U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-206/88-10

Docket No. 50-206

License No. DPR-13
EA 88-99

Licensee: Southern California Edison Company
P. O. Box 800, 2244 Walnut Grove Avenue
Rosemead, California 92770

Facility: San Onofre Unit 1

Location: San Onofre, San Clemente, California

Dates of Inspection: February 22 through March 30, 1988

Inspector: DH Johnson for F. R. Huey, Senior Resident Inspector, Units 1, 2 and 3 — 4/27/88 Date Signed

Approved By: DH Johnson P. H. Johnson, Chief Reactor Projects Section 3 — 4/27/88 Date Signed

Inspection Summary

Inspection on February 22 through March 30, 1988 (Report No. 50-206/88-10)

Areas Inspected:

This was a special inspection of Unit 1 conducted following the identification of environmental qualification deficiencies.

Results:

General Conclusions and Significant Safety Matters:

Several examples of lack of proper environmental qualification of Unit 1 safety equipment were identified during this inspection. A review conducted by the licensee in response to the inspector's findings identified numerous additional examples. The nature and large number of deficiencies identified indicates a programmatic breakdown of licensee implementation of environmental qualification controls, as required by

NRC regulations. The licensee was requested to address the root cause of this program breakdown and identify warranted corrective actions prior to restart of Unit 1 from the current mid-cycle outage.

Summary of Violations:

Enforcement action resulting from this inspection will be the subject of separate correspondence.

DETAILS

1. Persons Contacted

Southern California Edison Company

*C. McCarthy, Vice President, Site Manager
*K. Baskin, Vice President, Nuclear Engineering, Safety and Licensing
W. Moody, Deputy Site Manager
H. Morgan, Station Manager
*M. Medford, Manager, Nuclear Engineering and Licensing
D. Schone, Quality Assurance Manager
D. Stonecipher, Quality Control Manager
R. Krieger, Operations Manager
*J. Reilly, Technical Manager
*D. Pilmer, Manager, Nuclear Engineering
J. Reeder, Operations Superintendent, Unit 1
M. Wharton, Assistant Technical Manager

San Diego Gas and Electric Company

*R. Lacey, Manager of Nuclear Department

*Denotes those attending management meeting on March 24, 1988.

The inspector also contacted other licensee employees during the course of the inspection, including engineering, licensing, and construction personnel and QA and QC engineers.

2. Background

On February 5, the inspector completed the initial portion of a systematic review of licensee implementation of environmental qualification (EQ) requirements for Unit 1 safety injection equipment located in harsh environment areas outside of containment. The inspection emphasized the physical inspection of specific components located in harsh environment areas rather than a review of existing qualification packages.

In performing this review, the inspector noted what appeared to be deficiencies in the licensee's implementation of the environmental qualification program at Unit 1. Accordingly, the inspector expanded the original scope of the inspection to cover other safety related systems located in harsh environment areas outside of containment.

The requirements for environmental qualification of electrical equipment important to plant safety are identified in 10 CFR 50.49. The requirements applicable to this inspection include the following:

10 CFR 50.49(a) requires each holder of a license for operation of a nuclear power plant to establish a program for environmentally qualifying the electric equipment defined in paragraph (b).

10 CFR 50.49(b) defines equipment important to safety and covered by 10 CFR 50.49 to be:

(1) Safety-related electric equipment (i.e., that equipment relied upon to remain functional during and following design basis events),

(2) Non-safety-related electric equipment whose failure could affect the satisfactory fulfillment of a safety function, and

(3) Certain post-accident monitoring equipment.

10 CFR 50.49(d) requires the licensee to prepare a list of equipment covered under 10 CFR 50.49(a).

10 CFR 50.49(f) states that each item of electrical equipment shall be qualified by test and/or analysis to show that the equipment to be qualified is acceptable.

10 CFR 50.49(g) established a deadline of November 30, 1985, for completion of final environmental qualification of all electrical equipment covered by this section.

10 CFR 50.49(j) states that a record of the qualification of electrical equipment shall be maintained in a qualification file in an auditable form to permit verification that the equipment is qualified and meets the specified performance requirements under postulated environmental conditions.

3. Specific Findings (37701)

As of the close of this inspection, the findings indicated significant deficiencies in the licensee environmental qualification program as implemented for Unit 1.

Specific examples of identified environmental qualification deficiencies are described below. A preliminary review of these examples indicated two major categories of environmental qualification program deficiency. The first category involved failure of the design control process to properly address EQ concerns, as required by 50.49(b)(1), for plant modifications performed after compilation of the Master EQ List but prior to implementation of the EQ program. The second category involved failure to consider possible electrical interaction between associated electrical circuits, as required by 50.49(b)(2).

