic elements as a result of the review to determine a pattern of failures. Timely and proper implementation of changes that improve reliability will reduce the likelihood of subsequent failures and exceedence of another trigger value.

D.2.4.3 Actions for Plants That Exceed the 50 and 100 Demand Triggers

Nuclear units exceeding both the 50 demand and the 100 demand failure triggers should take additional actions beyond those required of plants exceeding a single trigger value. The same basic actions as for nuclear units with a new failure with no trigger value exceedence and for nuclear units exceeding a single trigger value should be performed including the effects of additional failures as the result of actions (1) and (4). The actions should be:

(1) determine the root cause of each new failure

(2) review applicable past failures

(3) evaluate the corrective maintenance tracking history

(4) assess actual failure history against critical review elements

(5) reliability program changes

(6) corrective actions

Actions (1) through (4) are similar to those discussed in the previous sections.

(5) Reliability Program Changes

The exceedence of both the 50 and 100 demand triggers requires consideration be given to a comprehensive review of the reliability program. The previous remedial actions in response to EDG failures would apppear to have not yet been successful in maintaining the desired reliability. Therefore, emphasis should be placed more on programmatic issues, rather than on response to individual failures. Consideration may also be given to assistance by independent reviewers, such as engineering or corporate staff, vendor or consultant personnel in assessment of the reliability program to the extent necessary to achieve needed improvements. Many quality improvement techniques are available which may be utilized in analyzing, evaluating and, as necessary, improving reliability programs.

An example of this review activity incorporating recognized analytical and quality improvement techniques is provided in the Topical Report as useful information.

(6) Corrective Actions

Following the comprehensive program review, improvements in the form of restructuring the reliability program are warranted to reinstate EDG reliability. Timely and proper implementation of these improvements should be accomplished to restore confidence in the ability to maintain the chosen EDG target reliability.

D.2.4.4 Problem EDG

A problem EDG is defined as an individual EDG that has experienced 4 or more failures in the last 25 demands. Should this case arise, the actions taken in response to exceedence of a single trigger value (Section D.2.4.2) would apply.

Following completion of corrective actions, restored performance of the problem EDG should be demonstrated by conducting seven consecutive failure free start and load-run tests (at a frequency of no less than 24 hours and of no more than seven days between each demand). The monthly surveillance test schedule should not be resumed on the problem EDG until the seven consecutive tests are successfully completed. All starts and load-runs performed during this period should be included in the unit EDG reliability data set so long as the EDG is operable.

This process of evaluating recent demands and taking appropriate action on the individual EDG experiencing recurring failures is a key element in providing reasonable assurance that EDG performance is restored to an acceptable level.

D.2.4.5 Post Exceedence Actions

Nuclear plants exceeding one or more failure trigger values would continue to monitor the actual unit EDG performance versus the trigger values. The unit would not revert to a no exceedence status until an exceedence no longer exists in the applicable number of demands, or two years from the last failure while in an exceedence, whichever occurs first. However, before a unit could revert to a no exceedence status on the basis of elapsed time, committed improvement actions shall be completed.

Should a unit continue in an exceedence because of new failures, these failures should be evaluated against the improvement actions previously identified for implementation. The purpose of this evaluation would be to assess whether prior conclusions and attendant actions should be revised due to continued failures.

D.2.4.6 Recordkeeping

Utilities should retain the following information relating to the trigger values and remedial actions in response to exceedences:

(1) Data on valid demands and failures that are used to calculate the performance and reliability indicators.

(2) The corrective actions taken in response to individual failures.

(3) A description of the actions taken in response to a single trigger exceedance.

(4) A description of the EDG reliability program improvements in response to the 50 and 100 demand trigger exceedence.

(5) The schedule of planned and in progress improvements.

D.2.4.7 Reporting to NRC

Utilities should report EDG failures in accordance with the provisions of existing regulations. The report should include the following information:

(1) The nuclear unit EDG performance and reliability indicators as compared to the appropriate 20, 50 and 100 demand trigger values.

(2) A description of the failures, underlying causes, and corrective actions taken.

Enclosure G

5-8-90 Draft

MEMORANDUM FOR: All Project Managers

FROM: James G. Partlow,
Associate Director for Projects
Office of Nuclear Reactor Regulation

SUBJECT: RESOLUTION OF GENERIC SAFETY ISSUE (GSI) B-56, "EDG RELIABILITY" (Generic Letter, see Encl. C)

Enclosed is Generic Letter 90-00 which is being sent to all power reactor licensees and operating license applicants. It provides guidance for action to implement programmatic requirements for an emergency diesel generator (EDG) reliability program that will provide an acceptable resolution to GSI B-56 on EDG reliability. It also provides guidance for the preparation of a license amendment request to implement line-item improvements in Technical Specifications (TS). Any request for changes in TS is voluntary.

It is intended that Project Managers will review licensees commitment to programmatic requirements for monitoring and maintaining EDG reliability in accordance with the guidance in Generic Letter 90-00 for the closure of GSI B-56. Generally it should not be necessary to consult or to obtain review assistance from a technical review branch unless the licensee's proposed action deviates from the generic letter guidance. Also, it is intended that Project Managers will review proposed license amendments for changes to TS conforming to the generic letter guidance.

Enclosed is a model Safety Evaluation Report (SER) that has been prepared by the Technical Specifications and the Electrical Systems Branches. The model SER should facilitate your preparation of a letter to close GSI B-56 for the facility as well as for any proposed license amendment to implement the line-item improvements in plant TS. Because the resolution of GSI B-56 permits a relaxation in TS requirements, proposed changes to TS are voluntary. If you should have any generic TS related questions on the Generic Letter or model SER, contact Tom Dunning, OTSB, on extension 21189. If you have questions of a technical nature, contact Om Chopra, SELB, on extension 20835. The Lead Project Manager for this project is _________. _____ will assist you in the preparation of a NSHC prenotice for a proposed amendment conforming to the generic letter.

James G. Partlow
Associate Director for
Projects Office of
Nuclear Reactor
Regulation

Enclosures:
1. Generic Letter 90-00 (see Encl. C)
2. Model SER

Enclosure G.1

5-8-90 Draft

MODEL SAFETY EVALUATION REPORT

Underscored blank spaces are to be filled in with the applicable information. The information identified in brackets should be used as applicable on a plant-specific basis.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO.__ TO FACILITY OPERATING LICENSE NFP-__
AND AMENDMENT NO.__ TO FACILITY OPERATING LICENSE NFP-__
[UTILITY NAME]
DOCKET NOS. 50-__ AND 50-__
[PLANT NAME], UNITS 1 AND 2

INTRODUCTION

By letter dated _____ __, 1990, [utility name] (the licensee) provided a response to the request for a commitment to implement Regulatory Positions C.3, C.4, C.5 and C.6 of Revision 3 to Regulatory Guide 1.9, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" and Initiative 5A and Appendix D of NUMARC 8700, "Guideline and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," Revision 1. This request was made in Generic Letter 90-00, "Request for Action Pursuant to 10 CFR 50.54(f) Related to the Resolution of Generic Safety Issue (GSI) B-56, Diesel Generator Reliability," dated ______ __, 1990. In addition, the licensee proposed changes to the Technical Specifications (TS) for [plant name]. The proposed changes modify the Action requirements of TS 3.8.1.1 for performing emergency diesel generator (EDG) surveillance requirements when an offsite power source is inoperable, modifying the requirements of Table 4.8.1.1.2-1 related to the accelerated frequency for conducting monthly EDG surveillance requirements based on the frequency of EDG failures, and the requirements in TS 4.8.1.1.3 for reporting EDG failures. Guidance on the proposed modifications to TS was also provided to all licensees and operating reactor applicants by Generic Letter 90-00.

EVALUATION

The licensee provided a commitment to comply with Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9, Revision 3 for implementing programmatic requirements for monitoring and maintaining the EDG target reliability of [0.95 or 0.975, as applicable] as selected for compliance with the requirements of the Station Blackout Rule (10 CFR 50.63). [By NRC letter dated _________, 1990, the staff found that [plant name(s)] is(are) in compliance with the requirements of the blackout rule. OR The staff's evaluation of compliance with the blackout rule for [plant name(s)] is ongoing.] However, based on the above response, the staff finds that the licensee has taken appropriate action to address the resolution of GSI B-56 on EDG reliability for [plant name(s)] by the commitment to comply with Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9 and NUMARC 8700, Revision 1. Furthermore, this action is consistent with the need for an EDG reliability program that has the capability to achieve and maintain the target EDG reliability selected to cope with station blackout in response to USI A-44, "Station Blackout."

The licensee has proposed a change to Specification 4.8.1.1 to modify the Action requirements that apply when an offsite power circuit is inoperable. This change would eliminate the requirement to each EDG unit by TS [4.8.1.1.2.a.5] A change to Table 4.8.1.1.2-1 was proposed such that the accelerated test frequency of not less than once per 7 days for conducting monthly EDG surveillance requirements would apply when the number of EDG failures, on a per EDG basis, exceeds 3 in the last 25 valid starts. Furthermore, the change permits the accelerated test frequency to be terminated when 7 consecutive failure-free starts have been performed provided the time interval between consecutive tests is no less than 24 hours. In addition, the criteria for determining the number of failures and number of valid tests were changed from Regulatory Position C.2.e of Regulatory Guide 1.108 to Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3.

Finally, the licensee has proposed to modify TS 4.8.1.1.3 to eliminate the special reporting requirements for all EDG failures and to include data consistent with the recommendations of Regulatory Position C.5 of Revision 3 to Regulatory Guide 1.9 for EDG failures that are reported pursuant to the requirements of 10 CFR 50.73.

These changes to the TS for [plant name/units] are consistent with the guidance provided in Generic Letter 90-00 and are based upon the recognition that the benefit to safety of the more restrictive existing Surveillance Requirements is small in view of the benefits to safety derived from the elimination of unnecessary starting cycles for the EDG units and from the implementation of the above noted programmatic requirements for monitoring and maintaining EDG target reliability, including the associated recordkeeping on EDG failures. On the basis of its review of this matter, the staff finds that these changes to the TS for [plant name] Unit(s) ___ is(are) acceptable.

ENVIRONMENTAL CONSIDERATION

This(These) amendment(s) involve changes in the use of the facility(ies) located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment(s) involve no significant increase in the amounts and no significant change in the types of any effluent that may be released off site, and that there is no significant increase in individual or cumulative occupational exposure. This determination is based upon the increased reliability of the EDG which will result from the implementation of programmatic requirements for monitoring and maintaining EDG reliability and the relaxation of surveillance requirements in TS that will have a beneficial impact on EDG reliability by reducing the number of unnecessary test cycles. The staff has determined that the amendment(s) involve no significant-hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

CONCLUSION

The Commission's determinations that the amendments involve no significant-hazards consideration, which were published in the Federal Register (5__ FR _____) on ______ __, 1990. The Commission consulted with the State of _______. No public comments were received, and the State of _______ did not have any comments.

On the basis of the considerations discussed above, the staff concludes that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this(these) amendment(s) will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Thomas G. Dunning, OTSB/DOEA
__________________, PD__/DRP__

Dated: ________ __, 1990

SEP 1 4 ...

MEMORANDUM FOR: James M. Taylor
Executive Director for Operations

FROM: Edward L. Jordan, Chairman
Committee to Review Generic Requirements

SUBJECT: MINUTES OF CRGR MEETING NUMBER 190

The Committee to Review Generic Requirements (CRGR) met on Wednesday, July 25, 1990 from 1:00-5:00 p.m. A list of attendees at the meeting is enclosed (Enclosure 1). The following items were discussed at the meeting:

1. C. Thomas, A. Gody, E. McKenna, and J. Spraul of NRR presented for CRGR review a proposed new Standard Review Plan Section 17.3 on Quality Assurance. The Committee recommended in favor of issuing the proposed section, subject to clarification of the applicability. This matter is discussed in Enclosure 2.

2. W. Minners and A. Serkiz of RES presented for CRGR review a revised package on diesel generator reliability including a proposed resolution for Generic Safety Issue B-56 and a proposed revision to Regulatory Guide 1.9. (This matter was previously discussed at Meetings 171 and 176.) The CRGR recommended in favor of issuing the proposed regulatory guide subject to a number of revisions. This matter is discussed in Enclosure 3.

In accordance with the EDO's July 18, 1983 directive concerning "Feedback and Closure of CRGR Reviews," a written response is required from the cognizant office to report agreement or disagreement with the CRGR recommendations in these minutes. The response, which is required within five working days after receipt of these minutes, is to be forwarded to the CRGR Chairman and if there is disagreement with CRGR recommendations, to the EDO for decisionmaking.

Questions concerning these meeting minutes should be referred to Dennis Allison (492-4148).

Original Signed by:
E. L. Jordan

Edward L. Jordan, Chairman
Committee to Review Generic Requirements

Enclosures:
As stated

cc: Commission (5)
SECY
J. Lieberman
P. Norry
D. Williams
Regional Administrators
CRGR Members

Distribution: See next page

[MIN190.DPA]slm:8/28/90

CRGR:AEOD	CRGR:AEOD	DD:AEOD	C:CRGR:AEOD
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9/13/90	9/13/90	/ /90	9/14/90

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ASerkiz	TMurley
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AGody	EMcKenna
JSpraul	DAllison
JConran	DRoss
EJordan	

ENCLOSURE 1

Attendance List for CRGR Meeting No. 190

July 25, 1990

CRGR Members

E. Jordan
F. Miraglia
L. Reyes
R. Burnett (for G. Arlotto)
B. Sheron
J. Moore

CRGR Staff

D. Ross
J. Conran
D. Allison

NRC Staff

W. Minners
A. Serkiz
C. Thomas
A. Gody
E. McKenna
J. Spraul
O. Chopra
H. Alderman
C. Nichols
J. Raval
E. Tomlinson
L. Plisco
D. Holody
G. Mizumo
F. Rosa
A. Thadani

Enclosure 2 to the Minutes of CRGR Meeting No. 190
Proposed Standard Review Plan (SRP) Section 17.3
on Quality Assurance

July 25, 1990

TOPIC

C. Thomas, A. Gody, E. McKenna and Spraul of NRR presented a proposed new SRP Section 17.3 for CRGR review. The new section would reduce the emphasis on QA program structure and increase the emphasis on performance. This would better reflect current practice in reviewing QA program descriptions. However, the staff indicated that it would not introduce any new positions. The new section would apply to future applications for CP's, OL's or design approvals. Licensees with existing approved QA program descriptions could volunteer to adopt the new Section 17.3 or they could continue using the existing Section 17.1 or 17.2, even when proposing changes for staff review.

A copy of the slides used by the staff in the presentation is provided as an attachment to this enclosure.

BACKGROUND

The package provided for CRGR review was transmitted by a memorandum dated June 4, 1990 from F. Miraglia to E. Jordan. The package included:

1. Proposed SRP Section 17.3
2. SRP Comparison
3. SRP Sections 17.1 and 17.2 (Current)
4. Comment resolution

CONCLUSIONS/RECOMMENDATIONS

The CRGR supported issuance of the proposed SRP section, subject to clarification of the intended applicability. (That is, an applicant for a CP/OL that references a standard design developed under a Section 17.1 QA program would not be required to adopt Section 17.3 for the Standard designer's QA program.)

This action was not considered to be a backfit.

Enclosure 3 to the Minutes of CRGR Meeting No. 190

July 25, 1990

Proposed Resolution for GSI B-56, Diesel Generator Reliability

TOPIC

W. Minners (RES) and A. Serkiz (RES) presented for CRGR review a revised proposal for final resolution of GSI B-56, "Diesel Generator Reliability". The proposed resolution included proposed Revision 3 to Reg. Guide 1.9 and an implementing generic letter. The B-56 issue was reviewed earlier by CRGR at Meetings Nos. 171 and 176; and the current review package included revisions reflect CRGR comments and recommendations from those earlier meetings. The proposed resolution involves backfitting; specifically, the imposition of new NRC staff positions/guidance relating to EDG reliability monitoring and EDG reliability programs. The proposed backfits were presented as cost-justified safety enhancements by the sponsoring staff.

Copies of the briefing slides used by the staff in their presentations to the Committee are enclosed (Attachment 1).

BACKGROUND

1. The documents submitted initially to CRGR for review in this matter were transmitted by memorandum dated June 19, 1990, E.S. Beckjord to E.L. Jordan; the initial review package included the following documents:

   a. Letter dated May 3, 1990 from W.H. Rasin (NUMARC) to E.S. Beckjord providing NUMARC Initiative 5A.

   b. Enclosure A - Responses to CRGR Comments (from CRGR Meeting No. 176) dated May 29, 1990

   c. Enclosure B - Working Draft, dated June 14, 1990, of Revision 3 to Reg. Guide 1.9

   d. Enclosure C - Draft Generic Letter, dated June 15, 1990, "Request for Action Pursuant to 10 CFR 50.54(f) Related to the Resolution of Generic Safety Issue (GSI) B-56, Diesel Generator Reliability"

   e. Enclosure D - Draft Backfit Analysis, dated May 30, 1990, "GI B-56, Diesel Generator Reliability"

   f. Enclosure E - Draft Federal Register Notice, dated May 29, 1990

   g. Enclosure F - Appendix D, Dated May 2, 1990, to NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors"

h. Enclosure G - Draft memorandum, dated May 8, 1990, "Resolution of Generic Safety Issue B-56, EDG Reliability", and enclosed model Safety Evaluation Report

2. A revision to the initial B-56 review package was transmitted by memorandum dated July 9, 1990 (Attachment 2).

3. NUMARC provided comments on the proposed resolution for GSI B-56 directly to CRGR via letter, dated July 18, 1990, to E.L. Jordan (Attachment 4).

CONCLUSIONS/RECOMMENDATIONS

As a result of their review of the B-56 issue, including the discussions with the staff at this meeting, the Committee recommended in favor issuance of proposed Revision 3 to Reg. Guide 1.9 and its implementing generic letter, subject to several conditions stated below:

1. The staff should revise the format of proposed Revision 3 along the lines discussed with the staff at this meeting (see Attachment 3), so that Regulatory Position C.6 identifies the principal elements of an EDG reliability program acceptable to NRC, but the detailed content currently included under C.6.2, C.6.3, C.6.4, C.6.5, C.6.G and C.6.7 is moved to a new Appendix. The new Appendix should note explicitly that the detailed information provided therein is intended as illustrative examples and considerations that could be used, by licensees who choose to do so, in developing EDG reliability programs based on the principal elements contained in Regulatory Position C.6. (or the equivalent guidance in the NUMARC Appendix D dated 5/2/90). Also, the Reg. Guide should state explicitly that the principal elements of the EDG reliability program identified in Regulatory Position C.6 are intended as guidelines, which need not be used by a licensee to replace or supplement an existing successful program.

2. The staff should revise the proposed implementing generic letter to make clearer that NRC is, in accordance with the provisions of 10 CFR 50.54(f), requiring licensee response as to whether they will provide a regulatory commitment (a) to implement NUMARC Initiative 5A, and (b) to implement voluntarily the guidance for monitoring and maintaining EDG reliability in Regulatory Positions C.3, C.4, C.5 and C.6 of Revision 3 to Reg. Guide 1.9 (or equivalent guidance in NUMARC's Appendix D), as the means of complying with 10 CFR 50.63; and, if not, describe their alternative method for compliance with the rule. Specifically, the wording in the last paragraph on page 1 of the proposed generic letter (e.g., the reference to "complying with" the Regulatory Positiions in Reg. Guide 1.9) should be revised or deleted, to make clear that this letter is a generic information request only, and to avoid any suggestion that the letter is intended to impose new regulatory requirements. The wording in the first paragraph on pages 1 and 2 is generally more suitable in that regard, and should be used as the model.

   Also the discussion under "Purpose and Background" in the proposed generic letter should be expanded to discuss the linkage between GSI B-56 and 10 CFR 50.63 (Station Blackout rule), specifically with respect to identification of the need for detailed guidance for monitoring EDG reliability and for EDG programs.

3. The staff should reexamine the wording of the Backfit Analysis provided with the review package for the B-56 issue, and the "Backfit Discussion" in the proposed implementing generic letter, and revise as appropriate to make clear that the staff is reaffirming at this time (in the light of the most current information available) the applicability of the bounding type cost estimates made for anticipated EDG reliability activities in the USI A-44 resolution approved earlier in connection with the Station Blackout rule. The comments received from NUMARC seem to lack recognition of this relationship, and a more explicit (perhaps expanded) discussion of this point in the B-56 package may be helpful.

4. The CRGR considered explicitly in discussions with the staff at this meeting comments submitted formally by NUMARC in their July 18, 1990 letter (Attachment 4), and reviewed the proposed responses to those comments provided at the meeting by the staff (Attachment 5). The Committee agreed with the overall thrust and tone of the proposed responses, and offered specific suggestions for several minor changes to improve their clarity and internal consistency. In finalizing the responses, the staff will consider expanding the discussion in areas that address policy type issues raised by NUMARC (e.g., whether there is any current need for detailed regulatory guidance on EDG reliability programs, and the effects of the recent Appendix D revisions by NUMARC).

5. The CRGR noted their disappointment and consternation at the recent NUMARC action in removing abruptly from their Appendix D guidance document much of detailed guidance on EDG programs previously included there. This action by NUMARC followed several years of extensive coordinative effort by the NRC staff to develop, in cooperation with NUMARC, complementary detailed EDG guidance (specifically, Revision 3 to Reg. Guide 1.9 and the NUMARC Appendix D document). As a result of those coordinated efforts, the NUMARC Appendix D guidance reviewed by CRGR at Meeting No. 176 was judged to be a fully acceptable equivalent to the detailed guidance in the staff's proposed Revision 3 to Reg. Guide 1.9. At that point, the Committee recommended, and the staff agreed in principle, that Appendix D should be adopted (essentially without exception) as an industry standard, suitable for referencing by the licensees as acceptable means for monitoring and maintaining EDG reliability.

   The staff informed NUMARC of the planned endorsement of, and reliance on, the Appendix D guidance by NRC. Notwithstanding, NUMARC chose to abruptly remove from Appendix D in a recent revision much of the detailed EDG program guidance that made it suitable for referencing as a standard. That action by NUMARC at this late stage has rendered largely a waste the expenditure of significant staff resources and CRGR review time over the last year-or-more, pursuing development of complementary detailed NRC and NUMARC guidance on EDG programs. Beyond the waste of staff resources involved, the time spent by the staff in pursuing that objective in good faith represents a year-or-more of unnecessary delay in coming to regulatory closure on the B-56 issue as now proposed by the staff.

   There was a CRGR consensus that the Chairman should send to the EDO a separate letter more fully discussing the circumstances involved, and expressing the Committee's concern regarding the broader policy implications of the NUMARC action.

File

STANDARD REVIEW PLAN

SECTION 17.3

"QUALITY ASSURANCE"

Attachment to
Enclosure 2

1984 NRC STUDY INDICATED

QA SHOULD FOCUS MORE ON

PERFORMANCE

THE ACCEPTANCE CRITERIA OF SRP
SECTIONS 17.1 & 17.2 ARE
PROGRAMMATICALLY ORIENTED -
IN ACCORDANCE WITH THE 18
CRITERIA OF APPENDIX B

THE ACCEPTANCE CRITERIA OF SRP SECTION 17.3 ARE PERFORMANCE ORIENTED:

A. MANAGEMENT

B. PERFORMANCE/VERIFICATION

C. SELF-ASSESSMENT

SRP SECTION 17.3:

1. REQUIRES NO NEW STAFF POSITIONS

2. IS NOT A BACKFIT

3. ELIMINATES FRAGMENTATION AND OVERLAP

4. SIMPLIFIES, CLARIFIES, AND CONSOLIDATES TEXT

5. USES UP-TO-DATE INDUSTRY CONSENSUS STANDARDS

6. EMPHASIZES A GRADED APPROACH TO QA

7. IS LESS PRESCRIPTIVE

17.3 IMPLEMENTATION:

1. NOTICE IN FED. REGISTER
2. ISSUE
3. DEVELOP REVIEWER TRAINING
4. TRAIN REVIEWERS
5. DISCUSS AT SOCIETY MEETINGS
6. REVISE STANDARD FORMAT (R.G. 1.70)

RESOLUTION OF GSI B-56

PRESENTATION TO THE COMMITTEE TO REVIEW GENERIC REQUIREMENTS

CRGR Meeting 190
July 25,1990

W. Minners
MS NL/S 360 EXT. 23900

Attachment 1
to Enclosure 3

OVERVIEW
RG 1.9, REV. 3

1. Consolidates into a single RG guidance previously provided in RG 1.9, Rev. 2, RG 1.108 and GL 84-15, thereby minimizing regulatory confusion.

2. Better defines testing requirements, eliminates cold fast starts and limits accelerated testing to the "problem" EDG.

3. Provides common guidance for monitoring EDG reliability levels and actions to be taken.

4. Defines the elements of an EDG reliability program and provides illustrative examples of proven considerations and practices; supplements guidance provided in RG 1.155, "Station Blackout".

5. Incorporates proven industry practices and is consistant with NUMARC's Appendix D (5-2-90) and related Topical Report.

REQUEST FOR APPROVAL

1. Issue RG 1.9, Rev. 3 (Enclosure B)
2. Issue 50.54(f) Letter (Enclosure C)
3. Close out GSI B-56 based on Items 1 & 2
4. Issue FRN which contains Backfit Analysis

B-56 CHRONOLOGY

SBO RULE ISSUED	6/88
CRGR MTGS NO. 144 & 146	8 & 9/88
RG 1.9, REV. 3 ISSUED FOR COMMENT	11/88
COMMENT PERIOD CLOSED	3/89
MTGS WITH NUMARC (7 MTGS)	5-6/89
CRGR MTG NO. 164	6/89
MTGS WITH NUMARC (4 MTGS)	7-10/89
CRGR MTG NO. 171	10/89
CRGR MTG NO. 176	12/89
ACRS MEETING	2/90
DISCUSSIONS WITH NUMARC	1-3/90
NUMARC SUBMITTAL OF INITIATIVE 5A & NUMARC-8700, APPENDIX D	5/90
CRGR MEETING 190	7/90
ACRS MEETINGS SCHEDULED	8/90

OVERVIEW

. Staff has followed up on CRGR recommendations.
(CRGR Meeting No. 176, 12/20/89)

. NUMARC was given the opportunity to submit Appendix D

. The Staff had discussions with NUMARC (Jan-Mar 1990).

. NUMARC submitted Initiative 5A and a revised Appendix D (reduced in scope) on 5-3-90.

. Staff has revised RG 1.9, Rev. 3 to reference NUMARC's Appendix D (5-2-90) as appropriate and included guidance for an EDG reliability program (C.6) in the RG.

. A 50.54(f) letter has been prepared to determine the course of action licensees and applicants plan to pursue and suggests submittal of Tech Spec changes to take advantage of relaxations afforded..

. Issuance of RG 1.9, Rev. 3, and the generic letter constitute resolution of GSI B-56. The FRN will include the backfit analysis for the proposed course of action.

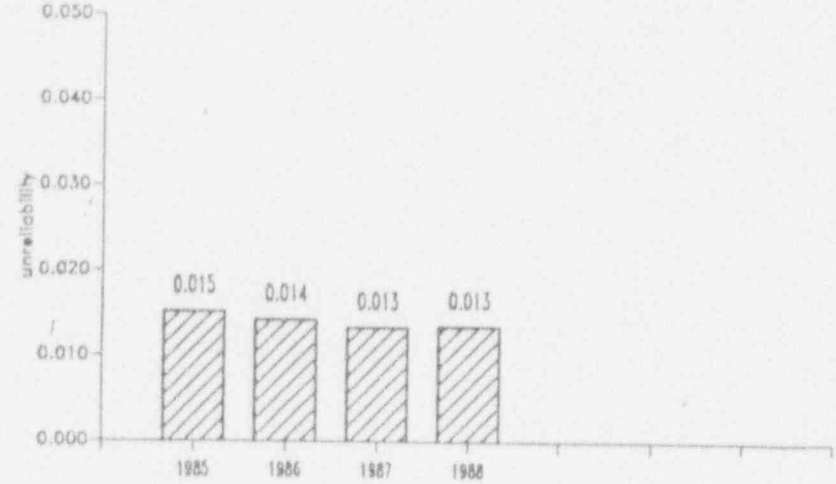
EDG RELIABILITY

1. EDG reliability situation has improved

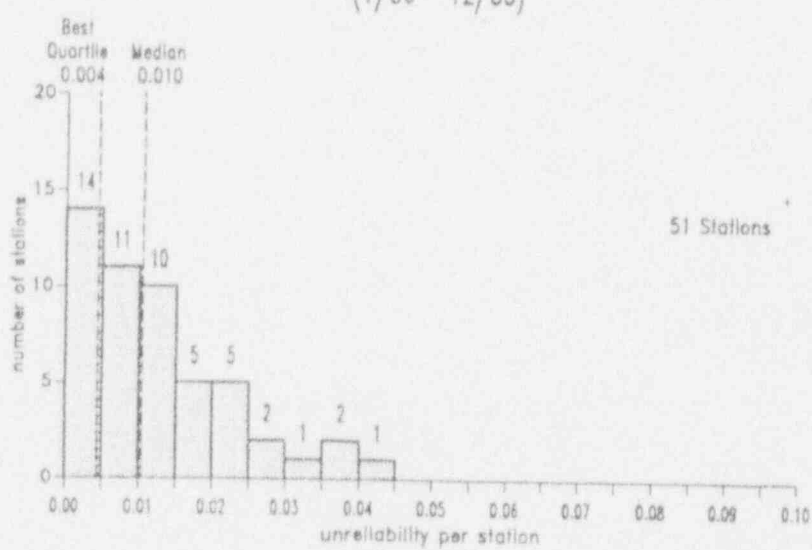
2. Industry "Averaged" level is 97 - 98%

3. Annual performance data shows a small number of plant sliding below 95%.

Diesel Generator Total Unreliability (by station)
Industry Average

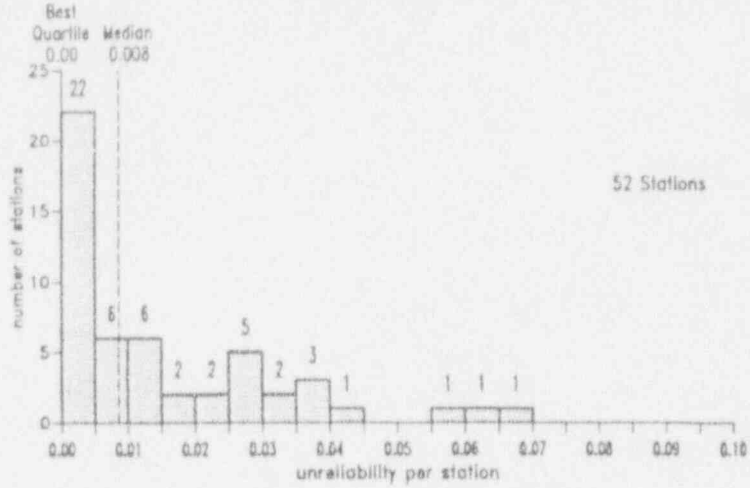


Diesel Generator Total Unreliability (by station)
Three Year Distribution
(1/86 - 12/88)

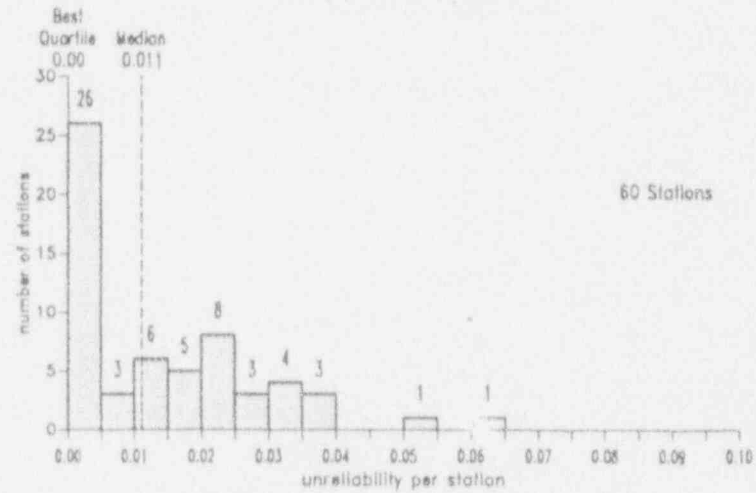


Ref. 5/2-3/90 meeting with NUMARC B-56 Working Group

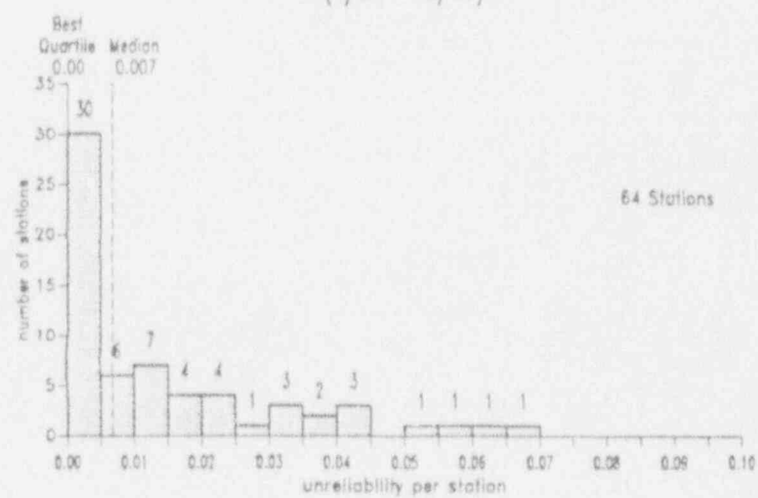
Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/86 - 12/86)



Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/87 - 12/87)



Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/88 - 12/88)



Ref. 5/2-3/90 meeting with NUMARC B-56 Working Group

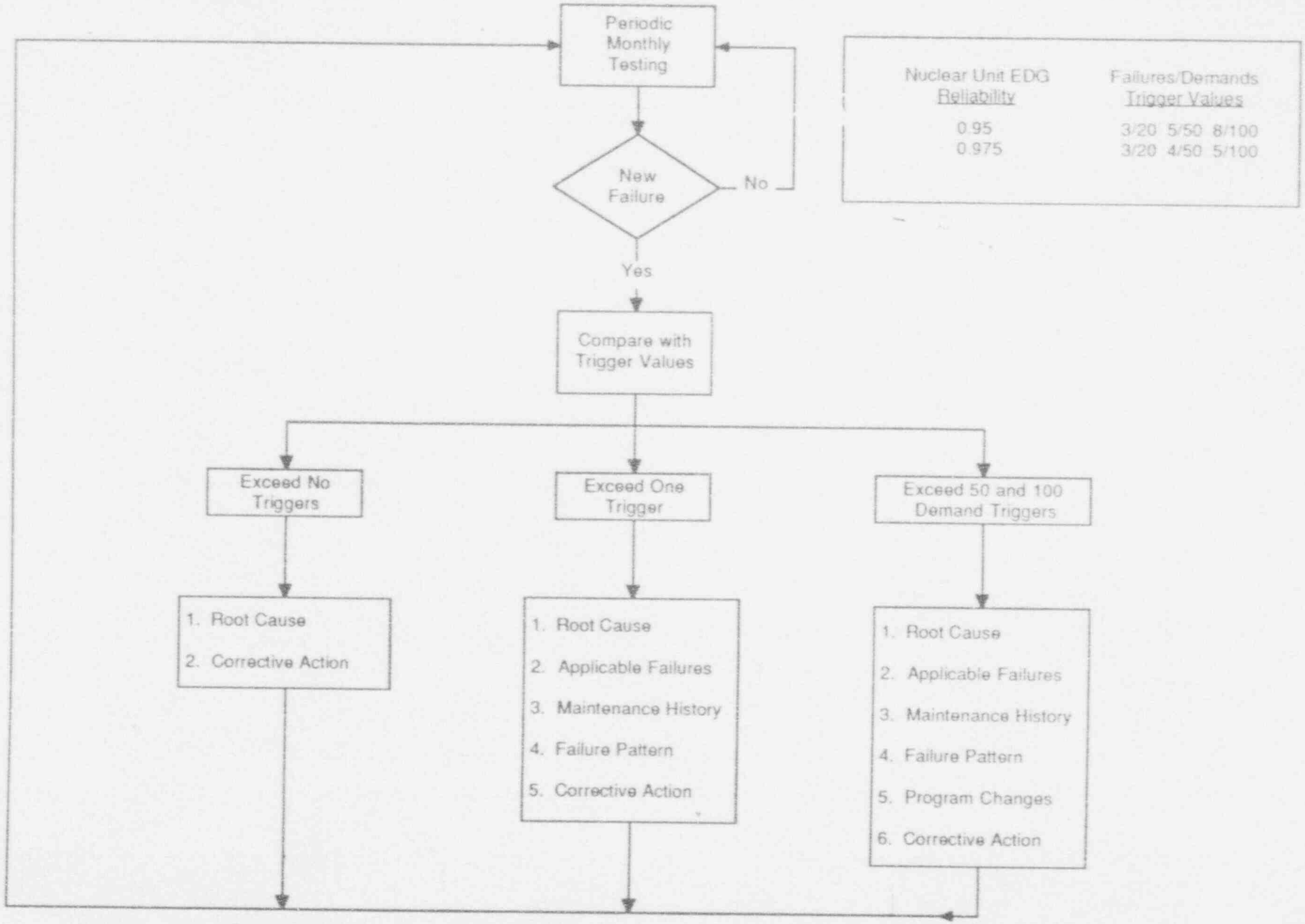
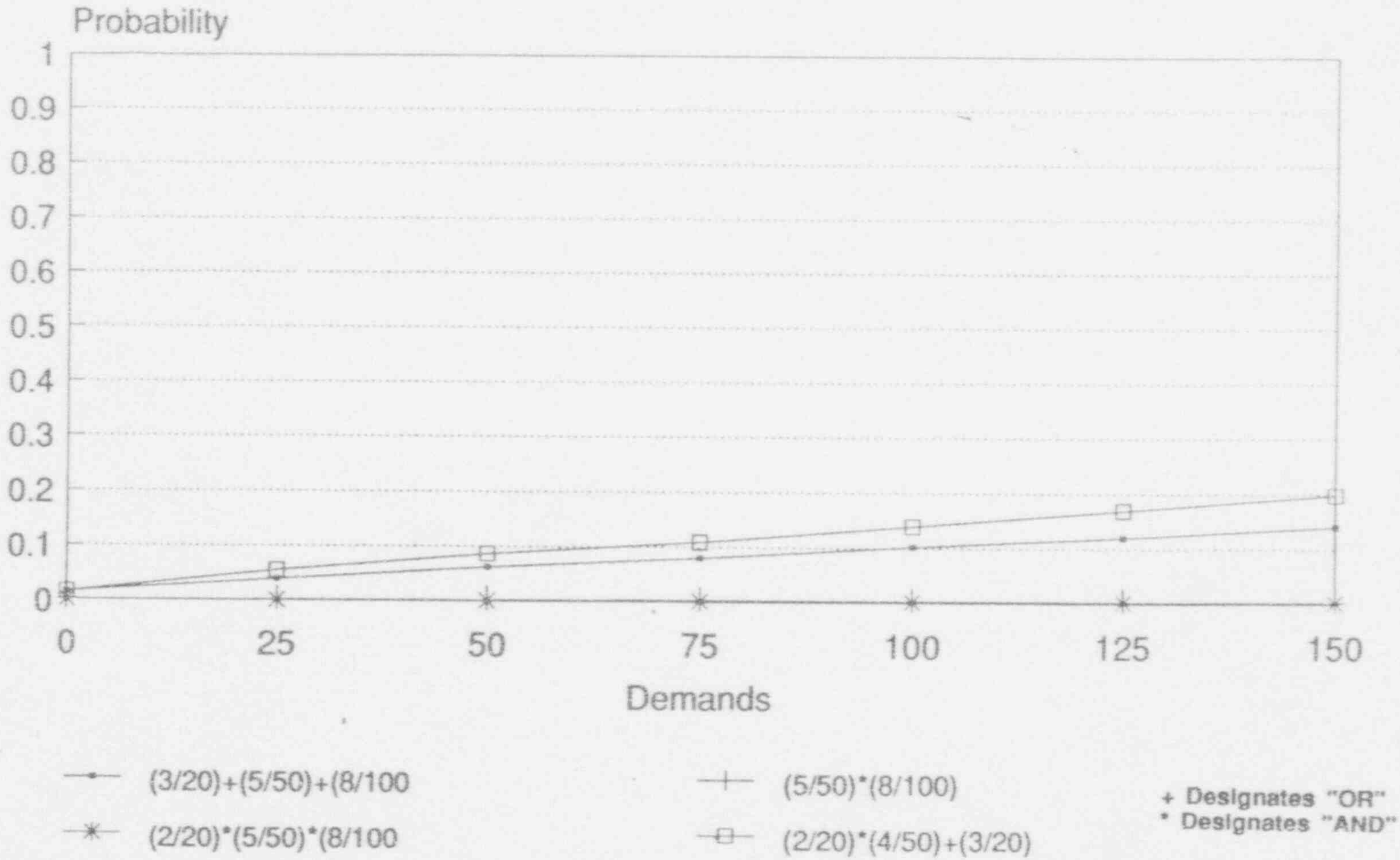


Figure 1 - EDG Reliability Monitoring & Maintenance Activities

FALSE ALARM RATE

(Steady-State Reliability is 98%)

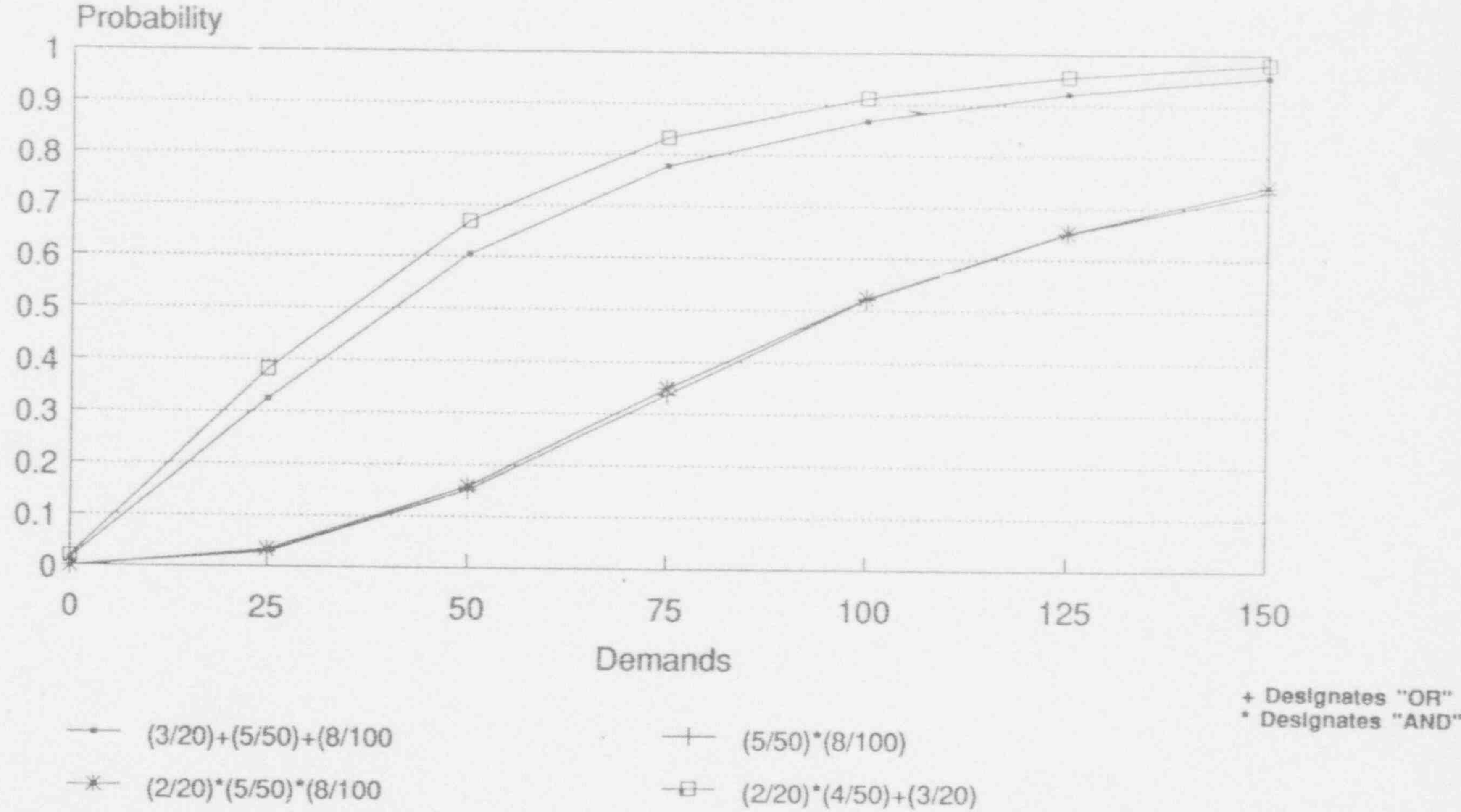


High EDG reliability will not result in significant false alarms

+ Desgnates "OR"
* Designates "AND"

High EDG reliability will not result in significant false alarms.

DETECTION RESPONSE
(Reliability Drops from 98% to 92%)



1) Single trigger is an indicator of onset of degradation.

2) Detection response with "multiple" triggers is slow.

(7-23-90)

TABLE 1

CROSS-REFERENCE BETWEEN REGULATORY GUIDE 1.9, REV. 3 AND NUMARC-87-00, APPENDIX D (5-2-90)

RG 1.9, REV 3 SECTION	NUMARC-8700 APPENDIX D
Section A, Introduction	None (Use RG 1.9,Rev.3)
Section B, Discussion	None (Use RG 1.9,Rev.3)
Section C, Regulatory Position	
1 Design Considerations	None (Use RG 1.9,Rev.3)
2 Diesel Generator Testing	
2.1 Definitions	D.1
2.2 Test Descriptions	None (Use RG 1.9,Rev.3)
2.3 Preoperational and Surveillance Testing	None (Use RG 1.9,Rev.3)
3 EDG Reliability Goals and Monitoring	D.2
3.1 Reliability Goals for SBO	Introduction
3.2 EDG Reliability Monitoring	D.2.2, D.2.3
3.3 Maintaining EDG Reliability	D.2.1,D.2.3,D.2.4,D.2.5
3.4 Problem EDG	D.2.4.4
4 Record keeping Guidance	D.2.4.6
5 Reporting Criteria	Use RG 1.9, Rev. 3
6 EDG Reliability Program	Introduction
6.1 Monitoring EDG Reliability	D.2
6.2 EDG Surveillance Plan	None (Use RG 1.9,Rev.3)
6.3 EDG Performance Monitoring	None (Use RG 1.9,Rev.3)
6.4 EDG Maintenance Program	None (Use RG 1.9,Rev.3)
6.5 EDG Failure Analysis and Root Cause Investigation	None (Use RG 1.9,Rev.3)
6.6 EDG Problem Close-out	None (Use RG 1.9,Rev.3)
6.7 EDG Reliability Data System	None (Use RG 1.9,Rev.3)
Section D, Implementation	Introduction (Initiative 5A)

C.6 EDG RELIABILITY PROGRAM

Section C.6 identifies the following principal elements of an EDG reliablity program:

1. Monitoring nuclear unit EDG reliability levels against SBO targets.

2. Surveillance Plan

3. Performance monitoring of important parameters.

4. Maintenance Program

5. Failure Analysis

6. EDG Problem Closeout Process

7. EDG Reliability Data System

These elements are the same as NUMARC's.

