



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 82 TO PROVISIONAL OPERATING LICENSE NO. DPR-13

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 1.

DOCKET NO. 50-206.

1.0 INTRODUCTION

1.1 Description of Proposed Action

This Safety Evaluation addresses an application by the Southern California Edison Company (the licensee) to amend the San Onofre Nuclear Generating Station, Unit No. 1 (the facility) operating license to revise and expand the Limiting Conditions for Operation and Surveillance Requirements applicable to the Auxiliary Feedwater System (AFWS), and its automatic initiation system and water supply.

1.2 Background Information

In response to "Clarification of TMI Action Plan Requirements," (NUREG-0737) Items II.E.1.1 and II.E.1.2, and NRC Generic Letter 82-16 (dated September 20, 1982) the licensee submitted an application for license amendment dated May 17, 1984. This application proposed to revise and expand the Technical Specifications applicable to the Auxiliary Feedwater System (AFWS) and the associated automatic initiation system and water supply. By letter dated September 5, 1984, the licensee provided additional information in support of this request.

Prior to the above, the licensee, by letter dated May 7, 1981, applied for certain other changes in the facility Technical Specifications. These changes, likewise, were based on lessons learned from the TMI accident. While many of the items requested in that application were subsequently approved and issued by the Commission, a proposed specification defining operability requirements for the AFWS was not processed at that time. Because this specification is appropriate to the subject matter at hand, this item from the May 7, 1981 submittal is included in the present review.

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A Notice of Consideration of Issuance of Amendment to License and Proposed No Significant Hazards Consideration Determination and Opportunity for Hearing related to the May 17, 1984 submittal was published in the Federal Register on July 24, 1984 (49 FR 29920). The May 7, 1981 request was noticed in the Federal Register on March 22, 1984 (49 FR 10743). No request for hearing and no comments were received.

2.0 EVALUATION

TMI Action Plan Item II.E.1.1, Auxiliary Feedwater System Evaluation, included several short- and long-term recommendations for improving the reliability of the AFWS.

TMI Action Plan Item II.E.1.2, Auxiliary Feedwater System Initiation and Flow Indication, required licensees to upgrade the AFWS as necessary to ensure safety grade automatic initiation and flow indication. Technical Specification (TS) requirements for both II.E.1.1 and II.E.1.2 were addressed by Generic Letter 82-16.

2.1 TMI Item II.E.1.1

2.1.1 Background

Long-term Recommendation GL-2 required that licensees with plants in which all (primary and alternate) water supplies to the AFWS pass through valves in a single flow path should install redundant parallel flow paths (piping and valves). Licensees with plants in which the primary AFWS water supply passes through valves in a single flow path, but the alternate AFWS water supplies connect downstream of the above valves should install redundant valves parallel to the valves or provide automatic opening of the valves from the alternate water supply upon low pump suction pressure.

By letter dated March 10, 1982, the licensee proposed a design which would automatically switch the suction for the auxiliary feedwater pumps to an alternate supply upon detection of low suction pressure. In its October 22, 1982 evaluation, the staff concluded that this design would satisfy the requirements of GL-2.

2.1.2 Discussion

However, as a result of the continuing seismic reevaluation program, the licensee has instead constructed a new seismically qualified auxiliary feedwater storage tank and redundant parallel flow paths (piping and valves) to the two auxiliary feedwater pumps. This design is shown in Enclosure 3 to the

May 17, 1984 submittal. The existing condensate storage tank and connected piping will be maintained as a supply for normal operations but would not be the primary supply of auxiliary feedwater. It could be used as a backup supply. The above design satisfies the stated requirements of long-term recommendation GL-2 and is therefore acceptable. Related TS changes are discussed below.

2.2 TMI Item II.E.1.2

The staff Safety Evaluation of TMI Item II.E.1.2 was issued on November 18, 1982. The evaluation concluded that with appropriate modification to the TS, the San Onofre Unit No. 1 AFWs complies with staff requirements with respect to this action. The requested modification was to include periodic testing of the Automatic Actuation Logic and logic relays in the TS. These TS changes were included in the May 17, 1984 submittal and are evaluated below.

