SAFETY EVALUATION REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 1

DOCKET NO. 50-206

ENVIRONMENTAL QUALIFICATION OF ELECTRIC EQUIPMENT IMPORTANT TO SAFETY

1.0 INTRODUCTION

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

2.0 BACKGROUND

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

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

In addition, the staff issued orders dated August 29, 1980 (amended in September 1980) and October 24, 1980 to all licensees. The August order required that the licensees provide a report, by November 1, 1980, documenting the qualification of safety-related electrical equipment. The October order required the establishment of a central file location for the maintenance of all equipment qualification records. The central file was mandated to be established by December 1, 1980. The staff subsequently issued a Safety Evaluation Report (SER) on environmental qualification of safety-related electrical equipment to the licensee on June 2, 1981. This SER directed the licensee to "either provide documentation of the missing qualification information which demonstrates that safety-related equipment meets the DOR Guidelines or NUREG-0588 requirements or commit to a corrective action requalification, replacement (etc.))." The licensee was required to respond to NRC within 90 days of receipt of the SER.

In response to the staff SER issued in 1981, the licensee submitted additional information regarding the qualification of safety-related electrical equipment. This information was evaluated for the staff by the Franklin Research Center (FRC) in order to: (1) identify all cases where the licensee's response did not resolve the significant qualification issues, (2) evaluate the licensee's qualification documentation in accordance with established criteria to determine which equipment had adequate documentation and which did not, and (3) evaluate the licensee's qualification documentation for safety-related electrical equipment located in harsh environments required for TMI Lessons Learned Implementation.

A Technical Evaluation Report (TER) was issued by FRC on June 28, 1982. An

SER was subsequently issued to the Southern California Edison Company on November 30, 1982 with the FRC TER as an attachment.

A final rule on environmental qualification of electric equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, Section 50.49 of 10 CFR Part 50, specifies the requirements of electrical equipment important to safety located in a harsh environment. In accordance with this rule, equipment for San Onofre Nuclear Generating Station, Unit 1 may be qualified to the criteria specified in either the DOR Guidelines or NUREG-0588, except for replacement equipment. Replacement equipment installed subsequent to February 22, 1983 must be qualified in accordance with the provisions of 10 CFR 50.49, using the guidance of Regulatory Guide 1.89, unless there are sound reasons to the contrary.

A meeting was held with each licensee of plants for which a TER had been prepared for the staff by FRC in order to discuss all remaining open issues regarding environmental qualification, including acceptability of the environmental conditions for equipment qualification purposes, if this issue had not yet been resolved. On December 20, 1983, a meeting was held to discuss Southern California Edison Company's proposed method to resolve the environmental qualification deficiencies identified in the November 30, 1982 SER and June 28, 1982 FRC TER. Discussions also included Southern California Edison Company's general methodology for compliance with 10 CFR 50.49, and justification for continued operation (JCO) for those equipment items for which environmental qualification is not yet completed.

A submittal on July 30, 1984 from the licensee was inadequate to resolve the environmental qualification deficiencies identified by the November 30, 1982 SER and the June 28, 1982 FRC TER, as well as the general methodology for compliance with 10 CFR 50.49. Accordingly, an audit of the environmental qualification documentation files was held on October 2, 3 and 4, 1984, with additional discussions with the licensee on October 26, 1984. This audit and discussions resulted in additional licensee submittals of November 3 and November 19, 1984.

3.0 EVALUATION

The evaluation of the acceptability of the licensee's electrical equipment environmental qualification program is based on the results of an audit review performed by the staff of: (1) the licensee's proposed resolutions of the environmental qualification deficiencies identified in the November 30, 1982 SER and June 28, 1982 FRC TER; (2) compliance with the requirements of 10 CFR 50.49; and (3) JCOs for those equipment items for which the environmental qualification is not yet completed.

Proposed Resolutions Of Identified Deficiencies

The proposed resolutions for the equipment environmental qualification deficiencies, identified in the November 30, 1982 SER, and the June 28, 1982 FRC TER enclosed with it, are described in the licensee's November 3 and November 19, 1984 submittals. During the December 20, 1983 meeting with the licensee, the staff discussed the proposed resolution of each deficiency for each equipment item identified in the FRC TER and found the licensee's approach for resolving the identified environmental qualification deficiencies acceptable. The majority of deficiencies identified were documentation, similarity, aging, qualified life and replacement schedule. All open items identified in the SER were also discussed and the resolution of these items has been found acceptable by the staff.