The RG subsections which follow provide general guidelines (with illustrative examples) for these major program elements.

C.6.1 Monitoring EDG Reliability

Periodic surveillance testing per Reg Position C.3 & NUMARC-8700, Appendix D, 5-2-90.

C.6.2 EDG Surveillance Plan

. Examples of factors for consideration in developing a surveillance plan.

. EDG components, subsystems & boundary defined (Fig. 2 of RG 1.9, Rev. 3) and examples of surveillance activities are provided (Tables 3 & 4)

C.6.3 EDG Performance Monitoring

General guidance provided regarding obtaining data for trending and detection of onset of degradation to allow for corrective action prior to failure.

C.6.4 EDG Maintenance Program

General guidance on development of a maintenance program which identifies:

. Vendor recommendations

. Relating maintenance actions to repair time, severity, likelihood of reoccurence.

. Consideration of reliability characteristics of the subsystems and components when planning preventive maintenance.

. Interfacing maintenance activities with the overall EDG reliability program.

C.6.5 Failure Analysis & Root Cause Investigation

General guidance for failure analysis and root cause investigationsis provided (ie Fig. 3) of systematic approach to failure and root cause analysis.

C.6.6 Problem Closeout

Notes that attention should be given to procedures and controls for resolution and closeout of problems and supports plant specific procedures to to prevent recurrence of failures or problem. Identifies the following considerations:

. Criteria for closeout

. Closeout review

. Closeout monitoring

. Data system interface

C.6.7 EDG Reliability Data System

Identifies need for a data collection, storage and retrieval system, that can be accessed by personnel assigned to monitoring and maintaining the EDGs. Identifies typical types of information:

. Surveillance test results

. EDG failure history

. Failure and root cause analysis information

. Manufacturer's recommendations

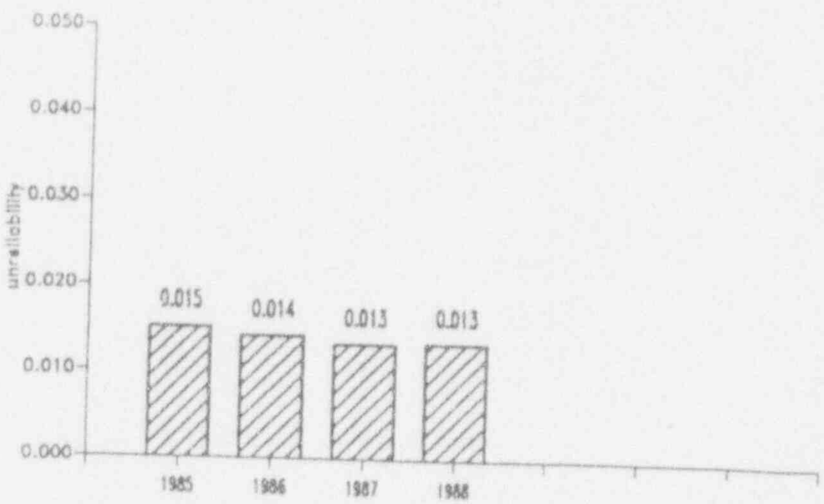
. Input from the preventative maintenance program

. Input from the corrective maintenance program

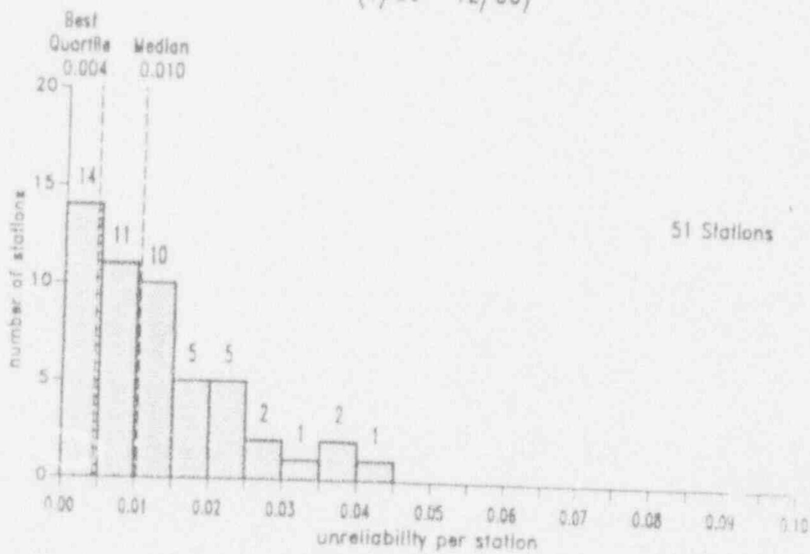
. Industry operating experiance

CRGR Meeting No. 190
July 25, 1990

Diesel Generator Total Unreliability (by station)
Industry Average



Diesel Generator Total Unreliability (by station)
Three Year Distribution
(1/86 - 12/88)

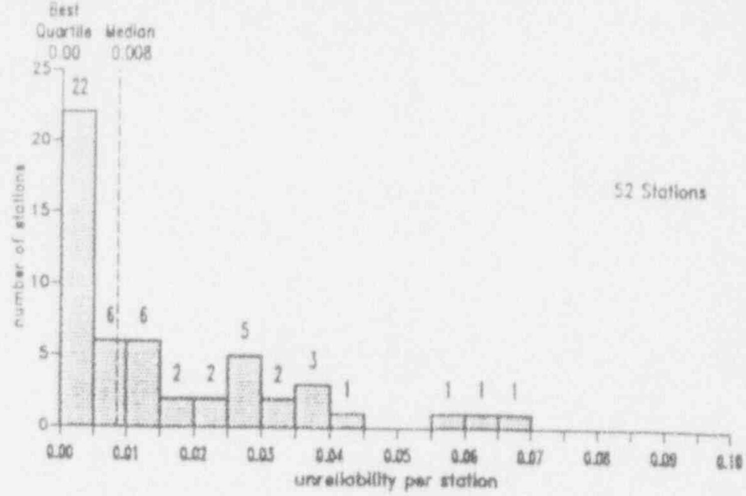


Ref. 5/2-3/89 meeting with NUMARC B-56 Working Group

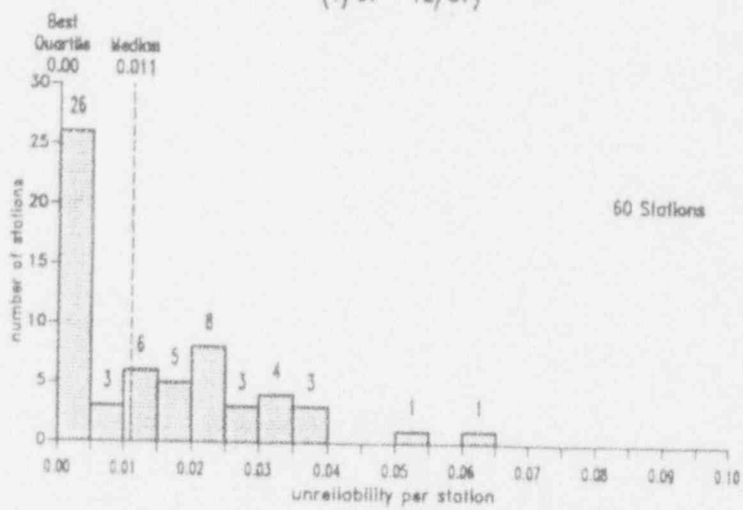
Supplemental Briefing Slide [redacted]

CRGR Meeting No.
July 25, 1990

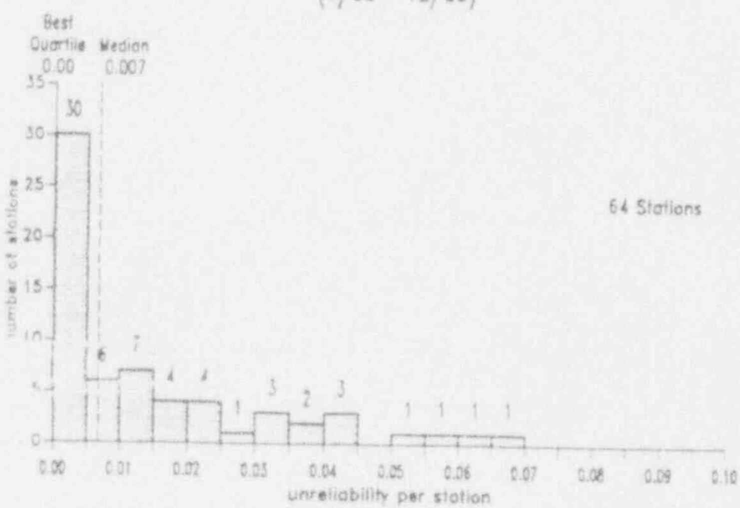
Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/86 - 12/86)



Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/87 - 12/87)



Diesel Generator Total Unreliability (by station)
One Year Distribution
(1/88 - 12/88)



Ref. 5/2-3/89 meeting with NUMARC B-56 Working Group

Supplemental Briefing slide [redacted]

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

JUL 9 1990

MEMORANDUM FOR: E. L. Jordan, Chairman
Committee to Review Generic Requirements

FROM: E. S. Beckjord, Director
Office of Nuclear Regulatory Research

SUBJECT: REVISION TO B-56 CRGR PACKAGE

Enclosed is a revision to Section C.5, "Reporting Criteria" of Regulatory Guide 1.9, Revision 3 which incorporates the reporting requirements desired by NRR. This revision calls for a special report to be submitted when a "problem" EDG situation occurs (i.e. 4 failures in the last 25 valid demands). The need for such a report is justified in the enclosed A. Thadani (NRR) to W. Minners (RES) memo dated July 6, 1990. The revised portion of the regulatory analysis dealing with this reporting requirement is also enclosed. This backfitting is necessary to provide uniform reporting requirements for all plants.

This report is a relaxation of the special EDG failure reporting requirements found in most Tech Specs which reference RG 1.108, which requires the reporting of all EDG failures, valid or non-valid. However, there are some older plants that do not have any Tech Spec EDG failure reporting requirements and therefore this requirement is a backfit.

A suggestion for submittal of revised Tech Specs associated with these relaxations is contained in page 2 of the 50.54 (f) letter (see Enclosure C of the B-56 package previously submitted to the CRGR).

E. S. Beckjord

E. S. Beckjord, Director
Office of Nuclear Regulatory Research

Enclosures: As stated

cc:
W. Russell, NRR
A. Thadani, NRR
F. Rosa, NRR
O. Chopra, NRR
J. Calvo, NRR
T. Dunning, NRR

Attachment 2 to
Enclosure 7

7-9-90

REVISION TO SECTION C.5, RG 1.9, REV. 3

5. REPORTING CRITERIA

When reporting EDG failures, all plants should conform with the provisions of 10 CFR 50.4, 10 CFR 50.72, 10 CFR 50.73, 10 CFR 21, plant technical specifications, and other current NRC reporting regulations.

In addition, if an individual EDG experiences 4 or more valid failures in the last 25 demands, these failures and any non-valid failures experienced by that EDG in that time period should be reported in 30 days. This report should include the following information:

1. The nuclear unit EDG performance and reliability indicators as compared to the appropriate 20, 50, and 100 demand trigger values.

2. A description of the failures, underlying causes, and corrective actions taken.

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the total cost would be $150,000.

The development of guidelines by staff and industry representatives which resulted in Revision 3 of Regulatory Guide 1.9, and of NUMARC-8700, Rev. 1, Appendix D provides for uniform guidance and conformity of approaches, thereby reducing NRC review costs.

(8) The potential impact of differences in facility type, design, or age on the relevance and practicality of the proposed backfit.

Differences in facility type, design, or age will not have any significant effect on the relevance or practicality of complying with the EDG reliability monitoring program <u>since the proposed changes reflect current industry practices.</u>

In addition, Revision 3 of Regulatory Guide 1.9 and NUMARC-8700, Rev. 1, Appendix D have been subjected to extensive discussions with NUMARC's B-56 working group and also issued for external review to solicit a wide spectrum of review and ensure conformity with proven practice, thereby further reducing potential impacts.

<u>However, reporting requirements associated with the problem EDG will impact older plants that currently are not subject to reporting any EDG failures through Tech Spec requirements. Current EDG performance indicates that such reports should be extremely minimal. The occurence of a problem EDG situation is indicative of an inability to correct failures through on-site EDG maintenance practices and also represents a significant deterioration of nuclear unit EDG reliability level.</u>

<u>On the other hand the revised EDG failure reporting requirements are a relaxation of reporting requirements for the majority of plants which currently report all EDG failures, valid or non-valid, per RG 1.108, Rev.1.</u>

(9) Whether the proposed backfit is interim or final and, if interim, the justification for imposing the proposed backfit on an interim basis.

The proposed action is final.

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

July 6, 1990

MEMORANDUM FOR: Warren Minners, Director
Division of Safety Issues Resolution
Office of Nuclear Reactor Research

FROM: Ashok C. Thadani, Director
Division of Systems Technology
Office of Nuclear Reactor Regulation

SUBJECT: REPORTING REQUIREMENTS FOR PROBLEM EDG FAILURES (GENERIC SAFETY ISSUE B-56)

Per our discussions of June 28, 1990, regarding reporting requirements for failures of problem emergency diesel generators (EDGs), we request that Regulatory Position C.5 previously concurred in by NRR be reinstated in Regulatory Guide 1.9, Rev. 3, which is being transmitted to the CRGR. The preferred wording is provided in the Enclosure.

The basis for this reporting requirement is simply that EDG reliability is an important factor in the determination of the overall safety status of a nuclear power plant. The continued occurrence of failures which result in a problem EDG are of particular concern since this is an indication that nuclear unit EDG reliability is being seriously degraded (particularly in a two EDG plant), and also that the onsite EDG reliability program is not being effective. Thus, submittal of a report when a problem EDG situation comes about will assure appropriate licensee and NRR management focus on this concern. The existence of a problem EDG must be considered in the context of other electrical or other problems that may also exist. Timely notification of this condition will assure appropriate NRR management oversite of potential overall safety problems.

Gary M Holahan for
Ashok C. Thadani, Director
Division of Systems Technology
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc: W. Russell
A. Serkiz

Contact:
O. P. Chopra, SELB/DST
X20781

ENCLOSURE

C.5 When reporting EDG failures, all plants should conform with the provisions of 10 CFR 50.72, 10 CFR 50.73, 10 CFR 50.21, plant technical specifications, and other current NRC reporting regulations. In addition, if an individual EDG experiences 4 or more valid failures in the last 25 demands, these failures and any non-valid failures experienced by that EDG in that time period shall be reported within 30 days. This report should include the following information:

1. The nuclear unit EDG performance and reliability indicators as compared to the appropriate 20, 50, and 100 demand trigger values.

2. A description of the failures, underlying causes, and corrective actions taken.

Draft
7-25-90

Potential Revision to Section C.6

The principal elements of an EDG reliability program should be comprised of the following principal elements (or activities):

1. Monitoring nuclear unit EDG reliability levels against those selected for station blackout (see also Regulatory Position C.3).

2. A surveillance plan that identifies EDG support systems and subsystems describes frequency and scope of testing, and incorporates manufacturer recommendations.

3. Performance monitoring of important parameters on an ongoing basis to obtain information on the condition of the EDG and key components so that precursor conditions can be identified prior to failure.

4. A maintenance program designed for both preventive and corrective actions based on operating history and past maintenance activities, vendor recommendations, spare parts considerations, and the results of surveillance monitoring.

5. Failure analyses and root cause investigation to assist in developing corrective actions to prevent recurrence of failures.

6. An EDG problem closeout process to ensure that the resolution of a failure or a problem is properly implemented and successful.

7. An EDG reliability data system to ensure the availability and retrievability of important data and information related to EDG reliability.

These elements are the same as those described in NUMARC-8700, Appendix D (5-2-90), "Introduction".

These principal elements of an EDG reliability program are provided as guidelines. Other reliability programs that include the same or similar activities may also be used, such as the TDI Owner's Group maintenance and surveillance activities. Such programs should be reviewed for consistency with Regulatory Guide 1.155 and this regulatory guide.

Attachment 3 to

Although this guidance is based on proven industry practices, it is recognized that there are existing programs that have proven effective at maintaining high EDG reliability levels. Therefore this guidance as well as the examples contained in Appendix A are not intended to replace or supplant programs proven effective.

Appendix A provides illustrative examples and considerations which could be used in developing an EDG reliability program based on the principal elements noted above.

NUMARC

NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

1776 Eye Street, N.W. • Suite 300 • Washington, DC 20006-2496
(202) 872-1280

July 18, 1990

Mr. Edward L. Jordan, Chairman
Committee to Review Generic Requirements
U.S. Nuclear Regulatory Commission
Mail Stop 37.
Washington, D.C. 20555

Dear Mr. Jordan:

NUMARC has met numerous times over the past two years with members of the NRC Staff in seeking a consensus on the resolution of Generic Issue B-56, Diesel Generator Reliability. The Staff made public the B-56 resolution package that was submitted to you this past June. Our review of this package raised a number of concerns regarding the Staff's approach to the resolution of this issue. We have enclosed a detailed set of comments that address specific items in the resolution package for CRGR information. We would also like to take this opportunity to clarify our position on this issue so that you and your committee will be fully apprised of our intent and actions taken by industry.

We believe that there are three elements that together provide the basis for closure of the B-56 issue. The first is the recognition of industry performance with regard to the reliability of emergency diesel generators (EDGs) over the past several years. Since 1983, data compiled by EPRI and INPO establish that the industry average reliability has been above 0.98. This data has been acknowledged and accepted by the Staff. Recognizing that the intended goal of the B-56 issue (as well as the Station Blackout rule) was to achieve 0.95 reliability per EDG demand, it is evident that industry performance has not only achieved, but surpassed this goal.

The second element that forms the basis for closure of B-56 is the establishment of consensus trigger values to monitor nuclear unit EDG target reliability. Utilities were required to select either a 0.95 or 0.975 target reliability as part of their coping assessments, and their selections were docketed through their SBO rule responses to NRC. In supplemental responses to NRC, utilities acknowledged their commitment to maintain the chosen reliability. The trigger values are the main subject of Industry Initiative 5A, which was approved by the NUMARC Board of Directors on March 7, 1990. This initiative commits <u>all</u> nuclear utilities to utilize these trigger values to monitor their selected EDG target reliability. The Staff had previously agreed to the trigger values (ref. RG 1.9, Rev. 3, 11/28/89 draft, Section C.3.4), which provide a uniform method to oversee emergency diesel generator performance.

~~9405160073~~

Attachment 4
to Enclosure 3

The third element that provides the basis for closure of B-56 is revision 1 to NUMARC 87-00, Appendix D, "EDG Reliability Program". The revised Appendix D has been distributed to all NUMARC Members. Appendix D provides a method of monitoring and maintaining EDG target reliabilities. Appendix D focuses on effectively responding to individual EDG failures and taking appropriate remedial actions when trigger values are exceeded. The main points of the guidance provided in Appendix D have essentially been duplicated in the Staff's proposed revision 3 to Regulatory Guide 1.9 (ref.: Sections C.2.1, C.3.3, C.3.4, C.4 and C.5).

One other point that we wish to clarify is our development and distribution of the Appendix D Topical Report. This Topical Report contains detailed information on EDG program elements, root cause analysis, and quality improvement techniques. It was provided to all NUMARC Members for their information and use at the same time that Appendix D was distributed. Much of the information in the Topical Report was contained in a previous version of Appendix D that the CRGR reviewed last October. There were several reasons for separating this information into the Topical Report. First, the information was viewed as too prescriptive to be included with the guidance in Appendix D, as this type of prescriptiveness was unwarranted in light of the high industry average reliability. Secondly, it was our belief that the NRC would focus on performance consistent with positions expressed by the Commission, rather than programs. Thirdly, there were serious concerns raised by utility reviewers that this information would be used in the inspection process by NRC. We believe that inspection of utility EDG programs absent declining EDG performance (i.e. exceeding the trigger values) would be a poor use of both utility and NRC resources. For these reasons, the Topical Report was not included in our submittal to the Staff.

We now observe in the B-56 resolution package that the Staff has included a section in the proposed revision 3 to Regulatory Guide 1.9 that details specific program elements. Additionally, the package contains a proposed generic letter that requests utilities to submit statements, pursuant to 10 CFR § 50.54(f), regarding their intent to implement the regulatory guide positions. We strongly oppose these actions and believe them to be unnecessary and unwarranted in light of the established industry performance and the NUMARC actions taken to address and resolve the B-56 issue.

In conclusion, we believe that industry actions addressing resolution of the B-56 issue provide the NRC Staff with the following:

1. A docketed commitment to maintain the chosen target reliability of 0.95 or 0.975;

2. A commitment to a standard set of trigger values, acceptable to NRC, from which to monitor EDG target reliability;

3. Information relative to individual EDG failures and associated corrective actions;

4. Information relative to the combination of individual failures as they relate to plant unit performance and reliability, and

5. Information relative to comprehensive programmatic improvements resulting from the assessments following double trigger exceedence.

We believe that Generic Issue B-56 has been satisfactorily resolved by the industry without the need for regulatory action. We ask that CRGR give our position due consideration and hope that the enclosed comments will be useful at the upcoming CRGR meeting on the B-56 issue. Please contact me or Alex Marion should you have any questions.

Sincerely,

William H. Rasin

William H. Rasin
Director, Technical Division

AM/ARP/
Enclosure

cc: T. Murley, NRC
E. Beckjord, NRC
A. Thadani, NRC
W. Minners, NRC

Enclosure 1

ASSESSMENT OF THE NRC'S RESOLUTION PACKAGE FOR CLOSURE OF GENERIC ISSUE B-56

The comments and discussion on aspects of this package follow the order of the documents contained therein. References to specific page numbers, paragraphs and line items are made to facilitate quick reference where appropriate.

Transmittal Cover Letter - E. Beckjord to E. L. Jordan, CRGR Chairman

Item 2 of the cover letter correctly states that the Topical Report was not submitted to the NRC. However, there is a statement that the report will only be provided to utilities as needed. Although our actions in this regard were discussed with cognizant NRC Staff, we believe it appropriate to clarify our reasoning for not forwarding the Topical Report to the NRC and emphasize that the topical was indeed issued to industry. Not submitting the topical to the NRC was recommended by the Station Blackout Working Group and based upon our belief that the NRC would focus upon performance consistent with positions expressed by the Commission, rather than programs. The Working Group and NUMARC recognized that proven industry average EDG reliability of 0.98 since 1983 exceeds the B-56 and SBO Rule target goal of 0.95. Additionally, as part of the SBO rule response, utilities were required to choose a target reliability of 0.95 or 0.975. Utilities have docketed their understanding that the chosen target is to be monitored and maintained. Consistent with this, the NUMARC Board of Directors approved an industry initiative that provides a mechanism for monitoring and maintaining EDG reliability. All of these efforts have been acknowledged by the NRC.

We believe the Generic Issue B-56 is resolved. Furthermore, we believe no benefit can be gained by a focus on a program for an issue that can be considered resolved based upon current industry performance and industry actions. Absent declining performance relative to maintaining ~~the chosen~~ target reliability, we believe expenditure of resources to inspect reliability programs is unnecessary.

Item 3 of the letter correctly indicates the NUMARC transmittal to the NRC does not "commit" the industry to implementation of Initiative 5A and Appendix D. This, of course, is a valid point relative to a docketed regulatory commitment. As indicated in NUMARC's May 3, 1990 transmittal, Initiative 5A provides the approved mechanism to be used by all utilities for monitoring EDG target reliability. The revised Appendix D provides guidance on utilization of the consensus trigger values and taking remedial actions to restore performance when the trigger values are exceeded. It should be recognized that the NUMARC Board of Director's approval does constitute a commitment by industry to Initiative 5A that provides a acknowledged generic mechanism for consistent application across the industry. The Appendix D guidance document will be incorporated into a revision of NUMARC 87-00, Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors that will be published this summer. Appendix D, as an integral part of the NUMARC 87-00 document, should be treated as similar guidance since it is recognized that there are other methods for maintaining the chosen EDG reliability targets that are acceptable to both the NRC and industry.

Based upon the above a request pursuant to 10 CFR § 50.54(f) is not appropriate. Utility licensee commitments to the reliability target have been made as part of the SBO rule responses. The industry commitment to Initiative 5A is complete. The supporting Appendix D guidance has been issued to all utilities. Industry performance is above the 0.95 reliability goal intended by Generic Issue B-56. The totality of these actions indicate that such a request is not required.

Enclosure A - Responses to CRGR Comments

Comment 1 - Refer to the previous discussion relative to the reduced scope of Appendix D, ie., excluding the Topical Report. We believe that adoption of Appendix D by reference is supportable based on the NRC Staff acceptance of industry performance, Initiative 5A and the current version of Appendix D.

Comment 2 - The extent to which NUMARC agrees with a consensus industry approach is discussed above.

Comment 3 - The commitment by the nuclear utility industry through NUMARC in the form of the initiative process is complete by action taken by the NUMARC Board of Directors in approving Initiative 5A. Commitments by individual licensees to a target reliability currently exist. Therefore, citing 10 CFR § 50.54(f) is not necessary.

Comment 4 - We do not concur with the Staff's backfit analysis. Refer to comments on Enclosures C and D.

Comment 5 - The conclusions relative to substantial safety improvement and cost justifications are inappropriate since the intended reliability goal for Generic Issue B-56 has already been achieved and exceeded. Therefore, NUMARC does not concur with the Staff's consideration that the B-56 issue is "...an outstanding safety issue related to USI A-44...". Because of the established performance relative to EDG reliability and commitments related to the Station Blackout rule, we believe the B-56 issue is resolved.

Comment 7 - The Staff response to this comment supports our concerns that the intent is to inspect programs independent of actual performance and currently docketed licensee commitments. As stated previously, we believe this an inappropriate use of industry and unnecessary use of NRC resources to assess compliance to what is currently a non-issue that in effect deters already limited resources from more important areas of acknowledged safety benefit or improvement.

Enclosure B - Regulatory Guide 1.9, 6/14/90

[References made relative to changes in previous NRC Staff positions refer to the 11/28/89 draft of the proposed regulatory guide.]

DISCUSSION, p. 5, 2nd paragraph from the bottom, 2nd sentence -- Actions and guidance necessary to maintain and monitor EDG reliability are currently in place. Improvement of reliability has already been achieved without the need for prescriptive guidance on program content and structure.

p. 6, first para. -- The minimum reliability goals intended by RG1.155 and Generic Issue B-56 have been achieved. As discussed earlier, maintaining and monitoring EDG reliability can be accomplished without mandating a prescriptive program.

2nd para. -- This discussion relative to the new Standard Technical Specifications (STS) should be clarified as it is not clear whether the proposed regulatory positions expressed in this guide can be effected in TS at this time or until some time after NRC endorsement of the STS. Additionally, we have been working with the NRC Staff for the past two years in trying to achieve resolution. We believe that industry actions have established an effective resolution. The STS should not present another opportunity, absent generic performance based concerns, to revisit the positions that had been thoroughly reviewed and concurred with.

Agree / modify Guide

3rd para. -- We believe this paragraph contains appropriate NRC guidance since it clearly states that the NRC Staff "...finds it (revised Appendix D) acceptable for monitoring and maintaining EDG reliability levels." We recommend this or a similar statement be articulated as a regulatory position. Any additional duplication of Initiative 5A or NUMARC 87-00 Appendix D content is unecessary.

Disagree since App D changed?

Regulatory Position (RP) C.1.5 -- The previous draft of this revision , dated 11/28/89, identified RP C.1.5.2 relating to time rates for starting and loading being consistent with manufacturer's recommendations. This position has been removed from this draft. We believe the previous position should be reinstated as it is consistent with the intent of GL 84-15.

RP C.2.2.1, p. 12 -- Previous drafts of this document referred to this as a Start-Test. Characterizing it now as "Slow-Start Test" may create confusion in interpreting the difference between this test and the remaining tests. We believe that this regulatory guide should be consistent with the intent of GL 84-15 and current state of knowledge of emergency diesel generators. The previous characterization of a generic type of "start test" is well understood.

RP C.2.2.2 -- Same comment as with RP C.2.2.1 but within the context of load run.

RP C.2.2.3, p. 13 -- This test was previously identified as a Fast Start Test and the intent understood. The proposed change appears to affect the title only since the test description for this "Fast-Start and Load Test" is the same as before. It does not provide any guidance relating to loading of the EDG. (The load run test is addressed by RP C.2.2.2.) The fast start test is intended to bring the EDG to the required voltage and frequency within specified time limits as described. It was our understanding that if a utility wishes to conduct the fast start test at a six-month interval, then it replaces that month's normally scheduled start test. However, a load run test would follow in eiother case as part of the normal monthly surveillance.

RP C.2.2.4 -- The addition of "...and energizes permanently connected loads..." was added to a previously understood test description. The inclusion of permanently connected loads appears unjustified in that it precludes load shedding and sequencing currently designed for in simulating SIAS and LOOP.

RP C.2.2.6 -- Same comment as on RP C.2.2.4 regarding the permanently connected loads.

RP C.2.2.8 -- Refer to previous comments and earlier drafts that related to automatically sequenced loads. The Staff and NUMARC concurred with automatically sequenced loads as representative of the type necessary to demonstrate this test. This is a reversal in Staff position that now focuses on "...continuous rating...".

RP C.2.2.9 -- Similar comment as on RP C.2.2.8 wherein the Staff reversed a previous position and focuses on continuous rating.

RP C.2.2.12 -- The correct reference to the SIAS test is RP C.2.2.5.

RP C.2.3.1 -- This is a change in a previously understood Staff position that is now unclear and confusing. The appropriate tests to be conducted on a monthly basis are the start and load-run as described in RP C.2.2.1 and C.2.2.2, with the noted comments. The replacement of the normally scheduled start test by RP C.2.2.3, in effect a fast start test on a six month interval, is addressed by RP C.2.3.2.2, Six-Month Testing and should be discussed separately.

RP C.2.3.2.2 - We believe this six month test is unnecessary and inconsistent with the intent of GL 84-15. Comments have been previously provided to the Staff questioning the benefit of such a test given the increased stress and wear due to the fast starting and loading. NRC's research has also found that fast starting and loading is detrimental to EDGs. We believe continuing these types of tests on intervals less than refueling outages, i.e., six month basis, is counterproductive to safety in terms of equipment availability.

RP C.2.3.3 -- The title of this position, Corrective Action Testing, is somewhat confusing because the discussion of this position relates to an individual EDG exhibiting 4 failures out of the last 25 demands. We suggest the addition of Problem EDG to the title so that it reads Corrective Action Testing-Problem EDG. The process of performing corrective actions in response to individual EDG failures is currently in place across the industry without the mandate of a prescriptive "...nuclear unit EDG reliability program...". 10CFR50 Appendix B, Criterion XVI, Corrective Action, and other existing regulations provide appropriate and sufficient guidance to licensees.

RP C.3, pp. 16-19, ff. -- We believe the entire section can be deleted as it essentially duplicates what is in NUMARC 87-00 Appendix D that has been acknowledged by the NRC Staff and issued to industry. There are, however, differences in the Staff version that we believe will lead to confusion.

We believe the Staff acknowledgement as stated in the Discussion, p. 6, 3rd para. is appropriate and sufficient.

RP C.4, pp. 19-20, ff. -- We believe this section should be deleted in it's entirety as it duplicates what is called for in the revision to NUMARC 87-00 Appendix D.

RP C.5, p. 20 -- We have received the revision to this position that was issued July 10, 1990. The previous position noted in the 6/14/90 draft relative to reporting EDG failures is clear, understood and more importantly focuses on a fundamental element - individual EDG failures. The proposed change relating to reporting the problem EDG is not necessary. Current regulations require reporting of the individual failures. The imposition of this additional report does not bring to the NRC any additional information relative to EDG failures that has not been previously submitted on an individual failure report.

RP C.6, pp. 20-26, ff. -- We believe this entire section regarding a reliability program is not necessary and should be deleted from this regulatory guide. As stated previously, we see no benefit or improvement in safety by conducting inspections of utility programs independent of performance. The existing technical specifications, regulations and reporting criteria require utilities to apprise the NRC regional and headquarters personnel of individual EDG failures, corrective actions, etc.

The revision to NUMARC 87-00 Appendix D focuses on monitoring EDG performance relative to the trigger values and taking appropriate remedial actions when these values are exceeded. Additionally, the guidance focuses on establishing a trend or pattern of individual failures by a review of the applicable past failures, evaluating the corrective maintenance tracking history and assessing specific program elements that may be implicated, e.g., training, maintenance, etc. These actions are called for when a single trigger is exceeded. However, upon exceeding both the 50 and 100 demand triggers, the guidance calls for a comprehensive review of the reliability program. The Topical Report that was forwarded to all utilities provides information to support such a review activity that includes recognized analytical and quality improvement techniques.

In conclusion, we believe industry actions addressing resolution of this issue provide the NRC Staff with the following:

1) docketed commitment to maintain the chosen target reliability of 0.95 or 0.975,

2) commitment via Initiative 5A to a standard set of trigger values,

3) information relative to individual EDG failures, and associated corrective actions,

4) information relative to the combination of individual failures as they relate to plant unit performance and reliability, and

5) information relative to comprehensive programmatic improvements resulting from the assessments following double trigger exceedence.

Section D, p. 26 -- The Staff intentions relative to select positions of the regulatory guide to review monitcring EDG reliability levels, record keeping, reporting of failures and reliability programs is unnecessary. Refer to the detailed comments noted to the related regulatory positions. We believe the Staff should review utility corrective actions in response to individual EDG failures as is currently being done within the current regulations. We also believe the Staff should monitor utility performance in maintaining the EDG reliability trigger values and assess remedial actions in accordance with Appendix D or other means acceptable to the NRC.

Table 2 - The previous comments relative to the RP C.2.2.3 and C.2.3.2.2 apply in that we believe this type of fast start and fast load test should not be on an interval less than that of current refueling outages of 18 or 24 months.

Tables 3, 4A and 5 -- These are offered in our Topical Report as examples of surveillance activities as information only. These examples do not apply to all manufacturer's EDG or utility activities. Given the Staff's intent to inspect programs, we believe these lists will be used by inspectors for compliance as requirements. Accordingly, we request they be removed from the regulatory guide as the listed information does not relate to maintaining and monitoring EDG target reliability.

Figure 1 -- This can be deleted as it duplicates what is in the revision to NUMARC 87-00 Appendix D that has been issued to utilities.

ENCLOSURE C - PROPOSED GENERIC LETTER

We do not believe that the proposed revision to Regulatory Guide 1.9 offers a technical resolution to Generic Issue B-56. As previously stated, we believe this issue is currently resolved based upon the acknowledged industry performance relative to EDG reliability, Initiative 5A and the revised Appendix D to NUMARC 87-00. The issue can be closed by issuance of a generic letter that acknowledges Appendix D as providing guidance for maintaining and monitoring EDG reliability.

As stated previously, there is no basis for invoking 10 CFR § 50.54(f).

With regard to submitting TS change requests, the language in the 2nd paragraph, second page, suggests implementation of Initiative 5A, Appendix D, Regulatory Guide 1.9 RP C.3, C.4, C.5 and C.6 prior to a submittal. Since RP C.3 through C.5 essentially duplicate that which is contained in Initiative 5A and Appendix D, we do not understand the benefit of requesting compliance and commitment to redundant references. Utilities are committed to Initiative 5A and will use the guidance contained in Appendix D, as previously discussed. Appropriate remedial action will be taken by utilities when the performance and reliability trigger values are exceeded.

Furthermore, the rationale for linking the line-item TS improvements identified in RP C.2 to implementation of programmatic requirements is unclear and inconsistent. The current revision 2 of Regulatory Guide 1.9 has somewhat similar testing requirements that are not coupled to a programmatic commitment, but currently allowed in TS.

We do not concur with the determination that a substantial increase in overall protection of the public health and safety is achieved by the regulatory guide positions. Industry through the efforts of EPRI, INPO and NUMARC has improved EDG availability and reliability. The results of these efforts are published in EPRI NSAC-108, reflected in the Industry-wide Plant Performance Indicator Program (PPIP) managed by INPO, NUMARC commitment to Initiative 5A, and the publication of the revision to NUMARC 87-00 Appendix D. The EPRI report and the PPIP data indicate that since 1983 the industry average EDG reliability exceeds the NRC's desired goal of 0.95. The NRC Staff acknowledges the common set of rules and definitions established by the PPIP, and the mechanism for monitoring and maintaining EDG reliability is currently in place via Initiative 5A and Appendix D. Since these are currently in place then the actions proposed by the NRC Staff in RP C.3 through C.6 are unnecessary. We recommend the NRC formalize their acknowledgement via generic letter since the industry actions and guidance are complete and in effect.

ENCLOSURE C.2 - GUIDANCE FOR THE PREPARATION OF LICENSE AMENDMENT REQUESTS, etc.

The guidance proposed by the Staff suggests that establishment of a program in accordance with the regulatory guide positions permits a reduction in accelerated testing frequency. We do not concur that the conditional requirement for a program is necessary in order to implement this reduction. This conditional requirement is unacceptable to industry because it is inconsistent with positions expressed by the Commission suggesting a realistic focus on demonstrated performance rather than compliance to interpretive programs. Industry performance has been demonstrated and a mechanism is in place to maintain and monitor that performance. Furthermore, in our discussions with the Staff during the past two years, we expressed our belief that any form of accelerated testing is contrary to the fundamental tenant of reliability focused activities. However, in the spirit of cooperation to achieve concomitant resolution of Generic Issue B-56 with the Staff, we concurred with the proposed reduction in accelerated testing and incorporated it into Initiative 5A and Appendix D. We can only express our disappointment that the Staff is yet unwilling to allow industry to pursue self-improvements that have an established performance based approach.

ENCLOSURE D - BACKFIT ANALYSIS

We do not believe the Staff has satisfied the backfitting rule requirements, 10 CFR § 50.109. Because the proposed B-56 resolution involves a backfit i.e., implementation of a specific reliability program, a separate backfitting justification is required. Our review of the regulatory analysis for USI A-44 as contained in the referenced NUREG-1109 document reveals that the Staff did not separately quantify the risk reduction or evaluate expected costs to industry associated with the implementation of EDG reliability programs.

We believe the the Staff's reliance on 10 CFR § 50.54(f) as a mechanism to require utility licensees to provide statements of their intent to implement EDG reliability programs is inappropriate. By doing so, the NRC in essence converts guidance contained in regulatory guide positions into regulatory requirements. Requirements should only be established by proper rulemaking procedures, which have not been followed in this case.

As stated previously, appropriate guidance on monitoring EDG reliability levels currently exists and has been acknowledged by the Staff.

Given that the desired reliability levels have been achieved, we question the need to expend additional industry and NRC resources to review current methods and practices for consistency with the regulatory guide positions.

The analysis acknowledges that utilities with operating plants have surveillance and maintenance programs in place that are currently applied to EDGs. Established industry performance and actions implemented by NUMARC show that current programs are effective.

The 7/5/90 revision to the resolution package suggests the Problem EDG condition impacts EDG maintenance and represents a deterioration of nuclear unit reliability. An assessment of the impact of a Problem EDG as it may relate to maintenance should be based upon the root cause of the experienced failures and the associated corrective actions. To conclude that such a condition generically represents an "..inability to correct failures..." is premature and inappropriate. Additionally, the Problem EDG, defined as an individual EDG experiencing 4 or more failures in the last 25 demands, presents an inadequate sample size to draw a statistically valid assessment of nuclear unit reliability.

7-25-90
Draft

RESPONSES TO NUMARC'S COMMENTS
ON RG 1.9, REV. 3

Pg 5, 2nd Paragraph (from bottom) - Retain

The Staff believes that a reliability program in conjunction with monitoring of EDG reliability should be implemented to assure that the minimum EDG reliability goals of selected for compliance with the SBO rule are acheived and maintained.

Pg 6, 1st Paragraph - Retain

A program is not being mandated. RG 1.9, Rev. 3 provides guidance for an EDG reliability program which supplements brief guidance provided in RG 1.155. The A-44 FRN stated : "The resolution of B-56 will provide specific guidance for the staff or industry to use to review the adequacy of diesel generator eliability programs consistant with the resolution of A-44."

Pg. 6, 2nd Paragraph - Delete

This paragraph will be deleted from the guide. The intent was to identify activities underway with NUMARC to arrive at mutually acceptable revisions to Standard Tech Specs.

Pg 6, 3rd Paragraph - Retain

Reference to NUMARC 87-00, Appendix D (5-2-90) has been made as appropriate throughout the guide. We feel some duplication of Initiative 5A and NUMARC 87-00 appendix "D" is necessary to make this guide as a "stand alone document" rather than scattering the guidance among too many documents.

Regulatory Position C.1.5 - Retain

The staff feels that requiring design features such as slow starting and slow loading will unnecessarily complicate EDG control circuitry even more. Moreover, the staff has made it very clear throughout the guide that for monthly tests the EDG should be slow started and loaded.

Regulatory Position C.2.2.1 - Change

The guide will be revised to re-title this position as "Start Test."

Attachment 5
to Enclosure 3

Regulatory Position C.2.2.2 - Change

The guide will be revised to re-title this position as "Load Run Test."

Regulatory Position C.2.2.3 - Change

This was a typographical error; RP C.2.2.3 will be re-titled: "Fast Start"

Regulatory Position C.2.2.4 - Retain

The intent of this position was simply misunderstood by NUMARC. There are some loads on the safety buses which are not shed on a loss-of-offsite power signal. Therefore, the staff requires that the EDG should have the capability to carry such loads when it is connected to the safety bus. Moreover, this RP is consistent with the new STS.

Regulatory Position C.2.2.6 - Retain

Same comment as on Regulatory Position C.2.2.4 regarding the permanently connected loads.

Regulatory Position C.2.2.8 - Retain

Testing the EDG at automatically sequenced loads will not include manually connectable loads. The staff believes that the full load rejection test should be conducted at loads that are connecta[illegible] to the safety bus at any given time (i.e. automati[illegible]ly sequenced and manually connectable loads). Moreover the Regulatory Position allows this test to be conducted at 95 to 100% of the EDG continuous rating.

Regulatory Position C.2.2.9 - Retain

Same comments as on Regulatory Position C.2.2.8 regarding testing of the EDG at the continuous rating.

Regulatory Position C.2.2.12 - Change

Reference to Regulatory Guide C.2.2.6 is correct. The guide will be revised to include Regulatory Positions C.2.2.5 and C.2.2.6.

Regulatory Position C.2.3.2.1 - Change

The staff believes NUMARC's reference to RP C.2.3.1 is a typographical error. Their comments appear to address RP C.3.2.1. The wording in RP C.3.2.1 correctly references the start and load definitions.

Regulatory Position C.2.3.2.2 - Retain

The staff notes that "all" EDG starts are "fast" starts as governed by the design and operation of a diesel engine. RP C.2.3.2.2 (the 6 month test) is designed to demonstrate starting from standby conditions and reaching valid voltage and frequency within Tech. Spec. limits. The "load-run" (which follows the start from standby condition) is identical to the monthly surveillance test. The RG further notes that this test may be substituted for the monthly test.

The staff believes NUMARC is re-focusing on past discussions related to the need for any tests related to large LOCA license requirements.

Regulatory Position C.2.3.3 - Title will be changed

This section will be re-titled "Corrective Action Testing - Problem EDG."

Regulatory Position C.3 (pp. 16-19) - Retain

The staff feels that incorporation of identical wording from NUMARC's Appendix D (5-2-90) into RG 1.9, Rev. 3 is a prudent thing to do in view of NUMARC's continuing changes and recently stated positions. This RG will provide regulatory guidance language for both reviewer and licensee to use.

Regulatory Positions C.4 - Retain

Same reason as noted above.

Regulatory Position C.5

The staff's revised reporting positions which reduces current reporting requirements (for those plants currently complying with RG 1.108 which report all failures) is a relaxation. For those plants that have no failure reporting requirements - this is a backfit.

Regulatory Position C.6 - Retain

The guidance for an EDG reliability program provided in RG 1.9, Rev. 3 defines the elements of an EDG reliability program which are identical to elements valid in NUMARC's Appendix D, and which also provides illustrative examples of proven considerations and practices employed by the industry. Section C.6 supplements guidance provided in RG 1.155.

It should also be noted that Section C.6 clearly recognizes (see pg. 20 of the RG) the effectiveness of existing programs and is not intended to replace or supplement such programs.

Further it should be noted that Sections C.6.2, C.6.3, C.6.4, C.6.5, C.6.6 and C.6.7 reflect guidance (in condensed form) currently found in NUMARC's typical Report which was not submitted. Therefore, the staff feels that prudence supports retaining the limited and general guidance in RG 1.9, ~~Rev.~~ 3.

(190)

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

June 4, 1990

MEMORANDUM FOR: Edward L. Jordan, Chairman
Committee to Review Generic Requirements

FROM: Frank J. Miraglia, Jr., Deputy Director
Office of Nuclear Reactor Regulation

SUBJECT: CRGR REVIEW OF STANDARD REVIEW PLAN CHAPTER 17, "QUALITY ASSURANCE," (SECTION 17.3)

NRR is proposing to revise Chapter 17, "Quality Assurance," of the Standard Review Plan. Enclosure 1 is the revised version as prepared by the Division of Licensee Performance and Quality Evaluation. It has been coordinated through the Inspection & Licensing Program Branch. It was also sent formally to the division director of each region's Division of Reactor Safety and to each of the other NRR technical division directors and informally to RES (Advanced Reactors and Generic Issues Branch) for review and comment. Enclosure 4 lists the comments received and our resolution. As indicated in Enclosure 4, the resolution of some of the comments has resulted in some changes in Enclosure 1. We are now asking for CRGR approval. Background leading to the revision and other pertinent information are given below.

In May 1984, the NRC completed a Congressionally mandated 15-month study of the causes of construction and design deficiencies in the commercial nuclear power industry. The report of that study was NUREG-1055, "Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants" (QA Report to Congress). The study's results, applicable rot only to design and construction, but also to operations, modifications, decommissioning, and fuel reprocessing activities, confirmed that the regulatory foundation provided by 10 CFR 50, Appendix B was sound. However, the study concluded that the implementation of Appendix B was inadequate because the NRC overly emphasized form (program development and documentation) at the expense of substance (program implementation and effectiveness). The NUREG stated that, to meet the expectation of further improving quality, quality assurance should focus more on performance.