3.0 TECHNICAL SPECIFICATIONS

3.1 Scope of Review

This review has consisted of a comparison of the licensee's proposed specifications with the present facility TS; with the "Standard Technical Specifications for Westinghouse Pressurized Water Reactors," NUREG-0452, Revision 4; the TS for San Onofre Unit 2; NUREG-0737; and the Standard Review Plan, NUREG-0800, July 1981, Chapters 5 and 10.

3.2 Evaluation

3.2.1 Section 3.4.1, Turbine Cycle: Operating Status.

The licensee proposes to add new Sections 3.4.3 and 3.4.4 to address the operability requirements for the auxiliary feedwater pumps and the auxiliary feedwater storage tank. The second and third items in present Section 3.4.1, which briefly address these requirements, are modified such that they now only reference the new sections. The acceptability of proposed new Sections 3.4.3 and 3.4.4 is discussed below. Since the change to this section merely relocates certain operability requirements, the change is editorial and is acceptable.

3.2.2 Section 3.4.3, Auxiliary Feedwater System.

This proposed specification would replace the AFW feedpump operability requirements presently included in Section 3.4.1(2). The proposed specification would require both AFW pumps (the electric motor driven pump and the steam turbine driven pump) to be operable when the reactor was in Operational Modes 1, 2, and 3. In addition it would provide that with one pump

inoperable, both pumps would be required to be restored to operable status within 72 hours or the reactor would have to be placed in Hot Standby within the next 6 hours and in Hot Shutdown within the following 6 hours.

Regarding the requirement that the pumps be operable in Modes 1, 2, and 3, the staff finds this is consistent with the provisions of the Standard Technical Specifications (STS) and is therefore acceptable.

Regarding the proposed allowable repair time and Action requirements, the staff notes the STS provisions for inoperability of one AFW pump are based on an AFWS consisting of two 50% capacity electric motor driven pumps and one 100% capacity turbine driven pump. Based on this configuration, the STS prescribe repair time and Action requirements which are the same as those proposed by the licensee. Inasmuch as the facility AFWS consists of two 100% capacity pumps and the STS do not limit the inoperability to the 50% capacity pumps, the staff concludes the licensee's proposal is consistent with the provisions of the STS. The staff also notes that for Emergency Core Cooling Systems consisting of two 100% capacity trains, the STS prescribe an allowable repair time and Action statements that are the same as those proposed by the licensee. Therefore, based on consistency with the provisions of the STS, the staff concludes that the proposed allowable repair time and Action requirements are acceptable.

3.2.3 Section 3.4.4, Auxiliary Feedwater Storage Tank.

This proposed specification would replace the AFW storage tank requirements presently set forth in Section 3.4.1(3). The revision is needed because of design changes made in response to NRC required upgrading of the AFWS design. These changes have included provision of a Seismic Category I Auxiliary Feedwater Storage Tank, which replaces the presently used Condensate Storage Tank and Service Water Reservoir/Primary Plant Makeup sources. The licensee states the specified minimum storage capacity (150,000 gallons) conforms to the requirements of Branch Technical Position (BTP) RSB 5-1. This is based on providing sufficient inventory for operation at hot shutdown for 4 hours, plus cooldown to Residual Heat Removal (RHR) system conditions with offsite or onsite power, plus a single failure. To fulfill these requirements, the licensee assumed natural circulation cooldown to 350°F (adequate for RHR operations) at a rate of 25°F/hr, plus a 20-hour "soak" period at 350°F.

Based on the above assumptions, the licensee concludes a minimum inventory of 150,000 gallons is required. The staff has performed independent hand calculations confirming the general magnitude of the required inventory. These calculations

indicate the licensee's estimates are conservative. The present inventory requirement is 120,000 gallons, therefore, the effect of the change is to increase the inventory requirements to 150,000 gallons and to authorize use of a new Seismic Category I storage tank designed for this purpose. Based on these considerations, the proposed change is acceptable.