It appears that the deficiencies identified during this inspection existed prior to the November 30, 1985 qualification deadline described in 10 CFR 50.49(g). Specific examples of observed environmental qualification deficiencies are as follows:

a. On January 7, 1988, a licensee quality assurance inspection identified EQ deficiencies related to six solenoid valves (SV 17, SV 17A, SV 18, SV 18A, SV 875A, and SV875B) associated with four safety injection and feedwater miniflow recirculation valves (CV 875A/B and CV 36/37). In particular, the six valves were not included on the environmental qualification master list (EQML), as required by 10 CFR 50.49(d). In addition, only SV 18 and SV 18A had been qualified by test or analysis, as required by 10 CFR 50.49(f). The plant safety analysis relies on these valves to prevent main feedwater pump damage during a small break loss-of-coolant accident (LOCA).

b. On January 25, the NRC inspector found that the main feedwater pump motor air filters did not conform to the description of those filters in the pump motor EQ package. In particular, the metal filters described in the pump motor environmental qualification package had been replaced with cardboard air filters. The metal air filters are specified to ensure that the pump will remain operable during harsh steam environment conditions.

c. On February 1, the NRC inspector determined that two safety injection bonnet vent valves (SV2900 and SV3900) were not included on the EQML as required by 10 CFR 50.49(d). The plant safety analysis relies on these valves to ensure proper operation of the safety injection discharge valves.

d. On February 5, the NRC inspector determined that two auxiliary feedwater pump discharge valves (MOV 1202 and MOV 1204) were not included on the EQML as required by 10 CFR 50.49(d), and that the valves were not qualified by test or analysis, as required by 10 CFR 50.49(f). The position taken by the licensee was that these valves were found in an "essentially qualified" condition (requiring only minor corrective action, such as change of lubricant). The safety analysis requires that these valves open and close (respectively) to allow automatic initiation of auxiliary feedwater.

e. On February 10, the NRC inspector identified EQ deficiencies associated with the three main feedwater block valves (MOV 20, 21 and 22). In particular, the valves were not included on the EQML as required by 10 CFR 50.49(d), and the valves were not qualified by test or analysis, as required by 10 CFR 50.49(f). The plant safety analysis relies on these valves to back up the HV852 valves for isolation of feedwater to the steam generators.

When the inspector identified this concern, the licensee stated that this deficiency had been recognized (in September 1987) in the course of completing the Unit 1 single failure analysis. The single failure analysis also confirmed that the feedwater system bypass valve solenoids (SV 149, SV 150 and SV 151) and the feedwater system regulating valve solenoids (SV 456, SV 457 and SV 458) were not properly qualified. These components were included within the scope of the Justification for Continued Operation provided for the single failure issue (which assumed these components to be inoperable). However, a comprehensive evaluation of the EQ deficiencies as related to root cause and possible program problems was not pursued at that

time, in contrast to prompt actions initiated by the licensee following the identification of single failure deficiencies.

f. In response to concerns raised by the NRC inspector on February 5, the licensee's nuclear engineering department committed to perform a detailed review of safety systems and safety system interfaces which are located in harsh environment areas. Although still in progress at the end of this inspection, this review had identified numerous additional examples of improperly or inadequately qualified components affecting safety-related systems. In particular:

The licensee concluded that the following additional components were not included on the EQML as required by 10 CFR 50.49(d):

(1) Seven charging system flow controllers (FY 1112, FY 1115A, FY 1115B, FY 1115C, FY 1115D, FY 1115E, FY 1115F).

(2) Three charging system recirculation flow indicators (FT 2114B, FT 2114C, FT 3114A).

The licensee determined that the following additional components were not included on the EQML as required by 10 CFR5 0.49(d), and also were not shown to be qualified by test or analysis as required by 10 CFR 50.49(f):

(1) Four charging system auxiliary spray valve position switches (ZSO 1304, ZSO 1305, ZSC 1304, ZSC 1305).

(2) Four safety injection miniflow valve position switches (ZSO 1875A, ZSO 1875B, ZSC 1875A, ZSC 1875B).

(3) One auxiliary feedwater pump bearing cooling water valve (SV 135).

(4) Twelve safety injection switchover valve air solenoids (SV 520, SV 521, SV 522, SV 523, SV 524, SV 525, SV 526, SV 527, SV 528, SV 529, SV 530, SV 531)

(5) Seven charging system flow control valves (SV 1112, SV 1115DA, SV 1115DB, SV 1115EA, SV 1115EB, SV 1115FA, SV 1115FB).