As a first step, the NRC staff introduced the concept of performance-based quality assurance in August 1987 in SECY 87-220, "Assurance of Quality." Since then, the staff has published NUREG/CR-5151, "Performance-Based Inspections," and implemented the "Inspecting for Performance" training course for NRC inspection personnel. The purpose of the "Inspecting for Performance" course and NUREG/CR-5151, which describes the course's methodology, is to broaden the scope and direction of NRC quality assurance activities by implementing inspection techniques that are based on observing and evaluating work-related activities affecting plant reliability and safety. A course modeled after the NRC's "Inspecting for

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Performance" course has been developed and is being taught within the nuclear industry.

To reinforce the performance-based inspection philosophy, the NRC headquarters staff developed TI 2515/78, "Inspection of Quality Verification Functions," (later, MC 35702) and conducted a series of inspections with the regions' staffs that increased the inspectors' emphasis on actual observation of ongoing work and reduced the emphasis on document and program reviews. By focusing attention on activities that are important to safe and reliable plant operations, the NRC's performance-based inspections were a model that encouraged licensees' verification and oversight organizations to conduct themselves similarly and to manage and operate their facilities in a more performance-based manner.

In 1988, the NRC's Light-Water Reactor Inspection Program for Plant Operations (Manual Chapter 2515) was revised to more clearly require inspection of licensee performance in technical disciplines, such as operations, maintenance, radiological controls, engineering, physical security, and environmental protection. That inspection program provides additional inspection guidance to follow up on operational events and safety issues and to investigate the root causes and corrective actions related to identified concerns. With those changes, the NRC's inspection program for operations now provides greater flexibility in applying inspection resources to deal with issues of plant reliability and safety.

Section 17.3 of the Standard Review Plan (Enclosure 1) puts into place a performance-oriented quality assurance program review plan for all phases of a nuclear power plant. Highlights of Section 17.3 are as follows:

1. It eliminates the current fragmentation and overlap of the self-assessment function responsibilities, including safety committee activities, audits, and other independent assessments.

2. It simplifies the format, clarifies the intent, and consolidates the text of the present SRP.

3. It permits the use of up-to-date industry consensus standards (with recognition of specific NRC guidance in current Regulatory Guides).

We are submitting Section 17.3 of the Standard Review Plan for CRGR approval. Because Section 17.3 does not represent any new staff positions and because it will apply only to applicants of new nuclear power and fuel reprocessing plants, a backfit in accordance with 10 CFR 50.109 does not exist. Note, too, that licensee-proposed revisions of quality assurance program descriptions that have been accepted by the staff will continue to be reviewed against their original acceptance criteria, Sections 17.1 or Section 17.2, not against Section 17.3. (This is why Sections 17.1 and 17.2 are not being deleted.) We do intend, however, to permit current licensees to adopt Section 17.3 if they choose to do so.

The proposed revision to the SRP is a Type I revision, as defined in NRR Office Letter No. 800. The format of Section 17.3 is substantially different from that of Sections 17.1 and 17.2. However, it neither incorporates new or revised requirements nor substantively changes the existing guidance. Therefore, we do not believe it is necessary to issue it for public comment.

Enclosures 2 and 3 are provided to assist your review. Enclosure 2 lists each element of Sections 17.1 and 17.2 of the Standard Review Plan and indicates where the element is reflected in Section 17.3. Enclosure 2 also shows the disposition of those elements which no longer specifically appear. Enclosure 3 includes Sections 17.1 and 17.2 of the present Standard Review Plan.

Any questions you or your staff may have may be directed to Eileen McKenna (X-21010) or Jack Spraul (X-21023).

Frank J. Miraglia Jr.
Frank J. Miraglia, Jr., Deputy Director
Office of Nuclear Reactor Regulation

Enclosures:
As Stated

cc w/enclosures:
CRGR (20)
ACRS (15)

Enclosure 1

SRP Section 17.3

(Proposed)

U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

17.3 QUALITY ASSURANCE PROGRAM DESCRIPTION

REVIEW RESPONSIBILITIES

Primary - Performance and Quality Evaluation Branch (LPEB)

Secondary - None

I. AREAS OF REVIEW

LPEB reviews and evaluates new quality assurance program descriptions (QAPDs) as submitted by the applicant. LPEB or appropriate Regional personnel review and evaluate proposed QAPD changes. A QAPD may be a quality assurance topical report or part of a safety analysis report. The reviews address the quality assurance controls for the activities encompassed by the submittal that may affect the quality of items important to safety.

The QAPD is a top-level policy document in which a facility's management sets the tone and establishes the manner in which quality is to be achieved. It is a product of senior-level management, and it represents an organization's overall philosophy regarding quality.

The individual performing the work determines the level of quality that is achieved. Therefore, the applicant must develop and maintain a philosophy whereby each individual, properly trained and motivated, achieves the highest quality of performance of which he or she is capable. This emphasis on individual performance reinforces the importance of the self-assessment process, the object of which is to independently review and evaluate overall performance. It also underscores management's role to provide integration, discipline, and the required support to ensure success.

This section of the Standard Review Plan (SRP) is organized into the three discrete areas of activity: management, performance/ verification, and self-assessment. Encompassed within the three areas are the 18 quality assurance (QA) criteria of 10 CFR Part 50, Appendix B. The SRP outlines a standardized QA program for construction permit holders, their principal contractors, and operating facility licensees. The QA program applies to all phases of a facility's life, including design, construction, operation, modification, and decommissioning.

A. MANAGEMENT

1. Methodology
2. Organization
3. Responsibility
4. Authority
5. Personnel Training and Qualification
6. Corrective Action
7. Regulatory Commitments

B. PERFORMANCE/VERIFICATION

1. Methodology
2. Design Control
3. Design Verification
4. Procurement Control
5. Procurement Verification
6. Identification and Control of Items
7. Handling, Storage, and Shipping
8. Test Control
9. Measuring and Test Equipment Control
10. Inspection, Test, and Operating Status
11. Special Process Control
12. Inspection
13. Corrective Action
14. Document Control
15. Records

C. SELF-ASSESSMENT

1. Methodology
2. Assessment

II. ACCEPTANCE CRITERIA

This section outlines and specifies the NRC's acceptance criteria for QAPDs. Criterion 1 of 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," requires that a QA program be established and implemented. Appendix B of 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," specifies 18 quality criteria which must be addressed in a QAPD. Except when acceptable alternatives are provided, the acceptance criteria that follow provide attributes to be addressed for a QAPD to be found acceptable. The QAPD should describe how each of the acceptance criteria will be met.

A. MANAGEMENT

1. Methodology

a. At the most senior management level, the applicant (that is, the organization applying to have its QAPD reviewed and accepted by the NRC) is to issue a written QAPD that establishes the quality policy and commits the organization to implement it.

b. The QAPD is to be binding on all personnel, including management personnel having responsibility for costs and schedules.

c. The QAPD is to include the criteria used to identify the items and activities to which the QA program applies. A list of items under the control of the quality assurance program is to be established and maintained.

d. The QAPD is to provide measures to ensure the quality of items and activities to an extent consistent with their importance to safety.

2. Organization

a. The QAPD is to contain an organizational description that addresses the organizational structure, functional responsibilities, levels of authority, and interfaces. The organizational description is to include the onsite and offsite organizational elements that function under the cognizance of the QA program. Functional responsibilities include activities such as preparing, reviewing, approving, and verifying designs; qualifying suppliers; preparing, reviewing, approving, and issuing instructions, procedures, schedules, and procurement documents; purchasing; verifying supplier activities; identifying and controlling acceptable and nonconforming hardware and software; manufacturing; calibrating and controlling measuring and test equipment; qualifying and controlling special processes; constructing; inspecting; testing; startup; operating; performing maintenance; performing the self-assessment function; decommissioning; and controlling records.

b. There is to be independence between persons and organizations executing performance activities and those executing verification and self-assessment activities. The degree of independence may be commensurate with the activity's relative importance to safety.

c. The person filling the most senior-level management position is responsible for implementing the QA policy and program.

d. A management position, in which the responsibility for carrying out the self-assessment function, including independent review-group activities, audits, and other independent assessments resides, is to be established. The person filling this position is to:

   (1) Have sufficient authority and organizational freedom to implement assigned responsibilities.

   (2) Report at a management level sufficiently high to ensure that cost and schedule considerations do not unduly influence decision making.

   (3) Have effective lines of communication with persons in other senior management positions.

   (4) Have no unrelated duties or responsibilities that would preclude full attention to assigned responsibilities.

   When site activities warrant, an onsite management position is to be established for which the above characteristics and responsibilities for the onsite activities apply.

e. Major delegation of work to participants outside the applicant's organization is to be identified and described as follows:

   (1) The organizational elements responsible for delegated work are to be identified.

   (2) Management controls and lines of communication between the applicant and the delegated organization are to be established.

   (3) Responsibility for the QA program and the extent of management oversight by the applicant are to be established.

   (4) The performance of delegated work is to be formally evaluated by the applicant.

3. Responsibility

   a. The applicant is to retain and exercise the responsibility for the scope and implementation of an effective overall QA program.

b. The applicant may delegate part or all of the activities of planning, establishing, and implementing the overall QA program to others, but is to retain the responsibility for the program's effectiveness.

c. Senior-level management is to assess annually the adequacy of the QA program's implementation.

d. The applicant is responsible for ensuring that the applicable portion of the QA program is properly documented, approved, and implemented (people are trained and resources are available) before an activity within the scope of the QA program is undertaken by the applicant or by others.

e. Individual managers are to ensure that personnel working under their management cognizance are provided the necessary training and resources to accomplish their assigned tasks.

f. The manager responsible for their implementation is to approve the procedures that implement the QA program. These procedures are to reflect the QA policy, and work is to be accomplished in accordance with them.

4. Authority

a. When the applicant delegates responsibility for planning, establishing, or implementing any part of the overall QA program, sufficient authority to accomplish the assigned responsibilities also is to be delegated.

b. Responsibility and authority to stop unsatisfactory work and control further processing, delivery, installation, or use of nonconforming items (such as structures, systems, components, parts, materials, equipment, consumable materials, and software) is to be assigned by the applicant such that cost and schedule considerations do not override safety considerations.

5. Personnel Training and Qualification

a. Personnel assigned to implement elements of the QA program are to be capable of performing their assigned tasks.

b. Training programs to ensure that personnel achieve and maintain suitable proficiency are to be established and implemented.

c. Personnel training and qualification records are to be maintained.

6. Corrective Action

a. Plant management, at all levels, is to foster a "no-fault" attitude toward the identification of conditions that are adverse to quality, such as failures, malfunctions, nonconformances, and out-of-control processes including the failure to follow procedures.

b. A corrective action program is to be established and implemented that includes prompt identification, documentation, classification, cause analysis, correction of the conditions, elimination of the cause of significant conditions, and followup of conditions that are adverse to quality. The program is to include provisions that ensure that corrective actions are not inadvertently nullified by subsequent actions.

c. Specific responsibilities within the corrective action program may be delegated, but the applicant is to maintain responsibility for the program's effectiveness.

d. Nonconforming items (those that do not meet quality requirements) are to be properly controlled to prevent their inadvertent test, installation, or use. They are to be reviewed and either accepted, rejected, repaired, or reworked.

e. Reports of conditions that are adverse to quality are to be analyzed to identify trends in quality performance. Significant conditions adverse to quality and significant trends are to be reported to the appropriate level of management.

7. Regulatory Commitments

a. The applicant is to comply with 10 CFR Part 21, Criterion 1 of Appendix A to 10 CFR Part 50, Appendix B to 10 CFR Part 50, 10 CFR 50.55a, and 10 CFR 50.55(e) as part of the overall QA program.

b. Except where acceptable alternatives are provided, the applicant is to comply with the regulatory positions in the appropriate revisions of the regulatory guides listed in Section VI.A of this chapter. Section VI.A lists regulatory guides issued in response to Appendix B to 10 CFR Part 50. (Regulatory Guides 1.26 and 1.29 are included to ensure that acceptable QA requirements are specified for items that they address.)

c. Except where acceptable alternatives are provided, the applicant is to comply with the QA guidance in the appropriate revisions of the applicable documents listed in Section VI.B of this chapter. Section VI.B lists documents that contain programmatic QA guidance for specific items and activities that are important to safety.

d. For Class 1, 2, and 3 items covered by Section III of the ASME Boiler and Pressure Vessel Code, the code QA requirements are to be supplemented by the guidance of the regulatory guides in Section VI.A.

e. The NRC is to be notified of QAPD changes in accordance with 10 CFR 50.54(a)(3) and 50.55(f)(3).

B. PERFORMANCE/VERIFICATION

1. Methodology

a. Personnel performing work activities such as design, engineering, procurement, manufacturing, construction, installation, startup, maintenance, modification, operation, and decommissioning are responsible for achieving acceptable quality.

b. Personnel performing verification activities are responsible for verifying the achievement of acceptable quality.

c. Work is to be accomplished and verified using instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and importance to safety.

d. Criteria that define acceptable quality are to be specified, and verification is to be against these criteria.

2. Design Control

a. A program is to be established and implemented for the design of items that are important to safety.

b. The program is to include provisions to control design inputs, processes, outputs, changes, interfaces, records, and organizational interfaces.

c. Design inputs (such as the design bases and the performance, regulatory, quality, and quality verification requirements) are to be correctly translated into design outputs (such as specifications, drawings, procedures, and instructions).

d. The final design output is to relate to the design input in sufficient detail to permit verification.

e. The design process is to ensure that items and activities that are important to safety are selected and independently verified consistent with their importance to safety to ensure they are suitable for their intended application.

f. Changes to final designs (including field changes and modifications) and dispositions of nonconforming items to use as is or repair are to be subjected to design control measures commensurate with those applied to the original design and approved by the organization that performed the original design or a qualified designate.

g. Interface controls (internal and external between participating design organizations and across technical disciplines) for the purpose of developing, reviewing, approving, releasing, distributing, and revising design inputs and outputs are to be defined.

h. Design records, maintained to provide evidence that the design was properly accomplished, are to include not only the final design output and revisions to the final output, but also the important design steps (calculations, analyses, and computer programs, for example) and the sources of input that support the final output.

3. Design Verification

a. A program is to be established and implemented to verify the acceptability of design activities and documents. Design inputs, processes, outputs, and changes are to be verified.

b. Verification methods include, but are not limited to, design reviews, alternative calculations, and qualification testing.

c. When a test program is used to verify the acceptability of a specific design feature, the test program is to demonstrate acceptable performance under conditions that simulate the most adverse design conditions that are expected to be encountered.

d. Independent design verification is to be completed before design outputs are used by other organizations for design work and before they are used to support other activities such as procurement, manufacture, or construction. When this timing cannot be achieved, the unverified portion of the design is to be identified and controlled. In all cases, the design verification is to be completed before relying on the item to perform its function and before its installation becomes irreversible (requiring extensive demolition or rework).

e. In exceptional circumstances, the designer's immediate supervisor can perform the design verification, provided (a) the supervisor is the only technically qualified individual capable of performing the verification, (b) the need is individually documented and approved in advance by the supervisor's management, and (c) the frequency and effectiveness of the supervisor's use as a design verifier are independently verified to guard against abuse.

f. Design verification procedures are to be established and implemented to ensure that an appropriate verification method is used, the appropriate design parameters to be verified are chosen, the acceptance criteria are identified, the verification is satisfactorily accomplished, and the results are properly recorded.

4. Procurement Control

a. A program is to be established and implemented to ensure that purchased items and services are of acceptable quality.

b. The program is to include provisions for evaluating prospective suppliers and selecting only qualified suppliers.

c. The program is to include provisions for ensuring that qualified suppliers continue to provide acceptable products and services.

d. The program is to include provisions (such as source verification, receipt inspection, pre-installation and post-installation tests, and certificates of conformance) for accepting purchased items and services.

e. Applicable technical, regulatory, administrative, and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, and 10 CFR Part 21) are to be invoked for procurement of items and services.

f. The program is to include provisions for ensuring that documentary evidence that an item conforms to procurement requirements is on site before the item is placed in service or used.

g. The program is to include provisions for ensuring that procurement, inspection, and test requirements have been satisfied before an item is placed in service or used.

h. The procurement of components, including spare and replacement parts, is to be subject to quality and technical requirements suitable for their intended service and to the purchaser's current QA program requirements.

i. Appropriate controls for the selection, determination of suitability for intended use (critical characteristics), evaluation, receipt, and quality evaluation of commercial-grade items are to be imposed to ensure that they will perform satisfactorily in service.

5. Procurement Verification

a. A program is to be established and implemented to verify the quality of purchased items and services at intervals and to a depth consistent with the item's or service's importance to safety, complexity, and quantity and the frequency of procurement .

b. The program is to be executed in all phases of procurement. As necessary, this may require verification of activities of suppliers below the first tier.

6. Identification and Control of Items

a. A program is to be established and implemented to identify and control items (including consumable materials and items with limited shelf life) to prevent the use of incorrect or defective items.

b. Identification of each item is to be maintained throughout fabrication, erection, installation, and use so that the item can be traced to its documentation. Traceability is to be maintained to an extent consistent with the item's importance to safety.

7. Handling, Storage, and Shipping

a. A program is to be established and implemented to control the handling, storage, shipping, cleaning, and preserving of items to prevent their damage, loss, and deterioration.

b. Special protective measures (such as containers, shock absorbers, accelerometers, inert gas atmospheres, specific moisture content levels, and temperature levels) are to be specified and provided when required to maintain acceptable quality.

c. Specific procedures are to be developed and used for cleaning, handling, storage, packaging, shipping, and preserving items when required to maintain acceptable quality.

d. Items are to be marked and labeled during packaging, shipping, handling, and storage to identify, maintain, and preserve the items' integrity and indicate the need for special controls.

8. Test Control

   a. A test control program is to be established and implemented to demonstrate that items will perform satisfactorily in service.

   b. Criteria are to be defined that specify when testing is required.

   c. The test control program is to include, as appropriate, proof tests before installation, pre-operational tests, post-maintenance tests, post-modification tests, and operational tests.

   d. Test procedures are to be developed that include (a) instructions and prerequisites to perform the test, (b) use of proper test equipment, (c) acceptance criteria, and (d) mandatory inspection hold points as required.

   e. Test results are to be documented and reviewed by the management of the testing organization and the management having responsibility for the item being tested.

   f. When acceptance criteria are not met, corrected areas are to be retested.

9. Measuring and Test Equipment Control

   a. A program is to be established and implemented to control the calibration, maintenance, and use of measuring and test equipment.

   b. The types of equipment covered by the program (such as instruments, tools, gages, reference and transfer standards, and nondestructive examination equipment) are to be defined.

   c. Measuring and test equipment is to be calibrated at specified intervals (or immediately before and after use) on the basis of the item's required accuracy, intended use, frequency of use, and stability characteristics and other conditions affecting its performance.

   d. Measuring and test equipment is to be labeled, tagged, or otherwise controlled to indicate its calibration status and to ensure its traceability to calibration test data.

   e. Measuring and test equipment is to be calibrated against standards that have an accuracy of at least four times the required accuracy of the equipment being calibrated or, when this is not possible, have an accuracy that ensures the equipment being calibrated will be within the required tolerance.

f. If nationally recognized standards exist, calibration standards are to be traceable to them. Except where calibration standards with the same accuracy as the instruments being calibrated are shown to be adequate for the requirements, calibration standards are to have a greater accuracy than the standards being calibrated.

g. Measuring and test equipment found out of calibration is to be tagged or segregated and not used until it is recalibrated. The acceptability of items measured, inspected, or tested with an out-of-calibration device is to be determined.

10. Inspection, Test, and Operating Status

a. As applicable, inspection, test, and operating status of items is to be verified before their release, fabrication, receipt, installation, test, and use to preclude inadvertent bypassing of inspections and tests and to prevent inadvertent operation.

b. The application and removal of status indicators and other labels are to be controlled.

11. Special Process Control

a. A program is to be established and implemented to ensure that special processes, such as welding, heat treating, and nondestructive examination are properly controlled.

b. The criteria that establish which processes are special are to be described.

c. Special processes are to be accomplished by qualified personnel using qualified procedures and equipment in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

12. Inspection

a. A program is to be established and implemented for inspections (source, in-process, final, receipt, maintenance, modification, in-service, operations, and decommissioning). The inspection program may be implemented by or for the organization performing the activity to be inspected.

b. Provisions to ensure inspection planning is properly accomplished are to be established. Planning activities are to identify the characteristics and activities to be inspected, the inspection techniques, the acceptance criteria, and the organization responsible for performing the inspection.

c. Provisions to identify inspection hold points, beyond which work is not to proceed without the consent of the inspection organization, are to be defined.

d. Inspection results are to be documented by the inspector and reviewed by management.

e. When acceptance criteria are not met, corrected areas are to be reinspected.

13. Corrective Action

a. Performance and verification personnel are to (a) identify conditions that are adverse to quality, (b) suggest, recommend, or provide solutions to the problems, and (c) verify resolution of the issue.

b. Reworked, repaired, and replacement items are to be inspected and tested in accordance with the original inspection and test requirements or specified alternatives.

14. Document Control

a. A program is to be established and implemented to control the development, review, approval, issue, use, and revision of documents.

b. The scope of the document control program is to be defined. Examples of documents to be controlled include design drawings, as-built drawings, engineering calculations, design specifications, computer codes, purchase orders and related documents, vendor-supplied documents, audit and surveillance procedures, operating procedures, emergency operating procedures, technical specifications, nonconformance reports, corrective action reports, work instructions and procedures, calibration procedures, quality verification procedures, and inspection and test reports.

c. Revisions of controlled documents are to be reviewed for adequacy and approved for release by the same organization that originally reviewed and approved the documents or by a designated organization that is qualified and knowledgeable.

d. Controlled copies of instructions and procedural documents are to be distributed to and used by the person performing the activity.

e. The distribution of new and revised controlled documents is to be in accordance with established timeliness guidelines. Superseded documents are to be controlled.

15. Records

a. A program is to be established and implemented to ensure that sufficient records of items and activities (such as design, engineering, procurement, manufacturing, construction, inspection and test [such as manufacturer's, proof, receipt, pre-operational, and post-installation], installation, pre-operation, startup, operations, maintenance, modification, decommissioning, and audits) are generated and maintained to reflect completed work.

b. The program is to provide provisions for the administration, receipt, storage, preservation, safekeeping, retrieval, and disposition of records.

C. SELF-ASSESSMENT

1. Methodology

a. Personnel responsible for carrying out the self-assessment function, including safety committee activities, audits, and other independent assessments, are to be cognizant of day-to-day activities so that they can act in a management advisory function. For example, during the operations phase of a nuclear power plant, this would involve monitoring the overall performance of the plant, identifying anomalous performance and precursors of potential problems, reporting findings in an understandable form and in a timely fashion to a level of line management having the authority to effect corrective action, reporting results back to line management, and verifying satisfactory resolution of problems.

b. Organizations performing self-assessment activities are to be technically and performance oriented, with their primary focus on the quality of the end product and a secondary focus on procedures and processes.

c. Personnel performing self-assessment activities are not to have direct responsibilities in the area they are assessing.

d. Self-assessments are to be accomplished using instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and importance to safety.

2. Assessment

   a. A program of planned and periodic assessments is to be established and implemented to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

   b. Assessments are to provide comprehensive independent evaluation of activities and procedures.

   c. Planning activities are to identify the characteristics and activities to be assessed and the acceptance criteria.

   d. Scheduling and resource allocation are to be based on the status and safety importance of the activity or process being assessed.

   e. Scheduling is to be dynamic and resources are to be supplemented when QA program effectiveness is in doubt.

   f. Assessment results are to be documented and reviewed by the assessor's management and by management having responsibility in the area assessed. Follow-up action, including a re-look at deficient areas, is to be initiated as necessary.

   g. When any work carried out under the requirements of the QA program is delegated to others, implementation of that part of the work is to be assessed by the applicant.

   h. Assessments are to be conducted using predetermined acceptance criteria.

III. REVIEW PROCEDURES

New QAPDs will be reviewed against the acceptance criteria described in Section II, including the applicant's commitment to the applicable references listed in Section VI. Any exceptions or alternatives to this SRP section, including the applicable references in Section VI, will be reviewed to ensure that they are defined and that an adequate basis exists for their acceptance. When required, the Performance and Quality Evaluation Branch will prepare a request for additional information for the applicant and review the response for acceptability.

Changes to a QAPD previously accepted by the NRC will be reviewed to determine their acceptability. The changed QAPD will be compared against the previously accepted QAPD, its controls, and the appropriate controls in Chapter 17 of the Standard Review Plan to determine the acceptability of the changes. When required, the reviewing organization will prepare a request for additional information for the applicant and review the response for acceptability.

Upon concluding that the QAPD describes an acceptable quality assurance program, the reviewing organization may request that an inspection be performed by NRR or Regional personnel as appropriate. The inspection will assess the applicant's interpretation and translation of the QAPD commitments into its procedures, processes, and organizational staffing. The inspection will focus on the effectiveness of the QAPD implementation.

Through review of the information provided by the applicant and, as required, meetings with the applicant, review of applicable NRC inspection reports, and discussion with involved NRC inspectors, a judgment is made of the applicant's capability to carry out its quality assurance responsibilities. The reviewer's satisfaction with the quality assurance program commitments, the description of how the commitments will be met, the organizational arrangements, and the capabilities to fulfill the QAPD should lead to the conclusion of acceptability as described in Section IV.

IV. EVALUATION FINDINGS

The reviewer will verify that sufficient information has been provided and that the review is sufficiently complete to support conclusions of the following type in either the staff's safety evaluation report (SER) or a letter to the applicant:

On the basis of the staff's detailed review and evaluation of the quality assurance program description (QAPD) in the (topical report or safety analysis report) for (nuclear facility), we conclude the following:

1. The QAPD acceptably describes the authority and responsibility of management and supervisory personnel, performance/verification personnel, and self-assessment personnel.

2. The organizations and persons responsible for performing the verification and self-assessment functions have the authority and independence to conduct their activities without undue influence from those directly responsible for costs and schedules.

3. The QAPD describes a philosophy and controls that, when properly implemented, comply with the requirements of Appendix B and Criterion 1 of Appendix A to 10 CFR Part 50, 10 CFR Part 21, 10 CFR 50.55a, and 10 CFR 50.55(e), with the criteria contained in SRP Section 17.3, and with the regulatory positions in the following regulatory guides:

   Regulatory Guide Title — Revision or Date

4. The QA program applies to activities and items that are important to safety.

5. Accordingly, the staff concludes that the applicant's QAPD complies with the applicable NRC regulations and industry

standards and can be implemented for the (Specify the application).

A brief description of the applicant's QA program that highlights the more important aspects of the program is to be provided in the SER.

V. IMPLEMENTATION

Except in those cases where the applicant proposes an acceptable alternative method for complying with the specified portions of the Commission's regulations and guidance, the method described herein will be used by the staff to evaluate conformance with Commission regulations. Licensee-proposed revisions of quality assurance program descriptions that have been accepted by the staff in accordance with 17.1 or 17.2 will continue to be reviewed against their original acceptance criteria. However, current licensees may adopt Section 17.3 if they choose to do so.

VI. REFERENCES

A. Regulatory guides issued in response to Appendix B of 10 CFR Part 50:

1. Regulatory Guide 1.8, "Personnel Selection and Training."

2. Regulatory Guide 1.26, "Quality Group Classification, and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants."

3. Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," using NQA-1 and NQA-2.

4. Regulatory Guide 1.29, "Seismic Design Classification."

5. Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operations)," with appropriate substitution of NQA-1 and NQA-2 for N-45.2 and its daughter standards.

B. Other Programmatic QA Guidance:

1. Fire protection QA controls are to be in accordance with Regulatory Positions 2 and 4 of Branch Technical Position CMEB 9.5-1 as given in SRP Section 9.5.1.

2. Radioactive waste QA controls are to be in accordance with Regulatory Position 6 of Regulatory Guide 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light Water-Cooled Nuclear Power Plants."

3. Software verification is to be in accordance with the regulatory position in Regulatory Guide 1.152, "Criteria for

Programmable Digital Computer System Software in Safety-Related Systems of Nuclear Power Plants."

4. Regulatory Guide 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants."

5. Regulatory Guide 2.5, "Quality Assurance Program Requirements for Research Reactors."

6. Regulatory Guide 3.3, "Quality Assurance Program Requirements for Fuel Reprocessing Plants and for Plutonium Processing and Fuel Fabrication Plants."

7. Regulatory Guide 3.21, "Quality Assurance Requirements for Protective Coatings Applied to Fuel Reprocessing and to plutonium Processing and Fuel Fabrication Plants."

8. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment."

9. Regulatory Guide 7.10, "Establishing Quality Assurance Programs for Packaging Used in the Transport of Radioactive Material."

10. Generic Letter 89-02 and its endorsement of EPRI NP-5652, "Guideline for the Utilization of Commercial-Grade Items in Nuclear Safety-Related Applications (NCIG-07)."

Enclosure 2

SRP Comparison

SRP COMPARISON

Rev. 2 SRP 17.1 & 17.2 Item	Rev. 0 SRP 17.3 Disposition (M = Management) (P = Performance/Verification) (SA = Self-Assessment)

1. ORGANIZATION

1A1	M - Responsibility "a"
1A2	M - Organization "a" & "e"
1A3a	M - Organization "e"(3)
b	M - Organization "e"(4)
c	M - Organization "e"(1)
1A4	M - Organization "e"(2)
1A5	M - Organization "a". Quality assurance (QA) is recognized to consist of management, performance, verification of performance, and self-assessment. The SRP is a performance-oriented plan that establishes goals and objectives for safety and reliability. Because the size of the staff required to achieve the goals is the prerogative of the applicant's management, the requirement to describe the criteria for determining the size of the QA organization including the inspection staff has been deleted.
1A6	M - Organization "a"
1B1	M - Organization "c"
a	M - Organization "d"(1) & (2)
b	M - Organization "d"(3)
c	M - Methodology "a" P - Document Control "a" requires review of procedures that implement the QA program, and M - Responsibility "e" requires that these procedures be approved by the manager responsible for their implementation. Additional approval is not required. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M -Personnel Training & Qualification.
d	M - Organization "d"(4)
1B2	The responsibility to verify conformance to established requirements can now be met by the performing organization. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M -Personnel Training & Qualification.
1B3	M - Corrective Action "a" P - Corrective Action "a"

1B4	M - Authority "b" requires that the responsibility and authority to stop unsatisfactory work be assigned. It does not require that designated QA personnel have this responsibility and authority.
1B5	Deleted requirement to describe how disputes involving quality are resolved. This is standard management prerogative.
1B6	SA - Methodology "a"
1C1	M - Methodology "a" & "b"
1C2(1)	M - Organization "c"
(2)	M - Organization "d"(2)
(3)	M - Personnel Training & Qualification
(-)	M - Organization "d"
	M - Personnel Training & Qualification "a" requires that personnel be capable of performing their assigned tasks. It does not specifically require that the qualifications of the QA manager are at least equivalent to those described in Section 4.4.5 of ANSI/ANS-3.1-1978.
RG 1.8	M - Regulatory Commitments "b" (VI.A.3 & .5)

2. QUALITY ASSURANCE PROGRAM

2A1a(1)	M - Methodology
(2)	M - Methodology "c" requires that the QAPD include criteria to identify the QA program scope. A list is required, but not in the QAPD.
b	P - Test Control "c"
c	M - Methodology "c" requires that the QAPD include criteria to identify the QA program scope. It does not specify that computer code programs must be included. Software controls are required by NQA-2.7 (draft).
d	M - Regulatory Commitments "c" (VI.b.1)
e	M - Responsibility "e"
2A2	M - Methodology "a"
2b1a(1)	M - Responsibility "f"
	P - Document Control "a"
a(2)	P - Document Control
a(3)	M - Responsibility "f"
b	Procedures can now be reviewed by the organization that prepared them. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M -Personnel Training & Qualification.
c	M - Methodology "a"
d	P - Procurement Control "b"
	M - Responsibility "d"
2b2	M - Regulatory Commitments "e"
2b3(1)	M - Regulatory Commitments "b"

(2)	M - Regulatory Commitments "a"
(3)	M - Regulatory Commitments "a"
(4)	M - Regulatory Commitments "d"
(5)	M - Regulatory Commitments "b" requires commitment to appropriate revisions of regulatory guides. The NRC reviewer is to verify the correct revision.
(6)	M - Regulatory Commitments "c"
(7)	M - Regulatory Commitments "b" requires commitment to appropriate revisions of regulatory guides. The NRC reviewer is to verify the correct revision.
(8)	M - Regulatory Commitments "b" requires commitment to appropriate revisions of regulatory guides. It does not specifically require that the QA and technical organizations participate early in the QA program to determine the extent QA controls are to be applied to specific items. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the program has been implemented effectively.
(9)	M - Methodology "d"
2B4	M - Responsibility "f" requires QA procedures. A specific list of these procedures is no longer required in the QAPD.
2B5	The last sentence of the first paragraph of part II states that the QAPD should describe how each of the acceptance criteria will be met, and a QAPD meeting SRP Chapter 17 will provide acceptable details of how the QA program will be implemented. There is no need for an acceptance criterion that requires the QAPD to emphasize "how."
2C1a	SA - Assessment "a" incorporates the audit program in the self-assessment program, the function of which is to keep upper management informed of the effectiveness of the overall QA program implementation.
b(1)	M - Responsibility "c"
b(2)	M - Corrective Action
2C2	M - Responsibility "d"
2C3	M - Organization "a" requires an organizational description that includes interfaces. The specific summary description of transfer of responsibilities from principal contractors to the licensee is not required.
2Da	Specific requirements (goals and objectives) for training and qualification are given in M - Personnel Training & Qualification.
b	Same as 2Da
c	Same as 2Da
d	Same as 2Da
e	Same as 2Da
f	Same as 2Da
g	M - Regulatory Commitments "b" (VI.A.3 & .5)

3. DESIGN CONTROL

3A(1) P - Design Control "a" & "c"
P - Design Verification "a"
(2) P - Design Control addresses engineering activities. The shopping list of engineering activities has been deleted. All activities important to safety are to be covered as required by M - Methodology "d".
3B M - Organization "a"
P - Design Control "h" addresses design records. The shopping list of design documents has been deleted.
3C1 M & P - Corrective Action address errors and deficiencies. They do not specifically address errors and deficiencies in approved design documents and computer codes.
3C2 M & P - Corrective Action address deviations. They do not specifically address deviations from engineering standards.
3D P - Design Control "g"
3E1 P - Design Verification "a" requires a program for independent verification of designs. It does not specifically require a check to verify dimensional accuracy and completeness of drawings and specifications.
3E2 The responsibility to review design drawings and specifications can now be met by the performing organization. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M -Personnel Training & Qualification.
3E3 P - Design Verification "a" & "b"
3E4a P - Design Verification "a" & "d"
M - Personnel Training & Qualification
(1) P - Design Verification "e"
(2) Same as 3E4a(1)
(3) Same as 3E4a(1)
b P - Design Verification "d"
c P - Design Verification "f". Deleted shopping list of design documents.
d P - Design Verification "f"
3E3 a P - Design Verification "f"
(#2)b P - Design Verification "d"
c P - Design Verification "c"
3E4 (#2) M - Methodology "d" requires measures to ensure quality. It does not specifically require that verified computer codes are certified for use and that their use is specified. SA - Assessment "a" requires a program to confirm that activities affecting quality

comply with the QA program and that the QA program has been implemented effectively.

3F1 P - Design Control "f"
3F2 M - Regulatory Commitments "b" (VI.A.3 & .5)

4. PROCUREMENT DOCUMENT CONTROL

4A1 P - Document Control "a" & "b"
M - Responsibility "d"
M - Personnel Training & Qualification
4A2 P - Document Control "a" & "b" require review and approval of procurement documents. The shopping list of what must be reviewed has been deleted.
4B1 Activities addressed as follows:
.1 P - Procurement Control "a"
.2 P - Document Control
.3 P - Procurement Control "b"
.4 P - Procurement Control "b"
.5 M - Responsibility "d"
.- M - Organization "a"
4B2 M - Regulatory Commitments "b" (VI.A.3 & .5)

5. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

5A P - Methodology "b"
5b P - Methodology "b" & "d"
P - Inspection "b"
P - Design Verification "f"
P - Test Control "d"(c)
SA - Assessment "c"

6. DOCUMENT CONTROL

6A1 P - Document Control "b"
6A2 The responsibility to review the technical adequacy and quality requirements of documents can now be met by the performing organization. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M - Personnel Training & Qualification.
6A3 P - Document Control "c"
P - Design Control "f"
6A4 P - Document Control "d"
6B1 P - Document Control "e"
6B2 P - Document Control "a" requires a program to control the development, review, approval, issue, use, and revision of documents, and P - Document Control "e" addresses timeliness of document distribution and requires control of superseded documents. The SRP

does not specifically require a master list or equivalent system to identify current revisions of documents. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

6C1 P - Document Control "b" & "e"

7. CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

7A1 M - Organization "a"

7A2 M - Organization "a"
P - Procurement Verification "a" requires a program to verify supplier quality. It does not specifically require participation by the QA organization. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

7A3 P - Procurement Control "b"
P - Document Control "b"
P - Records Control "a" requires the generation and maintenance of records sufficient to reflect completed work. Section 17.3 does not specifically require that supplier selection be documented and filed. Also, Section 17.3 does not refer to the CASE Register and LCVIP letters of confirmation since the vendor inspection program no longer issues LCVIP letters and the nuclear side of CASE has merged with NSQUAC to form NUPIC

7A4 P - Procurement Control "h" changes the requirement that spare and replacement parts be at least as good as the parts they replace to a requirement that they be suitable for their intended service.

7B1a P - Procurement Control "d"
b P - Procurement Control "d" & "g"
c P - Procurement Control "f" & "g"

7B2 P - Inspection, Test, & Operating Status "a" & "b"

7B3 P - Procurement Control "e" requires that reporting requirements be invoked on procurements, and P - Procurement Control "g" requires that procurement, inspection, and test requirements be met before an item is placed in service or used. The SRP does not require that suppliers give the following specific documents to the purchaser and that the purchaser review and accept these documents:

a. Documentation that identifies the purchased item and the specific procurement requirements (e.g., codes, standards, and specifications) met by the item

b. Documentation identifying any procurement requirements that have not been met
c. A description of nonconformances from the procurement requirements dispositioned "accept as is" or "repair"

7B4 P - Procurement Control "i"

7B5 P - Procurement Control "c" requires that provisions for ensuring that qualified suppliers continue to provide acceptable products and services be established and implemented. It does not specify how that is to be accomplished.

7B6 M - Regulatory Commitments "b" (VI.A.3 & .5)

8. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

8A P - Identification & Control of Items "a"
M - Organization "a"

8B1 P - Identification & Control of Items "b"

8B2 P - Identification & Control of Items "b". Deleted shopping list of "appropriate" documentation.

8B3 Inspection, Test, & Operating Status "b" requires that the identification of each item be maintained throughout fabrication, erection, installation, and use. It does not specifically require that identification be verified before an item is released for fabrication, assembly, shipment, and installation. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

9. CONTROL OF SPECIAL PROCESSES

9A1 P - Special Process Control "b" requires that the criteria for determining which processes are special be described. It does not require a list of special processes.

9A2 P - Special Process Control "c" requires that special processes be accomplished by qualified personnel using qualified procedures and equipment in accordance with the requirements, and M - Organization "a" requires a description of organizational responsibilities for qualifying and controlling special processes. The SRP does not require that the QA organization be involved. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

9B1 P - Special Process Control "c" requires that special processes be qualified. It does not require that the

QA organization be involved. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

9B2 P - Special Process Control "c"
P - Records "a" requires that records reflect completed work. It does not specifically require recording evidence of acceptable accomplishment of special processes.

9B3 P - Special Process Control "c"
P - Records "a" requires that records reflect completed work. It does not specifically require that qualification records be maintained of special processes.

10. INSPECTION

10A(1) P - Inspection "a" through "e"

(2) P - Inspection "a" and "b"

(3) M - Organization "a" requires a description of organizational responsibilities for inspections. It does not specifically require that the QA organization participate in these activities. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

10B1(1) M - Organization "a"

(2) M - Organization "b" requires independence between performers and verifiers. It does not have the specific requirement that inspectors not report directly to the immediate supervisor responsible for the work being inspected. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

(3) M - Organization "a" requires a description of organizational responsibilities for procedure review, M - Personnel Training & Qualification requires that tasks be accomplished by qualified personnel, and M - Organization "b" requires verifier independence. The SRP does not require QA organization involvement in these areas. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

10B2 M - Personnel Training & Qualification

10C1a P - Inspection "b"

b P - Inspection "b"

c M - Organization "a"

d P - Inspection "b"

e P - Inspection "b" requires inspection planning. It does not specifically require that inspection procedures identify required drawings and specifications with applicable revisions.
f P - Inspection "d"
g P - Measuring & Test Equipment "a" and "c"
10C2 P - Inspection "c"
10C3 P - Inspection "d"

11. TEST CONTROL

11A1(1) P - Test Control "a" and "c"
(2) P - Measuring & Test Equipment "a" and "c"
(3) P - Test Control "a" and "b"
11B1a P - Test Control "d"(c)
P - Design Verification "f"
b P - Test Control "d"(a)
c P - Test Control "d"(a) requires that test prerequisites be in test procedures. The shopping list of test prerequisites has been deleted.
d P - Test Control "d"(d)
e P - Test Control "d"(c)
f P - Test Control "e"
g P - Test Control "d"(a)
11C1 P - Test Control "e"

12. CONTROL OF MEASURING AND TEST EQUIPMENT

12.1 P - Measuring & Test Equipment "a"
12.2 M - Organization "a" requires a description of organizational responsibilities for calibrating and controlling measuring and test equipment (M&TE). It does not require that the QA organization be involved.
SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.
12.3(1) P - Measuring & Test Equipment "a"
P - Document Control "b"
(2) P - Document Control "b"
(3) P - Organization "a"
12.4 P - Measuring & Test Equipment "d"
12.5 P - Measuring & Test Equipment "a" requires a program to control M&TE. It does not require a description of the method of otherwise controlling M&TE when it is not labeled or tagged.
12.6(1) P - Measuring & Test Equipment "c"
(2) P - Measuring & Test Equipment "e"
(3) P - Records "a" requires records of completed work. It does not specifically require that the basis of

acceptance of a lower accuracy ratio for calibrations be documented.

(4) M - Organization "a" requires a description of organizational responsibilities for calibration and control of M&TE. It does not specifically require the identity of management authorized to allow a lower calibration accuracy.

12.7(1) P - Measuring & Test Equipment "f"

(2) P - Measuring & Test Equipment "f"

(3) P - Records "a" requires records of completed work. It does not specifically require that the basis of acceptance of an equal accuracy ratio be documented.

(4) M - Organization "a" requires a description of organizational responsibilities for calibration and control of M&TE. It does not specifically require the identity of management authorized to allow an equal calibration accuracy.

12.8 P - Measuring & Test Equipment "f"
P - Records "a" requires records of completed work. It does not specifically require that the basis for calibration be documented if nationally recognized standards do not exist.

12.9 P - Measuring & Test Equipment "g"
P - Corrective Action "a"

13. HANDLING, STORAGE, AND SHIPPING

13.1(1) P - Handling, Storage, and Shipping "c"

(2) M - Personnel Training & Qualification

13.2 P - Methodology "b" requires that work be accomplished in accordance with instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and safety importance. It does not specifically require procedures to control handling, storage, etc.

13.3 M - Regulatory Commitments "b" (VI.A.3 & .5)

14. INSPECTION, TEST, AND OPERATING STATUS

14.1 P - Methodology "b" requires that work be accomplished in accordance with instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and safety importance, and P - Inspection, Test, & Operating Status "b" requires that the application and removal of status indicators and other labels be controlled. The SRP does not require procedures to specifically indicate the status of items.

14.2 P - Inspection, Test, & Operating Status "b"

14.3 P - Document Control "b" & "c"

14.4(1) P - Inspection, Test, & Operating Status "b"

M - Corrective Action "d"
(2) M - Organization "a"

15. NONCONFORMING MATERIALS, PARTS, OR COMPONENTS

15.1(1) M - Corrective Action "b"
(2) P - Methodology "b" requires that work be accomplished in accordance with instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and safety importance, and P - Corrective Action "d" requires that nonconforming items be controlled. The SRP does not specifically require procedures to control nonconforming items.
(3) M - Organization "a"
15.2(1) M - Corrective Action "a" & "c"
M - Organization "a" requires a description of organizational responsibilities for controlling nonconforming items. It does not require that the QA organization be involved. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.
(2) M - Organization "a"
15.3(1) P - Document Control. Deleted shopping list of specific items that nonconformance documents include.
(2) P - Test Control "d"
M - Corrective Action "d"
15.4 M - Corrective Action "b"
P - Inspection "e"
15.5 M - Corrective Action "e" and "f"
M - Organization "a"

16. CORRECTIVE ACTION

16.1(1) M - Corrective Action "b"
(2) P - Methodology "b" requires that work be accomplished in accordance with instructions, procedures, or other appropriate means that are of a detail commensurate with the activity's complexity and safety importance. It does not specifically require procedures for the corrective action program.
(3) Corrective action procedures can now be reviewed by the organization that prepared them. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M - Personnel Training & Qualification.
16.2(1) M - Corrective Action "b"
P - Document Control

(2) M - Corrective Action "b" and P - Corrective Action "a" require verification of the resolution of conditions adverse to quality. They do not specifically require that the QA organization be involved. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

16.3 M - Corrective Action "b" and P - Corrective Action "a" require verification of the resolution of conditions adverse to quality. They do not specifically require that corrective action be closed out in a timely manner or that the QA organization be involved. SA -Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

16.4 M - Corrective Action "b" & "e"

17. QUALITY ASSURANCE RECORDS

17.1 P - Records "a"

17.2 M - Organization "a" requires a description of organizational responsibilities for records. It does not require that the QA organization be involved. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

17.3 P - Records "a". Deleted the shopping list of items to be included in inspection and test records.

17.4 Deleted detailed requirements for record storage facility. Covered in M - Regulatory Commitments "b" (VI.A.3 & .5)

17.5 M - Regulatory Commitments "b" (VI.A.3 & .5)

18. AUDITS

18A1 SA - Assessment "a". Audits are now performed as part the self-assessment function.

a SA - Assessment "b" requires a comprehensive, independent evaluation of procedures and activities, and P - Methodology "c" requires independent verifications. The SRP does not specifically require that the QA organization perform these functions. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

b Rather than requiring supplier audits, P - Procurement Control "c" specifies that provisions be established to ensure that qualified suppliers continue to provide acceptable products and services.

18A2 SA - Assessment "a", "c", "d", and "e"

18A3 SA - Methodology "b" requires technically and performance-oriented self-assessments with a secondary focus on procedures and processes.

18A4 SA - Assessment "a". Deleted reference to Appendix B and the shopping list of areas to be audited.

18.B1 M - Corrective Action "e" requires that significant conditions adverse to quality and significant trends be reported to management. The specific requirement that the QA organization do this has been deleted. SA - Assessment "a" requires a program to confirm that activities affecting quality comply with the QA program and that the QA program has been implemented effectively.

