August 3, 1981

Docket No. 50-206
LS05-81-08-007

Mr. R. Dietch, Vice President
Nuclear Engineering and Operations
Southern California Edison Company
2244 Walnut Grove Avenue
Post Office Box 800
Rosemead, California 91770

Dear Mr. Dietch:

SUBJECT: SEP TOPIC VI-7.C.1, APPENDIX K - ELECTRICAL INSTRUMENTATION AND CONTROL (EI&C) RE-REVIEWS, SAFETY EVALUATION FOR SAN ONOFRE UNIT 1

Enclosure 1 is our contractor's final evaluation of this topic. The evaluation has been revised to reflect the comments in your September 22, 1980 letter.

Enclosure 2 is the staff safety evaluation that is based upon Enclosure 1 and finds that your facility meets current licensing criteria.

Sincerely,

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosures:
As stated

cc w/enclosures:
See next page

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| DATE | 7/28/81 | 7/27/81 | 7/29/81 | 7/29/81 | 7/31/81 | 7/31/81 | |

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TOPIC: VI-7.C.1 APPENDIX K - ELECTRICAL INSTRUMENTATION AND CONTROL (EI&C) RE-REVIEWS

## I. INTRODUCTION

During the Appendix K reviews of some facilities initially considered, a detailed EI&C review was not performed. Accordingly we intended to re-review the modified ECCS of these facilities to confirm that it is designed to meet the most limiting single failure. Several types of failure were considered as candidates for designation as the most limiting. Because of the scope of the other SEP Topics, it was decided that, for the purpose of this study (and to reduce replication of effort on other SEP Topics), the loss of a single ac or dc onsite power system was the most limiting failure. Accordingly, this topic was limited to an evaluation of the independence between the onsite power systems.

## II. REVIEW CRITERIA

The review criteria are presented in Section 1 of EG&G Report 1630F. "Independence of Redundant Onsite Power Systems."

## III. RELATED SAFETY TOPICS AND INTERFACES

The scope of review for this topic was limited to avoid duplication of effort since some aspects of the review were performed under related topics. The related topics and the subject matter are identified below. Each of the related topic reports contain the acceptance criteria and review guidance for its subject matter.

| | |
|---|---|
| VI-4 | Bypass and Reset of Engineered Safety Features (B-24) |
| VI-7.A.3 | ECCS Actuation System |
| VI-7.B | ESF Switchover from Injection to Recirculation |
| VI-7.C.2 | Failure Mode Analysis-ECCS |
| VI-7.D | Long Term Cooling Passive Failures (e.g., flooding) |
| VI-10.A | Testing of Reactor Protection Systems |
| VII-1.A | Reactor Trip System Isolation |
| VII-3 | Systems Required for Safe Shutdown |
| VIII-2 | Onsite Emergency Power Systems |
| VIII-3 | Emergency dc Power Systems |
| VIII-4 | Electrical Penetrations |
| IX-6 | Fire Protection |

The conclusion that suitable isolation devices are provided is a basic assumption for Topics VI-7.C.2 and VII-3.

## IV. REVIEW GUIDELINES

The review guidelines are presented in Section 2 of Report 1630F, "Independence of Redundant Onsite Power Systems".

## V. EVALUATION

As noted in Report 1630F, "Independence of Redundant Onsite Power Systems," the separation between redundant systems is not compromised by the onsite power system.

The review of docketed information and plant electrical drawings indicates that the San Onofre Unit 1 onsite emergency redundant power sources and distribution system meet the current licensing requirements for independence of onsite power systems.

## VI. CONCLUSION

As a result of our review of our contractor's work the staff concludes that the subject ac and dc onsite systems satisfy all of the review criteria and are, therefore, acceptable.

# SEP TECHNICAL EVALUATION

## TOPIC VI-7.C.1
## INDEPENDENCE OF REDUNDANT ONSITE POWER SYSTEMS

FINAL DRAFT

SAN ONOFRE 1

Docket No. 50-206

October 1980

F. G. Farmer

CONTENTS

TECHNICAL EVALUATION
TOPIC VI-7.C.1
INDEPENDENCE OF REDUNDANT ONSITE POWER SYSTEMS

SAN ONOFRE 1

## 1.0 INTRODUCTION

The objective of this review is to determine if the onsite electrical power systems (AC and DC) are in compliance with current licensing criteria for electrical independence between redundant standby (onsite) power sources and their distribution systems.

General Design Criterion 17 requires that the onsite electrical power supplies and their onsite distribution systems shall have sufficient independence to perform their safety function assuming a single failure. Regulatory Guide 1.6, "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution System," and IEEE Standard 308-1974, "IEEE Standard Criteria for Nuclear Power Generating Stations" provide a basis acceptable to the NRC staff for meeting GDC 17 in regards to electrical independence of onsite power systems.

## 2.0 CRITERIA

2.1 AC Supplies. When operating from standby sources, redundant load groups and redundant standby sources should be independent of each other at least to the following extent.

(1) The standby source of one load group should not be automatically paralleled with the standby source of another load group under accident conditions

(2) No provisions should exist for automatically transferring one load group to another load group or loads between redundant power sources

(3) If means exist for manually connecting redundant load groups together, at least one interlock should be provided to prevent an operator error that would parallel their standby power sources.

2.2 DC Supplies. Each DC load group should be energized by a battery and charger. The battery-charger combination should have no automatic connection to any other redundant DC load group.

## 3.0 DISCUSSION AND EVALUATION

### 3.1 AC Supplies

3.1.1 Discussion. The San Onofre 1 onsite standby AC power system consists of two redundant diesel-generator (DG) supplied power trains.[4] The DGs feed four 4160 V buses and, through transformers, three 480 V switchgear assemblies. Manual breakers (11A02, 11C02, and 12C01) permit the 4160 V buses to be interconnected, but interlocks prevent such interconnections from paralleling the diesel generators. A similar condition exists with respect to the 480 V switchgear assemblies.

3.1.2 Evaluation. The electrical independence of the San Onofre 1 onsite standby AC power system has been reviewed by the NRC and a Safety Evaluation Report has been written.[5] The system meets the requirements of RG 1.6.

### 3.2 DC Supplies

3.2.1 Discussion. The San Onofre 1 onsite standby DC power system consists of two redundant 125 V DC trains. A battery, a DC bus, and two battery chargers compose each train. One charger of each train is supplied from the No. 1 DG train, with the second charger supplied from the No. 2 DG train.[4]

3.2.2 Evaluation. The electrical independence of the San Onofre 1 onsite standby DC power system has been reviewed by the NRC and a Safety Evaluation Report has been written.[5] The system meets the requirements of RG 1.6.

## 4.0 SUMMARY

The San Onofre 1 onsite standby power systems comply with the single failure criterion of GDC 17 and meet current licensing criteria.

## 5.0 REFERENCES


1. General Design Criterions 17, "Electrical Power System," of Appendix A, "General Design Criteria of Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," Regulatory Guide 1.6.

3. "IEEE Standard Criteria for Nuclear Power Generating Stations," IEEE Standard 308-1974, The Institute of Electrical and Electronic Engineers, Inc.

4. San Onofre 1 drawing 5146828, Revision 18, dated 4-26-77.

5. "Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Ammendment No. 25 to Provisional Operating License No. DPR-13," dated April 1, 1977.