(6) Two charging system recirculation pump bearing water valves (SV 2077 and SV 3078).

(7) Two charging system auxiliary spray valve converters (HY 1304 and HY 1305).

Items (4) and (6) above involve non-safety-related components which by electrical interactions (10 CFR 50.49(b)(2)) could cause failure of safety-related components. The remainder are safety-related components which are required to function during or following an accident, as discussed in 10 CFR 50.49(b)(1).

4. Additional Discussion

The above findings associated with the EQ issue were among items discussed with licensee representatives during a mid-level management meeting in the Region V office on February 25, 1988. A copy of the memorandum summarizing this meeting is enclosed as Attachment 1 to this inspection report.

During discussions with licensee management on February 26, 1988, the inspector emphasized the importance of prompt licensee assessment of the impact of the above environmental qualification program deficiencies on the ability of the licensee to restart Unit 1 following the current mid-cycle outage (scheduled for completion in April). The inspector requested that the licensee provide the NRC with a submittal to specifically define the licensee's plan of action on this matter.

An SCE letter, dated March 11, 1988, provided the licensee's response to the above NRC request. The licensee's letter described the circumstances contributing to the identified EQ problems and addressed the actions planned to correct deficiencies in the licensee EQ program. In particular:

a. The licensee confirmed that the cause of the Unit 1 EQ deficiencies was a combination of (a) inadequate design controls over equipment installed in the plant after development of the initial EQ Master List in 1981 but before the implementation of enhanced design controls in 1984, and (b) an inadequate review of electrical interactions as required by 10 CFR 50.49(b)(2). Licensee Event Report 50-206/88-01, dated March 30, 1988, provided additional detail in this regard. Although final review and corrective actions have not yet been completed, the licensee has stated that, based on the more rigorous controls implemented from the onset of Units 2/3 construction, similar deficiencies are not expected to be encountered on these units.

b. The licensee committed to define and properly qualify all Unit 1 safety-related electrical equipment, as required by 10 CFR 50.49(b)(1), prior to the end of the current mid-cycle outage.

c. The licensee stated that the planned review of electrical interactions, as required by 10 CFR 50.49(b)(2), was an extensive effort and would not be completed until August 31, 1988, after the unit returned to service following the mid-cycle outage.

On March 24, 1988, licensee, Region V, and NRR management met in the Region V Office to discuss the licensee's proposed corrective actions and plans for unit restart. The results of this meeting are documented in meeting report 50-206/88-11, dated March 29, 1988. During the meeting, licensee management representatives stated that a reassessment had been completed of Unit 1 safety related equipment required to be qualified pursuant to 10 CFR 50.49(b)(1). They stated that this reassessment had identified 48 components to be added to the EQ Master List. The licensee stated that all of these components would be properly qualified prior to completion of the ongoing mid-cycle outage.

The licensee also reviewed the scope of effort to complete the evaluation of EQ electrical interactions, as required by 10 CFR 50.49(b)(2). The NRC representatives expressed concern regarding SCE's plans to restart the unit before completion of the review of 10 CFR 50.49(b)(2) electrical interactions. The licensee was requested to submit for NRC review the rationale for proceeding with restart in the absence of a clear knowledge as to the state of compliance with 10 CFR 50.49(b)(2).

Following the March 24 meeting, further licensee review identified several additional components requiring environmental qualification in accordance with the requirements of 10 CFR 50.49(b)(1). On March 29, 1988, in a discussion with the NRC staff, the licensee committed to provide, prior to unit restart, the requested (b)(2) rationale and the basis for SCE's conclusion that all components covered by (b)(1) had been identified. This was provided by SCE in a letter dated April 1, 1988; however, the licensee subsequently informed Region V that Unit 1 would remain shut down until the 50.49(b)(2) review was completed and all EQ issues had been resolved.

The failure of the licensee to properly qualify Unit 1 electrical equipment in accordance with the environmental qualification requirements of 10 CFR 50.49 is an apparent violation. Enforcement action, in this regard, will be the subject of separate correspondence.

5. Exit Meeting (30703)

As documented in meeting report 50-206/88-11, dated March 29, 1988, a management meeting was conducted with the licensee representatives identified in Paragraph 1 on March 24, 1988. During this meeting, the inspector summarized the inspection scope and findings, as described in the Results section of this report.

The licensee acknowledged the inspection findings and noted that appropriate corrective actions would be implemented where warranted. The licensee did not identify as proprietary any of the information provided to or reviewed by the inspectors during this inspection.