18B2(1) SA - Methodology "d"

(2) M - Personnel Training & Qualification

(3) M - Organization "b"

18B3 M - Regulatory Commitments "b" (VI.A.3 & .5)

Operations Phase

1.1b M - Organization "a"

e M - Organization "d"

2.2 The SRP requires a QAPD for the complete life cycle. Therefore, the requirement that a QA program for operations be implemented at least 90 days before fuel loading is no longer specified.

2.3 The SRP requires a QAPD for the complete life cycle. The specific requirement for a commitment that the QA program described in the preliminary safety analysis report be implemented through preoperational testing has been deleted.

3.2 M - Personnel Training & Qualification
P - Document Control

6.2 The responsibility to review maintenance, modification, and inspection procedures can now be met by the performing organization. Personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable work output. Auditor independence is addressed in M - Organization "b" and training in M - Personnel Training & Qualification.

10.2 M - Personnel Training & Qualification
M - Organization "b" requires verifier independence. The SRP does not require that specific controls be met when inspections (verifications) associated with normal plant operations are performed by personnel within the same group as those who performed or supervised the work. Personnel performing the self-

assessment function will audit per SA - Assessment "a" to verify acceptable work output.

13.[illegible] P - Handling, Storage, & Shipping requires an effective program for controlling items in storage. It does not specifically require that provisions be described for the storage of chemicals, reagents, lubricants, and other consumable materials (including control of shelf life).

17.2 P - Records "a" requires records of completed work. It does not specifically require that these records include operating logs, maintenance and modification procedures, related inspection results, reportable occurrences, and other records required by the technical specifications.

18.2 M - Organization "a"

Enclosure 3

SRP Sections 17.1 &17.2

(Current)

U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

17.1 QUALITY ASSURANCE DURING THE DESIGN AND CONSTRUCTION PHASES

REVIEW RESPONSIBILITIES

Primary - Quality Assurance Branch (QAB)

Secondary - Mechanical Engineering Branch
Instrumentation & Control Systems Branch
Power Systems Branch
Accident Evaluation Branch
Radiological Assessment Branch
Hydrologic & Geotechnical Engineering Branch
Containment Systems Branch

I. AREAS OF REVIEW

QAB reviews and evaluates the description of the quality assurance (QA) program for the design and construction phases in each application for a construction permit (CP), a manufacturing license, or a standardized design approval in accordance with applicable portions of this section of the Standard Review Plan. The secondary review branches review the listing of structures, systems, and components (QA list) covered by the QA program for their areas of review responsibility in accordance with 2A1 of this section of the Standard Review Plan and documents the acceptability of the listing including any items that should be added or clarified by memo to the QAB. The review by MEB in this regard also addresses the areas of review responsibility normally assigned to ASB, RSB, CEB, PSB (except electrical), and SEB.

Pre-Docketing

Prior to docketing a CP application, the NRC performs a substantive review of the applicant's QA program description relative to ongoing design and procurement activities. This review and associated inspection are performed immediately after tendering of a CP application to determine that a satisfactory QA program has been established and is being implemented.

The pre-docketing substantive review places particular emphasis on the areas of organization, QA program, design control, procurement document control, and audit. The application is not docketed unless the established and implemented program in these areas has no substantive deviation from NRC QA guidance applicable to activities conducted prior to docketing. Representatives from the offices of NRR and IE may meet with the applicant's representatives nine to twelve months prior to tendering of the application to provide a clear understanding of what is expected in the QA program description and the implemented program in order for the program to be accepted during the substantive review and associated inspection.

Where an NRC-accepted QA topical report is referenced in the application, the referenced QA program is not re-reviewed except for conformance to the applicable staff positions in this SRP section and the Regulatory Guides in effect at the time of docketing the application. For the case of CP applications referencing a standard design that includes an approved QA program directly or by reference, the applicant need not conform to new or revised Regulatory Guides unless they contain regulatory positions determined to be significant to safety, as indicated in the implementation section of each guide.

Post-Docketing

The QAB review, after docketing, covers the QA controls to be applied by the applicant and principal contractors to activities that may affect the quality of structures, systems, and components important to safety. These activities include site testing and evaluation (starting with evaluation of exposed excavated surfaces, determination of site characteristics, and testing), designing, purchasing, fabricating, constructing, handling, shipping, storing, cleaning, erecting, installing, inspecting, and testing. This review extends to the determination of how the applicable requirements of the eighteen criteria of Appendix B to 10 CFR 50 are satisfied by the proposed QA program.

The areas of review are as follows:

1. ORGANIZATION

   A. Organizational description and charts of the lines, interrelationships and areas of responsibility and authority for all organizations performing quality-related activities, including the applicant's organization and principal contractors (architect engineer, nuclear steam supply system vendor, constructor, and construction manager when other than the constructor).

   B. Organizational location, degree of independence from the performing organization, and authority of the individuals assigned the responsibility for performing QA functions.

   C. Organizational provisions for assuring the proper implementation of the QA program.

2. QUALITY ASSURANCE PROGRAM

   A. Scope of the QA program.

   B. Provisions to assure proper definition of the QA program.

   C. Programmatic provisions to assure proper implementation of the QA program.

D. Provisions to assure adequacy of personnel qualifications.

3. DESIGN CONTROL

A. Scope of the QA program for design activities.

B. The organizational structure, activity, and responsibility of the positions or groups responsible for design activities.

C. Provisions to carry out design activities in a planned, controlled, and orderly manner.

D. Provisions for interface control.

E. Provisions to verify or check the technical adequacy of design documents.

F. Provisions to control design changes.

4. PROCUREMENT DOCUMENT CONTROL

A. Provisions which assure that applicable regulatory requirements, technical requirements, and QA program requirements are included or referenced in procurement documents.

B. Provisions for review and approval of procurement documents.

5. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

A. Provisions for assuring that activities affecting quality are prescribed by and accomplished in accordance with documented instructions, procedures, or drawings.

B. Provisions for including quantitative and qualitative acceptance criteria in instructions, procedures, and drawings.

6. DOCUMENT CONTROL

A. Provisions to assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed.

B. Provisions to prevent the inadvertent use of obsolete or superseded documents.

7. CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

A. Provisions for the control of purchased material, equipment, and services; for selection of suppliers; and for assessing the adequacy of quality.

B. Provisions to assure that documented evidence of the conformance of material and equipment to procurement requirements is available at the plant site prior to installation or use.

8. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

A. Provisions to identify and control materials, parts, and components.

B. Provisions to assure that incorrect or defective items are not used.

9. CONTROL OF SPECIAL PROCESSES

A. Provisions to assure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning.

B. Provisions to assure that special processes are performed by qualified personnel using qualified procedures and equipment.

10. INSPECTION

A. Provisions for the inspection of activities affecting quality, including the items and activities to be covered.

B. Organizational responsibilities and qualifications established for individuals or groups performing inspections.

C. Prerequisites to be provided in the written inspection procedures with provisions for documenting and evaluating inspection results.

11. TEST CONTROL

A. Provisions for tests which assure that structures, systems, and components will perform satisfactorily in service.

B. Prerequisites to be provided in written test procedures with provisions for documenting and evaluating test results.

C. Personnel qualification programs established for test personnel.

12. CONTROL OF MEASURING AND TEST EQUIPMENT

Provisions to assure that tools, gages, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

13. HANDLING, STORAGE, AND SHIPPING

Provisions to control handling, storage, shipping, cleaning, and preservation of items in accordance with work and inspection instructions to prevent damage, loss, and deterioration by environmental conditions such as temperature or humidity.

14. INSPECTION, TEST, AND OPERATING STATUS

Provisions to indicate the inspection, test, and operating status of items to prevent inadvertent use or bypassing of inspection and tests.

15. NONCONFORMING MATERIALS, PARTS, OR COMPONENTS

Provisions to control the use or disposition of nonconforming materials, parts, or components.

16. CORRECTIVE ACTION

Provisions to assure that conditions adverse to quality are promptly identified and corrected and that measures are taken to preclude repetition.

17. QUALITY ASSURANCE RECORDS

Provisions for the identification, retention, retrieval, and maintenance of records that furnish evidence of activities affecting quality.

18. AUDITS

A. Provisions for audits to verify compliance with all aspects of the QA program and to determine the effectiveness of the QA program.

B. Responsibilities and procedures for auditing, documenting and reviewing audit results, and designating management levels to review and assess audit results.

II. ACCEPTANCE CRITERIA

The applicant (and its principal contractors such as the NSSS vendor, A/E, constructor and construction manager) must establish a QA program for the design and construction phases in accordance with Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The applicant's QA program (including its principal contractors) must describe in the PSAR or SSAR how each criterion of Appendix B will be met. The acceptance criteria used by the QAB to evaluate this QA program are listed in the following eighteen subsections. The acceptance criteria include a commitment to comply with the regulations, regulatory positions presented in the appropriate issue of the Regulatory Guides, and the Branch Technical Position listed in subsection V. Thus, the commitment constitutes an integral part of the QA program description and requirements. Exceptions and alternatives to these acceptance criteria may be adopted by applicants provided adequate justification is given; the QAB review allows for considerable flexibility in defining methods and controls while still satisfying pertinent regulations. When the QA program description meets the applicable acceptance criteria of this subsection or provides acceptable exceptions or alternatives, the program is considered to be in compliance with pertinent NRC regulations.

The review will ascertain that the commitments and the description of how the commitments are implemented, to the extent necessary, are objective and stated in inspectable terms.

The Organization (17.1.1) elements responsible for the QA program are acceptable if:

1A1.* The responsibility for the overall program is retained and exercised by the applicant.

1A2. The applicant has identified and described major delegation of work involved in establishing and implementing the QA program or any part thereof to other organizations.

1A3. When major portions of the applicant's program are delegated:

a. Applicant describes how responsibility is exercised for the overall program. The extent of management oversight should be addressed including the location, qualifications, and criteria for determining the number of personnel performing these functions.

b. Applicant evaluates the performance (frequency and method stated - once per year although longer cycle acceptable with other evaluations of individual elements) of work by the delegated organization.

c. Qualified individual(s) or organizational element(s) are identified within the applicant's organization as responsible for the quality of the delegated work prior to initiation of activities.

1A4. Clear management controls and effective lines of communication exist for QA activities among the applicant and the principal contractors to assure direction of the QA program.

1A5. Organization charts clearly identify all the "onsite" and "offsite" organizational elements which function under the cognizance of the QA program (such as design, engineering, procurement, manufacturing, construction, inspection, test, instrumentation and control, nuclear engineering, etc.), the lines of responsibility, and a description of the criteria for determining the size of the QA organization including the inspection staff.

1A6. The applicant (and principal contractors) describes the QA responsibilities of each of the organizational elements noted on the organization charts.

1B1. The applicant (and principal contractors) identifies a management position that retains overall authority and responsibility for the QA program (normally, this position is the QA Manager) and this position has the following characteristics:

a. Is at the same or higher organization level as the highest line manager directly responsible for performing activities affecting quality (such as engineering, procurement, construction, and operation) and is sufficiently independent from cost and schedule.

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* The alphanumeric designation for each acceptance criterion in subsection II indicates its relationship to the areas of review identified in subsection I.

b. Has effective communication channels with other senior management positions.

c. Has responsibility for approval of QA Manual(s).

d. Has no other duties or responsibilities unrelated to QA that would prevent his full attention to QA matters.

1B2. Verification of conformance to established requirements (except for designs, ref. 3E2) is accomplished by individuals or groups within the QA organization who do not have direct responsibility for performing the work being verified or by individuals or groups trained and qualified in QA concepts and practices and independent of the organization responsible for performing the task.

1B3. Persons and organizations performing QA functions have direct access to management levels which will assure the ability to:

a. Identify quality problems.

b. Initiate, recommend, or provide solutions through designated channels.

c. Verify implementation of solutions.

Those persons and organizations with the above authority are identified and a description of how those actions are carried out is provided.

1B4. a. Designated QA personnel, sufficiently free from direct pressures for cost/schedule, have the responsibility delineated in writing to stop unsatisfactory work and control further processing, delivery, or installation of nonconforming material.

b. The organizational positions with stop work authority are identified.

1B5. Provisions are established for the resolution of disputes involving quality, arising from a difference of opinion between QA personnel and other department (engineering, procurement, manufacturing, etc.) personnel.

1B6. Designated QA individuals are involved in day-to-day plant activities important to safety (i.e., the QA organization routinely attends and participates in daily plant work schedule and status meetings to assure they are kept abreast of day-to-day work assignments throughout the plant and that there is adequate QA coverage relative to procedural and inspection controls, acceptance criteria, and QA staffing and qualification of personnel to carry out QA assignments).

1C1. Policies regarding the implementation of the QA program are documented and made mandatory. These policies are established at the Corporate President or Vice President level.

1C2. Position description (see 1B1) assures that the individual directly responsible for the definition, direction, and effectiveness of the overall QA program has sufficient authority to effectively implement responsibilities. This position is to be sufficiently free from cost and schedule responsibilities. Qualification requirements for this individual are established in a position description which includes the following prerequisites:

a. Management experience through assignments to responsible positions.

b. Knowledge of QA regulations, policies, practices, and standards.

c. Experience working in QA or related activity in reactor design, construction, or operation or in a similar high technological industry.

The qualifications of the QA Manager should be at least equivalent to those described in Section 4.4.5 of ANSI/ANS-3.1-1978, "Selection and Training of Nuclear Power Plant Personnel," as endorsed by the regulatory positions in Regulatory Guide 1.8.

1C3. The person at the construction site responsible for directing and managing the site QA program is identified by position and has appropriate organizational position, responsibilities, and authority to exercise proper control over the QA program. This individual is free from non-QA duties and can thus give full attention to assuring that the QA program at the plant site is being effectively implemented.

Activities related to <u>Quality Assurance Program</u> (17.1.2) are acceptable if:

2A1. The scope of the QA program includes:

a. A commitment that activities affecting structures, systems, and components important to safety will be subject to the applicable controls of the QA program. The structures, systems, components, and related consumables covered by the QA program are identified (QA list) in Section 3.2.1 of the SAR.*

b. A commitment that the preoperational test program will be conducted in accordance with the QA program and a description of how the QA program will be applied.

c. A commitment that the development, control, and use of computer code programs will be conducted in accordance with the QA program and a description of how the QA program will be applied.

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*Rulemaking is currently underway to clarify the requirement that structures, systems, and components important to safety as derived from the General Design Criteria of Appendix A to 10 CFR Part 50 shall be subjected to the pertinent requirements of the quality assurance criteria of Appendix B to 10 CFR 50. Until this rulemaking process is completed, staff reviewers should assure that the applicant's list of structures, systems, and components includes all those items necessary to prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public as stated in the Introduction to Appendix B. Guidance for identifying such items is provided in Regulatory Guide 1.29.

The identification of fire protection in SRP Section 9.5.1 as a system covered by the QA program or identification of the QA controls for fire protection. These controls are reviewed and accepted using the guidelines contained in BTP ASB 9.5-1 and 10 CFR Part 50 Appendix B as appropriate.

e. A commitment that special equipment, environmental conditions, skills, or processes will be provided as necessary.

2A2. A brief summary of the company's corporate QA policies is given.

2B1. a. Provisions are established to assure that quality-affecting procedures required to implement the QA program are consistent with QA program commitments and corporate policies and are properly documented, controlled, and made mandatory through a policy statement or equivalent document signed by the responsible official.

b. The QA organization reviews and documents concurrence with these quality-related procedures.

c. The organizational group or individual having responsibility for the policy statement should be identified.

d. The quality affecting procedural controls of the principal contractors should be provided for the applicant's review with documented agreement of acceptance prior to initiation of activities affected by the program.

2B2. Provisions are included for notifying NRC of changes (1) for review and acceptance in the accepted description of the QA program as presented or referenced in the SAR or SSAR prior to implementation, and (2) in organizational elements within 30 days after announcement. (Note - editorial changes or personnel reassignments of a non-substantive nature do not require NRC notification).

2B3. The applicant (and the principal contractors) commits to comply with the regulatory position in the appropriate issue of the Regulatory Guides listed in Subsection V; to comply with 10 CFR Part 50, §50.55a; to conduct activities under 10 CFR Part 50, §50.55(e) in accordance with the QA program; and to comply with 10 CFR Part 50 Appendix A, General Design Criterion 1. For systems, components, and structures covered by the ASME Code Section III (Classes 1, 2 and 3), the quality assurance code requirements should be supplemented by the specific guidance addressed in the regulatory positions of the applicable Regulatory Guides. The commitment identifies the Regulatory Guides and ANSI standard by number, title, and revision or date. Any alternatives or exceptions are clearly identified and supporting information presented in the docket. QA Regulatory Guides should be addressed which have an implementation date prior to the submittal or docket date of the QA program description.

Although primary responsibility for Regulatory Guides 1.26 and 1.29 is assigned to ASB (SRP Sections 3.2.1 and 3.2.2), their use as acceptance criteria in this SRP section is necessary to assure that adequate quality assurance requirements are specified for systems, components, and structures addressed by those guides.

The QA organization and the necessary technical organizations participate early in the QA program definition stage to determine and identify the extent QA controls are to be applied to specific structures, systems, and components. This effort involves applying a defined graded approach to certain structures, systems, and components in accordance with their importance to safety and affects such disciplines as design, procurement, document control, inspection tests, special processes, records, audits, and others described in 10 CFR Part 50, Appendix B.

2B4. Existing or proposed QA procedures are identified reflecting that Regulatory Guides listed in subsection VI, General Design Criterion 1 of Appendix A to 10 CFR Part 50, 10 CFR Part 50, §50.55a, and each criterion of 10 CFR Part 50, Appendix B will be met by documented procedures. In addition, activities conducted under 10 CFR Part 50, §50.55(e) shall conform to the requirement of the QA program.

2B5. A description is provided that emphasizes how the docketed QA program description, particularly the 10 CFR Part 50 regulations and Regulatory Guides listed in subsection V, will be properly carried out.

2C1. A description is provided of how management (above or outside the QA organization) regularly assesses the scope, status, adequacy, and compliance of the QA program to 10 CFR Part 50, Appendix B. These measures should include:

a. Frequent contact with program status through reports, meetings, and/or audits.

b. Performance of an annual assessment preplanned and documented. Corrective action is identified and tracked.

2C2. Quality-related activities (such as design, procurement, and site investigation) initiated prior to formal NRC acceptance of the QA program are controlled under a QA program in accordance with this SRP and, accordingly, with the requirements of 10 CFR Part 50, Appendix B. Approved procedures and a sufficient number of trained personnel should be available to implement the applicable portion of the QA program prior to the initiation of the activity.

2C3. A summary description is provided on how responsibilities and control of quality-related activities are transferred from the principal contractors to the applicant during the phaseout of design and construction and during preoperational testing and plant turnover.

2D. Indoctrination, training, and qualification programs are established such that:

a. Personnel responsible for performing quality-affecting activities are instructed as to the purpose, scope, and implementation of the quality-related manuals, instructions, and procedures.

b. Personnel verifying activities affecting quality are trained and qualified in the principles, techniques, and requirements of the activity being performed.

c. For formal training and qualification programs, documentation includes the objective, content of the program, attendees, and date of attendance.

d. Proficiency tests are given to those personnel performing and verifying activities affecting quality, and acceptance criteria are developed to determine if individuals are properly trained and qualified.

e. Certificate of qualifications clearly delineates (a) the specific functions personnel are qualified to perform and (b) the criteria used to qualify personnel in each function.

f. Proficiency of personnel performing and verifying activities affecting quality is maintained by retraining, reexamining, and/or recertifying as determined by management or program commitment.

g. The description of the training program provisions listed above satisfies the regulatory position in Regulatory Guide 1.58.

Activities related to Design Control (17.1.3) are acceptable if:

3A. The scope of the design control program includes design activities associated with the preparation and review of design documents including the correct translation of applicable regulatory requirements and design bases into design, procurement and procedural documents. Included in the scope are such activities as field design engineering; physics, seismic, stress, thermal, hydraulic, radiation, and the SAR accident analyses; associated computer programs; compatibility of materials; accessibility for inservice inspection, maintenance, and repair; and quality standards.

3B. Organizational responsibilities are described for preparing, reviewing, approving, and verifying design documents such as system descriptions, design input and criteria, design drawings, design analyses, computer programs, specifications, and procedures.

3C1. Errors and deficiencies in approved design documents, including design methods (such as computer codes), that could adversely affect structures, systems, and components important to safety are documented; and action is taken to assure that all errors and deficiencies are corrected.

3C2. Deviations from specified quality standards are identified and procedures are established to ensure their control.

3D. Internal and external design interface controls, procedures, and lines of communication among participating design organizations and across technical disciplines are established and described for the review, approval, release, distribution, and revision of documents involving design interfaces to assure structures, systems, and components are compatible geometrically, functionally, and with processes and environment.

3E1. Procedures are established and described requiring a documented check to verify the dimensional accuracy and completeness of design drawing and specifications.

3E2. Procedures are established and described requiring that design drawings and specifications be reviewed by the QA organization to assure that the documents are prepared, reviewed, and approved in accordance with company procedures and that the documents contain the necessary quality assurance requirements such as inspection and test requirements, acceptance requirements, and the extent of documenting inspection and test results.

3E3. Guidelines or criteria are established and described for determining the method of design verification (design review, alternate calculations, or test).

3E4. Procedures are established and described for design verification activities which assure the following:

a. The verifier is qualified and is not directly responsible for the design (i.e., neither the performer or his immediate supervisor). In exceptional circumstances, the designer's immediate supervisor can perform the verification provided:

   (1) The supervisor is the only technically qualified individual.

   (2) The need is individually documented and approved in advance by the supervisor's management.

   (3) QA audits cover frequency and effectiveness of use of supervisors as design verifiers to guard against abuse.

b. Design verification, if other than by qualification testing of a prototype or lead production unit, is completed prior to release for procurement, manufacturing, construction or to another organization for use in other design activities. In those cases where this timing cannot be met, the design verification may be deferred, providing that the justification for this action is documented and the unverified portion of the design output document and all design output documents, based on the unverified data, are appropriately identified and controlled. Construction site activities associated with a design or design change should not proceed without verification past the point where the installation would become irreversible (i.e., require extensive demolition and rework). In all cases, the design verification should be complete prior to fuel load for a plant under construction, or in the case of an operating plant, prior to relying upon the component, system, or structure to perform its function.

c. Procedural control is established for design documents that reflect the commitments of the SAR; this control differentiates between documents that receive formal design verification by interdisciplinary or multi-organizational teams and those which can be reviewed by a single individual (a signature and date is acceptable documentation for personnel certification). Design documents subject to procedural control include, but are not limited to, specifications, calculations, computer programs, system descriptions, SAR when used as a design document, and drawings including flow diagrams, piping and instrument diagrams, control logic diagrams, electrical single line diagrams, structural systems for major facilities, site arrangements, and equipment locations. Specialized reviews should be used when uniqueness or special design considerations warrant.

d. The responsibilities of the verifier, the areas and features to be verified, the pertinent considerations to be verified, and the extent of documentation are identified in procedures.

3E3. The following provisions are included if the verification method is only by test:

a. Procedures provide criteria that specify when verification should be by test.

b. Prototype, component or feature testing is performed as early as possible prior to installation of plant equipment, or prior to the point when the installation would become irreversible.

c. Verification by test is performed under conditions that simulate the most adverse design conditions as determined by analysis.

3E4. Procedures are established to assure that verified computer codes are certified for use and that their use is specified.

3F1. Design and specification changes, including fields changes, are subject to the same design controls that were applicable to the original design.

3F2. The description of the design control provisions satisfies the criteria of Regulatory Guide 1.64.

Activities related to Procurement Document Control (17.1.4) are acceptable if:

4A1. Procedures are established for the review of procurement documents to determine that quality requirements are correctly stated, inspectable, and controllable; there are adequate acceptance and rejection criteria; and procurement documents have been prepared, reviewed, and approved in accordance with QA program requirements. To the extent necessary, procurement documents should require contractors and subcontractors to provide an acceptable quality assurance program. The review and documented concurrence of the adequacy of quality requirements stated in procurement documents is performed by independent personnel trained and qualified in QA practices and concepts.

4A2. Procedures are established to assure that procurement documents identify applicable regulatory, technical, administrative, and reporting requirements; drawings; specifications; codes and industrial standards; test and inspection requirements; and special process instructions that must be complied with by suppliers.

4B1. Organizational responsibilities are described for (1) procurement planning; (2) the preparation, review, approval, and control of procurement documents; (3) supplier selection; (4) bid evaluations; and (5) review and concurrence of supplier QA programs prior to initiation of activities affected by the program. The involvement of the QA organization is described.

4B2. The description of the procurement document control provisions listed above satisfies the regulatory position in Regulatory Guide 1.123.

Activities related to Instructions, Procedures, and Drawings (17.1.5) are acceptable if:

5A. Organizational responsibilities are described for assuring that activities affecting quality are (1) prescribed by documented instructions, procedures, and drawings and (2) accomplished through implementation of these documents.

5B. Procedures are established to assure that instructions, procedures, and drawings include quantitative (such as dimensions, tolerances, and operating limits) and qualitative (such as workmanship samples) acceptance criteria for determining that important activities have been satisfactorily accomplished.

Activities related to Document Control (17.1.6) are acceptable if:

6A1. The scope of the document control program is described, and the types of controlled documents are identified. As a minimum, controlled documents include:

a. Design documents (e.g., calculations, drawings, specifications, analyses) including documents related to computer codes.

b. Procurement documents.

c. Instructions and procedures for such activities as fabrication, construction, modification, installation, test, and inspection.

d. As-built documents.

e. Quality assurance and quality control manuals and quality-affecting procedures.

f. Topical reports.

g. SAR.

h. Nonconformance reports.

6A2. Procedures for the review, approval, and issuance of documents and changes thereto are established and described to assure technical adequacy and inclusion of appropriate quality requirements prior to implementation. The QA organization, or an individual other than the person who generated the document but qualified in quality assurance, reviews and concurs with these documents with regards to QA-related aspects.

6A3. Procedures are established to assure that changes to documents are reviewed and approved by the same organizations that performed the initial review and approval or by other qualified responsible organizations delegated by the applicant.

6A4. Procedures are established to assure that documents are available at the location where the activity will be performed prior to commencing the work.

6B1. Procedures are established and described to assure that obsolete or superseded documents are removed and replaced by applicable revisions in work areas in a timely manner.

6B2. A master list or equivalent document control system is established to identify the current revision of instructions, procedures, specifications, drawings, and procurement documents. When such a list is used, it should be updated and distributed to predetermined responsible personnel.

6C1. Procedures are established and described to provide for the preparation of as-built drawings and related documentation in a timely manner to accurately reflect the actual plant design.

Activities related to Control of Purchased Material, Equipment, and Services (17.1.7) are acceptable if:

7A1. Organizational responsibilities are described for the control of purchased material, equipment, and services including interfaces between design, procurement, and QA organizations.

7A2. Verification of suppliers' activities during fabrication, inspection, testing, and shipment of materials, equipment, and components is planned and performed with QA organization participation in accordance with written procedures to assure conformance to the purchase order requirements. These procedures, as applicable to the method of procurement, provide for:

a. Specifying the characteristics or processes to be witnessed, inspected or verified, and accepted; the method of surveillance and the extent of documentation required; and those responsible for implementing these procedures.

b. Audits, surveillance, or inspections which assure that the supplier complies with the quality requirements.

7A3. Selection of suppliers is documented and filed. If an LCVIP letter of confirmation or the "CASE" Register is used to establish the qualifications of the supplier, the documentation should identify the "letter" or "audit" used.

7A4. Procurement of spare or replacement parts for structures, systems, and components important to safety is subject to present QA program controls, to codes and standards, and to technical requirements equal to or better than the original technical requirements, or as required to preclude repetition of defects.

7B1. Receiving inspection is performed to assure:

a. The material, component, or equipment is properly identified and corresponds to the identification on the purchase document and the receiving documentation.

b. Material, components, equipment, and acceptance records satisfy the inspection instructions prior to installation or use.

c. Specified inspection, test and other records, (such as certificates of conformance attesting that the material, components, and equipment conform to specified requirements) are available at the nuclear power plant prior to installation or use.

7B2. Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work.

7B3. The supplier furnishes the following records to the purchaser:

a. Documentation that identifies the purchased item and the specific procurement requirements (e.g., codes, standards, and specifications) met by the item.

b. Documentation identifying any procurement requirements that have not been met.

c. A description of those nonconformances from the procurement requirements dispositioned "accept as is" or "repair."

The review and acceptance of these documents should be described in the purchaser's QA program.

7B4. For commercial "off-the-shelf" items where specific quality assurance controls appropriate for nuclear applications cannot be imposed in a practicable manner, special quality verification requirements shall be established and described to provide the necessary assurance of an acceptable item by the purchaser.

7B5. Suppliers' certificates of conformance are periodically evaluated by audits, independent inspections, or tests to assure they are valid and the results documented.

7B6. The description of the control of procurement provisions listed above satisifies the regulatory position in Regulatory Guide 1.38 and Regulatory Guide 1.123.

Activities related to <u>Identification and Control of Materials, Parts, and Components</u> (17.1.8) are acceptable if:

8A. Controls are established and described to identify and control materials (including consumables), parts, and components including partially fabricated subassemblies. The description should include organizational responsibilities.

8B1. Procedures are established which assure that identification is maintained either on the item or on records traceable to the item to preclude use of incorrect or defective items.

8B2. Identification of materials and parts important to the function of structures, systems, and components important to safety can be traced to the appropriate documentation such as drawings, specifications, purchase orders, manufacturing and inspection documents, deviation reports, and physical and chemical mill test reports.

8B3. Correct identification of material, parts, and components is verified and documented prior to release for fabrication, assembling, shipping, and installation.

Activities related to <u>Control of Special Processes</u> (17.1.9) are acceptable if:

9A1. The criteria for determining those processes that are controlled as special processes are described. As complete a listing as possible of special processes, which are generally those processes where direct inspection is impossible or disadvantageous, should be provided. Some examples are welding, heat treating, NDT, and chemical cleaning.

9A2. Organizational responsibilities including those for the QA organization are described for qualification of special processes, equipment, and personnel.

9B1. Procedures, equipment, and personnel associated with special processes are qualified and are in conformance with applicable codes, standards, QA procedures, and specifications. The QA organization is involved in the qualification activities to assure they are satisfactorily performed.

9B2. Procedures are established for recording evidence of acceptable accomplishment of special processes using qualified procedures, equipment, and personnel.

9B3. Qualification records of procedures, equipment, and personnel associated with special processes are established, filed, and kept current.

Activities related to <u>Inspection</u> (17.1.10) are acceptable if:

10A. The scope of the inspection program is described that indicates an effective inspection program has been established. Program procedures provide criteria for determining the accuracy requirements of inspection equipment and criteria for determining when inspections are required or define how and when inspections are performed. The QA organization participates in the above functions.

10B1. Organizational responsibilities for inspection are described. Individuals performing inspections are other than those who performed or directly supervised the activity being inspected and do not report directly to the immediate supervisors who are responsible for the activity being inspected. If the individuals performing inspections are not part of the QA organization, the inspection procedures, personnel qualification criteria, and independence from undue pressure such as cost and schedule should be reviewed and found acceptable by the QA organization prior to the initiation of the activity.

10B2. A qualification program for inspectors (including NDT personnel) is established and documented, and the qualifications and certifications of inspectors are kept current.

10C1. Inspection procedures, instructions, or checklists provide for the following:

a. Identification of characteristics and activities to be inspected.

b. A description of the method of inspection.

c. Identification of the individuals or groups responsible for performing the inspection operation in accordance with the provisions of item 10B1.

d. Acceptance and rejection criteria.

e. Identification of required procedures, drawings and specifications and revisions.

f. Recording inspector or data recorder and the results of the inspection operation.

g. Specifying necessary measuring and test equipment including accuracy requirements.

10C2. Procedures are established and described to identify, in pertinent documents, mandatory inspection hold points beyond which work may not proceed until inspected by a designated inspector.

10C3. Inspection results are documented, evaluated and their acceptability determined by a responsible individual or group.

Activities related to <u>Test Control</u> (17.1.11) are acceptable if:

11A1. The description of the scope of the test control program indicates an effective test program has been established for tests including proof tests prior to installation and preoperational tests. Program procedures provide criteria for determining the accuracy requirements of test equipment and criteria for determining when a test is required or how and when testing activities are performed.

11B1. Test procedures or instructions provide as required for the following:

a. The requirements and acceptance limits contained in applicable design and procurement documents.

b. Instructions for performing the test.

c. Test prerequisites such as calibrated instrumentation, adequate test equipment and instrumentation including their accuracy requirements, completeness of item to be tested, suitable and controlled environmental conditions, and provisions for data collection and storage.

d. Mandatory inspection hold points for witness by owner, contractor, or inspector (as required).

e. Acceptance and rejection criteria.

f. Methods of documenting or recording test data and results.

g. Provisions for assuring test prerequisites have been met.

11C1. Test results are documented, evaluated, and their acceptability determined by a responsible individual or group.

Activities related to Control of Measuring and Test Equipment (17.1.12) are acceptable if:

12.1 The scope of the program for the control of measuring and test equipment is described and the types of equipment to be controlled are established. This information indicates an effective calibration program has been established.

12.2 QA and other organizations' responsibilities are described for establishing, implementing, and assuring effectiveness of the calibration program.

12.3 Procedures are established and described for calibration (technique and frequency), maintenance, and control of the measuring and test equipment (instruments, tools, gages, fixtures, reference and transfer standards, and nondestructive test equipment) that is used in the measurement, inspection, and monitoring of structures, systems, and components. The review and documented concurrence of these procedures is described and the organization responsible for these functions is identified.

12.4 Measuring and test equipment is identified and traceable to the calibration test data.

12.5 Measuring and test equipment is labeled or tagged or "otherwise controlled" to indicate due date of the next calibration. The method of "otherwise controlled" should be described.

12.6 Measuring and test equipment is calibrated at specified intervals based on the required accuracy, purpose, degree of usage, stability characteristics, and other conditions affecting the measurement.

Calibration of this equipment should be against standards that have an accuracy of at least four times the required accuracy of the equipment being calibrated or, when this is not possible, have an accuracy that assures the equipment being calibrated will be within required tolerance and that the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function is identified.

12.7 Calibrating standards have greater accuracy than standards being calibrated. Calibrating standards with the same accuracy may be used if it can be shown to be adequate for the requirements and the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function is identified.

12.8 Reference and transfer standards are traceable to nationally recognized standards; where national standards do not exist, provisions are established to document the basis for calibration.

12.9 Measures are taken and documented to determine the validity of previous inspections performed and the acceptability of items inspected or tested since the last calibration when measuring and test equipment is found to be out of calibration. Inspections or tests are repeated on items determined to be suspect.

Activities related to Handling, Storage, and Shipping (17.1.13) are acceptable if:

13.1 Special handling, preservation, storage, cleaning, packaging, and shipping requirements are established and accomplished by suitably trained individuals in accordance with predetermined work and inspection instructions.

13.2 Procedures are established and described to control the cleaning, handling, storage, packaging, and shipping of materials, components, and systems in accordance with design and procurement requirements to preclude damage, loss, or deterioration by environmental conditions such as temperature or humidity.

13.3 The description of the control of handling, storage, and shipping listed above satisfies the regulatory position in Regulatory Guide 1.38.

Activities related to Inspection, Test, and Operating Status (17.1.14) are acceptable if:

14.1 Procedures are established to indicate the inspection, test, and operating status of structures, systems, and components throughout fabrication, installation, and test.

14.2 Procedures are established and described to control the application and removal of inspection and welding stamps and status indicators such as tags, markings, labels, and stamps.

14.3 Procedures are established and described to control altering the sequence of required tests, inspections, and other operations important to safety. Such actions should be subject to the same controls as the original review and approval.

14.4 The status of nonconforming, inoperative, or malfunctioning structures, systems, and components is documented and identified to prevent inadvertent use. The organization responsible for this function is identified.

Activities related to Nonconforming Materials, Parts, or Components (17.1.15) are acceptable if:

15.1 Procedures are established and described for identification, documentation, segregation, review, disposition, and notification to affected organizations of nonconforming materials, parts, components and as applicable to services (including computer codes) if disposition is other than to scrap. The procedures provide identification of authorized individuals for independent review of nonconformances, including disposition and closeout.

15.2 QA and other organizational responsibilities are described for the definition and implementation of activities related to nonconformance control. This includes identifying those individuals or groups with authority for the disposition of nonconforming items.

15.3 Documentation identifies the nonconforming item; describes the nonconformance, the disposition of the nonconformance, and the inspection requirements; and includes signature approval of the disposition. Nonconformances are corrected or resolved prior to the initiation of the preoperational test program on the item.

15.4 Reworked, repaired, and replacement items are inspected and tested in accordance with the original inspection and test requirements or acceptable alternatives.

15.5 Nonconformance reports are periodically analyzed by the QA organization to show quality trends, and the significant results are reported to upper management for review and assessment.

Activities related to Corrective Action (17.1.16) are acceptable if:

16.1 Procedures are established and described indicating an effective corrective action program has been established. The QA organization reviews and documents concurrence with the procedures.

16.2 Corrective action is documented and initiated following the determination of a condition adverse to quality (such as a nonconformance, failure, malfunction, deficiency, deviation, and defective material and equipment) to preclude recurrence. The QA organization is involved in the documented concurrence of the adequacy of the corrective action.

16.3 Followup action is taken by the QA organization to verify proper implementation of corrective action and to close out the corrective action in a timely manner.

16.4 Significant conditions adverse to quality, the cause of the conditions, and the corrective action taken to preclude repetition are documented and reported to immediate management and upper levels of management for review and assessment.

Activities related to Quality Assurance Records (17.1.17) are acceptable if:

17.1 The scope of the records program is described. QA records include results of reviews, inspections, tests, audits, and material analyses; monitoring of work performance; qualification of personnel, procedures, and equipment; and other documentation such as drawings, specifications, procurement documents, calibration procedures and reports; nonconformance reports; and corrective action reports.

17.2 QA and other organizations are identified and their responsibilities are described for the definition and implementation of activities related to QA records.

17.3 Inspection and test records contain the following where applicable:

a. A description of the type of observation.

b. The date and results of the inspection or test.

c. Information related to conditions adverse to quality.

d. Inspector or data recorder identification.

e. Evidence as to the acceptability of the results.

f. Action taken to resolve any discrepancies noted.

17.4 Suitable facilities for the storage of records are described and satisfy the regulatory position given in Regulatory Guide 1.88 (endorses N45.2.9). Alternatives to the fire protection rated provisions are acceptable if records storage facilities conform to NFPA No. 232 Class 1 for permanent-type records and that the 2-hour fire rating requirement contained in the proposed N45.2.9 standard is met by applicants in any one of the following three ways. Specifically, (1) a 2-hour vault meeting NFPA No. 232; (2) 2-hour rated file containers meeting NFPA No. 232 (Class B); or (3) a 2-hour rated fire resistant file room meeting NFPA No. 232 if the following additional provisions are provided.

1. Early warning fire detection and automatic fire suppression should be provided, with electronic supervision at a constantly attended central station.

2. Records should be stored in fully enclosed metal cabinets. Records should not be permitted on open steel shelving. No storage of records should be permitted on the floor of the facility. Adequate access and aisle ways should be maintained at all times throughout the facility.

1

IMAGE EVALUATION
TEST TARGET (MT-3)

150mm

6"

1

IMAGE EVALUATION
TEST TARGET (MT-3)

150mm

6"

1

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

1

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

3. Work not directly associated with records storage or retrieval should be prohibited within the records storage facility. Examples of such prohibited activities include but are not limited to: records reproduction, film developing, and fabrication of microfiche cards.

4. Smoking and eating/drinking should be prohibited throughout the records storage facility.

5. Ventilation, temperature, and humidity control equipment should be protected inside with standard fire-door dampers where they penetrate fire barriers bounding the storage facility.

17.5 The description of the control of records provisions listed above satisfies the regulatory position of Regulatory Guide 1.88.

Activities related to <u>Audits</u> (17.1.18) are acceptable if:

18A1. Audits to assure that procedures and activities comply with the overall QA program are performed by:

a. The QA organization to provide a comprehensive independent verification and evaluation of quality-related procedures and activities.

b. The applicant (and principal contractors) to verify and evaluate the QA programs, procedures, and activities of suppliers.

18A2. An audit plan is prepared identifying audits to be performed, their frequencies, and schedules. Audits should be regularly scheduled based upon the status and safety importance of the activities being performed and are initiated early enough to assure effective QA during design, procurement, manufacturing, construction, installation, inspection, and testing.

18A3. Audits include an objective evaluation of quality-related practices, procedures, instructions; activities and items; and review of documents and records to ensure that the QA program is effective and properly implemented.

18A4. Provisions are established requiring that audits be performed in all areas where the requirements of Appendix B to 10 CFR Part 50 are applicable. Areas which are often neglected but should be included are activities associated with:

a. The determination of site features which affect plant safety (e.g., core sampling, site and foundation preparation, and methodology). (PSAR only).

b. The preparation, review, approval, and control of early procurements. (PSAR only).

c. Indoctrination and training programs.

d. Interface control among the applicant and the principal contractors.

e. Corrective action, calibration, and nonconformance control systems.

f. SAR and SSAR commitments.

g. Activities associated with computer codes.

18B1. Audit data are analyzed by the QA organization and the resulting reports indicating any quality problems and the effectiveness of the QA program, including the need for reaudit of deficient areas, are reported to management for review and assessment.

18B2. Audits are performed in accordance with pre-established written procedures or checklists and conducted by trained personnel having no direct responsibilities in the areas being audited.

18B3. The description of the conduct of audit provisions satisfies the regulatory position in Regulatory Guides 1.144 and 1.146.

III. REVIEW PROCEDURES

Each element of the QA program description will be reviewed against the acceptance criteria described in subsection II, including the regulations, Regulatory Guides, and Branch Technical Position listed in subsection V. QAB will interface with the secondary review branches to assure that they have documented to the QAB by memo the acceptability of the identification of structures, systems, and components covered by the QA program (Q-List). QAB will process the necessary requests for additional information to the applicant and coordinate the response with the appropriate branches for acceptance. Changes to the QA program will be evaluated to assure at a minimum that such changes have not degraded the previously approved program. Consideration should be given to the current regulatory position in the area of the change in determining acceptability of the change. The reviewer's judgment during the review is to be based on an assessment of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved. Any exceptions or alternatives to this SRP section, including the regulations and regulatory positions presented in the Regulatory Guides in subsection V, will be carefully reviewed to assure that they are clearly defined and that an adequate basis exists for acceptance.

The acceptability of the QA program is determined by the following review procedures:

1. The QA program description is reviewed in detail to determine if each of the criteria of 10 CFR Part 50, Appendix B has been acceptably addressed and if there is an adequate commitment to comply with the regulations and regulatory positions in the appropriate issue of the Regulatory Guides in subsection V, as identified by number, title, revision or date. The QA program description is also reviewed to assure that the applicant's approach to meeting the QA criteria and commitments is acceptable.

2. The measures described to implement 10 CFR Part 50, Appendix B are evaluated for:

   a. Technical acceptability (i.e., do they meet the Regulations and Regulatory Guides?)

b. Workability (i.e., do they seem to fit into an overall plan of action that can be implemented?)

c. Management support (i.e., do QA program measures have adequate review, approval, and endorsement of management?)

This evaluation is based primarily on the acceptance criteria contained in subsection II.

3. The duties, responsibility, and authority of personnel performing QA functions are reviewed to assure they provide sufficient independence to effectively perform these functions.

4. Through review of information provided, meetings with the applicant, by review of the acceptability of QA program and plant activities including performance and capability of personnel, and by review of the Office of Inspection and Enforcement position statement and inspection reports, a judgment is made of the applicant's capability to carry out its QA responsibilities.

5. Satisfaction with program commitments and descriptions of how the commitments will be met, organizational arrangements, and capabilities to fulfill QA requirements should lead to the conclusion of acceptability, as described in subsection IV.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that his review is sufficiently complete and adequate to support conclusions of the following type to be included in the staff's Safety Evaluation Report:

Based on our detailed review and evaluation of the QA program description contained in the (topical report or SAR) for (nuclear facility), we conclude that:

1. The organizations and persons performing QA functions have the required independence and authority to effectively carry out the QA program without undue influence from those directly responsible for costs and schedules.

2. The QA program describes requirements, procedures, and controls that, when properly implemented, comply with the requirements of Appendix B to 10 CFR Part 50 with the requirements of 10 CFR Part 50, §50.55a and §55(e); with the criteria contained in SRP Section 17.1; and with the regulatory positions presented in the following Regulatory Guides.

Reg. Guide/ANSI Std.	Title	Revision or Date

A brief description of the applicant's QA program is provided highlighting the more important aspects of the program.

3. The QA program covers activities affecting structures, systems, and components important to safety as identified in the PSAR.

Accordingly, the staff concludes that the applicant's description of the QA program is in compliance with applicable NRC regulations and industry standards and can be implemented for the (specify) phases of (specify application).

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plan for using this SRP Section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced guides and NUREGs.

VI. REFERENCES

1. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

2. 10 CFR Part 50, §50.55a, "Codes and Standards."

3. 10 CFR Part 50, §50.55(e), "Conditions of Construction Permits" (reporting significant QA deficiencies).

4. 10 CFR Part 50, §50.34(a.7), "Contents of Application; Technical Information" (Preliminary Safety Analysis QA program description).

5. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."

6. Regulatory Guide 1.8, "Personnel Selection and Training" (endorses ANSI/ANS 3.1).

7. Regulatory Guide 1.26, "Quality Group Classification, and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants."

8. Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)" (endorses N45.2).

9. Regulatory Guide 1.29, "Seismic Design Classification."

10. Regulatory Guide 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment" (endorses N45.2.4).

11. Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants" (endorses N45.2.1).

12. Regulatory Guide 1.38, "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants" (endorses N45.2.2).

13. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants" (endorses N45.2.3).

14. Regulatory Guide 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel" (endorses N45.2.6).

15. Regulatory Guide 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants" (endorses N45.2.11).

16. Regulatory Guide 1.74, "Quality Assurance Terms and Definitions" (endorses N45.2.10).

17. Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records" (endorses N45.2.9).

18. Regulatory Guide 1.94, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants" (endorses N45.2.5).

19. Regulatory Guide 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems" (endorses N45.2.8).

20. Regulatory Guide 1.123, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants" (endorses N45.2.13).

21. Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants" (endorses N45.2.12).

22. Regulatory Guide 1.146, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants" (endorses N45.2.23).

23. Branch Technical Position (BTP) ASB 9.5-1 (attached to SRP Section 9.5.1).

U.S. NUCLEAR REGULATORY COMMIS 'ON

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17.2 QUALITY ASSURANCE DURING THE OPERATIONS PHASE

REVIEW RESPONSIBILITIES

Primary - Quality Assurance Branch (QAB)

Secondary - Mechanical Engineering Branch
Instrumentation & Control Systems Branch
Power Systems Branch
Accident Evaluation Branch
Radiological Assessment Branch
Hydrologic & Geotechnical Engineering B .nch
Containment Systems Branch

I. AREAS OF REVIEW

QAB reviews and evaluates the applicant's operational quality assurance (QA) program as described in the FSAR. The review at the operating license stage addresses both the "offsite" and "onsite" QA controls to be applied to those activities that may affect the quality of items important to safety during the operation, maintenance, and modification of a nuclear power plant. The review covers the QA controls to be applied to those activities (e.g., designing, constructing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, maintaining, modifying, operating, inspecting, and testing) that may affect the quality of structures, systems, and components important to safety. The secondary review branches review the listing of structures, systems, and components (QA list) covered by the QA program for their areas of review responsibility in accordance with 2A1 of this section of the Standard Review Plan and documents the acceptability of the listing including any items that should be added or clarified by memo to the QAB. The review by MEB in this regard also addresses the areas of review responsibility normally assigned to ASB, RSB, CEB, PSB (except electrical), and SEB.