3.2.4 Section 3.5.7, Auxiliary Feedwater Instrumentation

The proposed changes to this specification include (1) addition of operability requirements and action statements for the manual and automatic actuation logic instrumentation channels; (2) removal of Operational Mode 4 as an applicable Mode; (3) revision of the action statements applicable to the steam generator water level; and (4) addition of the manual and automatic actuation logic channels to Table 3.5.7-2, "Auxiliary Feedwater Instrumentation Trip Setpoints."

Regarding Item 1, above, the proposed specification defines for the Manual and Automatic Actuation Logic Instrumentation, the total number of channels of instrumentation, the number of channels required to initiate the AFWS and the minimum number of channels required to be operable. The proposed specification also defines the operational modes during which the requirements apply and the action requirements for conditions when operability requirements are not met. The "Manual" and "Automatic Actuation Logic" instrumentation are additions to the existing specification which presently only addressed the "Steam Generator Water Level-Low" actuation instrumentation.

Regarding "Applicable Modes" the proposed specification would require all of the AFW actuation instrumentation to be operable in Modes 1, 2, and 3. This is a change in requirements for the Steam Generator Level instrumentation - which is currently required to be operable also in Mode 4 (Hot Shutdown). This change, however, is consistent with the operability requirements in the STS for instrumentation of this type (Modes 1, 2, and 3), and with the STS requirement for operability of the AFWS as a whole. Accordingly, the staff finds this element of the proposed change acceptable.

As for "Action requirements," those proposed by the licensee do not conform to the guidance given in the STS. According to the licensee, the reason for the difference is that the design of the San Onofre Unit 1 AFW instrumentation differs from the design assumed in the STS. Specifically, the San Onofre Unit 1 design provides Manual and Auto-Actuation logic channels for

each AFW train which are totally independent of the other AFW train. This is in contrast to "typical" designs where a single trip signal would initiate both trains. The significant difference is that failure of a given input for the San Onofre Unit 1 design would only affect one AFW train (with respect to that input) while a failure in a "typical" design could affect both (or all) trains (with respect to that input).

Because of the independence provided by this design, the licensee proposes to apply the same Action requirements to the AFW initiation instrumentation as are applied to the associated AFW train, i.e., restore to Operable within 72 hours or be in at least Hot Standby in the next 6 hours and in Hot Shutdown with the following 6 hours. Because these requirements are the same as those specified in the STS for safety systems with redundant, 100% capacity trains (e.g., ECCS), the staff concludes that the proposed Action requirements are acceptable.

The licensee also proposes to include provisions which would permit putting one Auto-Actuation Logic channel in the bypass condition for up to 8 hours to permit surveillance testing. The licensee notes 8 hours is greater than the 2-hour bypass period typically permitted in the STS but explains that this longer period is necessary because the design of these circuits does not include built-in testing equipment which could support a 2-hour testing period.

The licensee has proposed to perform surveillance testing of the Auto-Actuation Logic channels monthly. On this basis, one channel could be bypassed for surveillance slightly more than 1% of the time. During these periods, however, the channel for the redundant train would be operable and the train being tested could be manually started. Therefore, on the basis that this instrumentation does not include built-in provisions for testing and based on the licensee's estimate of the required time, the staff finds this element of the proposed change acceptable.

Regarding removal of Mode 4 as an Operational Mode during which the AFW initiation instrumentation must be operable, this is consistent with the provisions of the STS and the functional safety requirements of the AFWs. Accordingly, the staff concludes that this change is acceptable.

The changes proposed by the licensee with respect to the steam generator water level instrumentation are as follows:

- o With the total number of operable channels less than the total number of channels, optionally assign an operator to continuous surveillance of the channel with instructions to manually actuate auxiliary feedwater if necessary. This option would be an alternative to the present requirement to place the inoperable channel in the tripped condition within 1 hour.
- o Revise the action requirement which applies when more than one channel is inoperable so as to require the plant to be in Hot Shutdown within 6 hours after shutting down to Hot Standby. This is a change from the present requirement that the plant be in Cold Shutdown within 30 hours after shutting down to Hot Standby.

