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Docket No. 50-206

JULY 03 1980

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

Dear Mr. Dietch:

RE: SEP TOPICS III-10.A, V-II.A, VI-7.C.1 and VIII-3.B
San Onofre Nuclear Generating Station, Unit 1

Enclosed are copies of our current evaluations of Systematic Evaluation Program Topics III-10.A, V-II.A, VI-7.C.1 and VIII-3.B.

These assessments compare your facility, as described in Docket No. 50-206 with the criteria currently used by the regulatory staff for licensing new facilities. Please inform us if your as-built facility differs from the licensing basis assumed in our assessments within 60 days of receipt of this letter.

These evaluations will be basic inputs to the integrated safety assessments for your facility unless you identify changes needed to reflect the as-built conditions at your facility. These topic assessments may be revised in the future if your facility design is changed or if NRC criteria relating to these topics is modified before the integrated assessments are completed.

Sincerely,

Original signed by
Dennis M. Crutchfield
Dennis M. Crutchfield, Chief
Operating Reactors Branch #5
Division of Licensing

Enclosures:
Completed SEP Topics

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cc w/enclosures:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 3, 1980

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Completed SEP Topics

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SEP TECHNICAL EVALUATION
TOPIC III-10.A

THERMAL-OVERLOAD PROTECTION FOR MOTORS
OF MOTOR-OPERATED VALVES

SAN ONOFRE 1

TOPIC III-10.A Thermal-Overload Protection for Motors of Motor-Operated Valves

The objective of this review is to provide assurance that the application of thermal-overload protection devices to motors associated with safety-related motor-operated valves do not result in needless hindrance of the valves to perform their safety functions.

In accordance with this objective, the application of either one of the two recommendations contained in Regulatory Guide 1.106, "Thermal-Overload Protection for Electric Motors on Motor-Operated Valves," is adequate. These recommendations are as follows:

(1) Provided that the completion of the safety function is not jeopardized or that other safety systems are not degraded, (a) the thermal-overload protection devices should be continuously bypassed and temporarily placed in force only when the valve motors are undergoing periodic or maintenance testing, or (b) those thermal-overload protection devices that are normally in force during plant operation should be bypassed under accident conditions.

(2) The trip setpoint of the thermal-overload protection devices should be established with all uncertainties resolved in favor of completing the safety-related action. With respect to those uncertainties, consideration should be given to (a) variations in the ambient temperature at the installed location of the overload

protection devices and the valve motors, (b) inaccuracies in motor heating data and the overload protection device trip characteristics and the matching of these two items, and (c) setpoint drift. In order to ensure continued functional reliability and the accuracy of the trip point, the thermal-overload protection device should be periodically tested.

In addition, the current licensing criteria require that:

(3) In MOV designs that use a torque switch to limit the opening or closing of the valve, the automatic opening or closing signal should be used in conjunction with a corresponding limit switch.

DISCUSSION

Review of the plant safety-related motor-operated valve (MOV) schematics disclosed four valve motors having unbypassed thermal overloads (TOLs) and eight valves having automatic open or close signals.[4-12] All of the valves receiving automatic operate signals use those signals in conjunction with limit switches.

Of the four MOVs having unbypassed TOLs, two (MOV-813 and MOV-814) are associated with the Residual Heat Removal System and are not required to change state within a relatively short period of time during or following an accident and, in fact, are not actuated automatically by an accident signal.

The remaining two MOVs having unbypassed TOLs (MOV-720A and MOV-720B) are associated with the Component Cooling Water System. A report prepared for the licensee by NUS recommended that the TOLs on these MOVs be bypassed.[13] The licensee has stated that plant modifications based on the NUS recommendations will not proceed until such time as they are determined to be necessary as part of the integrated assessment of the SEP.[14]

EVALUATION

Two valves (MOV-720A and MOV-720B) at San Onofre 1 do not satisfy current licensing criteria for bypassing or establishing that TOL trip setpoints are set in favor of completing the saftey-related function. The licensee has elected to delay modification until after the DBE review.

REFERENCES

1. IEEE Standard 179-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

2. Branch Technical Position EICSB-27, "Design Criteria for Thermal Overload Protection for Motors of Motor-Operated Valves."