The review extends to the determination of how the applicable requirements of the 18 criteria of Appendix B to 10 CFR Part 50 are satisfied by the proposed QA p.ogram.

Rev. 2 - July 1981

Where an NRC-accepted QA topical report is referenced in the application, the referenced QA program is not re-reviewed except for conformance to the applicable staff positions in this SRP section and the Regulatory Guides in effect at the time of docketing the application.

The review will not involve an evaluation of the QA program for the design and construction phase and, therefore, the QAP description for design and construction should not be addressed in the FSAR except for a commitment for continued implementation of the PSAR QA program for the remaining design and construction activities and the preoperational test program or referenced as applicable for repair and modifications only during the operations phase. However, as desired, changes to the QA program for design and construction may be presented in the FSAR for staff review and approval. Staff review will only address the program changes.

The areas of review for this SRP section are the same as those described in SRP Section 17.1 except:

1. Organization (item 1) delete from part A: "including the applicant's organization and principal contractors (architect engineer, nuclear steam supply system vendor, constructor, and construction manager when other than the constructor)."

2. Audits (item 18) add a part C: "Provisions for the audit of operating activities important to safety independent of the operating organization."

II. ACCEPTANCE CRITERIA

The applicant must establish a QA program for the operations phase, including activities such as operation, maintenance, and modification of the nuclear power plant, in accordance with Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The QA program description presented in the FSAR must discuss how each criterion of Appendix B will be met. The acceptance criteria used by the QAB to evaluate the program are listed below. The acceptance criteria include commitments to comply with the regulatory positions presented in the appropriate issue of the Regulatory Guides including the requirements of ANSI Standard N45.2.12 and the Branch Technical Position listed in subsection V of SRP Section 17.1. Thus, these commitments constitute an integral part of the QA program description and requirements. Exceptions and alternatives to these acceptance criteria may be taken by applicants provided adequate justification is given; and the QAB review allows for considerable flexibility in defining methods and controls for satisfying pertinent regulations. When the QA program description meets the acceptance criteria of this SRP section or provides acceptable exceptions or alternatives, the program is considered to be in compliance with pertinent NRC regulations. The review will ascertain that the commitments and the description of how the commitments are implemented, to the extent necessary, are objective and stated in inspectable terms.

The Organization (SRP Section 17.2.1) elements responsible for the QA program are acceptable if:

1. The criteria described in 17.1.1* are satisfied except for:

*Refers to the acceptance criteria given in subsection II of SRP Section 17.1.

a. Item 1A4.

b. The organizational elements within the parenthesis in item 1A5 be expanded to include operations and maintenance.

c. The requirements that principal contractors describe QA responsibilities be deleted in Item 1A6.

d. The requirements that a QA position be identified for principal contractors as described in Item 1B1, be deleted.

e. "The person at the construction site responsible for directing and managing the site QA program..." described in Item IC3, be changed to "The person...responsible for...the onsite QA program," and continue on with remaining sentence starting with "has appropriate organizational...."

The Quality Assurance Program (SRP Section 17.2.2) description is acceptable if:

1. The criteria described in 17.1.2 are satisfied except for:

   a. Item 2A1b.

   b. The requirement for the principal contractors to provide a commitment to comply with the regulations and regulatory positions in the Regulatory Guides addressed in Item 2B3.

   c. Item 2C2.

   d. Item 2C3.

2. Provisions are established for assuring the QA program for operations is implemented at least 90 days prior to fuel loading.

3. Confirmation is provided to commit to continued implementation of the PSAR QA program for the remaining design and construction activities and the preoperational test program or an acceptable alternative is provided.

Activities related to Design Control (SRP Section 17.2.3) are acceptable if:

1. The criteria described in 17.1.3 are satisfied.

2. Measures are provided to assure that responsible plant personnel are made aware of design changes/modifications which may affect the performance of their duties.

Activities related to Procurement Document Control (17.2.4) are acceptable if:

1. The criteria described in 17.1.4 are satisfied.

Activities related to Instructions, Procedures, and Drawings (17.2.5) are acceptable if:

1. The criteria described in 17.1.5 are satisfied.

Activities related to Document Control (17.2.6) are acceptable if:

1. The criteria described in 17.1.6 are satisfied.

2. Maintenance, modification and inspection procedures are reviewed by qualified personnel knowledgeable in QA disciplines (normally the QA organization) to determine:

   a. The need for inspection, identification of inspection personnel, and documentation of inspection results.

   b. That the necessary inspection requirements, methods, and acceptance criteria have been identified.

Activities related to Control of Purchased Material, Equipment, and Services (17.2.7) are acceptable if:

1. The criteria described in 17.1.7 are satisfied.

Activities related to Identification and Control of Materials, Parts, and Components (17.2.8) are acceptable if:

1. The criteria described in 17.1.8 are satisfied.

Activities related to the Control of Special Processes (17.2.9) are acceptable if:

1. The criteria described in 17.1.9 are satisfied.

Activities related to Inspection (17.2.10) are acceptable if:

1. The criteria described in 17.1.10 are satisfied.

2. When inspections associated with normal operations of the plant (such as routine maintenance, surveillance, and tests) are performed by individuals other than those who performed or directly supervised the work, but are within the same group, the following controls are met:

   a. The quality of the work can be demonstrated through a functional test when the activity involves breaching a pressure retaining item.

   b. The qualification criteria for inspection personnel are reviewed and found acceptable by the QA organization prior to initiating the inspection.

Activities related to Test Control (17.2.11) are acceptable if:

1. The criteria described in 17.1.11 are satisfied.

Activities related to Control of Measuring and Test Equipment (17.2.12) are acceptable if:

1. The criteria described in 17.1.12 are satisfied.

Activities related to Handling, Storage, and Shipping (17.2.13) are acceptable if:

1. The criteria described in 17.1.13 are satisfied.

2. Provisions are described for the storage of chemicals, reagents (including control of shelf life), lubricants, and other consumable materials.

Activities related to Inspection, Test, and Operating Status (17.2.14) are acceptable if:

1. The criteria described in 17.1.14 are satisfied.

Activities related to Nonconforming Materials, Parts, or Components (17.2.15) are acceptable if:

1. The criteria described in 17.1.15 are satisfied.

Activities related to Corrective Action (17.2.16) are acceptable if:

1. The criteria described in 17.1.16 are satisfied.

Activities related to Quality Assurance Records (17.2.17) are acceptable if:

1. The criteria described in 17.1.17 are satisfied.

2. QA records include operating logs, maintenance and modification procedures, and related inspection results, reportable occurrences, and other records required by Technical Specifications.

Activities related to Audits (17.2.18) are acceptable if:

1. The criteria described in 17.1.18 are satisfied.

2. Where the "onsite" QA organization does not report to the "offsite" organization:

   a. The "offsite" QA organization conducts audits sufficient to verify adequacy of activities conducted by the "onsite" QA organization.

   b. The "offsite" QA organization reviews and concurs in the schedule and scope of audits performed by the "onsite" QA organization.

   c. Results of audits performed by the "onsite" QA organization are provided to the "offsite" QA organization for review and assessment.

III. REVIEW PROCEDURES

Same as SRP Section 17.1 except that the Office of Inspection & Enforcement (I&E) does not provide a position statement to QAB relative to their assessment of the QA program implementation for SER input. I&E provides this assessment to the Licensing Project Manager. QAB reviews a description of the I&E summary of completed QA program activities to further determine that the facility has been designed and constructed in accordance with PSAR program commitments.

IV. EVALUATION FINDINGS

Same as SRP Section 17.1.

V. IMPLEMENTATION

Same as SRP Section 17.1.

VI. REFERENCES

Same as SRP Section 17.1 except replace item 8, Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)" (endorses N45.2) with Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)" (endorses N18.7); replace 10 CFR Part 50, §50.34(a.7) with 10 CFR Part 50, §50.34 (b.6ii), "Final Safety Analysis Report"; and delete 10 CFR Part 50, §50.55(e), "Conditions of Construction Permits."

Enclosure 4

Comment Resolution

RESOLUTION OF COMMENTS

Source:	A. C. Thadani, Director DST, ADT, NRR	(No comment per telecon, 2/9/90)
Source:	J. E. Richardson, Director DET, ADT, RR	(No comment per memo to Spraul, 2/14/90)
Source:	C. E. Rossi, Director DOEA, ADT, NRR	(No comment per memo to Spraul, 2/27/90)
Source:	B. K. Grimes, Director DRIS, ADT, NRR	(Comments per memo to Roe, 2/26/90)

COMMENT	RESOLUTION
1. Under acceptance criterion II.B.4, Procurement Control, add a new item as follows: i. Appropriate controls should be established to ensure an effective dedication program to establish suitability of commercial grade items for installation in safety-related applications. The dedication process should include an engineering evaluation to identify the item's critical characteristics and to identify an acceptance process to ensure those critical characteristics are met.	1. Control of commercial-grade items is addressed in item II.B.4.h which now reads: "Appropriate controls for the selection, determination of suitability for intended use (critical characteristics), evaluation, receipt, and quality evaluation of commercial-grade items are to be imposed to ensure that they will perform as designed." Also, the action specified in the comment is required by NRC's endorsement of EPRI NP-5652, "Guideline for the utilization of Commercial-Grade Items in Nuclear Safety-Related Applications (NCIG-07)," in Generic Letter 89-02. Section 2.3 of the EPRI document addresses critical characteristics. Therefore, Generic Letter 89-02 has been added to the references under VI.B, "Other Programmatic QA Guidance."
2. Delete the second sentence from item 7A3 of Section 17.1 of the present SRP which references the CASE Register and LCVIP letters of confirmation.	2. This had, in fact, been done, but it was not reflected in the SRP Comparison. The comparison has been revised to address the deletion.

3. Under acceptance criterion II.B.1, Methodology, add a new item as follows:

d. The structures, systems, and components (SSC) to be covered by the quality assurance program shall be identified. The degree to which a graded quality assurance program is applied to an SSC shall be identified.

3. Item II.A.1.c requires that the QAPD includes criteria to identify the QA program scope in lieu of a list of items covered by the program. We do not believe such a list should be in the "top level policy document" (QAPD), but we do agree that such a list is required. To clarify this, a new sentence has been added to item II.A.1.c as follows: A list of items under the control of the quality assurance program is to be established and maintained.

The idea that the QAPD should identify "the degree to which a graded quality assurance program is applied" to different items constitutes a new SRP requirement. As such, it is not incorporated into Section 17.3.

4. NUREG-1055 concluded that the NRC "quality assurance efforts have focused on the form and paper at the expense of implementation and evaluating quality of completed work, and they should be reoriented to emphasize performance and effectiveness." The review of the QAPD should be augmented with an in-depth baseline assessment that addresses the translation of the QAPD into working level procedures, processes, and staffing implementation. The ongoing NRC assessment would be performed as part of the appropriate NRC inspection program. Section III should be augmented by the following:

4. Section III, REVIEW PROCEDURES, has been revised to read as follows:
"New QAPDs will be reviewed against the acceptance criteria described in Section II, including the applicant's commitment to the applicable references listed in Section VI. Any exceptions or alternatives to this SRP section, including the applicable references in Section VI, will be reviewed to ensure that they are defined and that an adequate basis exists for their acceptance. When required, the Performance and Quality Evaluation Branch will prepare a request for additional information for the applicant

"After the PQEB has completely reviewed the QAPD (or changes thereto) and determined the acceptability of the upper tier document with respect to the appropriate SRP Section 17 controls, an in-depth <u>baseline</u> implementation assessment shall be performed.

"The assessment will be performed by NRR and Regional personnel as appropriate. The interpretation and translation of the QAPD commitments into respective utility procedures, processes, and organizational staffing will be reviewed. The assessment will focus on the effectiveness of the QAPD implementation. The overall conclusion of QAPD acceptability will be based upon the QAPD review and implementation effectiveness assessment."

and review the response for acceptability.

"Changes to a QAPD previously accepted by the NRC will be reviewed to determine their acceptability. The changed QAPD will be compared against the previously accepted QAPD, its controls, and the appropriate controls in Chapter 17 of the Standard Review Plan to determine the acceptability of the changes. When required, the reviewing organization will prepare a request for additional information for the applicant and review the response for acceptability.

"Upon concluding that the QAPD describes an acceptable quality assurance program, the reviewing organization may request that an inspection be performed by NRR or Regional personnel as appropriate. The inspection will assess the applicant's interpretation and translation of the QAPD commitments into its procedures, processes, and organizational staffing. The inspection will focus on the effectiveness of the QAPD implementation.

"Through review of the information provided by the applicant and, as required, meetings with the applicant, review of applicable NRC inspection reports, and discussion with involved NRC inspectors, a judgment is made of the applicant's capability to carry out its QA responsibilities. The reviewer's satisfaction with the QA program commitments, the description of how the commitments will be met, the organizational arrangements, and the capabilities to fulfill the QAPD should lead to the conclusion of acceptability as described in Section IV."

Source: F. Congel, Director DREP, ADT, NRR — (No comment per telecon, 2/23/90)

Source M. W. Hodges, Director DRS, Region I — (Comments per telecon, 3/7/90)

COMMENT	RESOLUTION
1. Change "nondestructive testing" to "nondestructive examination" in item II.B.11.a.	1. So changed.
2. Add "vendor-supplied documents" to the list of documents in item II.B.14.b to be controlled within the scope of the document control program.	2. So changed. Note that this is a requirement of Generic Letters 83-28 and 90-03.

Source: A. F. Gibson, Director DRS, Region II — (Comments per memo to Roe, 3/27/90)

COMMENT Cover Letter	RESOLUTION
1. If licensees with currently approved Quality Assurance Program Descriptions elect to incorporate the guidance of this SRP revision, it is recommended that NRR accomplish the review and approval as this would represent a major QA program change with potential for unidentified reductions in commitments.	1. Staff reviewers will require additional training before reviewing QAPDs to the revised SRP. In addition, NRR staff will be made available to assist regional reviewers as appropriate on a case by case basis.
2. Present NRC inspection modules should be reviewed to assure they encompass the	2. Agreed. Although little change is anticipated, a

revised program structure.

review will be made by LPEB after Section 17.3 is issued.

General

1. There are several uses of the word "items" and it is not clear what this word represents, i.e., in some uses it appears that "items" refers to structures, systems, and components; in other uses it appears to refer to material, parts, and components. This is a minor but confusing "item".

1. "Item" is defined in NQA-1 as "an all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit." We accept this definition.

2. The plan refers to inspections, verifications, and self-assessments. The following questions are not clearly resolved following review of the plan.

2. See below.

a. Is self assessment a generic term or a synonym for audits? (Audits is the Appendix B criterion not directly referenced in SRP Revision 3 but referenced in Revision 2)

a. As stated in II.C.1.a of Section 17.3, the self-assessment function includes safety committee activities, audits, and other independent assessments.

b. How do these terms relate to each other and how do they differ?

b. Inspections are one way of performing verifications. NDE is another. Self assessments are as noted in a, above.

c. What level of independence is required for each?

c. As stated in II.A.2.b, there is to be independence between persons and organizations executing performance activities and those executing verification and self-assessment activities. The degree of independence may be commensurate with the activity's relative importance to safety.

3. The Plan hints at a graded QA approach to quality verification activities. Why not state it, define it, and provide an example?

3. Criterion II of Appendix B states that the QA program shall provide control over activities to an extent consistent with their importance to safety, and this thought is reflected in Section II.A.7.c of SRP 17.3 which refers to Section VI.B. Section VI.B includes references to NRC QA guidance for items that are not safety related. Thus we believe that SRP 17.3 (like Appendix B) requires a graded QA program. SRP 17.3 requires each submitter to define its QA program in response to the acceptance criteria in Section II, and the staff's acceptance of QAPD's using the acceptance criteria will provide the examples as suggested.

Specific

1. II.A.2.b: Performance activities should be clearly defined. Verification activities should be clearly defined. Define the term, "degree of independence." Does this refer to independence from the production task, production group, or functional area?

1. Performance activities are the "doing" functions of designing, purchasing, machining, performing special processes, erecting, operating, maintaining, etc. Verification activities are actions which verify that the doing functions produce acceptable results. NQA-1 defines verification as the act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements. We accept this definition except that we consider audits to be a self-assessment function. As stated in II.A.2.b, the

"degree of independence" can refer to independence from either the production task, the production group, or the functional area depending upon the activity's importance to safety.

2. II.A.6.e: The term "significant conditions adverse to quality" is not defined. If not defined by the SRP, it should be required to be defined by the QAPD under review.	2. To my knowledge the NRC has not defined "significant conditions adverse to quality" since it was used in Appendix B. We do not propose to do it in SRP 17.3.
3. II.A.7.b: This section references a limited number of applicable QA Program Regulatory Guides. The statement should reference a more comprehensive list or should be restated as a general reference to applicable QA Program Regulatory Guides.	3. The Regulatory Guides referenced are the same as those currently referenced except that the ones which currently reference the N-45.2 "daughter" standards have been replaced by referencing NQA-1 and NQA-2.
4. II.B.1.c: The second statement, "Criteria which define acceptable quality are to be specified, and verification is to be against these criteria," is important and should stand on its own rather than be buried in the other important statement requiring use of instructions and procedures for work important to safety.	4. Agreed. The second statement is now item II.B.1.d.
5. II.B.3.c: Recommend modifying this statement about simulation of the most adverse design conditions for testing of design to say, "simulate as near as practical the most adverse design condition."	5. SRP 17.3 matches 17.1 and Appendix B in this regard. No change.
6. II.B.3.e: This statement about design verification performance by engineering	6.This concern is addressed as follows: II.B.3.a requires design verification, II.A.2.b

supervisor is the first reference to a requirement for design verification by a qualified and independent reviewer. Recommend that a direct statement, requiring a qualified and independent reviewer, occur earlier in this section, i.e., as item 1.	requires verifier independence, and II.A.5 requires trained and qualified verifiers.
7. Section II.B.4, "Procurement Control," does not reflect the Appendix B criterion VII requirement that documentation of material and equipment conformance to procurement requirements be available at the nuclear power plant prior to installation or use of the material or equipment.	7. Part f has been inserted in II.B.4 as follows: "The program is to include provisions for ensuring that documentary evidence that items conform to procurement requirements is on site prior to installation or use of the item."
8. II.B.4.h (now "i"): The requirement for commercial grade items to "perform as designed" is vague. The SRP should state what we expect, i.e., assurance that the item will perform satisfactorily and reliably in the system, structure, or component.	8. ". . . perform as designed" has been changed to ". . . perform satisfactorily in service."
9. II.B.6: "Items" in the title, "Identification and Control of Items," should be replaced with "Materials, Parts, and Components" for clarity and to conform to associated Appendix B criterion category titles.	9. Use of "items" is in accordance with the NQA-1 definition (see the resolution of general comment 1 above).
10. II.B.8.d: Recommend deleting "availability" as this does not appear to have meaning in the context of providing guidance for test performance.	10. "Availability" has been deleted.
11. II.B.9: M&TE is not defined. M&TE should be defined or required to be	11. II.B.9.b requires that the types of equipment covered by the M&TE control program be

defined by the QAPD.	defined. Also, NQA-1 has an acceptable definition.
12. II.B.9.g: Requirement for QAPD to address acceptability determination of use of out-of-calibration M&TE does not include reference to timeliness of performance. Recommend that timeliness be addressed.	12. This would constitute a new requirement. As such, it is not incorporated into Section 17.3.
13. Section II.B.10, "Inspection, Test, and Operating Status," does not have a clear meaning as to what these statements apply. It appeared that condensation of the Appendix B criterion XIV on this subject resulted in some loss of clarity. For example, the item addresses physical identification of items by tagging, marking, etc. to indicate status of tests or inspections of that item. Additionally operating status of structures, systems, and components to indicate operating status or prevent inadvertent operation (i.e. system tag out program) should be with physical identifiers such as tagging or marking, on the item.	13. Transfer of the SRP 17.1 guidance into SRP 17.3 in this area is shown on pages 10 and 11 of Enclosure 3 of this package. II.B.10.b indicates that the status of items should be verified before use in order to prevent inadvertent operation. A "system tag-out program" would be a new SRP requirement. As such, it is not incorporated into Section 17.3.
14. Section II.B.13, "Corrective Action," does not address timeliness of corrective action or measures to preclude recurrence. These requirements are addressed in Appendix B criterion XVI and SRP revision 2, item 16.	14. Section II.a.6 requires management's involvement in the corrective action program and requires measures to preclude recurrence of conditions adverse to quality (II.A.6.b). While timeliness of corrective action is not addressed specifically in SRP 17.3, personnel performing the self-assessment function will audit per SA - Assessment "a" to verify acceptable timeliness of corrective action. Auditor independence

is addressed in I.A.2.b and training in II.A.5.

15. II.C.1.c: How does this criterion, "Personnel performing self-assessment activities are not to have direct responsibilities in the area they are assessing," apply to self-assessment activity within a functional area? For example the engineering organization may have internal self-assessment activities to evaluate the quality of their work product. Recommend defining licensee self-assessment program activity as distinct from internal functional area self-assessment activity.

15. Self-assessment activities are not to be performed by personnel who are responsible for or who performed the work being assessed. Engineering organizations should evaluate the quality of their work product: but, even in this case, the evaluators should not be evaluating their own work. Supervisors are responsible for the work of their personnel, and audits of this work need to be done by someone other than the supervisor. We believe the acceptance criteria are clear in this regard.

Source: H. J. Miller, Director
DRS, Region III

(Comments per memo to Roe, 2/28/90)

COMMENT

General. We strongly support the efforts being made to encourage licensees to develop performance-based quality assurance programs. To that end we are pleased that the proposed revision does not require the Quality Assurance organization to perform line activities such as review of procedure revisions, procurement documents, and nonconformance reports on a routine basis, freeing these organizations to perform more technical and performance oriented audits and surveillances. However, we are concerned that the proposed revision utilizes the draft revision of Regulatory Guide 1.33 and correspondingly

RESOLUTION

General. Section 17.3 does not refer to specific revisions of regulatory guides. Due to the time required to revise regulatory guides (there are drafts of Revision 3 of Regulatory Guide 1.33 dating back more than 10 years), Section 17.3 allows (but does not require) organizations with NRC-approved QAPDs to update them to the latest industry quality assurance standards. Specific Comment 18, below, also addresses this issue.

deletes reference to all of the regulatory guides superseded by the development of NQA-1 and NQA-2. We consider it essential that the revision to the regulatory guide be completed and issued prior to the issuance of this proposed revision to the Standard Review Plan. Specific comments follow.	
1. For clarity, change the 2nd sentence of the 2nd paragraph of Section I, as follows: "Therefore, the applicant must emphasize a philosophy whereby each individual, properly trained and motivated, achieves the highest quality <u>of</u> performance ~~of~~ which he or she is capable."	1. Sentence now reads: "Therefore, the applicant must emphasize a philosophy whereby each individual, properly trained and motivated, achieves the highest quality <u>of</u> performance of which he or she is capable."
2. Section II identifies the following items as acceptance criteria; however, in most cases, the items consist of issues to be addressed by the QAPD. The true acceptance criteria are those contained within the regulatory guides in sections VI.A and VI.B. We suggest that this section be reworded as follows: "Criterion 1 of 10 CFR Part 50, Appendix A, ~~"General Design Criteria for Nuclear Power Plants,"~~ requires that a QA program be established and implemented. Appendix B of 10 CFR Part 50, 'Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,' specifies 18 quality criteria ~~which must be addressed in a QAPD~~. <u>Other than where</u> ~~Except when~~ acceptable alternatives are provided, the <u>specific attributes to be addressed are</u>	2. The acceptance criteria are in the text, and item II.A.7 requires commitment to regulatory guides (or alternatives). Section II now reads: "<u>This section outlines and specifies the NRC's acceptance criteria for QAPDs.</u> Criterion 1 of 10 CFR Part 50, Appendix A, 'General Design Criteria for Nuclear Power Plants,' requires that a QA program be established and implemented. Appendix B of 10 CFR Part 50, 'Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,' specifies 18 quality criteria <u>which must be addressed in a QAPD</u>. Except when acceptable alternatives are provided, the acceptance criteria that follow provide attributes to be addressed for a QAPD to be found acceptable. The QAPD should describe how each of

as follows ~~acceptance criteria that follow provide attributes to be addressed for a QAPD to be found acceptable~~. The QAPD should describe how each of these attributes is addressed ~~the acceptance criteria will be met~~. Acceptance criteria for the specific attributes are provided in the appropriate regulatory guides and Branch Technical Positions contained within Sections VI.A and VI.B of this chapter."

the acceptance criteria will be met."

3. Although item II.A.2.e(4) specifies that the performance of delegated work be formally evaluated by the licensee, no frequency is specified. Assuming that this criteria only applies to delegated work (e.g., done by contractors), we recommend that the work be formally evaluated by the applicant on a schedule commensurate with the complexity of the work and its importance to safety.

3. This is partially covered on a generic basis in item II.A.1.d which states: "The QAPD is to provide measures to ensure the quality of items and activities to an extent consistent with their importance to safety."

The idea that evaluation scheduling be based on "the complexity of the work" constitutes a new SRP requirement. As such, it is not incorporated into Section 17.3.

4. Item II.A.3.e should be clarified to describe what is meant by the term "necessary means to accomplish their assigned tasks," for example, appropriate equipment, training, and procedures.

4. "Means" has been changed to "training and resources" in item II.A.3.e to clarify the item and make it consistent with item II.A.3.d.

5. Item II.A.4.b: To ensure independence, we recommend that "responsibility and authority to stop unsatisfactory work and control further processing" be vested in an individual who is independent from cost and schedule considerations such that they (cost and schedule) do not unduly influence

5. Item II.A.4.b now reads: "Responsibility and authority to stop unsatisfactory work and control further processing, delivery, installation, or use of nonconforming items (such as structures, systems, components, parts, materials, equipment, consumable materials, and software) is to

decision making.

be assigned by the applicant <u>such that cost and schedule considerations do not override safety considerations</u>.

6. Item II.A.5.b: More guidance should be provided on what constitutes an acceptable training program. Specifically, elements from the Commission's Policy Statement on Training and Qualification of Nuclear Power Plant Personnel should be added as follows: "Training programs to ensure that personnel achieve and maintain suitable proficiency are to be established and implemented. <u>Such programs should be based on a systematic approach to training which incorporates the following five elements: (a) systematic analysis of the jobs to be performed; (b) learning objectives derived from the analysis which describe desired performance after training; (c) training design and implementation based on the learning objectives; (d) evaluation of the trainee mastery of the objectives during training; and (e) evaluation and revision of the training based on the performance of trained personnel in the job setting."</u>

6. The proposed additional requirements are too detailed for the "top-level policy document" that QAPDs are to be. In a letter of 3/9/90 to the chairman of the ASME NQA-1 Programmatic Activities Work Group, we have proposed that these requirements be included in Supplement 2S-4, "Supplementary Requirements for Personnel Indoctrination and Training," of NQA-1.

7. The term "no fault" is utilized in item II.A.6.a. We suggest this sentence be expanded to provide the definition of what is meant by "no fault."

7. Item II.A.6.a, under the heading "Corrective Action," states: "Plant management, at all levels, is to foster a "no-fault" attitude toward the identification of conditions that are adverse to quality, such as failures, malfunctions, nonconformances, and out-of-control processes including the failure to follow procedures." A "no

fault" attitude indicates that the purpose of corrective action is not to point fingers but to correct problems. In this context no change is made.

8. Item II.A.6.b: We recommend that the first sentence be modified as follows: "A corrective action program is to be established and implemented that includes prompt identification, documentation, classification, cause analysis, prompt correction of the conditions, elimination of the cause of significant conditions, and follow-up of conditions that are adverse to quality." The addition of the word "prompt" corresponds to the text of the Appendix B requirement.

8. Appendix B requires measures to assure that conditions adverse to quality "are promptly identified and corrected." Since the documentation, classification cause analysis, etc. are all part of correcting a condition adverse to quality, the first "prompt" has been added, but not the second.

9. We recommend that item II.A.7.e be deleted as it is specifically required by 10 CFR 50.54(a)(3) and 10 CFR 50.55(f)(3). Therefore, requiring its inclusion in the QAPD is redundant.

9. The 10 CFR references apply to holders of NRC licenses and construction permits only. Item II.A.7.e requires the same updating commitment from others whose QAPDs are reviewed by the NRC.

10. Item II.B.4.g should not be restricted to only repair and replacement parts, but should address all components. We recommend that it be worded as follows: "The procurement of components, including spare and replacement parts, is to be subject to quality and technical requirements suitable for their intended service and to the purchaser's current QA program requirements."

10. So changed.

11. We recommend that wording from the regulation for design control be incorporated into

11. So changed.

item II.b.4.h to make it clearer to the licensee that commercial grade items are subject to the same quality requirements as safety-related items if they are used in safety-related applications. Specifically: "Appropriate controls for the selection, <u>determination of suitability for intended use (critical characteristics),</u> evaluation, receipt, and quality evaluation of commercial-grade items are to be imposed to ensure that they will perform as designed."

12. We recommend that item II.B.7.d be expanded to clarify the source of acceptance criteria, namely: "Acceptance criteria contained in applicable design and procurement documents."

12. Item II.B.7.d now reads: "Items are to be marked and labeled during packaging, shipping, handling, and storage to identify, maintain, and preserve the items' integrity and indicate the need for special controls <u>contained in applicable design and procurement documents</u>."

13. Item II.B.10.b should be expanded to pick up a description of some of the labels listed in the old chapter 17.1, namely: "The application and removal of status indicators and other labels <u>such as inspection or welding stamps</u> are to be controlled."

13. The proposed wording is too detailed for the "top-level policy document" that QAPDs are to be. Note that item II.B.10.b could also pick up some of the status indicators listed in the old Section 17.1 such as tags, markings, labels, and stamps. Item II.B.10.b has not been revised.

14. Item II.B.14.a: We feel that a brief elaboration of what constitutes "documents" in light of the cross reference would be useful. Therefore, we suggest rewording this item as follows: "A program is to be established and implemented to control the development, review, approval, issuance,

14. Examples of "documents" are given in item II.B.14.b, and II.B.14.a has not been revised.

use, and revision of documents, including procedures, procurements, instructions, and drawings.

15. In comparing item II.B.14.b with the associated sections of the current standard review plan, we note that the Topical Reports and Safety Analysis Report have been deleted from the list of examples of documents to be controlled. In addition, discussion of as-built drawings no longer reference the need to actually reflect plant design. In light of industry problems in this regard, we suggest that this item be reworded as follows: "The scope of the document control program is to be defined. Examples of documents to be controlled include design drawings, as-built drawings that accurately reflect the actual plant design, engineering calculations, design specifications, computer codes, purchase orders and related documents, audit and surveillance procedures, operating procedures, emergency operating procedures, technical specifications, nonconformance reports, corrective action reports, work instructions and procedures, calibration procedures, quality verification procedures, ~~and~~ inspection and test procedures and reports, topical reports, and the Safety Analysis Report."

15. Comment incorporated except that "as-built drawings that accurately reflect the actual plant design," as suggested, has been changed to "as-built documents that accurately reflect current (up-to-date) plant design."

16. We recommend clarifying item II.B.15.a to address nonconformance reports,special

16. We have tried to be consistent and use "items" in accordance with the NQA-1

process controls, and controlled documents as follows: "A program is to be established and implemented to ensure that sufficient records of items (such as nonconformances and controlled documents) and activities (such as design, engineering, procurement, manufacturing, construction, special process control, inspection and test [such as manufacturer's, proof, receipt, pre-operational, and post-installation,] installation, pre-operation, start-up, operations, maintenance, modification, decommissioning, and audits) are generated and maintained to reflect completed work."

definition which says an item is an all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit. Therefore, we have not included the first parenthetical expression. Also, we consider special processes to be part of a manufacturing, construction, or inspection operation and have not added "special process control" to the list.

17. We recommend that item II.C.2.e be expanded to address those situations where the QA organization may lack sufficient technical expertise to audit a specific area, specifically: "Scheduling is to be dynamic and resources are to be supplemented when QA program effectiveness is in doubt or appropriate technical expertise is not available."

17. Item II.A.3.d requires that audit personnel are trained and resources are available before an audit is undertaken, and item II.A.5.a requires that audit personnel are capable of performing their audits. These two items satisfy the concern and item II.C.2.e is unchanged.

18. We have two comments regarding Section VI.A:

18. See below.

a. We do not feel that this section should delete mention of the regulatory requirements related to quality activities, namely Part 50 Appendix A criterion I; Part 50, Appendix B, all parts; 50.34(a)(7); 50.54(a), all parts; 50.55(a); and 50.55(e).

a. All activities of Part 50 are "quality activities." Therefore it would not be appropriate to single out only specific parts and list them in Section VI.A.

b. We note that the references are based on a revised Regulatory Guide 1.33 having been issued which endorses NQA-1, NQA-2, and ANS 3.2. In this case, we strongly recommend that the issuance of this standard review plan be delayed until the formal issuance of the revised regulatory guide 1.33. In addition, we recommend that all of the superseded regulatory guides (1.30, 1.37, 1.38, 1.58, 1.64, 1.74, 1.88, 1.94, 1.116, 1.123, 1.144, and 1.146) be deleted, and regulatory guide 1.33 clearly indicate how those regulatory guides have been incorporated into 1.33.

b. Item VI.B.5 references: "Regulatory Guide 1.33, 'Quality Assurance Program Requirements (Operations),' with appropriate substitution of NQA-1 and NQA-2 for N-45.2 and its daughter standards," and it is neither required or desirable that the issuance of SRP Section 17.3 be delayed. The regulatory guides listed to be deleted cannot be deleted as long as there are plants in existence whose NRC accepted QAPD commits to these older guides. To require an update would be a backfit which could not be justified. Therefore, the proposed forward-fit of SRP 17.3, allowing applicants to update their quality assurance programs to meet SRP 17.3 if they desire to do so, is the thing to do.

Source: L. J. Callan, Director
DRS, Region IV

(Comments per memo to Spraul, 3/2/90)

COMMENT

1. We concur that the proposed revision eliminates the current fragmentation of the self-assessment responsibilities and simplifies the format.

RESOLUTION

1. None required

2. We note that the proposed revision permits a significant departure from typical organizational structure and practices that have been used in implementing the quality assurance function. While we do not have a problem with the

2. The acceptance criteria are clearly defined in Section 17.3 of the SRP. However, with the criteria being less prescriptive and directed more to the applicants' goals and objectives, we agree that staff reviewers will require

overall thrust of the revision, our perception from reading the SRP is that implementation of this approach could lead to potential problems in the absence of additional staff actions. In particular, the de-emphasis on clearly defined acceptance criteria for a quality assurance program could, in our view, lead to staff acceptance of a less than satisfactory program.	additional training before reviewing QAPDs to the revised SRP. In addition, NRR staff will be made available to assist regional reviewers as appropriate on a case by case basis.
3. Similarly, we believe that issuance of detailed NRC inspection guidance in this area would be warranted should utilities opt to adopt this approach to the quality assurance function.	3. Detailed guidance will be provided with the training of reviewers as noted above.

Source: R. Zimmerman, Director DRSP, Region V (Comments per memo to Roe, 3/5/90)

COMMENTS	RESOLUTION
1. We agree with the change of focus to place the QA organization in the more appropriate role of assessing the quality of work activities, in lieu of the current practice of QA providing assurance through in-process verifications of work activities. This approach, which relies more heavily on line management to be responsible for implementing the QA program, should improve the overall performance of work activities affecting plant safety. It is most appropriate that the QA organization shift emphasis to concentrating on rooting out problem areas, rather than merely verifying the quality of in-process work.	1. None required.

Source: O. P. Gormley, ARGIB/DRA/RES (Comments per memo to Spraul, 3/19/90)

COMMENT

General

1. I understand that Chapter 17.3 will replace Chapters 17.1 and 17.2. If that's the case, does that mean that secondary responsibilities will be eliminated? I guess you've already determined how they feel about that. What about the inspection organization? It seems as if they would have some important perspectives to offer. It looks to me that some of the changes proposed might be difficult to inspect and enforce. If it replaces 17.1 and 17.2, why isn't it simply Chapter 17?

2. What do you intend for the purpose of the Chapter? I had the impression that guidance to the applicant would be through the reg. guides endorsing industry standards, and guidance to the internal NRC reviewers would be through the SRP. Then the SRP would be a check list based on the reg guides and the standards they endorse. As I read Chapter 17.3, there seems to be inconsistencies between the guidance given to the applicants, and the guidance given to the NRC reviewer. In some instances "requirements" seem to be relaxed and in others new requirements appear. Won't this lead to confusion in the industry? Did you pick up all the generic letters and

RESOLUTION

1. The acceptance criteria no longer require that the QAPD includes a list of items subject to the QA program: rather, criteria used to identify the items and activities to which the QA program applies are to be in the QAPD (see I1.A.1.c). This has eliminated the need of secondary review. Comments on 17.3 have been requested and received from involved NRC organizations and incorporated as indicated herein. Since 17.3 is not a backfit, 17.1 and 17.2 remain viable for existing QAPDs.

2. The principal purpose of SRP 17.3 is to ensure the quality and uniformity of staff reviews of QAPDs. It is also a purpose of SRP 17.3 to make information about regulatory QA matters widely available and to improve communication and understanding of the staff QA review process by interested members of the public and the nuclear power industry. The SRP provides guidance, not requirements, and the guidance in 17.3 is given for both the applicant and the reviewer. Thus there can be no inconsistency. The disposition of each acceptance criterion of 17.1 and 17.2 is shown in Enclosure 2, and we believe that industry is capable of understanding 17.3.

bulletins, either in the text, or certainly in the references? I didn't see any. They are a really difficult item to deal with when trying to revise regulatory guides.

We have not attempted to include all the generic letters and bulletins, but Generic Letter 89-02 has been added to Section VI.B per the suggestion of DRIS.

3. Perhaps I'm reading it wrong, but I think I detect a trend away from following procedures, and away from the use of independent quality assurance organizations and professional quality assurance people. The strict adherence to procedures is what you use not only to achieve quality, but to keep yourself out of serious trouble. In other words, the end doesn't justify the means. It's <u>not</u> O.K. to change the current setting on your welding machine as long as the part appears to be stuck together when you're done. What about specialized quality skills like auditing and the ability to spot a deficiency and track it down to its source? Aren't those skills needed by the self-assessment people?

3. II.A.3.f states that procedures are to reflect the QA policy, and work is to be accomplished in accordance with the procedures. Thus there is no trend away from following procedures. Independence of both verifiers and personnel performing the self-assessment function is specified in II.A.2.b, and people are to be trained and capable of performing their assigned tasks per II.A.5. However, as noted in the comment, there is no requirement for an "independent quality assurance organization." Although the guidance of 17.1 and 17.2 ofttimes refers to a "QA organization," such an organization is not a requirement of Appendix B. SRP 17.3 reflects the statement in Appendix B that states: "the organizational structure for executing the quality assurance program may take various forms provided that the persons and organizations assigned the quality assurance function have this required authority and organizational freedom." (That is, to identify quality problems; to initiate, recommend, or provide solutions; to verify implementation of solutions; and to have sufficient independence from cost and schedule when opposed to safety considerations.)

4. Some of the guidance doesn't lend itself to use by reviewers. It seems to be more oriented to exhorting some response from the applicants. I have some more appropriate examples later, but the third paragraph on the first page under Areas of Review illustrates the point when it says, "Therefore the applicant must emphasize a philosophy whereby each individual, properly trained and motivated, achieves the highest quality performance of which he or she is capable. This emphasis on individual performance reinforces the importance of the self-assessment process, the object of which is to independently review and evaluate overall performance." Now, if I were a reviewer trying to judge an applicant's program submittal, I'd have a hard time with that one. I think that these areas which are subjective rather than objective, are a significant shortcoming of the Chapter. That isn't to say that we don't need to do something about licensee's emphasis on documentation vs. performance. I just don't see how it can be done this way.

4. The quoted words are to set the tone of the applicant's quality assurance program. In light of this comment (and others in this area), the quoted words have been changed to. "Therefore, the applicant must develop and maintain ~~emphasize~~ a philosophy whereby each individual, properly trained and motivated, achieves the highest quality of performance of which he or she is capable. This emphasis on individual performance reinforces the importance of the self-assessment process, the object of which is to independently review and evaluate overall performance." However, the reviewers will not use these words to determine the acceptability of a QAPD. As indicated in the opening paragraph of Part II, "Acceptance Criteria," the reviewers will be using the more objective acceptance criteria given in Part II of SRP 17.3.

5. In spite of the above, I believe the Chapter opens up some areas which need to be addressed and makes some necessary improvements. One is procurement, and another is management involvement and responsibility. I wonder if this is the appropriate way to tighten these requirements and to make new ones, though. Shouldn't we first try to get

5. There is no tightening of requirements nor are there new requirements. The requirements are in Appendix B, and the SRP provides guidance, not requirements. While the guidance in SRP 17.3 may be somewhat less prescriptive than that provided in 17.1 and 17.2, it does not represent any new staff positions. The cover

the consensus standards folks to make the improvements and then endorse the standards, or put the requirements in the reg guides if that doesn't work.

letter identifies three things that it does, and the resolution of Region III's general comment addresses the updating of Regulatory Guides.

6. If this is a good time to revise the SRP, maybe we should also see what additional requirements are needed to accommodate the combined licensing requirements of proposed Part 52.

6. We do not propose to add new "requirements" (guidance) to the SRP at this time.

Specific

1. With the 18 Criteria of Appendix B being the governing requirements and with the industry consensus standards on which the licensees build their programs all being structured on the 18 criteria, the format change in Chapter 17 which now obscures them could be a problem for reviewers. I think a Matrix which helps the reviewers relate the licensee's submittals to the SRP should be a part of the Chapter.

1. As submittals are made to meet SRP 17.3, the reviewer has the option of requesting that the applicant supply any matrices that may be required. We do not think it advisable to add a matrix to SRP 17.3.

2. II.A.2.b: By lumping folks performing verification activities in with those performing the self-assessment ones, you seem to be implying a greater degree of organizational independence for the former than has been the case in the past. For example folks doing the verification of engineering activities usually report to another group, but perhaps to the same manager as the supervisor of the group performing the work, and well below the engineering manager.

2. See the response to General item 3 above regarding organization arrangements and the independence of verifiers and personnel performing the self-assessment functions.

On the other hand the QA department is usually totally separate and reports at a vice presidential level. Am I reading too much into that?

3. II.A.2.d: There's an english glitch in the third line which will cause folks to look for the wrong thing there. The items listed are not characteristics of the person, nor are they qualifications. They are features of the position.

3. Clarified as follows: The person filling this position is to:

(1) Have sufficient authority . . . .
(2) Report at a management level . . . .
(3) Have effective lines of communication . . . .
(4) Have no unrelated duties . . . .

4. II.A.3.d&f: What are we looking for here - just a commitment to do these things? In (f), I assume you mean that the manager responsible for performing a task subject to QA will approve the procedures for performing not only the work, but also the applicable QA procedures. I assume you also mean him to be responsible for implementing the QA procedures. If that's the case, doesn't it get us back to the old QC/QA argument, and raise the question of independence? I don't have any quarrel with the manager of projects signing off on QA procedures to be applied by your self-assessment people, but the quality work he does, and is responsible for, has always been called QC. QA used to mean the independent assessment by the special group.

4. In response to II.A.3.d, we would accept a commitment that, before an activity within the scope of the QA program is undertaken, the applicant will ensure that the applicable portions of the QA program is properly documented, approved, and implemented (people trained and resources available). II.a.3.f seems self explanatory. Since the applicant is responsible to describe its organization for achieving and ensuring quality, we do not visualize the old QC/QA organization argument reappearing. As noted earlier, independence of the verifier from the doer is required with the amount of independence being a function of the safety importance of the activity or item whose quality is being verified.

5. II.A.6.b: If we are going to increase requirements this way, I would have expected a stronger position

5. II.A.6.b is not an increase of requirements. Rather, it incorporates the guidance of all or part of

on corrective action. This is an area where NQA hasn't been overly cooperative. I expected to see the phrase "root cause analysis." I also expected to see a section which addressed your excellent comment on the recent NQA ballot, about getting to the basic underlying cause vs.the apparent cause. I'd give you some words, but they are difficult to write without getting into the problem of exhorting performance from the licensee vs. telling the reviewer what to look for.

acceptance criteria 15.1(1), 15.4, 16.1(1), 16.2, 16.3, and 16.4 from SRP 17.2 into this one criterion of SRP 17.3. Since we are not increasing "requirements," we are not addressing root cause analysis in more detail than it is currently addressed in SER 17.2.

6. II.B.1: I have difficulty with the concept of "acceptable quality" in a regulatory environment; especially in verifying it and establishing criteria which define it. Perhaps you don't, and, after I see how it is further defined and implemented, maybe I won't either. However, if one defines quality as that an item performs as intended, then in a highly controlled endeavor such as a nuclear power plant, all one can achieve is that he did what he was supposed to do, according to the instructions (procedures) he was given, and the verifier can only verify that the job was done according to instructions. Even in an engineering environment where there is more freedom (and where we compensate for that by requiring independent verification), there are controls on the tools and methods. I can understand how we want the licensee to make the workers and verifiers

6. The response to the questions, "Who can we hold accountable?" and "How can we enforce what you have here?" is that the new SRP 17.3 does not change anything in this regard. Enforcement action will continue as in the past unless changes to other documents change the enforcement policy and procedures. The meaning of the expressions, "acceptable quality" and "criteria that define acceptable quality," depends upon the item or activity that the expression applies to. For example, a piece of hardware is of "acceptable quality" if it meets the design requirements. The design requirements are of "acceptable quality" if the hardware that meets the design requirements will perform satisfactorily in service. Operational activities are of "acceptable quality" if they are performed in accordance with procedures. Procedures are of "acceptable quality" if they give the desired results. And so on. But 17.3 is no

responsible, but who can we hold accountable? The proposed wrongdoing rule only covers deliberate wrongdoing. How can we enforce what you have here?

different from 17.1 and 17.2 in this regard. No change has been made to the SRP.

"Criteria that define acceptable quality" is even a more difficult problem. Usually all we can hope for is to achieve some <u>level of assurance</u> of quality which is based on assembled evidence that all the controlled actions designed to produce quality have been taken.

7. II.B.2.b: Did you want to introduce the idea of requiring a configuration management program?

7. No. One policy in the development of SER 17.3 is that no new acceptance criteria be introduced.

8. II.B.2.f: I don't think that regulators ought to require that changes be justified. I think we can only require that the changes preserve the ability of the item to perform as intended. A configuration management program would provide some level of assurance that all requirements and interfaces are evaluated.