The approach described by the licensee for addressing and resolving the identified deficiencies includes replacing equipment, performing additional analyses, utilizing additional qualification documentation beyond that reviewed by FRC, obtaining additional qualification documentation and determining that some equipment is outside the scope of 10 CFR 50.49, and therefore not required to be environmentally qualified, e.g., located in a mild environment. The staff discussed the proposed resolutions in detail on an item by item basis with the licensee during the December 20, 1983 meeting. Replacing or exempting equipment, for an acceptable reason, are clearly acceptable methods for resolving environmental qualification deficiencies. The more lengthy discussions with the licensee concerned the use of additional analyses or documentation. Although the staff did

not review the additional analyses or documentation, it discussed how analysis was being used to resolve deficiencies identified in the FRC TER, and the content of the additional documentation in order to determine the acceptability of these methods. The staff concluded that the analysis used was acceptable. In addition to the audit performed in October 1984, the licensee's equipment environmental qualification files will be audited by the staff during follow-up inspections to be performed by Region V, with assistance from IE Headquarters and NRR staff as necessary.

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

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

Compliance With 10 CFR 50.49

In its November 19, 1984 submittal, the licensee has described the approach used to identify equipment within the scope of paragraph (b)(1) of 10 CFR 50.49, equipment relied upon to remain functional during and following design basis events. The licensee states that the environmental effects (including flooding) from all postulated design basis accidents (both inside and outside containment) were considered in the identification of safety-related electrical equipment to be environmentally qualified. These accidents include loss-of-coolant-accidents and the High Energy Line Break (HELB) inside containment, and various HELBs outside containment.

The equipment that is required to operate during these design basis accidents were identified by a review of the Final Safety Analysis Report, Emergency - Operating Procedures, piping and instrumentation diagrams, Technical Specifications and other relevant sources.

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

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

The licensee stated that the identification of this equipment was accomplished as a result of compliance with a number of other efforts. These efforts included a preliminary review performed as part of the fire protection review, a response to IE Information Notice 79-22 and other IE Information Notices, Bulletins and Circulars, and an Emergency Core Cooling System (ECCS) single failure evaluation. This ECCS evaluation involved not only the ECCS, but also the associated systems such as the component cooling water system, the containment spray system, the standby power system and the electrical power distribution system.

These ECCS evaluations utilized failure modes and effects analysis, which would identify those nonsafety related electric equipment items whose failure could prevent satisfactory accomplishment of safety functions, therefore, the staff finds the methodology being used by the licensee is acceptable since it provides reasonable assurance that equipment within the scope of paragraph (b)(2) of 10 CFR 50.49 has been identified.

With regard to paragraph (b)(3) of 10 CFR 50.49, the licensee states that in preparation of the main list, many devices which provided control room indication for post-accident monitoring were included on the list (10 CFR 50.49 Section b(3)). In addition, Southern California Edison Company is currently addressing the requirements of Reg. Guide 1.97.

Additional monitoring equipment may be identified as part of the resolution of Supplement 1 to NUREG-0737 and will be qualified as necessary to 10 CFR 50.49.

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

Justification for Continued Operation(JCO)

The licensee has provided, in its November 3, 1984 submittal, JCOs addressing each item of equipment for which the environmental qualification is not yet completed (see enclosure for the JCO equipment list).

The staff has reviewed each JCO provided by the licensee in its November 3, 1984 submittal and finds them acceptable since they are based on essentially the same criteria that were used by the staff and its contractor to review JCOs previously submitted by licensees. These criteria, listed below, are also essentially the same as those contained in 10 CFR 50.49(i).

1. The safety function can be accomplished by some other designated equipment that is qualified, and failure of the principal equipment as a result of the harsh environment will not degrade other safety functions or mislead the operator.

2. Partial test data that does not demonstrate full qualification, but provides a basis for concluding the equipment will perform its function. If it can not be concluded from the available data that the equipment will not fail after completion of its safety function, then that failure must not result in significant degradation of any safety function or provide misleading information to the operator.

3. Limited use of administrative controls over equipment that has not been demonstrated to be fully qualified. For any equipment assumed to fail as a result of the accident environment, that failure must not result in significant degradation of any safety function or provide misleading information to the operator.

4.0 CONCLUSIONS

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

- Southern California Edison Company's electrical equipment environmental qualification program complies with the requirements of 10 CFR 50.49 since all electrical equipment important to safety will be environmentally qualified by March 31, 1985 or an alternative date reviewed and approved by the staff and since acceptable justification for continued operation has been provided for all equipment not currently qualified.