3. Regulatory Guide 1.106, "Thermal Overload Protection for Electric Motors on Motor-Operated Valves."

4. San Onofre drawing 64374, Revision 4, dated 12-23-77.

5. San Onofre drawing 455368, Revision 5, dated 11-10-77.

6. San Onofre drawing 455369, Revision 2, dated 11-10-77.

7. San Onofre drawing 455371, Revision 2, dated 12-8-76.

8. San Onofre drawing 455378, Revision 2, dated 11-10-77.

9. San Onofre drawing 455379, Revision 2, dated 11-10-77.

10. San Onofre drawing 455516, Revision 7, dated 11-10-77.

11. San Onofre drawing 5151028, Revision 8, dated 4-24-78.

12. San Onofre drawing 5151796, Revision 1, dated 11-29-77.

13. "Separation and LOCS Environment Assessment of San Onofre Unit 1 Emergency Core Cooling Systems," report prepared for SCECo by NUS Corp, dated December 1977, paragraph 5.4.1.

14. Letter, SCECo (Baskin) to NRR (Ziemann), dated August 10, 1978.

SEP TECHNICAL EVALUATION REPORT
ELECTRICAL, INSTRUMENTATION, AND CONTROL FEATURES FOR
ISOLATION OF HIGH AND LOW PRESSURE SYSTEMS
Topic V-11.A
SAN ONOFRE NUCLEAR STATION, UNIT 1

1.0 INTRODUCTION

The purpose of this review is to determine if the electrical, instrumentation, and control (EI&C) features used to isolate systems with a lower pressure rating than the reactor coolant primary system are in compliance with current licensing requirements as outlined in SEP Topic V-11A. Current guidance for isolation of high and low pressure systems is contained in Branch Technical Position (BTP) EICSB-3, BTP RSB-5-1, and the Standard Review Plant (SRP), Section 6.3.

2.0 CRITERIA

2.1 Residual Heat Removal (RHR) Systems. Isolation requirements for RHR systems contained in BTP RSB-5-1 are:

(1) The suction side must be provided with the following isolation features:

   (a) Two power-operated valves in series with position indicated in the control room.

   (b) The valves must have independent and diverse interlocks to prevent opening if the reactor coolant system (RCS) pressure is above the design pressure of the RHR system.

   (c) The valves must have independent and diverse interlocks to ensure at least one valve closes upon an increase in RCS pressure above the design pressure of the RHR system.

(2) The discharge side must be provided with one of the following features:

   (a) The valves, position indicators, and interlocks described in (1)(a) through (1)(c) above.

   (b) One or more check valves in series with a normally-closed power-operated valve which has

its position indicated in the control room. If this valve is used for an Emergency Core Cooling System (ECCS) function, the valve must open upon receipt of a safety injection signal (SIS) when RCS pressure has decreased below RHR system design pressure.

(c) Three check valves in series.

(d) Two check valves in series, provided that both may be periodically checked for leak tightness and are checked at least annually.

2.2 Emergency Core Cooling System. Isolation requirements for ECCS are contained in SRP 6.3. Isolation of ECCS to prevent overpressurization must meet one of the following features:

(1) One or more check valves in series with a normally-closed motor-operated valve (MOV) which is to be opened upon receipt of a SIS when RCS pressure is less than the ECCS design pressure

(2) Three check valves in series

(3) Two check valves in series, provided that both may be periodically checked for leak tightness and are checked at least annually.

2.3 Other Systems. All other low pressure systems interfacing with the RCS must meet the following isolation requirements from BTP EICSB-3:

(1) At least two valves in series must be provided to isolate the system when RCS pressure is above the system design pressure and valve position should be provided in the control room

(2) For systems with two MOVs, each MOV should have independent and diverse interlocks to prevent opening until RCS pressure is below the system design pressure and should automatically close when RCS pressure increases above system design pressure

(3) For systems with one check valve and a MOV, the MOV should be interlocked to prevent opening if RCS pressure is above system design pressure and should automatically close whenever RCS pressure exceeds system design pressure.

3.0 DISCUSSION AND EVALUATION

There are three systems at San Onofre Unit 1 which have a direct interface with the RCS pressure boundary and have a design pressure rating of all or part of the system which is less than that of the RCS. These systems are the Chemical and Volume Control System (CVCS), the Safety Injection System (SIS), and the Residual Heat Removal (RHR) system.