8. Agreed. The criterion has been revised to delete the need for justification. As noted above, a configuration management program is not specified.

9. II.B.2.g: I think that interfaces should be controlled as well as defined.

9. Agreed. "Interface controls" in 17.1 was changed to "Interfaces" in 17.3. The criteria has been revised appropriately.

10. II.B.3.d: This could use some clarification with respect to "independently verified" and "other organizations." From context, I took it to mean that we would prefer that they give up the practice of building the plant from draft drawings etc.

10. The criterion has been clarified as follows: "Independent design verification is to be completed before design outputs are used . . . ."

I first interpreted it to mean that the A-E couldn't use the licensee's as built drawings, a constructor couldn't use the A-E's drawings or that the A-E couldn't use the NSSS's dose rates without doing an independent verification. You don't mean that, do you?

11. II.B.3.e: I like the NQA-1 circumstances better - they're more restrictive. Chapter 17.1 [3E4(3)] requires QA audits to guard against abuse. I guess I think that specifying QA responsibility might cut down on abuse vs. not specifying anyone as in Chapter 17.3.

11. SRP 17.3 requires an independent verification to guard against abuse. As with all other independent verifications, it is the responsibility of the applicant's management to assign the responsibility.

12. II.B.4&5: Did I miss something in GL 89-02, or is procurement verification an important new requirement being added here? Verification, as I understand it, and as used in other parts of the chapter, means a lot more than audit. Also, <u>verification of quality</u> is a lot more difficult than verification of supplier's activities ala 17.1, II-7A2. I agree that something like this is needed somewhere, but I think some more explanation is needed too. For example, who will do the verification? Is there a place for audits in the policy?

12. The heading of II.B.5 is new. The concept and the acceptance criteria are not. In Section 17.1, acceptance criterion 7.A.2 requires audits, surveillance, and inspections to assure supplier compliance with quality requirements. In Section 17.3, this is called "procurement verification." Again, it is the responsibility of the applicant's management to assign responsibilities. Audits are part of the self-assessment activity of II.C in Section 17.3.

13. II.B.8.a: This should probably have an "as appropriate." Not all items will need to be tested. Also, there should be a requirement to ensure that testing can be and will be conducted in such a way that the plant will be protected. ie. can be kept out

13. Virtually all of the acceptance criteria could have an "as appropriate" since few criteria apply 100% of the time. The suggestion regarding the protection of the plant would constitute a new requirement. As such, it

of unanalyzed conditions or physically detrimental conditions like over pressure of mating systems during hydro test, exceeding allowable pressures at low temperatures.	is not incorporated in Section 17.3.
14. II.B.11: I'd like to see forging, casting, terminating and splicing added to the list of special processes to raise consciousness in those often forgotten areas.	14. The examples of special processes are those from Section 17.1. Additions to the list could be construed as an increase in requirements. Therefore, no change is made.
15. II.B.13: The aggregate of this and II.A.6 still falls short of what is needed with respect to tracking, identifying root causes and correcting the root causes. Will we be looking to NQA-1 for additional requirements on corrective action? Para II.B.13.a is a good idea,but it is more of an employee suggestion program. As you know the corrective action program is to track down and resolve deficiencies which have resulted in a deficiency. It's not voluntary, and doesn't require someone to spot a problem. Therefore it's enforceable. While II.B.13.a is an excellent idea and a good objective, and probably should be included in something, it seems to be unenforceable.	15. II.B.13 & II.A.6 respectively address corrective action from a performer/verifier perspective and from a manager perspective. Collectively, these two parts of Section 17.3 include the collective action guidance provided in Section 17.1. Therefore, they fall short of what is needed to the same extent as the prior guidance. NQA-1 would indeed be a good place to put addition guidance concerning corrective action. The responsibilities of Item II.B.13.a, that were assigned to persons and organizations performing the QA function (per Section 17.1), are no longer so limited.
16. Here are some examples of "requirements" which struck me as being too subjective to allow the reviewer to make a reasonable evaluation, and being too vague to allow enforcement.	16. See below.
a. Pg 1 I already pointed out the problem with emphasizing a philosophy.	a. This comment is addressed in the resolution of general comment 4, above.

b. II.A.3.e: "Individual managers are to ensure that personnel . . . are provided the necessary means to accomplish their assigned tasks."

b. The QAPD should include such a commitment or an acceptable alternative. Note that "means" has been changed to "training and resources."

c. II.A.6.a: "Plant management . . . is to foster a 'no-fault' attitude toward identification of conditions adverse to quality . . . ."

c. The QAPD should include such a commitment or an acceptable alternative.

d. II.B.1.a: "Personnel performing work activities . . . are responsible for achieving acceptable quality."

d. The QAPD should include such a commitment or an acceptable alternative.

e. II.B.1.b: "Personnel performing verification activities are responsible for verifying the achievement of acceptable quality."

e. The QAPD should include such a commitment or an acceptable alternative.

f. II.B.2.c: "Design inputs are to be <u>correctly</u> translated into design outputs . . . ." (What we usually do to achieve something like this is to provide a verification step.)

f. The QAPD should include such a commitment or an acceptable alternative.

g. II.B.5.b: "As necessary, this (the procurement verification program) may require verification of activities of suppliers below the first tier."

g. The QAPD should include such a commitment or an acceptable alternative.

h. II.C.1.a: "Personnel responsible for the self-assessment function . . . are to be cognizant of day-to-day activities so that they can act in a

h. The QAPD should include such a commitment or an acceptable alternative.

management advisory function."	
i. II.C.1.b: "Organizations performing self-assessment activities are to be technically and performance oriented, with their primary focus on the quality of the end product and a secondary focus on procedures and processes.	i. The QAPD should include such a commitment or an acceptable alternative.

not being deleted.) We do intend, however, to permit current licensees to adopt Section 17.3 if they choose to do so.

The proposed revision to the SRP is a Type I revision, as defined in NRR Office Letter No. 800. The format of Section 17.3 is substantially different from that of Sections 17.1 and 17.2. However, it neither incorporates new or revised requirements nor substantively changes the existing guidance. Therefore, we do not believe it is necessary to issue it for public comment.

Enclosures 2 and 3 are provided to assist your review. Enclosure 2 lists each element of Sections 17.1 and 17.2 of the Standard Review Plan and indicates where the element is reflected in Section 17.3. Enclosure 2 also shows the disposition of those elements which no longer specifically appear. Enclosure 3 includes Sections 17.1 and 17.2 of the present Standard Review Plan.

Any questions you or your staff may have may be directed to Eileen McKenna (X-21010) or Jack Spraul (X-21023).

Original signed by:

Frank J. Miraglia, Jr., Deputy Director
Office of Nuclear Reactor Regulation

Enclosures: As Stated

cc w/enclosures: CRGR (20)
ACRS (15)

cc w/o enclosures:

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190

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

JUN 1 9 1990

MEMORANDUM FOR: Edward L. Jordan, Chairman
Committee to Review Generic Requirements

FROM: Eric Beckjord, Director
Office of Nuclear Regulatory Research

SUBJECT: CRGR REVIEW OF PROPOSED RESOLUTION OF GENERIC SAFETY ISSUE B-56, "DIESEL RELIABILITY"

The purpose of this memorandum is to request that the revised proposed resolution of Generic Safety Issue B-56 be scheduled for review by the CRGR in July 1990.

We have followed through on the recommendations made by the CRGR on December 20, 1989 (Ref. CRGR Meeting Number 176) and have had discussions with NUMARC regarding the use of Appendix D of NUMARC-8700 as the principal reference for monitoring and maintaining EDG reliabilities selected for compliance with 10 CFR 50.63, "Station Blackout". NUMARC has revised NUMARC-8700, with the following changes:

1. Initiative 5 of NUMARC-8700, 10/19/87, has been revised to include monitoring of EDG reliabilities against the target reliability selected for Station Blackout (SBO), and also addresses actions for a problem EDG experiencing 4 or more failures in the last 25 demands. A copy of NUMARC's Initiative 5A is enclosed.

2. NUMARC has revised their Appendix D, "EDG Reliability Program" from the 11/6/89 draft which was discussed at CRGR Mtg. 176. The current version has been reduced in scope. The previous guidance dealing with surveillance needs, performance monitoring of important EDG parameters, data systems, maintenance, failure analysis and root cause investigation, problem closeout and methodology for determining programmatic deficiencies is now being put in a topical report titled "Effective Elements of an EDG Reliability Program." This Topical Report has not and will not be submitted to the NRC. NUMARC intends to provide this Topical Report only to utilities, as needed.

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Appendix D now consists of two sections: D1, "Definitions" and D.2, "Monitoring EDG Reliability." The details of the EDG reliability program are discussed in the Topical Report. This reduction in contents does not provide a means for the direct "total endorsement" approach as recommended by the CRGR. We recommend that Revision 3 of Regulatory Guide 1.9 reference Appendix D where unambiguous reference can be made to Appendix D, and that guidance related to an on-site EDG reliability program be included in the Regulatory Guide. Revision 3 of Regulatory Guide 1.9 has been revised accordingly and is responsive to CRGR comments received.

3. The NUMARC letter (W.H. Rasin to E.S. Beckjord letter dated April 27, 1990) notes that NUMARC's Board of Directors has approved Initiative 5A and a revised Appendix D which will be incorporated into NUMARC-8700, Revision 1. NUMARC's submittal does not commit the industry to implementation of Initiative 5A or Appendix D; instead these documents are referred to as guidance. Utilities could chose not to use it. Therefore the resolution of GSI B-56 requires issuance of Regulatory Guide 1.9, Revision 3 and a 50.54(f) letter requesting identification of actions to be taken by licensees including modification of TS. A letter (Enclosure C) has been prepared, along with guidance for preparation of a license amendment request to change Technical Specifications (TS). The TS changes consist of line-item changes that are acceptable based on the implementation of programmatic requirements for monitoring and maintaining EDG reliability levels. The TS changes are a relaxation of those TS based on R.G. 1.108. Not all plants have TS based of R.G.1.108.

4. Also a draft memo to Project Managers (Enclosure G) has been prepared, with a model SER, for evaluation of the licensee response to the generic letter and proposed TS changes.

The B-56 Backfit Analysis and Federal Register Notice have been revised in response to CRGR comments. CRGR comments resulting from CRGR Meeting 176 are discussed in Enclosure A.

We feel that these changes have been responsive to CRGR's comments and will be prepared to discuss them at the next CRGR meeting. If you have questions on the enclosures please contact Al Serkiz on 492-3942.

Eric S. Beckjord
Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

ENCLOSURES:

1. W. H. Rasin to E. S. Beckjord Letter dated 5-3-90
2. Enclosure A: Responses to CRGR Comments
3. Enclosure B: Regulatory Guide 1.9, Revision 3
4. Enclosure C: Proposed Generic Letter (with Tech Spec Guidance)
5. Enclosure D: Backfit Analysis
6. Enclosure E: FRN Draft Notice
7. Enclosure F: NUMARC-8700, Rev. 1, Appendix D, 5-2-90
8. Enclosure G: Memo to Project Managers w/Model SER

NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

1776 Eye Street, N.W. • Suite 300 • Washington, DC 20006-2496
(202) 872-1280

May 3, 1990

Dr. Eric S. Beckjord, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Dr. Beckjord:

The purpose of this letter is to update you on the NUMARC efforts relating to Generic Issue B-56, Diesel Generator Reliability. These efforts have been focused through the NUMARC Station Blackout Working Group, chaired by John Opeka, Executive Vice President, Engineering and Operations, Northeast Utilities. NUMARC has met numerous times over the past several months with members of the NRC Staff in seeking a comprehensive resolution to this important issue. We believe the results of these efforts as discussed in this letter provide sufficient basis for closure of B-56.

On March 7, 1990, the NUMARC Board of Directors approved a revision to one of the existing Station Blackout Initiatives. The revised Initiative 5A, Coping Assessment/EDG Performance, provides a mechanism for monitoring the EDG target reliability chosen by utilities as part of the station blackout coping assessment. This initiative also addresses a reduction in accelerated testing that will enhance long term EDG reliability while adequately demonstrating the restored performance of individual EDGs. A copy of the initiative dated March 7, 1990, is enclosed for your information.

We believe Initiative 5A establishes reasonable consensus trigger values for monitoring the EDG target reliability (0.95 or 0.975) on a plant unit basis. We further believe the initiative provides an appropriate focus on EDG performance rather than programmatic activities. This focus is supported by data compiled by EPRI and published as NSAC-108, The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants, as well as by INPO through the U.S. Industrywide Plant Performance Indicator Program. The data shows that since 1983, the industry average EDG reliability has been above 0.98. This clearly indicates that current industry practices are effective in maintaining EDG reliability at acceptable levels, and that prescriptive guidance is not warranted in this area.

With regard to the portion of Initiative 5A dealing with accelerated testing, we anticipate utilities will address this reduction through changes to current plant technical specifications. It is expected that the submitted changes will be reviewed and approved by the plant specific NRC project managers. Furthermore, the NUMARC Technical Specifications Improvement Working Group will incorporate this reduction in accelerated testing into its efforts on electrical power systems. Discussions are currently underway with the appropriate members of the NRR staff. However, because accelerated

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testing is one element of a more comprehensive set of technical specification improvements, we believe a generic communication, e.g., the generic letter that addresses closure of the B-56 issue, may be appropriate to identify NRC's acceptance of the reduction in accelerated testing and further expedite the approval process.

In addition to Initiative 5A, the Station Blackout Working Group has revised NUMARC 87-00, Appendix D, EDG Reliability Program. A copy dated May 2, 1990, is also enclosed for your information. This revision provides a framework for monitoring and maintaining EDG reliability. It includes guidance on utilizing the trigger values noted in the initiative and on taking remedial actions when these values are exceeded. We believe these remedial actions provide reasonable assurance that the EDG target reliability is maintained consistent with the intent of the Station Blackout Rule, 10CFR50.63. The revised Appendix D has been distributed to all NUMARC Members and may be used to support each utility's implementation of Initiative 5A. As noted previously, Appendix D has also been the subject of various discussions with the NRC Staff. Based on these discussions, it is our understanding that revision 3 of Regulatory Guide 1.9 will contain specific language accepting NUMARC 87-00, Appendix D, as an adequate means of monitoring and maintaining EDG reliability.

In summary, we believe that Initiative 5A and the revised NUMARC 87-00, Appendix D, coupled with the high average EDG reliability in the nuclear industry since 1983, provide a comprehensive resolution to Generic Issue B-56. It is our plan to proceed with printing a revision to NUMARC 87-00 that incorporates errata, questions/answers from the Station Blackout Seminars, the revised Appendix F addressing equipment operability, supplemental clarifying questions/answers, Initiative 5A, and the revised Appendix D. A copy of the bound version will be forwarded to you after printing is complete.

Please contact me if you have any questions. If your staff has any questions relative to the enclosures, they may contact Alex Marion or Tony Pietrangelo of the NUMARC staff.

Consistent with past practice we understand this transmittal will be placed in the Public Document Room.

Sincerely,

William H. Rasin

William H. Rasin
Director, Technical Division

AM/ARP
Enclosures

cc: C. J. Heltemes, Jr., NRC
W. Minners, NRC
A. C. Thadani, NRC
A. W. Serkiz, NRC
J. F. Opeka, Northeast Utilities

INITIATIVE 5A - COPING ASSESSMENT/EDG PERFORMANCE

EACH UTILITY WILL ASSESS THE ABILITY OF ITS PLANT(S) TO COPE WITH A STATION BLACKOUT. PLANTS UTILIZING ALTERNATE AC POWER FOR STATION BLACKOUT RESPONSE WHICH CAN BE SHOWN BY TEST TO BE AVAILABLE TO POWER THE SHUTDOWN BUSSES WITHIN 10 MINUTES OF THE ONSET OF STATION BLACKOUT DO NOT NEED TO PERFORM ANY COPING ASSESSMENT. REMAINING ALTERNATE AC PLANTS WILL ASSESS THEIR ABILITY TO COPE FOR ONE-HOUR. PLANTS NOT UTILIZING AN ALTERNATE AC SOURCE WILL ASSESS THEIR ABILITY TO COPE FOR FOUR HOURS. FACTORS IDENTIFIED WHICH PREVENT DEMONSTRATING THE CAPABILITY TO COPE FOR THE APPROPRIATE DURATION WILL BE ADDRESSED THROUGH HARDWARE AND/OR PROCEDURAL CHANGES SO THAT SUCCESSFUL DEMONSTRATION IS POSSIBLE.

AS PART OF THE COPING ASSESSMENT, UTILITIES ARE REQUIRED TO CHOOSE AN EDG TARGET RELIABILITY (0.95 OR 0.975) AND ARE REQUIRED TO MAINTAIN THAT CHOSEN RELIABILITY. ACCORDINGLY, EACH UTILITY WILL EMPLOY THE FOLLOWING EXCEEDENCE TRIGGER VALUES (ON A PLANT UNIT BASIS) AS THE MECHANISM FOR MONITORING EDG TARGET RELIABILITY AND TO SUPPORT CLOSURE OF GENERIC ISSUE B-56:

SELECTED EDG TARGET RELIABILITY	FAILURES IN 20 DEMANDS	FAILURES IN 50 DEMANDS	FAILURES IN 100 DEMANDS
0.95	3	5	8
0.975	3	4	5

ADDITIONALLY, EACH UTILITY, IN RESPONSE TO AN INDIVIDUAL EDG EXPERIENCING 4 OR MORE FAILURES IN THE LAST 25 DEMANDS, WILL DEMONSTRATE RESTORED EDG PERFORMANCE BY CONDUCTING SEVEN (7) CONSECUTIVE FAILURE FREE START AND LOAD-RUN TESTS. THIS FORM OF ACCELERATED TESTING SHALL BE CONDUCTED AT A FREQUENCY OF NO LESS THAN 24 HOURS AND OF NO MORE THAN SEVEN (7) DAYS BETWEEN EACH DEMAND. EACH UTILITY WILL, IF APPLICABLE, ADDRESS THIS REDUCTION IN ACCELERATED TESTING THROUGH CHANGES TO TECHNICAL SPECIFICATIONS OR OTHER APPROPRIATE MEANS.

NOTE: Boldface type represents additions to original Initiative 5

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ENCLOSURE A
5-29-90

RESPONSES TO CRGR COMMENTS
(REF. CRGR MEETING NO. 176)

Comment 1: Following discussions related to guidance provided in NUMARC's revised Appendix D (Enclosure F to the transmittal memorandum) and Regulatory Guide 1.9, Rev 3 (Enclosure B to the transmittal memorandum), the Committee reached a consensus that NUMARC's Appendix D provided acceptable guidance for monitoring EDG reliability and an EDG reliability program, provided that licensees committed to implementing such a program and monitoring procedures. Appendix D could be adopted by reference in the regulatory guide (as an industry standard). Regulatory Positions C.3, C.4, C.5 and C.6 would be reduced in size through reference to Appendix D.

The RES staff tentatively agreed, subject to the understanding that a thorough review of the Appendix D would be needed to verify the acceptability of Appendix D as formally submitted. Final determination of the contents of the regulatory guide, generic letter, and Federal Register Notice would then be made.

Response: NUMARC's revised Appendix D does not have the scope and informational content discussed at CRGR Meeting No. 126. Appendix D (5-2-90) deals with monitoring EDG reliability and corrective actions to be taken if trigger values are exceeded, with only brief mention to an EDG reliability program. Guidance for activities associated with an EDG reliability program are now in a Topical Report which was not submitted by NUMARC; nor does NUMARC intend to submit this report.

NUMARC's submittal (see Enclosure F) has been reviewed by the staff and modifications have been made to Revision 3 of Regulatory Guide 1.9 as appropriate, per CRGR direction. Because of the reduced scope of Appendix D (4-6-90), an adoption by reference (in total) is not supportable.

Comment 2: The consensus discussed in Item 1 above was subject to the condition that NUMARC agree with the approach, adopt the draft standard as a final standard and make the final standard available to the public.

Response: Copies of NUMARC-8700, Revision 1, Appendix D can be obtained from NUMARC and such notification is included in Revision 3 of Regulatory Guide 1.9. Adoption by reference as a standard (such as IEEE Std 387-1984) is not supportable for the reason noted above.

Comment 3: The Committee reached a consensus that the generic letter transmitting the guide would not need to cite 10 CFR 50.54f if NUMARC would get industry agreement and have licensees submit letters committing to the industry standard. It was agreed that NRR would contact NUMARC to initiate pursuit of this approach. If the commitments were not forthcoming the generic letter should cite 10 CFR 50.54f.

Response: NUMARC's submittal encourages, but does not commit utilities to comply with initiative 5A and Appendix D. Therefore, the generic letter cites 10 CFR 50.54f and requests a statement of intent to implement Initiative 5A and utilization of guidelines provided in Appendix D, or identification of alterative methods to be employed (see Enclosure C).

Comment 4: The CRGR considered issuance of the regulatory guide to be a backfit, (regardless of whether or not licensees committed to the industry standard as discussed in item 3 above) since issuance of the guide would apply a new staff position to operating plants.

Response: The staff agrees with this CRGR point of view and a backfit analysis based on NUMARC's submittal is enclosed (see Enclosure D).

Comment 5: With regard to backfitting, it was recognized that the conclusions on substantial safety improvement and cost justification had been made for the overall generic issue in connection with issuance of the blackout rule. This regulatory guide revision was considered a necessary final step although additional explanation for this action was needed. The backfit discussion in the proposed generic letter and the proposed backfit analysis should be revised accordingly.

Response: The issuance of the Station Blackout Rule in 53FR23217 June 21, 1988, identified that GSI B-56 was an outstanding safety issue related to USI A-44 and that resolution of GSI-56 would provide specific guidance for use by the staff and industry to review the adequacy of diesel generator reliability programs. The backfit analysis has been revised to more clearly reflect this relationship to USI A-44, and it also notes the applicability of A-44 conclusions to this regulatory guide revision. The A-44 analysis was based upon costs and benefits/values associated with actions to be implemented through activities such as described NUMARC's Appendix D (5-2-90) and Regulatory Guide 1.9, Revision 3. Therefore, no separate backfit analysis needs to be done.

Comment 6: The CRGR indicated that it would review the revised regulatory guide at a future meeting and would at least circulate the revised generic letter to the members. Further, it would review the basis for the action (backfit discussion and backfit analysis) at a future meeting.

Response: Enclosures B, C, D, E, and F are provided to facilitate CRGR review of the principal documents related to the resolution of GSI B-56.

Comment 7: It was noted that the industry standard was more detailed than normal regulatory guidance, and NRC inspectors should not focus on the finer details in the standard. It was agreed that NRR should provided appropriate guidance to the inspectors for this area in accordance with normal procedures.

Response: Since NUMARC has noted that the Appendix D Topical Report is not to be used for on-site inspections, Revision 3 of Regulatory Guide 1.9 has retained the general guidance on EDG reliability program activities, but with modification through suitable reference to guidance provided in NUMARC's Appendix D.

Comment 8: On page 9 the proposed guide, footnote 3 should be removed and reference to INPO should be removed from footnote 2.

Response: References to INPO have been removed.

ENCLOSURE B

Revision 3
6/14/90
Working Draft

REGULATORY GUIDE 1.9
(TASK RS 802-5)

SELECTION, DESIGN, QUALIFICATION, TESTING, AND RELIABILITY OF EMERGENCY DIESEL GENERATOR UNITS USED AS CLASS 1E ONSITE ELECTRIC POWER SYSTEMS AT NUCLEAR POWER PLANTS

A. INTRODUCTION

Criterion 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that onsite electric power systems have sufficient independence, capacity, capability, redundancy, and testability to ensure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents, assuming a single failure.

Criterion 18, "Inspection and Testing of Electric Power Systems," of Appendix A to 10 CFR 50 requires that electric power systems important to safety be designed to permit appropriate periodic inspection and testing to assess the continuity of the systems and the condition of their components.

Criterion XI, "Test Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR 50 requires that (1) measures be provided for verifying or checking the adequacy of design by design reviews, by the use of alternative or simplified calculational methods, or by the performance of a suitable testing program and (2) a test program be established to ensure that systems and components perform satisfactorily and that the test program include operational tests during nuclear power plant operation.

Section 50.63, "Loss of All Alternating Current Power," of 10 CFR Part 50 requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (i.e., loss of offsite and onsite emergency ac power system) for a specified duration. The reliability of onsite emergency ac power sources is one of the main factors contributing to risk of core melt resulting from station blackout.

Diesel generator units have been widely used as the power source for onsite electric power systems. This regulatory guide provides guidance acceptable to the NRC staff for complying with the Commission's requirements that diesel generator units intended for use as onsite emergency power sources in nuclear power plants be selected with sufficient capacity, be qualified, and be maintained to ensure availability of the required emergency diesel generator performance capability for station blackout and design basis accidents.

This guide has been prepared for the resolution of Generic Safety Issue B-56, "Diesel Generator Reliability," and is related to Unresolved Safety Issue (USI) A-44, "Station Blackout." The resolution of USI A-44 established a need for an emergency diesel generator (EDG) reliability program that has the capability to achieve and maintain the emergency diesel generator reliability levels in the range of 0.95 per demand or better to cope with station blackout.

This guide recognizes that unless emergency diesel generators are properly maintained, their capabilities to perform on demand may degrade. The condition of the diesel units must be monitored during test and maintenance programs, and appropriate parametric trends must be noted to detect potential failures; appropriate preventive maintenance should be performed.

All previous licensing commitments based on Regulatory Guides 1.9 and 1.108 are considered to be in effect until a licensee revises plant technical specifications.

[Insert for ACRS approval will be added later]

Any information collection activities mentioned in this regulatory guide are contained as requirements in 10 CFR Part 50, which provides the regulatory basis for this guide. The information collection requirements in 10 CFR Part 50 have been cleared under OMB Clearance No. 3150-0011.

B. DISCUSSION

An emergency diesel generator unit selected for use in an onsite electric power system should have the capability to (1) start and accelerate a number of large motor loads in rapid succession while maintaining voltage and frequency within acceptable limits, (2) provide power promptly to engineered safety features if a loss of offsite power and an accident occur during the same time period, and (3) supply power continuously to the equipment needed to maintain the plant in a safe condition if an extended loss of offsite power occurs.

IEEE Std 387-1984,[1] "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," delineates principal design criteria and qualification and testing guidelines that, if followed, will help ensure that selected diesel generator units meet performance requirements. (IEEE Std 387-1977 was endorsed by Revision 2 of Regulatory Guide 1.9, "Selection, Design, and Qualification of Diesel-Generator Units Used as Standby (Onsite) Electric Power Systems at Nuclear Power Plants.") IEEE Std 387-1984 was developed by Working Group 4.2C of the Nuclear Power Engineering Committee (NPEC) of the Institute of Electrical and Electronics Engineers, Inc. (IEEE), approved by NPEC, and subsequently approved by the IEEE Standards Board on March 11, 1982. Std 387-1984 is supplementary to IEEE Std 308-1974, "IEEE Standard Criteria for Class 1E Power Systems and Nuclear Power Generating Stations," and specifically amplifies paragraph 5.2.4, "Standby Power Supplies," of IEEE Std 308 with respect to the application of diesel generator units. IEEE Std 308-1974 is endorsed, with certain exceptions, by Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants."

IEEE Std 387-1984 also references other standards that contain valuable information. Those referenced standards not endorsed by a regulatory guide or incorporated into the regulations, if used, are to be used in a manner consistent with current regulations.

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[1]Copies may be obtained from the Institute of Electrical and Electronics Engineers, Inc., IEEE Service Center, 445 Hoes Lane, P. O. Box 1331, Piscataway, NJ 08855.

A knowledge of the characteristics of each load in essential in establishing the bases for the selection of an emergency diesel generator unit that is able to accept large loads in rapid succession. The majority of the emergency loads are large induction motors. This type of motor draws, at full voltage, a starting current five to eight times its rated load current. The sudden large increases in current drawn from the diesel generator resulting from the startup of induction motors can result in substantial voltage reductions. The lower voltage could prevent a motor from starting, i.e., accelerating its load to rated speed in the required time, or could cause a running motor to coast down or stall. Other loads might be lost because of low voltage if their contractors drop out. Recovery from the transient caused by starting large motors or from the loss of a large load could cause diesel engine overspeed that, if excessive, might result in a trip of the engine, i.e., loss of the Class 1E power source. These same consequences can also result from the cumulative effect of a sequence of more moderate transients if the system is not permitted to recover sufficiently between successive steps in a loading sequence.

Generally it has been industry practice to specify a maximum voltage reduction of 10 to 15 percent when starting large motors from large-capacity power systems and a voltage reduction of 20 to 30 percent when starting these motors from limited-capacity power sources such as diesel generator units. Large induction motors can achieve rated speed in less than 5 seconds when powered from adequately sized emergency diesel generator units that are capable of restoring the bus voltage to 90 percent of nominal in about 1 second.

Protection of the emergency diesel generator unit from excessive overspeed, which can result from an improperly adjusted control system or governor failure, is afforded by the immediate operation of a diesel generator unit trip, usually set at 115 percent of nominal speed. Similarly, in order to prevent substantial damage to the generator, the generator differential current trip must operate immediately upon occurrence of an internal fault. There are other protective trips provided to protect the emergency diesel generator units from possible damage. However, these trips could interfere with the successful functioning of the unit when it is most needed, i.e., during accident conditions. Experience has shown that there have been numerous occasions when these trips have needlessly shut down emergency diesel generator units because of spurious operation of a trip circuit. Consequently, it is important that measures be taken to ensure that spurious actuation of these other protective trips does not prevent the emergency diesel generator unit from performing its function.

The uncertainties inherent in estimates of safety loads at the construction permit stage of design are sometimes of such magnitude that it is prudent to provide a substantial margin in selecting the load capabilities of the emergency diesel generator unit. This margin can be provided by estimating the loads conservatively and selecting the continuous rating of the emergency diesel generator unit that exceeds the sum of the loads needed at any one time. A more accurate estimate of safety loads is possible during the operating license stage of review, because detailed designs have been completed and component test and preoperational test data are usually available.

The reliability of diesel generators is one of the main factors affecting the risk of core damage from a station blackout event. Thus, attaining and maintaining high reliability of emergency diesel generators at nuclear power plants is necessary to reduce the probability of station blackout. In Regulatory Guide 1.155, "Station Blackout," the reliability of the diesel generator is one of the factors to be used to determine the length of time a plant should be able to cope with a station blackout. If all other factors (redundancy of emergency diesel generators, frequency of loss of offsite power, and probable time needed to restore offsite power) remain constant, a higher reliability of the diesel generators will result in a lower probability of a total loss of ac power (station blackout) with a corresponding coping duration for certain plants according to Regulatory
Guide 1.155.

High reliability should be designed into the emergency diesel generator units and maintained throughout their service lifetime. This can be achieved by appropriate testing, maintenance, operating programs, and institution of a reliability program designed to monitor, improve, and maintain reliability at selected levels.

This guide provides explicit guidance in the areas of preoperational testing, periodic testing, reporting requirements, and valid demands and failures. The preoperational and periodic testing provisions set forth in this guide provide a basis for taking corrective actions needed to maintain high inservice reliability of installed diesel generator units. The data developed will provide an ongoing demonstration of performance and reliability for all emergency diesel generator units after installation and during service.

This revision of Regulatory Guide 1.9 integrates into a single regulatory guide pertinent guidance previously addressed in Revision 2 of Regulatory Guide 1.9, Regulatory Guide 1.108, and Generic Letter 84-15, and it references, as appropriate, guidelines set forth in IEEE Std 387-1984. In addition, this guide describes a means for meeting the minimum diesel generator reliability goals in Regulatory Guide 1.155. This guide also provides guidance for an emergency diesel generator reliability program designed to monitor and maintain EDG reliability levels.

In addition, new Standard Technical Specifications (STS) are being developed by NRC and industry as a joint effort. The periodic testing guidance provided herein reflects progress made to date to define EDG surveillance requirements in the new STS. Upon NRC endorsement, those new STS surveillance requirements will supersede guidance on periodic testing provided in this regulatory guide.

Concurrent with the development of this regulatory guide, the Nuclear Management and Resources Council (NUMARC) has revised NUMARC-87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors." NUMARC-8700, Revision 1, Appendix D, "EDG Reliability Program," which (4-6-90) provides for monitoring nuclear unit EDG reliability levels and remedial actions to restore EDG reliability to above those values selected for station blackout. The NRC staff has reviewed NUMARC's revised Appendix D and finds it acceptable for monitoring and maintaining EDG reliability levels. Table 1 of this regulatory guide provides a cross reference between Revision 3 of Regulatory Guide 1.9 and NUMARC 8700, Revision 1, Appendix D.

C. REGULATORY POSITION

Conformance with the guidelines in IEEE Std 387-1984 "IEEE Standard Criteria for Diesel-Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations," is a method acceptable to the NRC staff for satisfying the Commission's regulations with respect to design, qualification, and periodic testing of diesel generator units used as onsite electric power systems for nuclear power plants subject to the following:

1. DESIGN CONSIDERATIONS

The guidelines of IEEE Std 387-1984 should be supplemented as follows:

1.1 Section 1.2, "Inclusions," of IEEE Std 387-1984 should be supplemented to include diesel generator auto controls, manual controls, and diesel generator output breaker.

1.2. When the characteristics of the required emergency diesel generator loads are not accurately known, such as during the construction permit stage of design, each emergency diesel generator unit of an onsite power supply system should be selected to have a continuous load rating (as defined in Section 3.7.1 of IEEE Std 387-1984) equal to or greater than the sum of the conservatively estimated loads (nameplate) needed to be powered by that unit at any one time. In the absence of fully substantiated performance characteristics for mechanical equipment such as pumps, the electric motor drive ratings should be calculated using conservative estimates of these characteristics, e.g., pump runout conditions and motor efficiencies of 90 percent or less and power factors of 85 percent or lower.

1.3. At the operating license stage of review, the predicted loads should not exceed the continuous rating (as defined in Section 3.7.2 of IEEE Std 387-1984) of the diesel generator unit.

1.4. Section 5.1.2, "Mechanical and Electrical Capabilities," of IEEE Std 387-1984 pertains, in part, to the starting and load-accepting capabilities of the diesel generator unit. In conformance with Section 5.1.2, each diesel generator unit should be capable of starting and accelerating to rated speed, in the required sequence, all the needed engineered safety feature and emergency shutdown loads. The diesel generator unit design should be such that at no time during the loading sequence should the frequency decrease to less than 95 percent of nominal nor the voltage decrease to less than 75 percent of nominal (a larger decrease in voltage and frequency may be justified for a diesel generator unit that carries only one large connected load). Frequency should be restored to within 2 percent of nominal in less than 60 percent of each load-sequence interval for step-load increase and in less than 80 percent of each load-sequence interval for disconnection of the single largest load, and voltage should be restored to within 10 percent of nominal within 60 percent of each load-sequence time interval. (A greater percentage of the time interval may be used if it can be justified by analysis. However, the load-sequence time interval should include sufficient margin to account for the accuracy and repeatability of the load-sequence timer). During recovery from transients caused by the disconnection of the largest single load, the speed of the diesel generator unit should not exceed the nominal speed plus 75 percent of the difference between nominal speed and the overspeed trip setpoint or 115 percent of nominal, whichever is lower. Furthermore, the transient following the complete loss of load should not cause the speed of the unit to attain the overspeed trip setpoint.

1.5. Emergency diesel generator units should be designed to be testable as discussed in Regulatory Position C.2. The design should include provisions so that testing of the units will simulate the parameters of operation (manual start, automatic start, load sequencing, load shedding, operation time, etc.), normal standby conditions, and environments (temperature, humidity, etc.) that would be expected if actual demand were to be placed on the system. If prewarm systems designed to maintain lube oil and jacket water cooling at certain temperatures or prelubrication systems or both are normally in operation, this would constitute normal standby conditions for that plant.

1.5.1. The units should be designed to automatically transfer from the test mode to an emergency mode upon receipt of emergency signals.

1.6. Design provisions should include the capability to test each emergency diesel generator unit independently of the redundant units. Test equipment should not cause a loss of independence between redundant diesel generator units or between diesel generator load groups.

1.6.1 Testability should be considered in the selection and location of instrumentation sensors and critical components (e.g., governor, starting system components). Instrumentation sensors should be readily accessible and designed so that their inspection and calibration can be verified in place. The overall design should include status indication and alarm features.

1.7 Section 5.5.3.1, "Surveillance Systems," of IEEE Std 387-1984 pertains to status indication of diesel generator unit conditions. The guidance in this section should be supplemented as follows:

1.7.1 A surveillance system should be provided with remote indication in the control room for displaying emergency diesel generator unit status, i.e., under test, ready-standby, lockout. A means of communication should also be provided between diesel generator unit testing locations and the main control room to ensure that the operators are cognizant of the status of the unit under test.

1.7.2 In order to facilitate trouble diagnosis, the surveillance system should indicate which of the emergency diesel generator protective trips has been activated first.

1.8 Section 5.5.4, "Protection," of IEEE Std 387-1984, which pertains to bypassing emergency diesel generator protective trips during emergency conditions, should be interpreted as follows:

The emergency diesel generator unit should be automatically tripped on an engine overspeed, low oil pressure, and generator-differential overcurrent. All other diesel generator protective trips should be handled in one of two ways: (1) a trip should be implemented with two or more measurements for each trip parameter with coincident logic provisions for trip actuation, or (2) a trip may be bypassed under accident conditions provided the operator has sufficient time to react appropriately to an abnormal diesel generator unit condition. The design of the bypass circuitry should include the capability for (1) testing the status and operability of the bypass circuits, (2) alarming in the control room for abnormal values of all bypass parameters (common trouble alarms may be used), and (3) manually resetting the trip bypass function. Capability for automatic reset is not acceptable.

Section 5.5.4(2) of IEEE Std 387-1984, on retaining all protective devices during emergency diesel generator testing, does not apply to a periodic test that demonstrates diesel generator system response under simulated accident conditions per Regulatory Positions C.2.2.5, C.2.2.6, and C.2.2.12.

2. DIESEL GENERATOR TESTING

Section 3, "Definitions," Section 6, "Testing,"[2] and Section 7, "Qualification Requirements," in IEEE Std 387-1984 should be supplemented as discussed below.

2.1 Definitions

The following definitions[3] are applicable to the positions of this regulatory guide that address testing, reliability calculations, recordkeeping, and reporting of performance.

Start demands: All valid and inadvertent start demands, including all start-only demands and all start demands that are followed by load-run demands, whether by automatic or manual initiation. A start-only demand is a demand in which the emergency generator is started, but no attempt is made to load the emergency diesel generator. See "Exceptions" below.

Start failures: Any failure within the emergency generator system that prevents the generator from achieving specified frequency (or speed) and voltage is classified as a valid start failure. (For the monthly surveillance tests, the emergency diesel generator can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to reach rated speed and voltage in the precise time required by technical specifications, the start attempt is not considered a failure if the test demonstrated that the generator would start and run in an emergency). See "Exceptions" below. Any condition identified in the course of maintenance inspections (with the EDG in the standby mode) that would definitely have resulted in a start failure if a demand had occurred should be counted as a valid start demand and failure.

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[2]Additional useful information on testing and test definitions can be found in the ASME O&M Part 16, "Inservice Testing and Maintenance of Diesel Drives at Nuclear Power Plants." Copies can be obtained by contacting the American Society of Mechanical Engineers (ASME), United Engineering Center, 345 East 47th Street, New York, NY 10017.

[3]These definitions are taken from NUMARC-8700, Revision 1, Appendix D, May 2, 1990.

Load-run demands: To be valid, the load-run attempt must follow a successful start and meet one of the following criteria: (See "Exceptions" below.)

- o A load-run of any duration that results from a real (e.g., not a test) automatic or manual signal.
- o A load-run test to satisfy the plant's load and duration test specifications.
- o Other operations (e.g., special tests) in which the emergency diesel generator is planned to run for at least one hour with at least 50 percent of design load.

Load-run Failures: A load-run failure should be counted when the emergency diesel generator starts but does not pick up load and run successfully. Any failure during a valid load-run demand should be counted. See "Exceptions" below. (For monthly surveillance tests, the emergency diesel generator can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to load in the precise time required by technical specifications, the load-run attempt is not considered a failure if the test demonstrated that the generator would load and run in an emergency.) Any condition identified in the course of maintenance inspections (with the EDG in the standby mode) that definitely would have resulted in a load-run failure if a demand had occurred should be counted as a valid load-run demand and failure.

Exceptions: Unsuccessful attempts to start or load-run should not be counted as valid demands or failures when they can be definitely attributed to any of the following:

- o Spurious operation of a trip that would be bypassed in the emergency operation mode (e.g. high cooling water temperature trip)
- o Malfunction of equipment that is not required to operate during the emergency operating mode (e.g., synchronizing circuitry).
- o Intentional termination of the test because of alarmed or observed abnormal conditions (e.g., small water or oil leaks) that would not have

ultimately resulted in significant emergency generator damage or failure.

- o Component malfunctions or operating errors that did not prevent the emergency diesel generator from being restarted and brought to load within a few minutes i.e., without corrective maintenance or significant problem diagnosis).

- o A failure to start because a portion of the starting system was disabled for test purposes, if followed by a successful start with the starting system in its normal alignment.

Each emergency diesel generator failure that results in the emergency diesel generator being declared inoperable should be counted as one demand and one failure. Exploratory tests during corrective maintenance and the successful test that is run following repair to verify operability should not be counted as demands or failures when the EDG has not been declared operable again.

2.2 Test Descriptions

The following test descriptions are to be used with Regulatory Positions C.3 and C.4. Table 2 describes the sequence of qualification and surveillance testing. There should be detailed procedures for each test defined in Regulatory Position C.2.2. The procedures should identify special arrangements or changes in normal system configuration that must be made to put the EDG under test. Jumpers and other nonstandard configurations or arrangements should not be used subsequent to initial equipment startup testing.

2.2.1 Slow-Start Test: Demonstrate proper startup from standby conditions, and verify that the required design voltage and frequency is attained. For these tests, the emergency diesel generator can be slow-started, be prelubricated, have prewarmed oil and water circulating, and should reach rated speed on a prescribed schedule that is selected to minimize stress and wear.

2.2.2 Slow Load-Run Test: Demonstrate 95 to 100 percent of the continuous rating of the EDG, for an interval of not less than 1 hour and until temperature equilibrium has been attained. This test may be accomplished by synchronizing the generator with offsite power. The loading and unloading of an emergency diesel generator during this test should be gradual and based on a prescribed schedule that is selected to minimize stress and wear on the diesel generator.

2.2.3 Fast-Start and Load Test: Demonstrate that each emergency diesel generator unit starts from standby conditions (if a plant has normally operating prelube and keep-warm systems, this would constitute its standby conditions), and verify that the emergency diesel generator reaches standby required voltage and frequency within acceptable limits and time as defined in the plant technical specifications.

2.2.4 Loss-of-Offsite-Power (LOOP) Test: Demonstrate by simulating a loss of offsite power that (1) the emergency buses are deenergized and the loads are shed from the emergency buses and (2) the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency and energizes permanently connected loads within acceptable limits and time, energizes the auto-connected shutdown loads through the load sequencer, and operates for a minimum of 5 minutes.

2.2.5 SIAS Test: Demonstrate that on a safety initiation actuation signal (SIAS), the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency within acceptable limits and time, and operates on standby for greater than or equal to 5 minutes.

2.2.6 Combined SIAS and LOOP Tests: Demonstrate that the EDG can satisfactorily respond to a loss of offsite power (LOOP) in conjunction with SIAS in whatever sequence they might occur (e.g. LOCA followed by delayed LOOP or LOOP followed by LOCA). A simultaneous LOOP/LOCA event would be demonstrated by simulating a LOOP and SIAS an verifying that (1) the emergency buses are deenergized and loads are shed from the emergency buses and (2) the emergency diesel generator starts on the auto-start signal from its standby conditions, attains the required voltage and frequency and energizes permanently connected loads within acceptable limits and time, energizes auto-connected loads through the load sequencer, and operates while loaded with the auto-connected loads for greater than or equal to 5 minutes.

2.2.7 Single Load Rejection Test: Demonstrate the emergency diesel generator's capability to reject a loss of the largest single load and verify that the voltage and frequency requirements are met and that the unit will not trip on overspeed.

2.2.8 Full-Load Rejection Test: Demonstrate the emergency diesel generator's capability to reject a load equal to 95 to 100 percent of it's continuous rating and verify that the voltage requirements are met and that the unit will not trip on overspeed.

2.2.9 Endurance and Margin Test: Demonstrate full-load carrying capability for an interval of not less than 24 hours, of which 2 hours should be at a load equal to 105 to 110 percent of the continuous rating of the emergency diesel generator, and 22 hours at a load equal to 95 to 100 percent of it's continuous rating. Verify that voltage and frequency requirements are maintained.

2.2.10 Hot Restart Test: Demonstrate hot restart functional capability at full-load temperature conditions by verifying that the emergency diesel generator starts on a manual or auto-start signal, attains the required voltage and frequency within acceptable limits and time, and operates for longer than 5 minutes.

2.2.11 Synchronizing Test: Demonstrate the ability to (1) synchronize the emergency diesel generator unit with offsite power while the unit is connected to the emergency load, (2) transfer this load to the offsite power, and (3) restore the EDG to ready-to-load status.

2.2.12 Protective-Trip Bypass Test: Demonstrate that all automatic emergency diesel generator trips (except engine overspeed, oil pressure, and generator differential) are automatically bypassed upon a safety injection actuation signal. This test may be performed in conjunction with Regulatory Position 2.2.6.

2.2.13 Test Mode Change-Over Test: Demonstrate that with the emergency diesel generator operating in the automatic test mode while connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the emergency diesel generator to standby operations and (2) automatically energizing the emergency loads from offsite power.

2.2.14 Redundant Unit Test: Demonstrate that, by starting and running both redundant units simultaneously, potential common failure modes that may be undetected in single emergency diesel generator unit tests do not occur.

2.3 Pre-Operational and Surveillance Testing

Table 2 relates pre-operational and surveillance tests to the anticipated schedule for performance (e.g., pre-operational, monthly surveillance, 6-month, scheduled refueling period, and 10-year testing).

All planned tests should be preceeded by a prelube period and should be in general accordance with the manufacture's recommendations for reducing engine wear, including cool-down operation at reduced power followed by postoperation lubrication.

2.3.1 *Pre-Operational Testing*: A pre-operational test program should be implemented for all emergency diesel generator systems following assembly and installation at the site. This program should include the tests identified in Table 2, and the tests described in Regulatory Position C.2.2 should be carried out.

In addition, demonstrate through a minimum of 25 valid start-and-load demands (or tests) without failure on each installed emergency diesel generator unit that an acceptable level of reliability has been achieved to place the new EDG into an operational category.

2.3.2 Surveillance Testing: After the plants are licensed (after fuel load), periodic surveillance testing of each emergency diesel generator must demonstrate continued capability and reliability of the diesel generator unit to perform its intended function. When the EDG is declared operational in accordance with plant technical specifications, the following periodic test program should be implemented.