- The proposed resolutions for each of the environmental qualification deficiencies identified in the November 30, 1982 SER and FRC TER are acceptable.

- Continued operation until completion of the licensee's environmental qualification program will not present undue risk to the public health and safety.

5.0 ACKNOWLEDGEMENT

This Safety Evaluation was prepared by P. Shemanski and W. Paulson.

Dated: March 11, 1985

ENCLOSURE

Justification For Continued Operation Equipment List

SONGS-1 Tag Number	NRC TER Number	Description
C75, C76	-	Westinghouse Hydrogen Recombiner Model B
-	-	Conax Electrical Conductor Seal Assembly Model N-11001, N-11011
MOV 18, 19	5	Limitorque Motor Operator Model SMB-00/Class B
-	54	Raychem Control and Instrumentation Cable Flametrol Insulation
LE 2001, LE 3001 LE 2002 A, B, C LE 3002 A, B, C	-	Transamerica Delaval Level Transmitter Model XM-54852, XM-54853
RT 1255, 1257	-	General Atomic Radiation Monitor Model RD-23
TE-400 A, B, C TE-401A/2401A TE-401 B, C TE-402A/3402A TE-402B, C TE-410 A, B, C	41	Weed Instrument Company RTD Model Numbers: 1D6E/612D-1A-D-6-C-16.5-0-0 1D6E/612-1A-D-6-C-16.5-0-0

SONGS-1 Tag Number	NRC TER Number	Description
TF-411A/3411A TE-411B, C TE-412A/2412A TE-412B, C TE-420A, B, C TE-421A/3421A TE-421 B, C TE-422A/2422A TE-422 B, C		
WPC 23, EPC 23	44	Amphenol Penetration Model 50020353
G10S	50	Westinghouse Pump Motor Type ABDP
G27 A, G27 B,	48	Westinghouse Pump Motors Model AALG
G3 A, B	49	Westinghouse Pump Motors Type CS
MOV 1100 B, C, D	1, 3	Limitorque Valve Motor Operators SMB-00/Class B
MOV 720 A	7	Limitorque Valve Motor Operator SMB-00/Class B
MOV 866 A, B	6	Limitorque Valve Motor Operator SMB-00/Class B
MOV 880	4	Limitorque Valve Motor Operator SMB-00/Class B

SONGS-1 Tag Number	NRC TER Number	Description
CV 515, 516, 517 518, 525, 526 527, 528, 737A, 737 B	17, 35, 52 13, 36, 51, 16	Paul Monroe Hydraulic Rotary Valve Operators Model Number PD 89423, PD 89425, PD=89426
PE 2001, 3001 TE 2001, 3001 AEH2 2001, 3001	-	Exo-Sensor, Inc. Hydrogen Monitor Assemblies Drawing 108D001
MOV 805 A, B, C	8	Limitorque Motor Operators Model SMA-1/Class B
-	-	Revere Corp. Thermocouple Cable Model Number 16, Type JX
-	-	Rockbestos Coaxial Cable Model RSS-6-104
G-45 A, G-45 B	47	Chempump Pump Motors Model GPS-60L-46H-3T
FT 460, 461, 462	25	Foxboro Flow Transmitters Model E 11 DM Without MCA/RRW
FT 912, 913, 914	22	Foxboro Flow Transmitters Model 630-2AS
PT-425	32	Foxboro Flow Transmitter Model E 11 GM

SONGS-1 Tag Number	NRC TER Number	Description
HV 851 A/B, 852 A/B, 853 A/B, 854 A/B	58	Teledyne Solenoid Valve Actuators Model 02112-002-5210 and 02112-003-5210
FCV 1115, D, E, F	12, 57	Valve Actuator Assemblies Honeywell Positioner ASCO Solenoid Model 8300
TE 606	38	Foxboro Temperature Element Model DB-13V-26W
SV 19, 127 (CV40, 116)	64	ASCO Solenoid Valve Model WPLB 3800
SV 28 (CV 10)	70	ASCO Solenoid Valve Model WPLB 8300
SV 29, 30 (POV 9, 10)	63	ASCO Solenoid Valve Model 8345
SV 108, 110, 112 (CV 102, 104, 106)	13	ASCO Solenoid Valve Model WPLB 8300
SV 109, 111, 113 (CV 103, 105, 107)	67	ASCO Solenoid Valve Model WPLB 8300
SV 118, 128 (CV 114, 82)	60, 62	ASCO Solenoid Valve Model WPLB 8300
SV 126 (CV 115)	61	ASCO Solenoid Valve Model WPLB 8300