3.1 Residual Heat Removal System. The RHR system takes a suction on the RCS loop C hot leg, circulates the water through the RHR system heat exchanger, and discharges to the RCS loop A cold leg. Two motor-operated valves in series provide isolation capabilities in both the suction and discharge lines. Each of these MOVs has position indication in the control room. The inboard (closest to the RCS) valves are interlocked to prevent opening if RCS pressure is above RHR system design pressure. However, both valves use the same pressure switch and relay to provide this interlock. The outboard valves have no pressure interlocks. None of the valves will automatically close if RCS pressure increases above RHR system design pressure during RHR system operation.

The RHR system is not in compliance with the current licensing requirements of BTP RSB-5-1 since none of the isolation valves will automatically close if RCS pressure exceeds RHR design pressure. Also, the outboard isolation valves have no interlocks to prevent RHR over-pressurization, and the inboard valve interlocks are neither diverse nor independent.

3.2 Safety Injection System. One SIS subsystem consists of two loops, each supplied by a safety injection pump and a feed pump. Each loop discharges through a common header to the cold legs of each RCS loop. Isolation is provided by a check valve in series with a MOV for each branch going to the RCS cold legs. The motor-operated isolation valves have position indication in the control room and open upon

receipt of a safety injection signal, but have no interlocks preventing opening when RCS pressure is above SIS design pressure.

The other SIS subsystem uses the refueling water pumps or charging pumps to provide water from the refueling water storage tank to each RCS cold leg. Isolation is provided by a MOV in series with a check valve for the three branches. The MOVs are opened using a manual switch and have no interlocks to prevent opening when RCS pressure is above SIS design pressure.

The SIS is not in compliance with the current licensing requirements of SRP 6.3 since the MOVs in the discharge lines have no interlocks to prevent opening when RCS pressure exceeds system design pressure.

3.3 Chemical and Volume Control System. The CVCS takes water from the RCS and passes it through a regenerative heat exchanger, an orifice to reduce its pressure, and a nonregenerative heat exchanger before reducing its pressure further by the use of a pressure control valve. After filtering and cleanup, the water may be returned to the RCS by the use of the charging pumps, which increase the water pressure and pass it through the regenerative heat exchanger to either the RCS loop A cold leg or to the pressurizer auxiliary spray line.

The CVCS suction line isolation is provided by an air-operated valve in series with three parallel solenoid-operated valves. Each of the solenoid valves is operated from the control room and has valve position indicated. The air-operated valve is operated by the pressurizer level control system. None of the valves have interlocks to prevent opening or to automatically close if the pressure exceeds the design rating of the low pressure portions of the system.

The CVCS discharge line isolation is provided by a check valve in series with an air-operated valve in each of the branches. The air-operated isolation valves in each discharge line branch have position

indication in the control room, but these valves have no interlocks to prevent system overpressurization.

The CVCS is not in compliance with current licensing requirements for isolation of high and low pressure systems contained in BTP EICSB-3 since the suction and discharge line isolation valves have no interlocks to prevent system overpressurization.

4.0 SUMMARY

The San Onofre Unit 1 has three systems with a lower design pressure rating than the RCS, which are directly connected to the RCS. The CVCS, SIS, and RHR system do not meet current licensing requirements for isolation of high and low pressure systems as specified below.

(1) The CVCS isolation valves have no pressure-related interlocks as required by BTP EICSB-3

(2) The SIS motor-operated isolation valves have no pressure-related interlocks required by SRP 6.3

(3) None of the RHR system isolation valves automatically close if RCS pressure increases above RHR system design pressure during RHR system operation, and the outboard isolation valves have no pressure-related interlocks as required by BTP RSB-5-1. The interlocks for the inboard isolation valves are neither diverse nor independent.

5.0 REFERENCES

1. NUREG-075/087, Branch Technical Positions EICSB-3, RSB-5-1; Standard Review Plan 6.3.

2. Final Safety Analysis Report, San Onofre Nuclear Generating Station, Unit 1.

3. San Onofre drawings (P&ID) 568766, 568767, 568768, and 568769.

4. San Onofre electrical drawings 455368, 455371, 455516, and 5151796.