2.3.2.1 Monthly Testing: After completion of the emergency diesel generator unit reliability demonstration during preoperational testing, periodic testing of diesel emergency generator units during normal plant operation should be performed. Each diesel generator should be started and loaded as described in Regulatory Positions C.2.2.1 or C.2.2.3 and loaded as described in 2.2.2 at least once in 31 days (with maximum allowable extension not to exceed 25 percent of the surveillance interval).

2.3.2.2 Six-Month (or 184 days) Testing:[4] In order to demonstrate the capability of the EDG to start from standby and provide the necessary power to mitigate the loss-of-coolant accident coincident with loss of offsite power, once every 6 months each diesel generator should be started from standby conditions as described in C.2.2.3 to verify that the diesel generator reaches stable rated voltage and frequency within acceptable limits and time as specified in the plant technical specifications. Following this test the EDG should be loaded as described in Reg. Position C.2.2.2. (See also Table 2).

2.3.2.3. Refueling Outage Testing: Overall emergency diesel generator unit design capability should be demonstrated at every refueling outage by performing the tests identified in Table 2.

2.3.2.4. Ten-Year Testing: Demonstrate that the trains of standby electric power are independent once every 10 years (during a plant shutdown) or after any modifications that could affect emergency diesel generator independence, whichever is the shorter, by starting all redundant units simultaneously to help identify certain common failure modes undetected in single diesel generator unit tests.

2.3.3 Corrective Action Testing: If an individual EDG experiences 4 or more failures in the last 25 demands, then following completion of corrective actions performed through the nuclear unit EDG reliability program, the restored performance of the problem EDG must be demonstrated by conducting seven consecutive failure-free start and load-run demand tests (at a frequency of no less than 24 hours and of no more than seven days between each demand). All starts and load-run tests performed during this period should be included in the nuclear unit EDG reliability data set so long as the EDG is declared operable.

3. EDG RELIABILITY GOALS AND MONITORING

Reliability goals for emergency diesel generators and their monitoring are as follows:

3.1 Reliability Goals for Station Blackout

In order to comply with 10 CFR 50.63, "Loss of All

[4]This test may be substituted for a monthly test.

Alternating Current Power," and the guidance in Regulatory Guide 1.155, "Station Blackout," the minimum EDG reliability should be targeted at 0.95 or 0.975 per demand for each EDG for plants in emergency ac (EAC) Groups A, B, and C and at 0.975 per demand for each EDG for plants in EAC Group D (see Table 2 of Regulatory Guide 1.155).

EDGs credited to each nuclear unit's station blackout coping assessment should be monitored and maintained at or above the target reliabilities selected for compliance with 10 CFR 50.63.

3.2 EDG Reliability Monitoring

The monitoring of EDG reliability should be based on valid demands, valid starts, and valid load-run tests as defined in Regulatory Position 2.1, and surveillance tests as defined in Regulatory Position 2.3. The determination of adequate EDG performance should be based on a reliability indicator utilizing the performance data from the last 20, 50, and 100 demands.

The calculation of the performance and reliability indicators for individual EDGs comprises two components: (1) the start reliability and (2) the load-run reliability. Since not all EDG demands include both start and load-run demands, data on these two reliability components should be gathered and evaluated individually and then combined. An equal number of start demands and load-run demands may not occur in the same time interval. These reliability components are defined as follows:

1) Start Reliability (SR) is defined as:

$$SR = \frac{\text{Number of Successful Starts}}{\text{Total Number of Valid Start Demands}}$$

2) Load-run Reliability (LR) is defined as:

$$LR = \frac{\text{Number of Successful Load-runs}}{\text{Total Number of Valid Load-Run Demands}}$$

3) EDG Reliability = (SR) * (LR)

The above equations produce point estimates of individual EDG reliabilities with attendant uncertainties. Care should be taken in using such numbers in comparing plant performance with the EDG trigger values, particularly when using the last 20 demands data set.

Estimates of EDG reliability for a nuclear unit should utilize individual EDG performance data, which are then combined in a manner representative of the EDGs assigned to a specific nuclear unit. NUMARC-8700, Revision 1, Appendix D, Table D.2-1, provides guidance for combining data from individual EDG performance to arrive at a nuclear unit reliability estimate.

3.3 Maintaining EDG Reliability:

Maintaining EDG reliability should include the following:

(1) maintaining data on successful and failed EDG start and load-run demands.

(2) evaluating nuclear unit reliability indicators for the last 50 and the last 100 demands as well as individual EDG performance over the last 20 demands.

(3) relating calculated EDG performance and reliability indicators to trigger values established for selected target reliabilities.

(4) taking remedial actions for individual failures and for exceeding one or more trigger values.

The sample size and action levels are based on the assumption that the minimum surveillance testing interval for each EDG is once per month.

The following failure rate triggers should be used to assess EDG performance and to determine corrective actions to be taken:

EDG TRIGGER VALUES

Selected Target Reliability	Failures in 20 Demands	Failures in 50 Demands	Failures in 100 Demands
0.95	3	5	8
0.975	3	4	5

The selected target reliability is that selected for the station blackout coping analysis. This value represents the underlying nuclear unit EDG reliability needed for determining the coping duration for a station blackout. Figure 1 defines actions that should be undertaken as an integral part of an ongoing EDG reliability program when one or more of the triggers shown above are exceeded. A more detailed discussion of actions related to exceeding one or more of these triggers can be found in Section D.2.4 of NUMARC's Appendix D.

3.4 Problem EDG

A problem diesel generator is defined as an individual EDG that has experienced 4 or more failures in the last 25 demands. Should this case arise, the actions taken in response to exceeding a single trigger value as defined in Figure 1 would apply.

Following completion of reliability program corrective actions, restored performance of the problem EDG should be demonstrated by conducting seven consecutive failure-free start and load-run demand tests per Regulatory Position 2.3.3. The monthly surveillance test schedule should not be resumed until the seven consecutive tests are successfully completed. All starts and load-runs performed during this period should be included in the nuclear unit EDG reliability data set so long as the EDG is declared operable.

This process of evaluating recent demands and taking appropriate action on the individual EDG experiencing recurring failures is a key element in providing reasonable assurance that EDG performance is restored to an acceptable level.

4. RECORDKEEPING GUIDANCE[5]

Guidance from Section 7.5.2, "Records and Analysis," of IEEE Std 387-1984 should be supplemented as follows:

Utilities should retain the following information from monthly surveillance tests related to the trigger values and remedial actions taken in response to exceeded trigger values:

(1) Data on valid demands and failures that are used to calculate the performance and reliability indicators.

[5]Licensees should also retain data relevant to the fast start tests required by Technical Specifications.

(2) The corrective actions taken in response to individual failures.

(3) A description of the actions taken in response to exceeding a single trigger.

(4) A description of the EDG reliability program improvements in response to exceeding the triggers for 50 and 100 demands.

(5) The schedule of planned and in-progress improvements.

5. REPORTING CRITERIA

When reporting EDG failures, all plants should conform with the provisions of 10 CFR 50.72, 10 CFR 50.73, 10 CFR 21, plant technical specifications, and other current NRC reporting regulations.

6. EMERGENCY DIESEL GENERATOR RELIABILITY PROGRAM

Regulatory Guide 1.155 describes a means acceptable to the NRC staff for meeting the requirements of 10 CFR 50.63 and identifies the need for an EDG reliability program designed to maintain and monitor EDG reliability levels to ensure that selected reliability levels are being achieved. Regulatory Guide 1.155 also provides brief guidance on typical elements or activities associated with an EDG reliability program.

This section provides guidance for a reliability program based on proven industry practices. It is also recognized that there are other existing programs that have proven effective at maintaining high EDG reliability levels. Therefore, this guidance is not intended to replace or supplement such programs.

The principal elements of an EDG reliability program (or activities) should encompass the following:

1. Monitoring nuclear unit EDG reliability levels against those selected for station blackout (see also Regulatory Position C.3).

2. A surveillance plan that identifies EDG support systems and subsystems, describes frequency and scope of testing, and incorporates manufacturer recommendations.

3. Performance monitoring of important parameters on an ongoing basis to obtain information on the condition of the EDG and key components so that precursor conditions can be identified prior to failure.

4. A maintenance program designed for both preventive and corrective actions based on operating history and past maintenance activities, vendor recommendations, spare parts considerations, and the results of surveillance monitoring.

5. Failure analyses and root cause investigation to assist in developing corrective actions to prevent recurrence of failures.

6. An EDG problem closeout process to ensure that the resolution of a failure or a problem is properly implemented and successful.

7. An EDG reliability data system to ensure the availability and retrievability of important data and information related to EDG reliability.

These principal elements of an EDG reliability program are provided as guidelines. Other reliability programs that include the same or similar activities may also be used, such as the TDI Owner's Group maintenance and surveillance activities.[6] Such programs should be reviewed for consistency with Regulatory Guide 1.155 and this regulatory guide.

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[6]Revision 2, Appendix 2, "Design Review/Quality Validation" report submitted 5/1/86, J. George(TDI) to H. Denton (NRC) was utilized in revising plant-specific technical specifications.

6.1 Monitoring Diesel Generator Reliability

Monitoring of nuclear unit EDG reliability should be based on periodic surveillance testing as discussed in Regulatory Position C.3 and corrective actions undertaken when one or more triggers are exceeded. (See also NUMARC-8700, Rev. 1, Appendix D). The reliability program should provide the means for failure evaluation, corrective action, and demonstration of its effectiveness.

6.2 EDG Surveillance Plan

A surveillance plan should consider the following factors:

1. The effect that EDG support and auxiliary systems have on overall EDG reliability.

2. Failures caused by surveillance.

3. Frequency and nature of surveillance testing effects on EDG reliability and unavailability.

4. The types of failures that can be detected by a surveillance program.

5. Detection of failures by parameter monitoring versus testing.

6. The ability of specialized tests to simulate actual operating conditions.

Figure 2 illustrates typical components and support systems that should be considered when defining an EDG boundary. Those components whose function is solely to support the EDG are to be viewed as within the EDG boundary. The systems that provide support to the EDG and perform other plant functions are shown outside the boundary, with the understanding that the boundary interface function must be maintained.

IEEE Std 387-1984 and ANSI/ASME OM-16 provide similar definitions of components and system boundaries and may also be used as guidance.

Tables 3 and 4 list types of periodic surveillance activities that have proven effective. When performing such surveillance, it is important to capture the actual values of critical parameters since such data would be extremely useful for failure analyses, as well for long-term EDG condition monitoring.

6.3 EDG Performance Monitoring

Performance monitoring should be applied to equipment that is run on a continual or a near-continual basis. The purpose is to monitor certain parameters on an ongoing basis in order to obtain information about the state of physical conditions that may potentially impact the operability of a piece of equipment and that could be used for trending purposes. These trends may signal a degradation in a particular condition. Such evaluation may detect onset of failure and allow corrective actions to be taken before failure occurs.

Equipment that is normally in a standby condition, such as an EDG, can only be monitored on a limited basis. Monitoring critical operating parameters is usually performed during monthly operational testing. In order for this monitoring to be effective, it should be applied to the following conditions:

1. The characteristic or parameter should be a measurable condition that is known to be related to an important failure mode.

2. The characteristic or parameter should be able to be measured conveniently and practically.

3. The characteristic or parameter should be accurately monitored.

4. Parameters recorded should be measured under the same conditions (i.e., load) to the extent possible.

The actual values of the conditions should be recorded rather than simply verifying that they are within a specific range. A comparison between the values obtained from successive readings can then be made to ascertain the possibility of a degrading condition.

6.4 EDG Maintenance Program

An important contributor to EDG reliability is the manner in which both preventive and corrective maintenance are performed.

Generally speaking, an EDG maintenance program should be based on the following:

1. Vendor-recommended maintenance actions and schedule for implementation.

2. Maintenance actions should be prioritized based on such factors as repair time, severity, likelihood of reoccurrence.

3. The reliability characteristics of the EDG subsystems and components should be considered when planning EDG preventive maintenance.

4. Maintenance activities should interface with the overall EDG reliability program.

The maintenance program should have both a preventive and a corrective element. The preventive program should be tailored to specific EDG types. Table 5 shows typical examples of preventive maintenance activities.

6.5 EDG Failure Analysis and Root Cause Investigation

An EDG reliability program should include failure analysis procedures designed to systematically reduce problems or failures to corrective actions. Failure analysis starts from the most apparent symptoms and progresses to determination of underlying causes or incipient conditions. Root cause analysis goes further and attempts to find underlying causes related to design, engine operation, or maintenance. Figure 3 is an example of a systematic approach to failure and root cause analyses.

When performing a root cause analysis, the method of categorizing underlying causes is important so that corrective action can be integrated into both plant activities and the EDG reliability program. A typical classification system should consider the following:

a. Manufacturing and design

b. Quality control

d. Training

e. Communication

f. Human factors

6.6 EDG Problem Closeout

Attention should be given to procedures and controls used to ensure the resolution or "closeout" of a particular problem. The closeout of a failure or problem that is detected during maintenance or surveillance should be closed out by means of a formal procedure. A formal plant-specific procedure offers a means to prevent recurrence of the particular failure or problem.

The problem closeout procedure should be based on the following considerations:

1. Criteria for closeout

2. Closeout review

3. Closeout monitoring

4. Data system interface

A more detailed discussion of problem closeout considerations can be found in NUMARC's Appendix D Topical Report.

6.7 EDG Reliability Data System

An EDG reliability program should have a data collection, storage, and retrieval system that can be accessed by personnel assigned to monitoring and maintaining the EDGs and satisfying Regulatory Position C.5. The data system does not need to be a

special purpose dedicated system, but access to "current" information should be a major consideration.

Typical types of information that should be considered in the formation of a data system are:

1. Surveillance test results

2. EDG failure history

3. Failure and root cause analysis results

4. Manufacturer's recommendations

5. Input from the preventive maintenance program

6. Input from the corrective maintenance program

7. Industry operating experience

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for using this regulatory guide.

Except in those cases in which an applicant proposes an acceptable alternative method for complying with the specified portions of the Commission's regulations, the methods described in Regulatory Positions C.1 and C.2 of this guide will be used by the NRC staff in evaluating selection, design, qualification, and testing of diesel generator units used as onsite electric power systems for the following nuclear power plants:

1. Plants for which the construction permit is issued after the issue date of the final guide,

2. Plants for which the operating license application is docketed 6 months or more after the issue date of the final guide,

3. Plants for which the licensee commits to the provisions of this guide.

The NRC Staff intends to use Regulatory Positions C.3, C.4, C.5, and C.6 of this regulatory guide to review the monitoring of EDG reliability levels, record keeping, reporting of failures, and existing or proposed EDG reliability programs.

Implementation of this regulatory guide by the NRC staff will in no case be earlier than (270 days after issuance).

REGULATORY ANALYSIS

A separate regulatory analysis was not prepared for this regulatory guide. The regulatory analysis prepared for the station blackout rule, NUREG-1109, "Regulatory/Backfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout," provides the regulatory basis for this guide and examines the costs and benefits of the rule as implemented by the guide. A copy of NUREG-1109 is available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street NW., Washington, DC. Copies of NUREG-1109 may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7802; or from the National Technical Information Service, Springfield, VA 22161.

(6-14-90)

TABLE 1

CROSS-REFERENCE BETWEEN REGULATORY GUIDE 1.9, REV. 3 AND NUMARC-87-00, APPENDIX D (3-8-90)

RG 1.9,REV 3 SECTION	NUMARC-8700 APPENDIX D
Section A, Introduction	None (Use RG 1.9,Rev.3)
Section B, Discussion	None (Use RG 1.9,Rev.3)
Section C, Regulatory Position	
1 Design Considerations	None (Use RG 1.9,Rev.3)
2 Diesel Generator Testing	
2.1 Definitions	D.1
2.2 Test Descriptions	None (Use RG 1.9,Rev.3)
2.3 Preoperational and Surveillance Testing	None (Use RG 1.9,Rev.3)
3 EDG Reliability Goals and Monitoring	D.2
3.1 Reliability Goals for SBO	Introduction
3.2 EDG Reliability Monitoring	D.2.3
3.3 Maintaining EDG Reliability	D.2.1,D.2.3,D.2.4,D.2.5
3.4 Problem EDG	D.2.4.4
4 Record keeping Guidance	D.2.4.6
5 Reporting Criteria	Use RG 1.9, Rev. 3
6 EDG Reliability Program	Introduction
6.1 Monitoring EDG Reliability	None (Use RG 1.9,Rev.3)
6.2 EDG Surveillance Plan	None (Use RG 1.9,Rev.3)
6.3 EDG Performance Monitoring	None (Use RG 1.9,Rev.3)
6.4 EDG Maintenance Program	None (Use RG 1.9,Rev.3)
6.5 EDG Failure Analysis and Root Cause Investigation	None (Use RG 1.9,Rev.3)
6.6 EDG Problem Close-out	None (Use RG 1.9,Rev.3)
6.7 EDG Reliability Data System	None (Use RG 1.9,Rev.3)
Section D, Implementation	Introduction (Initiative 5A)

TABLE 2. PRE-OPERATIONAL AND SURVEILLANCE(a) TESTING 6-14-90

Refer to Regulatory Position C.2.2 for Description	Pre-Operational Test Program	Monthly Periodic Tests	Refueling Outage 6-Month Tests	18 Month Tests	10-Year Tests
2.2.1 Start Test	X (b)	X			
2.2.2 Load-Run Test	X (b)	X			
2.2.3 Fast-Start and Load Test	X (c)		X(c)	X(c)	
2.2.4 Loss-of-Offsite Power (LOOP) Test	X			X	
2.2.5 SIAS Test	X			X	
2.2.6 Combined SIAS & LOOP Test	X			X	
2.2.7 Single-Load Rejection Test	X			X	
2.2.8 Full-Load Rejection Test	X			X	
2.2.9 Endurance and Margin Test	X			X	
2.2.10 Hot Re-start Test	X			X	
2.2.11 Synchronizing Test	X			X	
2.2.12 Protective-Trip Bypass Test	X			X	
2.2.13 Test Mode Change-Over Test	X			X	
2.2.14 Redundant Unit Test	X				X

(a) Tech Spec requirements take precedence to this table.
(b) Included in each of the 25 tests described in Regulatory Position 2.3.1.
(c) Utilities should retain data for fast starts required by Tech Specs. This test may be substituted for a monthly surveillance test.

TABLE 3. EDG SHIFT OR DAILY SURVEILLANCE (EXAMPLE)

Lube Oil System

Lube oil inlet temperature
Lube oil outlet temperature
Lube oil sump level
Lube oil strainer/filter differential pressure
Visual inspection for leaks

Fuel Oil System

Day tank level
Storage tank level
Bleed fuel oil filters
Visual inspection for leaks
Bleed fuel oil filters*

Jacket Water System

Jacket water inlet temperature
Jacket water outlet temperature
Expansion tank level
Visual inspection for leaks

Starting Air System

Air receiver pressure
Blowdown air receiver
Compressor oil level
Aligned to appropriate power

Governor System

Governor oil level
Verify load limit settings
Governor setting in Auto/Manual

Diesel/Generator

Oil Level of pedestal bearing
Turbo oil level
Intercooler leak inspection
Turbocharger lube oil level
Drain moisture from exhaust silencers
Verify alarms clear
Diesel starting selector switches in remote
EDG breaker remote-local select switch in remote
Verify auto-manual regulators set in normal range
Check water and fuel hoses
Check starter motors
Check exhaust

Electrical*

Auto/Manual start switch in auto
Appropriate breakers racked in
Power to Breaker Verified Check operation of compressor traps source
Fault Indicator

*Weekly surveillance

TABLE 4A. MONTHLY EDG SURVEILLANCE (EXAMPLE)

Diesel/Generator

Visually inspect fuel system for leaks
Visually inspect for exhaust leaks
Drain water from crankcase vent piping
Verify generator synchronization
Engine coolant level
Mainfold pressure
Crankcase pressure
Air inlet temperature
Turbo temperature
Intercooler outlet temperature
operability
Ventilation fan operability
Cylinder exhaust temperatures
Cooling water supply temperature
Stator temperature
Gen frequency
Gen voltage
Gen Amps
Gen KW

Jacket Water System

Inspect for leaks
Check water treatment
HX outlet temperature
Engine outlet temperature
System pressure
Turbo outlet temperature

Governor System

Inspect linkage for looseness
Verify all control settings
Check actuator oil level
Check automatic shutdown
Filter DP
Inspect for leaks
Day tank level
Storage tank level
Verify transfer pumps

Fuel oil pressure
(inlet/outlet)

Lube Oil System

Check lube oil for dilution
Lube oil chemical analysis
Inspect for leaks
LO filter DP
LO pressure
LO level
Turbo LO pressure
LO inlet temperature
LO outlet temperature

In addition to the above surveillances there are other less frequent inspections that may be considered. Examples of these include the following:

TABLE 4B. LESS FREQUENT EDG SURVEILLANCES (EXAMPLE)

Periodic Surveillance:	
Lubrication oil Chemical Analysis	Once every quarter
Fuel Oil Chemical Analysis	Once every quarter
Non-Periodic Surveillances:	
Chemical analysis of new fuel oil	Upon delivery and prior to use
Chemical analysis of new lubrication Oil	Upon delivery and prior to use

TABLE 5. TYPICAL PREVENTIVE MAINTENANCE ACTIVITIES (EXAMPLE)

Engine Lube Oil System:

Clean and inspect lube oil strainer
Replace lube oil filters
Replace turbocharger filter element
Inspect lube oil cooler

Engine Cooling System:

Inspect cooling water pump
Drain and replace coolant
Inspect expansion tank

~l Oil System:

Replace fuel oil filters
Clean and inspect fuel oil strainers
Test fuel condition

Starting Air System:

Clean and inspect air strainer
Replace compressor oil
Inspect compressor drive belts

Engine Maintenance:

Replace inlet air filter oil
Inspect and clean inlet air filter
Inspect air box drains
Inspect air box cooling system
Check cylinder head to piston clearances
Inspect cylinder liners
Inspect rod bearings
Inspect main bearings
Inspect piston rings

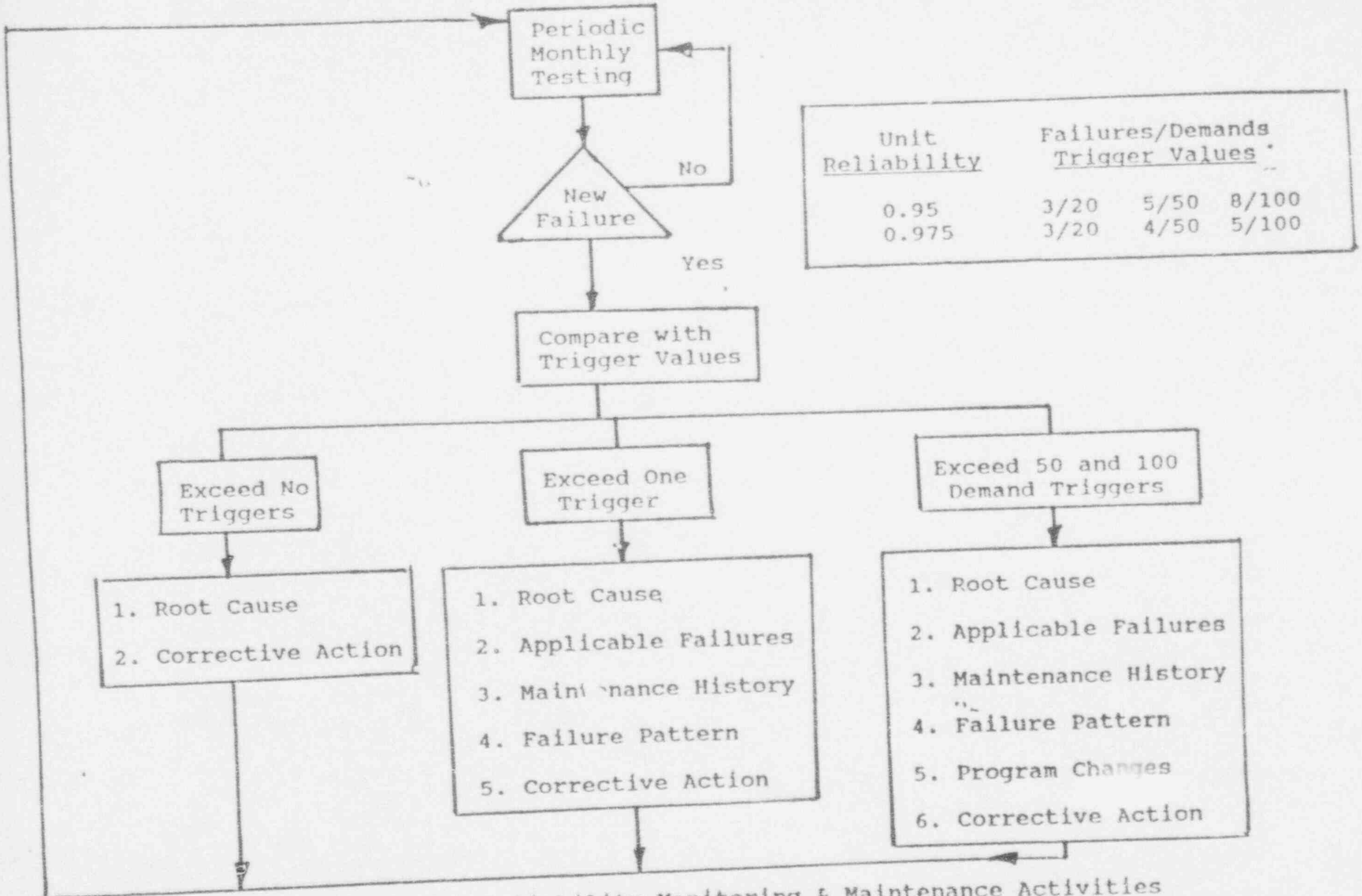


Figure 1, Reliability Monitoring & Maintenance Activities

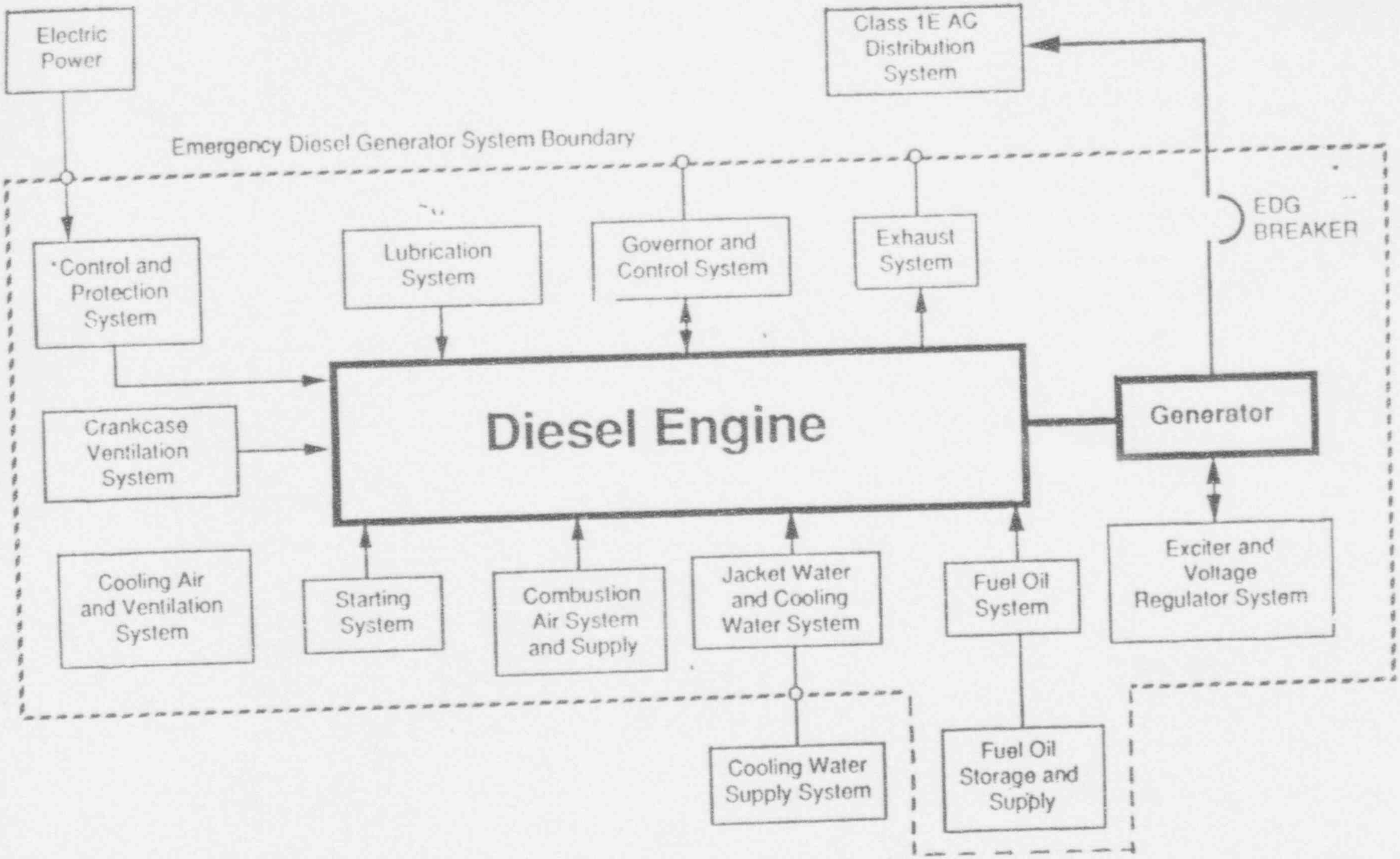


Figure 2 - Emergency Diesel Generator Systems, Boundary and Support Systems

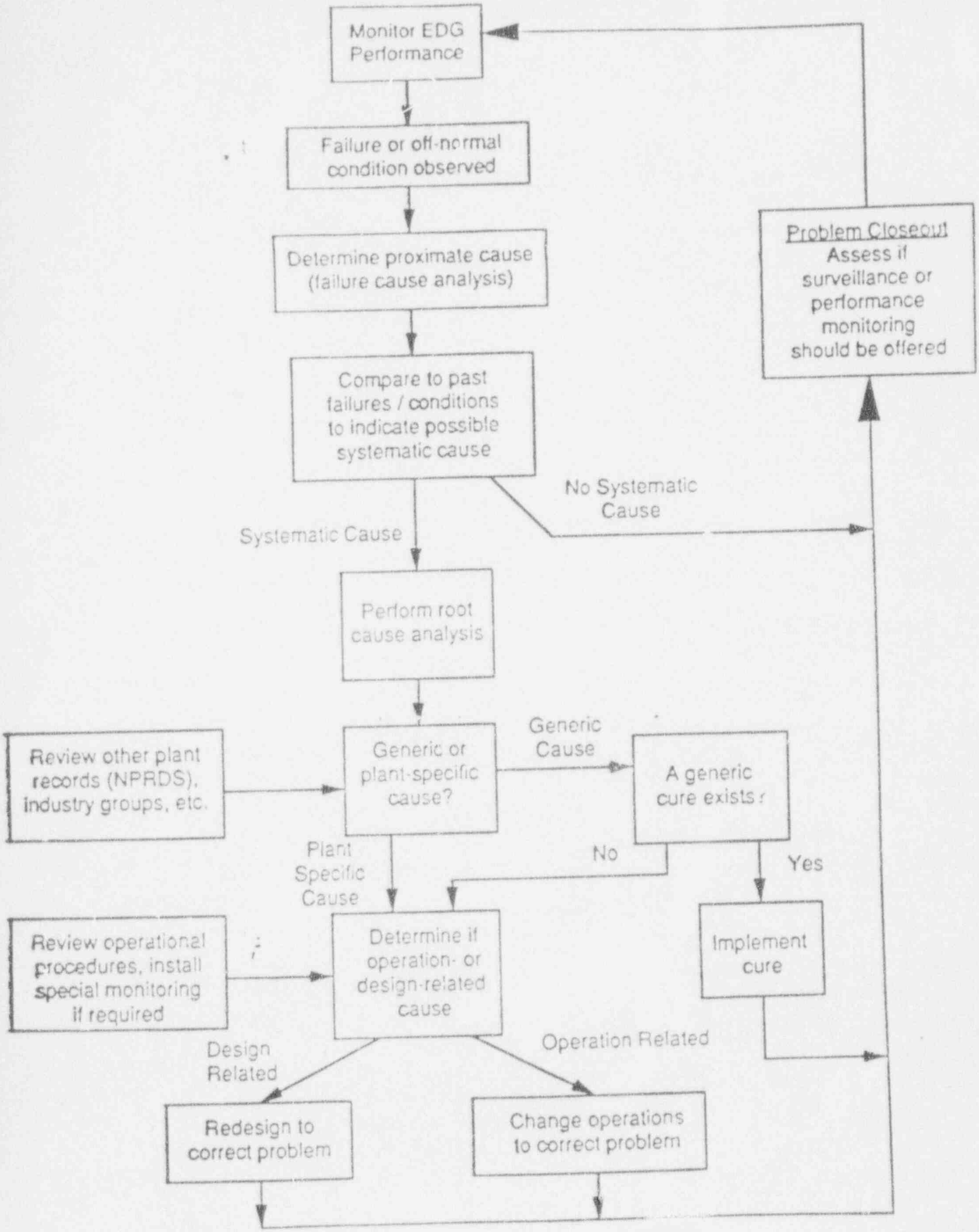


Figure 3 - Failure and Root Cause Analysis Logic

ENCLOSURE C

6-15-90 Draft

PROPOSED GENERIC LETTER (REFERENCE GSI B-56)

TO: ALL HOLDERS OF OPERATING LICENSES OR CONSTRUCTION PERMITS FOR NUCLEAR POWER REACTORS.

SUBJECT: REQUEST FOR ACTION PURSUANT TO 10 CFR 50.54(f) RELATED TO THE RESOLUTION OF GENERIC SAFETY ISSUE (GSI) B-56, "DIESEL GENERATOR RELIABILITY" (GENERIC LETTER 90-)

PURPOSE AND BACKGROUND:

This generic letter is being sent to all licensees of operating nuclear power reactors and to all construction permit holders to determine whether licensees will voluntarily implement NUMARC's Initiative 5A, "Coping Assessment/EDG Performance,"(1) (see Enclosure C.1), the guidance for monitoring and maintaining Emergency Diesel Generator (EDG) reliability provided in NUMARC 8700, Revision 1, Appendix D and an EDG reliability program such as described in Regulatory Position C.6 of Regulatory Guide 1.9, Revision 3.

The Staff has issued Revision 3 of Regulatory Guide 1.9, "Selection, Design, Qualification, Testing and Reliability of Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" for the technical resolution of GSI B-56. This revision integrates into a single document guidance on EDG selection, design, qualification and testing previously addressed (or provided) in Revision 3 of Regulatory Guide 1.108, Revision 2 of Regulatory Guide 1.9, and Generic Letter 84-15. Reporting of EDG failures in conformance with 10 CFR Parts 50.72 and 50.73 will continue. Licensees are also encouraged to continue to report EDG failures to NPDRS.

REQUESTED ACTIONS TO BE TAKEN BY ADDRESSEES:

In order to determine whether any operating license or construction permits for facilities covered by this request should be modified, suspended or revoked, you are required, pursuant to Section 182 of the Atomic Energy Act and 10 CFR 50.54(f), to provide the NRC within 180 days of the date of this letter a statement as to your plans and the schedule for implementation at each facility to comply with Initiative 5A and Appendix D of NUMARC 8700, Revision 1 and with Regulatory

*(1) NUMARC 87-00, Revision 1 (5-2-90)

Positions C.3, C.4, C.5 and C.6 of Revision 3 to RG 1.9 as yc.. method for monitoring and maintaining EDG reliability levels for compliance with 10 CFR 50.63. If you do not plan to implement Initiative 5A and regulatory positions noted above, in full or part, the statement shall identify with specificity the portions of the Initiative and Regulatory Guide which you do not intend to implement and the basis therefore. If you plan to use a different method for monitoring and maintaining EDG reliability levels, your response should detail your approach and the schedule for that approach, and a schedule for implementation at each facility within 270 days from the date of this letter. Your response should be submitted to the NRC, signed under oath and affirmation. You should retain all documentation supporting this statement consistent with the records retention program for your facility.

Licensees that implement NUMARC Initiative 5A, Appendix D and Regulatory Positions, C.3, C.4, C.5, and C.6 of Revision 3 of Regulatory Guide 1.9 may include a request to change their plant Technical Specifications (TS) to incorporate the line-improvements noted in Enclosure C.2. These line-item TS improvements are a result of the implementation of programmatic requirements for monitoring and maintaining EDG target reliability. Guidance for the preparation of a proposed license amendment to implement these line-item TS improvements is provided in Enclosure C.2. Conforming amendment requests will be expeditiously reviewed by the NRC Project Manager for the facility.

BACKFIT DISCUSSION

In Revision 3 of Regulatory Guide 1.9, the actions proposed by the NRC staff in Regulatory Positions C.3, C.4, C.5, and C.6 represent new staff positions and are considered a backfit in accordance with NRC procedures. A backfit analysis of the type described in 10CFR 50.109(a)(3) and 10 CFR 50.109(c) was performed and a determination was made that there will be a substantial increase in overall protection of the public health and safety, and that the costs are justified in view of this increased protection. The staff also believes that this approach is the most cost effective method for maintaining emergency diesel generator reliability since the prposed actions are consistant with practices developed by the nuclear industry.

The backfit analysis is included in the Federal Register Notice for the issuance of Revision 3 of Regulatory Guide 1.9, and will be made available in the Public Document Room along with the minutes of the 171st, 176th and _____ meetings of the Committee to Review Generic Requirements that discussed the resolution of this generic issue.

PAPERWORK REDUCTION ACT REQUIREMENTS

This request is covered by Office of Management and Budget Clearance Number 3150-0011, which expires ___________. The estimated average burden hours is 120 person-hours per license response, including assessing the new recommendations, searching data sources, gathering and analyzing data, and the required reports. These estimated average burden hours pertain only to these identified response-related matters and do not include the time for actual implementation of requested actions. Estimates of implementation of an EDC reliability program are reported in NUREG-1109, "Regulatory/BAckfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout." Comments on the accuracy of this estimate and suggestions to reduce the burden may be directed to the U.S. Office of Management and Budget, Executive Office Building, Washington, D.C. 20503, and to the Nuclear Regulatory Commission, Records and Reports Management Branch, Office of Administration and Resources Management, Washington, D.C. 20555.

If you have any questions on this matter, please contact your project manager.

Sincerely,

James G. Partlow, Associate
Director for Projects
Office of Nuclear Regulation

Enclosures:
1. C.1 NUMARC Initiative 5A
2. C.2 Guidance for the Preparation of License Amendments

NUMARC INITIATIVE 5A
"COPING ASSESSMENT/EDG PERFORMANCE"
(Ref. NUMARC-8700, Rev. 1, May 2,1990)

The following verbatim quote of NUMARC's Initiative 5A is provided for convenience :

"Each Utility will assess the ability of its plant(s) to cope with a "Station Blackout." Plants utilizing alternate AC power for "Station Blackout" response which can be shown by test to be available to power the shutdown busses within 10 minutes of the onset of "Station Blackout" do not need to perform any coping assessment. Remaining alternate AC plants will assess their ability to cope for one-hour. Plants not utilizing an alternate AC source will assess their ability to cope for four hours. Factors identified which prevent demonstrating the capability to cope for the appropriate duration will be addressed through hardware and/or procedural changes so that successful demonstration is possible.

As part of the coping assessment, utilities are required to choose an EDG target reliability (0.95 or 0.975) and are required to maintain that chosen reliability. Accordingly, each utility will employ the following exceedence trigger values (on a plant unit basis) as the mechanism for monitoring EDG Target Reliability and support closure of Generic Issue B-56:

SELECTED EDG TARGET RELIABILITY	FAILURES IN 20 DEMANDS	FAILURES IN 50 DEMANDS	FAILURES IN 100 DEMANDS
0.95	3	5	8
0.975	3	4	5

Additionally, each utility, in response to an individual EDG experiencing 4 or more failures in the last 25 demands, will demonstrate restored EDG performance by conducting seven (7) consecutive failure free start and load-run tests. This reduced form of accelerated testing shall be conducted at a frequency of no less than 24 hours and of no more than seven (7) days between each demand. Each utility will, if applicable, address this reduction in accelerated testing through changes to technical specifications or other appropriate means."

Enclosure C.2
5-31-90 Draft

GUIDANCE FOR THE PREPARATION OF A LICENSE AMENDMENT REQUEST TO MODIFY EMERGENCY DIESEL GENERATOR SURVEILLANCE, ACTION, AND REPORTING REQUIREMENTS

BACKGROUND

A program for monitoring and maintaining the reliability of emergency diesel generators (EDGs) is an essential element for assuring that the selected EDG target reliability for compliance with the station blackout rule (10 CFR 50.63) is met. The establishment of this program in accordance with the guidance in Regulatory Positions C.3, C.4, C.5 and C.6 of Revision 3 to Regulatory Guide 1.9 will permit a reduction in the accelerated frequency of EDG monthly surveillance requirements that are applcable to most operating plants. For the remaining plants, the implementation of an accelerated frequency for monthly EDG surveillance requirements, consistant with a commitment to NUMARC Initiative 5A, constitutes a backfit. Also, a relaxation in the reporting requirements for EDG failures, consistent with Regulatory Position C.5 of Revision 3 of Regulatory Guide 1.9 is appropriate. Consistent with the NRC policy on Technical Specification (TS) improvements, this guidance is provided for a license amendment request to implement these line-item TS improvements.

DISCUSSION

Current plant TS typically require an accelerated frequency of once per 7 days for conducting EDG monthly surveillance requirements when the number of failures exceeds 1 in the last 20 or 5 in the last 100 valid tests on a per diesel generator basis. With the implementation of a EDG reliability program conforming to the guidelines of Revision 3 to Regulatory Guide 1.9, the staff has concluded that 4 or more failures in the last 25 valid tests is acceptable for imposing an accelerated test frequency for monthly surveillance requirements. Furthermore, the accelerated testing may be suspended following 7 consecutive failure-free tests provided the time interval between consecutive tests is no less than 24 hours.

An acceptable alternative to the existing requirements of TS Table 4.8.1.1.2-1 is the following:

Table 4.8.1.1.2-1
DIESEL GENERATOR TEST SCHEDULE

NUMBER OF FAILURES IN LAST 25 VALID TESTS*	TEST FREQUENCY
$\leq$ 3	Once per 31 days
$\geq$ 4	Once per 7 days** (but no less than 24 hours)

* Criteria for determining number of failures and valid demands shall be in accordance with Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3, where the number of demands and failures is determined on a per diesel generator basis. The criteria are based upon counting only those failures that have an impact on the capability of the EDG to respond to a station blackout. However, the ACTION requirements must be met for those fast start failures that are excluded for determining the number of failures in the last 25 valid tests.

** This test frequency shall be maintained until 7 consecutive failure-free start and load-run demands have been performed. If subsequent to the 7 failure free tests 1 or more additional failures occur such that there are again 4 or more failures in the last 25 tests, the testing interval shall again be reduced as noted above and maintained until 7 consecutive failure-free tests have been performed.

The changes to Table 4.8.1.1.2-1 are in the number of failures in the last 25 valid tests. The * footnote is changed to reflect the updated criteria on valid tests and failures provided in Regulatory Position C.2.1 of Revision 3 to Regulatory Guide 1.9. The criteria are based upon counting only those failures that have an impact on the capability of the EDG to respond to a station blackout. Therefore, it is noted that the ACTION requirements must be met for those fast start failures that are excluded for determining the number of failures in the last 25 valid tests. The ** footnote is changed to reflect testing requirements noted in Regulatory Position C.3.4 of Regulatory Guide 1.9 and Initiative 5A of NUMARC 87-00. Individual plant TS may have other notes relating to reducing the previous failure count to zero following a complete diesel overhaul. With the change in the requirements for initiating and terminating the accelerated frequency for monthly surveillance requirements, notes related to reducing the previous failure count to zero following a complete diesel overhaul are no longer appropriate and should be deleted.

The "Bases" Section for TS 3/4.8.1 should be updated to note that the basis for this TS also includes this generic letter.

Finally, with the implementation of recordkeeping requirements on EDG failures as a part of the above noted programmatic requirements for monitoring and maintaining EDG reliability, the staff has concluded that a special report for all EDG failures is no longer necessary . Accordingly, the following provides an acceptable alternative for TS 4.8.1.1.3. This is consistent with Regulatory Position C.5 of Revision 3 to Regulatory Guide 1.9:

> 4.8.1.1.3 Reports - Reports on failures of the emergency diesel generators, pursuant to the requirements of 10 CFR 50.73, shall include the information noted in Regulatory Position C.5 of Regulatory Guide 1.9, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," Revision 3, _______ 1990.

SUMMARY

The alternative to the requirements of Table 4.8.1.1.2-1 will permit a reduction in the accelerated frequency of EDG monthly surveillance requirements. Finally, a reduction in the reporting requirements for EDG failures is also appropriate with the implementation of recordkeeping requirements noted above.

ENCLOSURE D
5-30-90
DRAFT

BACKFIT ANALYSIS

GI B-56, "DIESEL RELIABILITY"

Background:

The NRC staff has issued Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," constitutes resolution of Generic Safety Issue B-56, "Diesel Generator Reliability." Revision 3 of Regulatory Guide 1.9, integrates into a single regulatory guide pertinent guidance previously addressed in Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Regulatory Guide 1.9, Revision 2, and Generic Letter 84-15. Guidance provided in Revision 3 of Regulatory Guide 1.9 supersedes Regulatory Guide 1.108, and Regulatory Guide 1.108 is hereby withdrawn. Withdrawal of Regulatory Guide 1.108, however, does not alter any prior or existing licensing commitments based on Regulatory Guides 1.108 and 1.9 and Generic Letter 84-15. These are still considered to be in effect until a licensee changes plant Technical Specifications.

In addition, the nuclear power industry has revised Appendix D of NUMARC-8700, which provides guidance for monitoring nuclear unit EDG reliability levels and for remedial actions to restore reliability levels above the target reliability selected for station blackout. The NRC staff has reviewed Appendix D and finds it's guidance acceptable for monitoring and maintaining EDG reliability levels, and they have referenced this guidance (as applicable) in Regulatory Guide 1.9, Revision 3. Table 1 of this regulatory guide cross-references the guide and NUMARC 8700, Revision 1, Appendix D (5-2-90).

The resolution of USI A-44, "Station Blackout" identified GSI B-56, "Diesel Generator Reliability" an oustanding safety issue related to USI A-44, and also noted that the resolution of B-56 would provide guidance for use by the staff and industry for reviewing diesel generator reliability programs. The regulatory analysis for USI A-44 is contained in NUREG-1109, "Regulatory/ Backfit Analysis for the Resolution of Unresolved Safety Issue A-44, Station Blackout", June 1988. This regulatory analysis evaluated costs associated with implementation of EDG reliability programs and concluded that operation of onsite emergency AC power sources shuld be ensured by a reliability program designed to monitor and maintain EDG reliability levels consistant with those selected for compliance with the Station Blackout Rule. The staff finds the regulatory analysis developed for USI A-44 applicable to the resolution of GI B-56, and therefore a new regulatory analysis will not be developed for GI B-56.