SONGS-1 Tag Number	NRC TER Number	Description
SV 410, 411 (CV 410, 411)	-	ASCO Solenoid Valve Model LB 8316
SV 702 A, B, C, D	14, 15	Marotta Solenoid Valve Model 583H-AA
SV 1212-6, 7 (CV 146, 147)	68	ASCO Solenoid Valves Model WPLB 8300
FY 1202, 1203, 1204 (CV 202, 203, 204)	-	ASCO Solenoid Valves Model WPLB 8300
HV 1287 (CV 287)	69	ASCO Solenoid Valve Model WPLB 8300
-	55	Anaconda-Ericsson, Inc. Power and Control Cable Silicone Rubber Insulation
RT 1256 A, B RT 1258 A, B	-	General Atomic Company Radiation Detector Model RD-1, RD-2A
PY 3545, 2546, 2530, 3531 (CV 545, 546, 530, 531)	65	ASCO Solenoid Valves Model 8316
-	55	Rockbestos Instrumentation Cable PVC and Teflon Insulation
EPC 4, WPC 7, WPC 9, EPC 1, WPC 5	43	Viking Industries Inc. Electrical Penetrations Power and Control-480VAC

SONGS-1 Tag Number	NRC TER Number	Description
WPC 3, WPC 4, EPC 2, EPC 3	43	Viking Industries Inc. Electrical Penetrations Power and Control-480VAC
-	43	Viking Industries Inc. Electrical Penetrations Power and Control-120VAC
-	56	Rockbestos Control and Instrument Cable Firewall EP Insulation
-	56	Rockbestos Control and Instrument Cable Firewall III Insulation
-	59	General Electric Power and Control Cable Vulkine Insulation
-	53	General Electric Power and Control Cable FR-EPR Neoprene Insulation
EI5, WI6, EPC 11, 12 WCP 11, 13	45	Conax Electrical Penetration Assemblies Model 7895-10000-02
ZSO 2530, 3531, 3545, 2546 ZSC 2530, 3531, 3545, 2546 ZSO 2300, 2301, 3300, 3301 ZSC 2300, 2301, 3300, 3301	37	NAMCO Limit Switches Model EA-180

SONGS-1 Tag Number	NRC TER Number	Description
MOV 356, 357, 358 720B, 883	3, 7	Limitorque Valve Motor Operators SMB-00/Class RH Motor Insulation
G8 A, B	46	Westinghouse Pump Motors Type CSP
-	39, 40	Raychem Nuclear Inline Cable Splice Assemblies Model WCSF-N
SV 532 A, 533 A 534 A, 535 A, 536 A, 537 A (CVs 532, 533, 534, 535, 536, 537) SV 3201, 3213	10, 11	ASCO Solenoid Valves Model NP 8320
SV-1212-8, SV-1212-9, SV-119, SV-120, SV-121 SV-122, SV-123, SV-124 SV-125 A (CV-123), SV-3302, SV-3303, SV-2004, SV-3004, SV-2401, SV-2402, SV-2403 SV-2404, SV-3401, SV-3402 SV-3403, SV-3404	71, 67, 66	Target Rock Solenoid Valves Model 81A-001, 002, 003, 114; 79RR-003; 80B-001-10; 80 EE-001
-	55	Simplex Wire and Cable Company Power and Control Cable Anhydrex-XX Insulation
-	55	Rome Cable Company Cable Rozone A/Roprene Insulation

SONGS-1 Tag Number	NRC TER Number	Description
-	55	Okonite Power and Control Cable Okonex/Okoprene Insulation
EI3, EI4, WI13, WI14	43	Viking Industries Inc. Electrical Penetrations Instrument Penetrations TC & Twisted Pair Cable
LT 3400, A, B, C LT 2400 A, B, C PT 1121 A PT 1120 A PT 430, 431, 425 X1 PT 425 X 2 FT 456, 457, 458 PT 3000 A, B, C FTH 3453, 3454, 3455 FTL 3453, 3454, 3455 PT 2010, 3010 PT 2011, 3011 PT 2001, 3001	34, 30, 31 32, 18	Foxboro Transmitters Model N-E10
LT 430, 431, 432 PT 432 FT 500, 501 PT 501, 502, 503 FT 504	29, 30, 31 23, 20, 33	Foxboro Transmitters Model E-10 With MCA/RRW Modification