The following information is provided in answer to specific requirements of paragraph (c) of 10 CFR 50.109.

(1) Statement of specific objectives that the proposed backfit is to achieve.

The objectives for issuing Revision 3 of Regulatory Guide 1.9 are as follows:

(a) To provide guidance on monitoring EDG reliability levels selected for compliance with 10 CFR 50.63, "Station Blackout," and reviewing EDG reliability programs.

(b) To incorporate guidance into a single regulatory guide that has been addressed through two regulatory guides (1.108 and 1.9, Rev. 2) and Generic Letter GL 84-15.

The first objective involves a backfit, the second objective does not.

(2) General description of activity that would be required by the licensee or applicant to complete the backfit.

A generic letter will be sent to all licensees of operating nuclear power plants and all construction permit holders who currently rely upon EDGs to comply with 10 CFR 50.63. The letter will request a statement of plans and schedule for monitoring and maintaining EDG reliability levels per guidelines contained in NUMARC's Initiative 5A, NUMARC-8700, Revision 1, Appendix D (5-2-90) and Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9, Revision 3 or identification and justification of an alternative plan. The generic letter also identifies a need for revisions to plant Technical Specifications as determined by the course of action selected.

The licensee or applicant will need to review current methods for monitoring and maintaining EDG reliability levels and determine if current practices are consistent with the guidelines noted above, or if an alternative approach is desireable. Since most plants have reliability programs similar that described in the guide and NUMARC's guidance, it is likely that only confirmation would be required.

Revisions to plant Technical Specifications will require plant specific reviews since some existing Technical Specifications pre-date Regulatory Guides 1.108, 1.9, Revision 2 and GL 84-15. Committment to the use of guidance based on current industry-wide practices and the relaxation of accelerated testing per NUMARC's Initiative 5A and Regulatory Guide 1.9, Revision 3 will therefore be licensee specific. NUMARC has indicated that they anticipate utilities will address this reduction in accelerated testing through revisions to current plant Technical Specifications.

(3) Potential change in the risk to the public from accidental offsite release of radioactive material.

The USI A-44 backfit analysis (NUREG-1109) identified the risk reduction for 100 operating reactors to be 145,000 person-rem and thereby supported the Commission's conclusion that 10 CFR 50.63 provided a substantial improvement in the level of public health and safety protection. Inherent in the above finding was the understanding that adequate EDG reliability levels would be maintained (see Regulatory Guide 1.155) and that further guidance would be provided through the issuance of Revision 3 of Regulatory Guide 1.9 which constitutes the resolution of GI B-56, "Diesel Generator Reliability."

Implementation of the guidance provided in Regulatory Positions 3, 4, 5 and 6 in Revision 3 of Regulatory Guide 1.9, as taken from NUMARC's revised Appendix D, will provide the staff and industry with common guidance for monitoring and maintaining EDG reliability levels selected for compliance with 10 CFR 50.63. The improvement in the level of public health and safety estimated for USI A-44 is thereby further ensured.

(4) Potential impact of radiological exposure of facility employees.

No radiological exposure is projected since the monitoring of EDG reliability and implementating an EDG reliability program is not expected to require personnel to be exposed to radiation.

(5) Installation and continuing costs associated with the backfit, the cost of facility downtime, or the cost of construction delay.

No facility downtime or startup delays from construction or installation are envisioned with the issuance of Revision 3 of Regulatory Guide 1.9

since no facility modifications are needed. The continuing costs associated with maintaining a diesel reliability program should be small, since operating plants currently conduct monthly surveillance tests to monitor EDG reliability and have some form of an EDG maintenance program. Cost estimates for improving EDG reliability, if necessary, were estimated to be $150,000 to $400,000 per reactor (NUREG-1109).

It is also noted that industry information provided by NUMARC indicates that industry-wide EDG reliability levels are currently 97% to 98%, so it is expected that the actual cost of implementation beyond those measures currently employed will be less than noted above. In view of the present EDG reliability levels and use of recommended industry practices, impact on licensee resources should be small or negligible.

In addition, NUMARC's revised Initiative 5A, "Coping Assessment/EDG Performance" from NUMARC-8700, Revision 1, 5-2-90, states that utilities should maintain EDG reliability at target levels chosen for compliance with 10 CFR 50.63. The staff has interacted with NUMARC's B-56 working group in the development of Revision 3 of Regulatory Guide 1.9 and NUMARC's Appendix D.

(6) The potential safety impact of changes in plant or operational complexity, including the relationship to proposed and existing regulatory requirements.

Regulatory Positions C.3, C.4, C.5, and C.6 will not introduce additional operational complexity since monthly surveillance testing of EDGs has been implemented for some time by all licenses. Monthly surveillance testing will be the basis for monitoring EDG reliability levels and assessing the effectiveness of the on-site EDG reliability program. The relaxation of accelerated testing (from that in RG 1.108, Rev. 2) through focusing on the problem EDG should enhance life expectancy of EDGs. Therefore, there will be no adverse impact on plant safety from implementating the proposed actions.

(7) The estimated resource burden on the NRC associated with the proposed backfit and the availability of such resources.

The principal cost to the NRC would be associated with reviewing EDG reliability programs at selected plant sites, as needed. It is estimated that such efforts would not exceed 0.5 person-month per site. Using an estimated cost of $12,000 per staff month and 15 sites, the total cost would be $150,000.

The development of guidelines by staff and industry representatives which resulted in Revision 3 of Regulatory Guide 1.9, and of NUMARC-8700, Rev. 1, Appendix D provides for uniform guidance and conformity of approaches, thereby reducing NRC review costs.

(8) The potential impact of differences in facility type, design, or age on the relevance and practicality of the proposed backfit.

Differences in facility type, design, or age will not have any significant effect on the relevance or practicality of complying with the EDG reliability monitoring program.

In addition, Revision 3 of Regulatory Guide 1.9 and NUMARC-8700, Rev. 1, Appendix D have been subjected to extensive discussions with NUMARC's B-56 working group and also issued for external review to solicit a wide spectrum of review and ensure conformity with proven practice, thereby further reducing potential impacts.

(9) Whether the proposed backfit is interim or final and, if interim, the justification for imposing the proposed backfit on an interim basis.

The proposed action is final.

ENCLOSURE E

5-29-90
[7590-01]

DRAFT FEDERAL REGISTER NOTICE
(Ref. Resolution GSI B-56)

NUCLEAR REGULATORY COMMISSION
Regulatory Guide; Issuance, Availability

The Nuclear Regulatory Commission has issued a revision to a guide in its Regulatory Guide Series. This series has been developed to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the staff in evaluating specific problems or postulated accidents, and data needed by the staff in its review of applications for permits and licenses.

The issuance of Regulatory Guide 1.9, Revision 3, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants," constitutes resolution of Generic Safety Issue B-56, "Diesel Generator Reliability." Revision 3 of Regulatory Guide 1.9, integrates into a single regulatory guide pertinent guidance previously addressed in Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Regulatory Guide 1.9, Revision 2, and Generic Letter 84-15. Guidance provided in Revision 3 of Regulatory Guide 1.9 supersedes Regulatory Guide 1.108, and Regulatory Guide 1.108 is hereby withdrawn. Withdrawal of Regulatory Guide 1.108, however, does not alter any prior or existing licensing commitments based on Regulatory Guides 1.108 and 1.9 and Generic Letter 84-15. These are still considered to be in effect until a licensee changes plant Technical Specifications.

Regulatory Positions C.3, "EDG Reliability Goals and Monitoring" and C.6, "Emergency Diesel Generator Reliability Program" of Revision 3 of Regulatory Guide 1.9, will be used by the staff, in conjunction with NUMARC-8700, Revision 1, Appendix D (5-2-90), for monitoring and maintaining EDG reliability levels against those selected for compliance with 10 CFR 50.63, "Loss of all alternating current power" and for reviewing EDG reliability programs. Compliance with these regulatory positions is a backfit. A backfit analysis for this aspect of the regulatory guide is included here.

Comments and suggestions in connection with (1) items for inclusion in guides currently being developed or (2) improvements in all published guides are encouraged at any time. Written comments may be submitted to the Regulatory Publications Branch, Division of Freedom of Information and Publications Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Regulatory guides are available for inspection at the Commission's Public Document Room, 2120 L Street NW., Washington, DC. Copies of issued guides may be purchased from the Government Printing Office at the current GPO price. Information on current GPO prices may be obtained by contacting the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082, telephone (202) 275-2060 or (202)275-2171. Issued guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161.

(5 U.S.C. 552(a))

Dated at ________________ this ________ day of ____________ 1989.

For the Nuclear Regulatory Commission

____

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

ENCLOSURE F

NUMARC 87-00

GUIDELINES AND TECHNICAL BASES FOR NUMARC INITIATIVES

ADDRESSING STATION BLACKOUT AT LIGHT WATER REACTORS

REVISION 1

MAY 2, 1990

APPENDIX D

EDG RELIABILITY PROGRAM

INTRODUCTION

Utilities are required to ensure that the Emergency Diesel Generators (EDGs) credited in each facility's station blackout coping assessment are maintained at or above the target reliability selected per Section 3.2.4. Initiative 5A presents triggers values for 20, 50 and 100 demands that were developed as the mechanism to monitor nuclear unit reliability levels. This appendix provides guidance on monitoring these levels in accordance with Initiative 5A, along with guidance on remedial actions that may be considered in response to exceedance of the trigger values. These remedial actions are designed to restore nuclear unit reliability levels above the selected target reliability.

This appendix consists of two sections. Section D.1 provides definitions of key terms related to the EDG Reliability Program. The terminolgy and concepts presented in this section are consistent with the methodology of the Industrywide Plant Performance Indicator Program (PPIP) managed by the Institute of Nuclear Power Operations (INPO).

Section D.2 provides guidance on methods to monitor nuclear unit EDG reliability levels and on remedial actions to restore reliability above the selected target reliability. The remedial actions set forth in this section are derived from current industry practices that have proven effective in maintaining EDG reliability.

The associated Topical Report to this appendix provides additional information on root cause analysis, recognized analytical and quality improvement techniques, and further detail on the elements (critical review elements) of an EDG reliability program. These elements are:

(1) Surveillance that identifies EDG support systems and subcomponents, frequency and scope of testing, and incorporates manufacturer's recommendations.

(2) Performance monitoring of important parameters on an ongoing basis to obtain information on the condition of the EDG and key components so that precursor conditions can be identified prior to failure.

(3) Maintenance designed for both preventive and corrective actions based upon operating history and past maintenance activities, vendor recommendations, and the results of surveillance testing.

(4) Failure analysis and root cause investigation to assist in developing effective corrective actions to prevent recurrence of failures.

(5) EDG problem closeout process to ensure the resolution of a failure or a problem is properly implemented and successful.

(6) EDG reliability data system to ensure the availability and retreivability of important data and information relating to EDG reliability.

This appendix represents one approach to EDG reliability. It is recognized that there are existing programs that have proven extremely successful at maintaining high EDG reliability. This appendix is not intended to replace or supplant such programs, but simply to provide guidance to address declining EDG reliability for utility use, as appropriate.

D.1 DEFINITIONS

NUMBER OF START DEMANDS

All valid and inadvertent start demands, including all start-only demands and all start demands that are followed by load-run demands, whether by automatic or manual initiation. A start-only demand is a demand in which the emergency generator is started, but no attempt is made to load the generator. See "Exceptions" below.

NUMBER OF START FAILURES

Any failure within the emergency generator system that prevents the generator from achieving specified frequency (or speed) and voltage is classified as a valid start failure. (For the monthly surveillance test, the generator can be brought to rated speed and voltage in a time that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to reach rated speed and voltage in the precise time required by technical specifications, the start attempt .. not considered a failure if the test demonstrated that the generator would start in an emergency.) See "Exceptions" below. Any condition identified in the course of maintenance inspections (with the emergency generator in the standby mode) that definitely would have resulted in a start failure if a demand had occurred should be counted as a valid start demand and failure.

NUMBER OF LOAD-RUN DEMANDS

To be valid, the load-run attempt must follow a successful start and meet one of the following criteria: (See "Exceptions" below.)

- a load-run of any duration that results from a real (e.g., not a test) automatic or manual signal
- a load-run test to satisfy the plant's load and duration test specifications
- other operations (e.g., special tests) in which the emergency generator is planned to run for at least one hour with at least 50 percent of design load

NUMBER OF LOAD-RUN FAILURES

A load-run failure should be counted when the emergency generator starts but does not pick up load and run successfully. Any failure during a valid load-run demand should be counted. See "Exceptions" below. (For monthly surveillance tests, the generator can be loaded at a rate that is recommended by the manufacturer to minimize stress and wear. Similarly, if the generator fails to load in the precise time required by technical specifications, the load-run attempt is not considered a failure if the test demonstrated that the generator would load and run in an emergency.) Any condition identified in the course of maintenance inspections (with the emergency generator in the standby mode) that definitely would have resulted in a load-run failure if a demand had occurred should be counted as a valid load-run demand and failure.

EXCEPTIONS

Unsuccessful attempts to start or load-run should not be counted as valid demands or failures when they can be definitely attributed to any of the following:

- spurious operation of a trip that would be bypassed in the emergency operation mode (e.g., high cooling water temperature trip)
- malfunction of equipment that is not required to operate during the emergency operating mode (e.g., synchronizing circuitry)
- intentional termination of the test because of alarmed or observed abnormal conditions (e.g., small water or oil leaks) that would not have ultimately resulted in significant emergency generator damage or failure
- component malfunctions or operating errors that did not prevent the emergency generator from being restarted and brought to load within a few minutes (i.e., without corrective maintenance or significant problem diagnosis)
- a failure to start because a portion of the starting system was disabled for test purposes, if followed by a successful start with the starting system in its normal alignment

Each emergency generator failure that results in the generator being declared inoperable should be counted as one demand and one failure. Exploratory tests during corrective maintenance and the successful test that is run following repair to verify operability should not be counted as demands or failures when the EDG has not been declared operable again.

UNIT EDG RELIABILITY: The average reliability of all EDGs being combined at an individual nuclear unit.

EXCEEDENCE TRIGGER VALUE: The value (based on number of failures during a comparative number of demands) at which additional actions to review the effectiveness of EDG reliability efforts are initiated.

CORRECTIVE MAINTENANCE: Maintenance performed to correct a component or subcomponent which is determined to be incapable of performing its function.

PREVENTATIVE MAINTENANCE: Maintenance performed with the expectation of preventing a component or subcomponent from failing to perform its function.

D.2 MONITORING EDG RELIABILITY

This section provides methodology to monitor, maintain, and improve unit EDG reliability. The methodology utilizes samples of EDG test and operating data and compares this data with predetermined values (trigger values) to determine a proper course of action to support EDG reliability goals. It should be noted that a reliability value derived from a sample is only an approximate indication of an EDG's true underlying reliability. This is because the r liability from samples will vary from the true underlying reliability due to statistical variations based upon the sample sizes. The trigger values take into account such statistical variations. Therefore, the comparison of the reliability indicators against the trigger values provides an accurate indication of reliability levels from which to base remedial actions. The method of calculating these reliability indicators is given in Section D.2.2.

The methodology in this section consists of four parts:

(1) maintaining data on successful and failed EDG start and load-run demands

(2) evaluating the unit EDG reliability indicators for the last 50 and last 100 demands as well as EDG performance over the last 20 demands via the prescribed methodology

(3) relating the calculated EDG performance and reliability indicators to trigger values established for the selected target reliability

(4) taking remedial actions for individual failures and for exceedence of one or more trigger values

The sample size and action levels are based on a surveillance testing interval for each EDG of once per month. Details of each step are presented in the sections that follow.

D.2.1 Maintaining EDG Reliability Data

Utilities should maintain records on EDG demands, successes and failures. Each success or failure should be characterized using the Industrywide Plant Performance Indicator Program (PPIP) methodology to establish valid demands, successful starts and successful load-runs. The rules governing the INPO methodology are similar to the intent of NSAC 108, The Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants [Wyckoff].

D.2.2 Determining Performance and Reliability Indicators

The calculation of the performance and reliability indicators of a nuclear unit is comprised of two components: (1) the start reliability and (2) the load-run reliability. Since not all EDG demands include both start and load-run demands, data on these two reliability components should be gathered and evaluated individually and then combined. An equal number of start demands and load-run demands may not occur in the same time interval.

D.2.2.1 Determining Unit EDG Performance Indicator for Last 20 Demands

Determining the unit EDG performance indicator for the last 20 demands is accomplished by summing the number of failures observed in the last 20 start demands and the number of failures observed in the last 20 load-run demands for all of the EDGs serving as standby power supplies to that unit.

D.2.2.2 Determining Unit EDG Reliability Indicator for Last 50 Demands

Determining the unit EDG reliability indicator for the last 50 demands is accomplished by summing the number of failures observed in the last 50 start demands and the number of failures observed in the last 50 load-run demands for all of the EDGs serving as standby power supplies to that unit. A time limit of four years is suggested on the data.

Example: Determining the plant unit EDG reliability indicator for the last 50 demands

A site has one nuclear unit which has two EDGs (EDG-1 and EDG-2). The last 50 start demands consisted of 30 start demands on EDG-1, and 20 start demands on EDG-2. The last 50 load-run demands consisted of 25 load-run demands on EDG-1, and 25 load-run demands on EDG-2.

EDG-1 has experienced two starting related failures in its last 30 EDG-1 start demands and EDG-2 has experienced no starting related failures in its last 20 start demands. Thus, the unit has experienced two starting failures in the last 50 start demands.

EDG-1 has experienced one load-run failure in its last 25 load-run demands, and EDG-2 has experienced one load-run failure in its last 25 load-run demands. Thus, the unit has experienced two load-run failures in the last 50 load-run demands.

Reliability Indicator - The total number of nuclear unit EDG failures experienced in the last 50 demands is four (two start failures for the unit plus two load-run failures for the unit). Therefore the reliability indicator is four out of 50.

D.2.2.3 Determining Unit EDG Reliability Indicator for Last 100 Demands

Determining the unit EDG reliability indicator in the last 100 demands is accomplished by summing the number of failures observed in the last 100 start demands and the number of failures observed in the last 100 load-run demands for all of the EDGs serving as standby power supplies to that unit. A time limit of four years is suggested on the data.

D.2.2.4 Special Conditions

The evaluation of a nuclear unit's EDG performance and reliability indicators should take into account the demand and failure experience of all EDGs which provide standby power for the the unit. For nuclear units with fully shared EDGs between nuclear units (for example, four EDGs serving two units), the same evaluation based on all the EDGs should be performed. For units with some dedicated and some shared EDGs, the failure experience of the EDG serving the specific nuclear unit are to be included.

Example: For a two unit plant with one EDG dedicated to the first unit, one EDG dedicated to the second unit and a third EDG shared between units, the EDG reliability indicator for the first unit should consider only the failure experience of its dedicated diesel and the shared diesel. Likewise, the EDG reliability indicator for the second unit should consider the failure experience of its dedicated EDG and the shared EDG. The shared EDG is applied to both units.

Some units have EDGs of different designs which serve the function of providing standby power supplies. EDGs that have different designs, operating procedures and maintenance procedures may be evaluated separately if desired. In this case a unit would have more than one set of reliability indicator evaluations to perform and to compare to program triggers.

Example: A two nuclear unit site has five EDGs. Three are of the same manufacturer and design. Two of these three serve the emergency busses of one of the nuclear units and the third serves as a swing between nuclear units. The remaining two EDGs are of a different manufacturer and design than that of the first three. These remaining two serve the emergency buses of the second nuclear unit. Since each of these EDGs have the capability to provide for safe shutdown, they are roughly equivalent from a station blackout risk perspective. One set of 20, 50 and 100 demand indicators is calculated using the combined experience of three EDGs of the same type and a second set of indicators is calculated using the combined experience of the other two EDGs. The results of these separate evaluations are to be compared to appropriate reliability triggers as described in Section D.2.3.

Table D.2-1 provides methods that can be used for combining unit EDG experience for different EDG configurations.

Table D.2-1

METHODS FOR COMBINING UNIT EDG EXPERIENCE

EDG Configuration	Method for Combining
2,3,4 EDGs dedicated to a unit	Use combined failures of all EDGs
2,3,4 EDGs shared between units for all units	Use combined failures of all EDGs
1 dedicated EDG at each unit and 1 shared between units	Each unit uses the combined failures of its dedicated EDG and the shared EDG
2 dedicated EDGs at each unit and 1 shared between units	Each unit uses the combined failures of its dedicated EDGs and the shared EDG
2 dedicated EDGs and 1 or more diverse EDGs within the same unit	Use the combined failures of all EDGs or separately consider the failures of different EDGs

D.2.3 Relating the Calculated Unit EDG Performance and Reliability Indicators to Trigger Values for Selected Target Reliability

D.2.3.1 Use of the Exceedence Trigger Values

Failure rate triggers are used to indicate when EDGs do not meet the selected target reliabilities. This sub-section incorporates the trigger values presented in Initiative 5A for the selected target reliabilities. Table D.2-2 provides the trigger values for 20, 50 and 100 demands based on the selected EDG target reliability of 0.95 or 0.975. The selected EDG target reliability is the allowed underlying EDG target reliability selected in Section 3.2.4 and used in Table 3.8 on page 3-19 to establish the coping duration category for a station blackout.

Table D.2-2

EXCEEDENCE TRIGGER VALUES

Selected Target Reliability	Failures In 20 Demands	Failures In 50 Demands	Failures In 100 Demands
0.95	3	5	8
0.975	3	4	5

The exceedence trigger values for failures in 20 demands, failures in 50 demands and failures in 100 demands represent the values at which additional actions should be taken to restore the selected target reliability.

Periodic testing is normally conducted at one month intervals for each EDG. Real demands may also occur between testing intervals. After each failure of an EDG, and prior to the next scheduled periodic test, the number of unit EDG failures in the last 20, 50 and 100 demands should be compared to the exceedence trigger values for the selected target reliability.

D.2.3.2 Successful Test/Demand

If the most recent test is successful, then no additional actions are required unless already in a past exceedence category (see Section D.2.4.5).

D.2.3.3 Unsuccessful Test/Demand - No Trigger Values Exceeded

If the most recent test results in a failure and the failures in the last 20 demands, the failures in the last 50 demands, and the failures in the last 100 demands are less than the trigger values in Table D.2-2 for the selected target reliability, then the actions set forth in Section D.2.4.1, Actions for Plants That Do Not Exceed Any Trigger Value, should be followed.

Example: A unit has a selected EDG target reliability of 0.95. The most recent failure was the second failure in the last 20 demands, the third failure in the last 50 demands and the sixth failure in the last 100 demands. The two failures are less than the three failure trigger value for the failures in 20 demands, the three failures are less than the five failure trigger value for the failures in 50 demands and the six failures are less than the eight failure trigger for the failures in 100 demands. Hence, none of the trigger values were equaled or exceeded. The actions set forth in section D.2.4.1, Actions for Plants That Do Not Exceed Any Trigger Value, should be followed.

D.2.3.4 Unsuccessful Test/Demand - One Trigger Value Exceeded

If the most recent test resulted in a failure and either:

(1) the failures in 20 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

<u>OR</u>

(2) the failures in 50 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

<u>OR</u>

(3) the failures in 100 demands are equal to or greater than the trigger value for the selected target reliability in Table D.2-2,

then the actions set forth in Section D.2.4.2, Actions For Plants Exceeding A Single Trigger, should be followed.

<u>Example</u>: A unit has a selected EDG reliability target of 0.95. The most recent failure was the third failure in the last 20 demands test, the fourth failure in the last 50 demands, and the sixth failure in the last 100 demands. The three failures equals or exceeds the three failure trigger value for the failures in 20 demands, the four failures are less than the five failure trigger value for the failures in 50 demands, and the six failures are less than the eight failure trigger value for the failures in 100 demands. Hence one trigger value was equaled or exceeded. The actions set forth in section D.2.4.2, Actions for Plants Exceeding a Single Trigger, should be followed.

D.2.3.5 Unsuccessful Test/Demand - 50 and 100 Demand Trigger Values Exceeded

If the most recent test resulted in a failure and:

(1) the failures in 50 demands are equal to or greater than the trigger value for the selected reliability target in Table D.2-2,

<u>AND</u>

(2) the failures in 100 demands are equal to or greater than the trigger value for the selected reliability target in Table D.2-2,

then the actions set forth in Section D.2.4.3, Actions For Plants That Exceed the 50 and 100 Demand Triggers, should be followed.

Example: A unit has a selected EDG target reliability of 0.975. The most recent failure was the fourth failure in the last 50 demands and the fifth failure in the last 100 demands. The four failures equals or exceeds the four failure trigger value for the failures in 50 demands and the fifth failure equals or exceeds the five failure trigger for the failures in 100 demands. Hence, both trigger values were equaled or exceeded. The actions set forth in section D.2.4.3, Actions for Plants That Exceed the 50 and 100 Demand Triggers, should be followed.

D.2.4 Actions for Individual Failures and for Exceedence of One or More Trigger Values

This section provides the response action guidelines to EDG failures or the exceedence of one or more trigger values. Figure D.2-1 illustrates the actions to be taken. The left-most flow path represents actions to be taken in response to individual EDG failures, but when no trigger values are exceeded. These actions are detailed in Section D.2.4.1. The center flow path represents the actions to be taken when the trigger value for either 20, 50 or 100 demands is exceeded. These actions are detailed in Section D.2.4.2. The right flow path represents the actions to be taken when the trigger values for both the 50 and 100 demands have been exceeded. These actions are detailed in Section D.2.4.3.

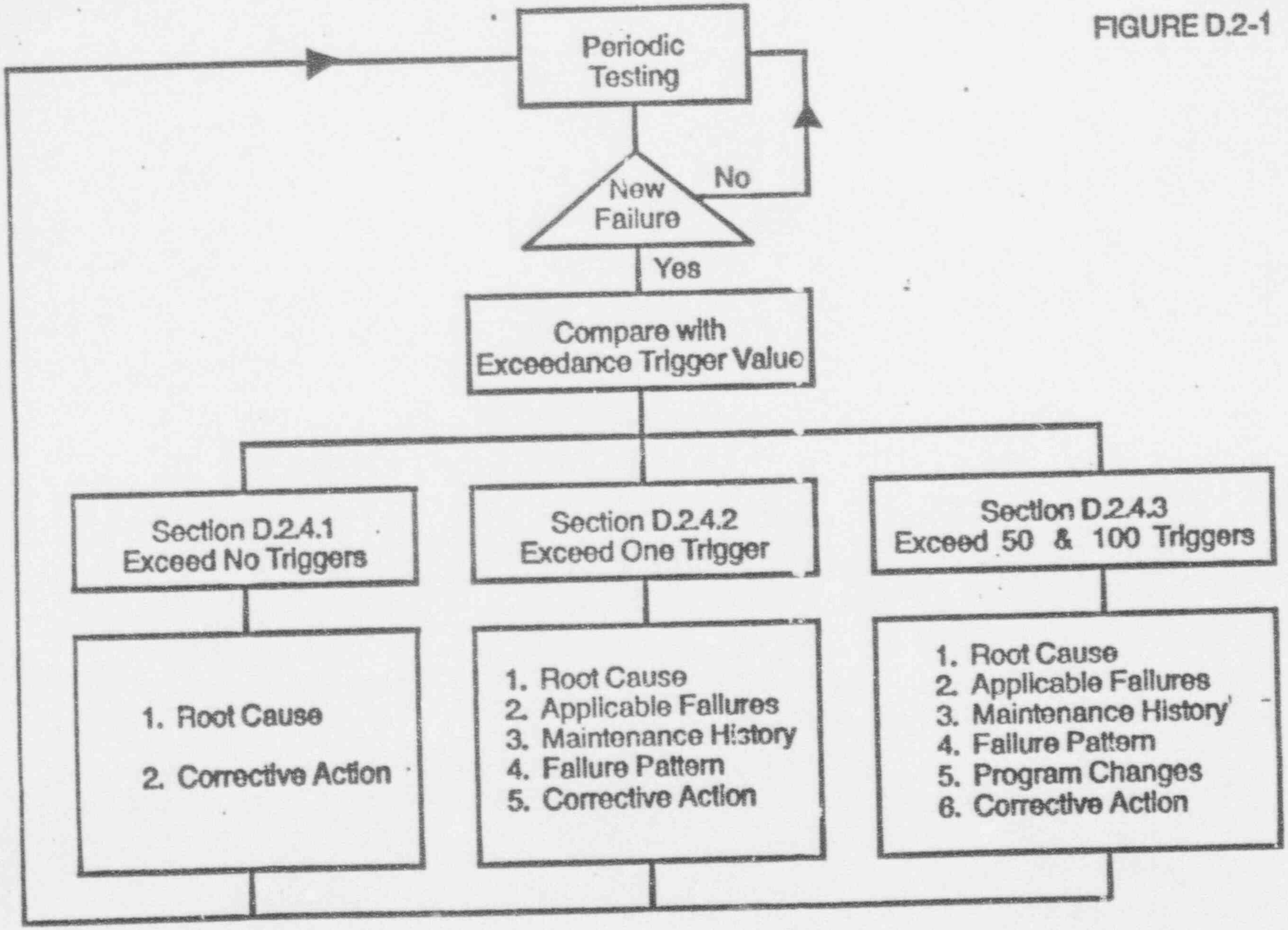
Section D.2.4.4 provides guidance on actions to address an individual EDG that has experienced 4 or more failures in the last 25 demands.

Section D.2.4.5 provides details on the duration of actions arising from exceeding one or more of the trigger values.

Section D.2.4.6 provides guidance on recordkeeping.

Section D.2.4.7 provides guidance on reporting to NRC.

FIGURE D.2-1


Periodic Testing
New Failure
No
Yes
Compare with Exceedance Trigger Value
Section D.2.4.1 Exceed No Triggers
Section D.2.4.2 Exceed One Trigger
Section D.2.4.3 Exceed 50 & 100 Triggers
1. Root Cause
2. Corrective Action
1. Root Cause
2. Applicable Failures
3. Maintenance History
4. Failure Pattern
5. Corrective Action
1. Root Cause
2. Applicable Failures
3. Maintenance History
4. Failure Pattern
5. Program Changes
6. Corrective Action

D.2.4.1 Actions for Plants That Do Not Exceed Any Trigger Value

For plants where the observed number of failures in the last 20, 50 and the last 100 demands are less than the associated trigger values for the selected target reliability, but have experienced an unsuccessful start or load-run, the following actions should be performed:

(1) determine the root cause of each new failure

(2) corrective actions

It should be noted that the reliability actions described herein following an EDG failure do not preclude any immediate actions currently docketed to fulfill regulatory requirements. Testing and response to EDG failures (corrective actions) should be consistent with current plant Technical Specifications.

The normal plant practices and procedures to accomplish the noted reliability actions do not need to be modified specifically for EDGs. The results of root cause evaluations in response to EDG failures should be incorporated into appropriate corrective actions. Details of these actions are provided below.

(1) Determine the Root Cause of Each New Failure

The cause of each new failure should be determined. A root cause analysis capability is generally agreed to be an effective part of the failure analysis process. A root cause analysis of any EDG failure should include:

a. investigating the cause of failures in sufficient detail with appropriate cause codes for tracking Corrective Maintenance (CM),

b. addressing the cause of failures to the highest level at which they can be by an applicable and effective maintenance task, testing task, procedure change, operations change, or design modification.

Additional information on root cause analysis is provided in the Topical Report.

A root cause analysis should be done to the extent necessary for determination of the cause of each failure. The threshold for performing/not performing detailed root cause analysis is a function of the failure being examined.

(2) Corrective Actions

Corrective actions should be implemented following the root cause analyses of the EDG failures. These actions, to the extent possible, should be prioritized and scheduled based on the significance of their contribution to preventing a recurring failure. Timely and proper implementation of corrective actions will reduce the likelihood of future failures and help prevent exceedence of reliability trigger values.

D.2.4.2 Actions for Plants Exceeding a Single Trigger

Nuclear units that exceed the last 20 demand failure trigger or the last 50 demand failure trigger or the last 100 demand failure trigger should take actions that focus on identifying and correcting the cause of the decrease in reliability based on the actual EDG failures experienced. The actions should be:

(1) determine the root cause of each new failure

(2) review applicable past failures

(3) evaluate the corrective maintenance tracking history

(4) assess actual failure history against critical review elements

(5) corrective actions

A detailed description of these actions is provided below.

(1) Determine Root Cause of Each New Failure

This action determines the cause of new failures as provided in Section D.2.4.1.

(2) Review Applicable Past Failures

The review of observed EDG failures associated with the trigger value exceedence should be undertaken to identify specific improvements (e.g., in EDG testing, maintenance, operational practices, design changes, etc.) that would restore target reliability. The scope of this review is all failures in the last 100 demands. This review attempts to establish a pattern in the experienced failure modes and the underlying reasons for the failures. For this review failure modes actually experienced are considered to be dominant modes. With this information it would be possible to specify actions that could be taken to preclude or minimize the recurrence of many of the observed failures. The product of this task action would be a list of effective changes that could be implemented.

NOTE: Action (2) may be performed concurrently with Action (3).

(3) Corrective Maintenance Tracking History

Nuclear units that have exceeded one trigger should evaluate the EDG Corrective Maintenance (CM) history and ongoing CM tracking. The history should identify previous CM activities to the extent appropriate based on the nature of the failures. This history should provide cognizant plant personnel with additional information that would be useful in identifying precursors to further reliability degradation. As part of this history, where available data permits, each CM related to an EDG system component failure within the last 100 demands would be evaluated and categorized in four important areas: severity of failure, functions affected, EDG subsystem involved, and failure cause classification. The severity of each CM would be classified in accordance with the IEEE Std 500 Reliability Data and the Nuclear Plant Reliability Data System (NPRDS) severity levels: immediate (catastrophic), degraded and incipient. A sample format for tracking EDG CMs is provided in Figure D.2-2. Other formats that accomplish the same purpose are acceptable.

Figure D.2-2

Corrective Maintenance Tracking History

CM # (1)	Component Involved (2)	Subsystem (3)	Immediate/ Degraded/ Incipient (4)	Function(s) Affected (5)	Description of Failure (6)	Corrective Action(s) Taken (7)

Heading Definitions:

1. **CM #:** A unique identifier for the work request or work authorization which was identified in response to the failure.
2. **Component Involved:** The unique equipment piece number(s) for the component(s) involved in the failure.
3. **Subsystem:** The EDG subsystem affected by this failure (i.e., fuel, starting air, engine, generator, cooling exhaust, lubrication or I&C).
4. **Immediate/Degraded/Incipient:** Classification of the failure according to the IEEE-500 severity index and NPRDS. Note: the immediate classification in NPRDS is equivalent to the catastrophic classification in IEEE-500.
5. **Function(s) Affected:** Identification of the function(s) of the EDG impacted by the failure (i.e., starting, loading, continued operations, shutdown, etc.).
7. **Corrective Action(s) Taken:** A brief description of action taken in response to failure (i.e., repair, replacement, redesign, etc.).

The Corrective Maintenance history and ongoing tracking should take care to distinguish between corrective maintenance actions and other actions that may use the normal plant work order system commonly used for corrective maintenance. The ongoing CM tracking should continue until the EDGs are no longer considered to be in an exceedence category as per Section D.2.4.5. After implementing the CM tracking, plant personnel would have available summaries to assist in monitoring and evaluating EDG performance over time.

(4) Assess Failure History Against Critical Review Elements

Once the specific failures have been reviewed and improvements identified, an evaluation should be performed to determine if any failure patterns identified by Actions (2) and (3) are indicative of programmatic deficiencies. The evaluation should determine whether the observed pattern of failures are related to any of the reliability program critical review elements (CRE). For each observed failure that had a root cause analysis performed, it may only be necessary to review each of these root cause analyses to determine which element if any is implicated. Information relating to each of the critical review elements is contained in the Topical Report.

(5) Corrective Actions

These actions are similar to that provided in Section D.2.4.1, except that the scope may be greater and may include programmatic elements as a result of the review to determine a pattern of failures. Timely and proper implementation of changes that improve reliability will reduce the likelihood of subsequent failures and exceedence of another trigger value.

D.2.4.3 Actions for Plants That Exceed the 50 and 100 Demand Triggers

Nuclear units exceeding both the 50 demand and the 100 demand failure triggers should take additional actions beyond those required of plants exceeding a single trigger value. The same basic actions as for nuclear units with a new failure with no trigger value exceedence and for nuclear units exceeding a single trigger value should be performed including the effects of additional failures as the result of actions (1) and (4). The actions should be:

(1) determine the root cause of each new failure

(2) review applicable past failures

(3) evaluate the corrective maintenance tracking history

(4) assess actual failure history against critical review elements

(5) reliability program changes

(6) corrective actions

Actions (1) through (4) are similar to those discussed in the previous sections.

(5) Reliability Program Changes

The exceedence of both the 50 and 100 demand triggers requires consideration be given to a comprehensive review of the reliability program. The previous remedial actions in response to EDG failures would apppear to have not yet been successful in maintaining the desired reliability. Therefore, emphasis should be placed more on programmatic issues, rather than on response to individual failures. Consideration may also be given to assistance by independent reviewers, such as engineering or corporate staff, vendor or consultant personnel in assessment of the reliability program to the extent necessary to achieve needed improvements. Many quality improvement techniques are available which may be utilized in analyzing, evaluating and, as necessary, improving reliability programs.

An example of this review activity incorporating recognized analytical and quality improvement techniques is provided in the Topical Report as useful information.

(6) Corrective Actions

Following the comprehensive program review, improvements in the form of restructuring the reliability program are warranted to reinstate EDG reliability. Timely and proper implementation of these improvements should be accomplished to restore confidence in the ability to maintain the chosen EDG target reliability.

D.2.4.4 Problem EDG

A problem EDG is defined as an individual EDG that has experienced 4 or more failures in the last 25 demands. Should this case arise, the actions taken in response to exceedence of a single trigger value (Section D.2.4.2) would apply.

Following completion of corrective actions, restored performance of the problem EDG should be demonstrated by conducting seven consecutive failure free start and load-run tests (at a frequency of no less than 24 hours and of no more than seven days between each demand). The monthly surveillance test schedule should not be resumed on the problem EDG until the seven consecutive tests are successfully completed. All starts and load-runs performed during this period should be included in the unit EDG reliability data set so long as the EDG is operable.

This process of evaluating recent demands and taking appropriate action on the individual EDG experiencing recurring failures is a key element in providing reasonable assurance that EDG performance is restored to an acceptable level.

D.2.4.5 Post Exceedence Actions

Nuclear plants exceeding one or more failure trigger values would continue to monitor the actual unit EDG performance versus the trigger values. The unit would not revert to a no exceedence status until an exceedence no longer exists in the applicable number of demands, or two years from the last failure while in an exceedence, whichever occurs first. However, before a unit could revert to a no exceedence status on the basis of elapsed time, committed improvement actions shall be completed.

Should a unit continue in an exceedence because of new failures, these failures should be evaluated against the improvement actions previously identified for implementation. The purpose of this evaluation would be to assess whether prior conclusions and attendant actions should be revised due to continued failures.

D.2.4.6 Recordkeeping

Utilities should retain the following information relating to the trigger values and remedial actions in response to exceedences:

(1) Data on valid demands and failures that are used to calculate the performance and reliability indicators.

(2) The corrective actions taken in response to individual failures.

(3) A description of the actions taken in response to a single trigger exceedance.

(4) A description of the EDG reliability program improvements in response to the 50 and 100 demand trigger exceedence.

(5) The schedule of planned and in progress improvements.

D.2.4.7 Reporting to NRC

Utilities should report EDG failures in accordance with the provisions of existing regulations. The report should include the following information:

(1) The nuclear unit EDG performance and reliability indicators as compared to the appropriate 20, 50 and 100 demand trigger values.

(2) A description of the failures, underlying causes, and corrective actions taken.

Enclosure G

5-8-90 Draft

MEMORANDUM FOR: All Project Managers

FROM: James G. Partlow,
Associate Director for Projects
Office of Nuclear Reactor Regulation

SUBJECT: RESOLUTION OF GENERIC SAFETY ISSUE (GSI) B-56, "EDG RELIABILITY" (Generic Letter, see Encl. C)

Enclosed is Generic Letter 90-00 which is being sent to all power reactor licensees and operating license applicants. It provides guidance for action to implement programmatic requirements for an emergency diesel generator (EDG) reliability program that will provide an acceptable resolution to GSI B-56 on EDG reliability. It also provides guidance for the preparation of a license amendment request to implement line-item improvements in Technical Specifications (TS). Any request for changes in TS is voluntary.

It is intended that Project Managers will review licensees commitment to programmatic requirements for monitoring and maintaining EDG reliability in accordance with the guidance in Generic Letter 90-00 for the closure of GSI B-56. Generally it should not be necessary to consult or to obtain review assistance from a technical review branch unless the licensee's proposed action deviates from the generic letter guidance. Also, it is intended that Project Managers will review proposed license amendments for changes to TS conforming to the generic letter guidance.

Enclosed is a model Safety Evaluation Report (SER) that has been prepared by the Technical Specifications and the Electrical Systems Branches. The model SER should facilitate your preparation of a letter to close GSI B-56 for the facility as well as for any proposed license amendment to implement the line-item improvements in plant TS. Because the resolution of GSI B-56 permits a relaxation in TS requirements, proposed changes to TS are voluntary. If you should have any generic TS related questions on the Generic Letter or model SER, contact Tom Dunning, OTSB, on extension 21189. If you have questions of a technical nature, contact Om Chopra, SELB, on extension 20835. The Lead Project Manager for this project is _________. _____ will assist you in the preparation of a NSHC prenotice for a proposed amendment conforming to the generic letter.

James G. Partlow
Associate Director for
Projects Office of
Nuclear Reactor
Regulation

Enclosures:
1. Generic Letter 90-00 (see Encl. C)
2. Model SER

MODEL SAFETY EVALUATION REPORT

Underscored blank spaces are to be filled in with the applicable information. The information identified in brackets should be used as applicable on a plant-specific basis.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO.__ TO FACILITY OPERATING LICENSE NFP-__
AND AMENDMENT NO.__ TO FACILITY OPERATING LICENSE NFP-__
[UTILITY NAME]
DOCKET NOS. 50-__ AND 50-__
[PLANT NAME], UNITS 1 AND 2

INTRODUCTION

By letter dated _____ __, 1990, [utility name] (the licensee) provided a response to the request for a commitment to implement Regulatory Positions C.3, C.4, C.5 and C.6 of Revision 3 to Regulatory Guide 1.9, "Selection, Design, Qualification, Testing, and Reliability of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants" and Initiative 5A and Appendix D of NUMARC 8700, "Guideline and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," Revision 1. This request was made in Generic Letter 90-00, "Request for Action Pursuant to 10 CFR 50.54(f) Related to the Resolution of Generic Safety Issue (GSI) B-56, Diesel Generator Reliability," dated ______ __, 1990. In addition, the licensee proposed changes to the Technical Specifications (TS) for [plant name]. The proposed changes modify the Action requirements of TS 3.8.1.1 for performing emergency diesel generator (EDG) surveillance requirements when an offsite power source is inoperable, modifying the requirements of Table 4.8.1.1.2-1 related to the accelerated frequency for conducting monthly EDG surveillance requirements based on the frequency of EDG failures, and the requirements in TS 4.8.1.1.3 for reporting EDG failures. Guidance on the proposed modifications to TS was also provided to all licensees and operating reactor applicants by Generic Letter 90-00.

EVALUATION

The licensee provided a commitment to comply with Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9, Revision 3 for implementing programmatic requirements for monitoring and maintaining the EDG target reliability of [0.95 or 0.975, as applicable] as selected for compliance with the requirements of the Station Blackout Rule (10 CFR 50.63). [By NRC letter dated _________, 1990, the staff found that [plant name(s)] is(are) in compliance with the requirements of the blackout rule. OR The staff's evaluation of compliance with the blackout rule for [plant name(s)] is ongoing.] However, based on the above response, the staff finds that the licensee has taken appropriate action to address the resolution of GSI B-56 on EDG reliability for [plant name(s)] by the commitment to comply with Regulatory Positions C.3, C.4, C.5 and C.6 of Regulatory Guide 1.9 and NUMARC 8700, Revision 1. Furthermore, this action is consistent with the need for an EDG reliability program that has the capability to achieve and maintain the target EDG reliability selected to cope with station blackout in response to USI A-44, "Station Blackout."

The licensee has proposed a change to Specification 4.8.1.1 to modify the Action requirements that apply when an offsite power circuit is inoperable. This change would eliminate the requirement to each EDG unit by TS [4.8.1.1.2.a.5] A change to Table 4.8.1.1.2-1 was proposed such that the accelerated test frequency of not less than once per 7 days for conducting monthly EDG surveillance requirements would apply when the number of EDG failures, on a per EDG basis, exceeds 3 in the last 25 valid starts. Furthermore, the change permits the accelerated test frequency to be terminated when 7 consecutive failure-free starts have been performed provided the time interval between consecutive tests is no less than 24 hours. In addition, the criteria for determining the number of failures and number of valid tests were changed from Regulatory Position C.2.e of Regulatory Guide 1.108 to Regulatory Position C.2.1 of Regulatory Guide 1.9, Revision 3.

Finally, the licensee has proposed to modify TS 4.8.1.1.3 to eliminate the special reporting requirements for all EDG failures and to include data consistent with the recommendations of Regulatory Position C.5 of Revision 3 to Regulatory Guide 1.9 for EDG failures that are reported pursuant to the requirements of 10 CFR 50.73.

These changes to the TS for [plant name/units] are consistent with the guidance provided in Generic Letter 90-00 and are based upon the recognition that the benefit to safety of the more restrictive existing Surveillance Requirements is small in view of the benefits to safety derived from the elimination of unnecessary starting cycles for the EDG units and from the implementation of the above noted programmatic requirements for monitoring and maintaining EDG target reliability, including the associated recordkeeping on EDG failures. On the basis of its review of this matter, the staff finds that these changes to the TS for [plant name] Unit(s) ___ is(are) acceptable.

<u>ENVIRONMENTAL CONSIDERATION</u>

This(These) amendment(s) involve changes in the use of the facility(ies) located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment(s) involve no significant increase in the amounts and no significant change in the types of any effluent that may be released off site, and that there is no significant increase in individual or cumulative occupational exposure. This determination is based upon the increased reliability of the EDG which will result from the implementation of programmatic requirements for monitoring and maintaining EDG reliability and the relaxation of surveillance requirements in TS that will have a beneficial impact on EDG reliability by reducing the number of unnecessary test cycles. The staff has determined that the amendment(s) involve no significant-hazards consideration, and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

CONCLUSION

The Commission's determinations that the amendments involve no significant-hazards consideration, which were published in the *Federal Register* (5__ FR _____) on ______ __, 1990. The Commission consulted with the State of _______. No public comments were received, and the State of _______ did not have any comments.

On the basis of the considerations discussed above, the staff concludes that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this(these) amendment(s) will not be inimical to the common defense and security or to the health and safety of the public.

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