Regarding the first item, the licensee states this is necessary because the steam generator level instrumentation does not accommodate manual tripping of individual channels. In addition, the staff notes the current specifications provide for continuous operator surveillance when more than one channel is inoperable. Therefore, based on these considerations, this proposed change is acceptable.

As for the second item, the proposed change in the shutdown mode requirement from Cold Shutdown to Hot Shutdown is acceptable on the basis that the AFWS is not required for cooldown after the reactor enters the Hot Shutdown Mode (Mode 4). The proposed reduction in the time allowed to cool down from Hot Standby (from 30 hours to 6 hours) would require the facility to reach a safer condition at an orderly but more rapid rate, and is therefore more conservative. Based on these considerations, the staff concludes that this proposed change is acceptable.

Finally, as part of Specification 3.5.7, the licensee proposes to add the "Manual" and "Automatic Actuation Logic" channels to Table 3.5.7-2, "Auxiliary Feedwater Instrumentation Trip Setpoints." The change is essentially minor since the entries for these channels are "Not Applicable." Such entries, however, are consistent with the corresponding provisions in the STS. Therefore, because this change is consistent with the STS and because this addition demonstrates these channels have not been inadvertently omitted, the staff concludes that this element of the change is acceptable.

3.2.5 Section 4.1.8, Auxiliary Feedwater Instrumentation Surveillance

The licensee has proposed several revisions to this specification.

One proposed revision would add the AFW Manual and Automatic Actuation Logic instrumentation channels to the table specifying surveillance requirements for AFW instrumentation, Table 4.1.8-1. In particular, performance of the "Trip Actuating Device Operational Test" at least once every 18 months is specified for the "Manual" channel; and performance of a "Channel Test" monthly is specified for the "Automatic Actuation Logic." Because these provisions are consistent with the general provisions of the STS and the format of the facility TS, the staff finds this change acceptable.

The proposed change would also revise the modes during which surveillance is required from Modes 1, 2, 3, and 4 to Modes 1, 2, and 3. Because the AFWS is only needed when the facility is operating in Modes 1, 2, and 3, and because this conforms to the provisions of the STS, this change is acceptable.

In addition to the above, the proposed change would make minor revisions to the wording in Section 4.1.8.A. The staff has reviewed these proposed changes in wording and determined they merely remove redundancy between this section and Table 4.1.8-1, and therefore are merely editorial in nature and not significant.

Based on the above considerations, the staff finds these proposed revisions acceptable.

3.2.6 Section 4.1.9, Auxiliary Feedwater System Surveillance

The proposed revisions to this section consist of the following: (1) revision of Section 4.1.9.B to delete the requirement that normally open manual valves in the main and emergency flow paths to the AFW pumps be verified locked open on a monthly basis; (2) revision of Section 4.1.9.C.2 to provide that the starting test of the steam-driven auxiliary feedwater pump can be deferred until steam is available; (3) deletion of present Section 4.1.9.D; and (4) revision of present Section 4.1.9.E to define an acceptable interval after availability of steam for performance of a flow test, and to identify the Auxiliary Feedwater Storage Tank as the new water source for the redesigned AFWS.

The first revision listed above is prompted by the implementation of a new design for the AFWS which provides redundant suction lines and valves to the AFW pumps such that mispositioning a single valve cannot interrupt or prevent all AFW flow.

Accordingly, substitute wording based on the specification presented in NRC Generic Letter 83-37 (November 1, 1983), Enclosure 3, page 9, is proposed. The substance of this change is that whereas with the previous design it was required that essential, normally open valves periodically be verified "locked open"; with the new design it is only required that manual valves that are not locked, or otherwise secured, be regularly verified to be in the correct position. Based on the implementation of the new design and the similarity of the wording to that suggested by Generic Letter 83-37, the staff finds this proposed revision acceptable.

The proposed change to Section 4.1.9.C.2 recognizes the fact that the steam-driven AFW pump cannot be tested until steam is available and formally approves deferral of testing until that time (72 hours after entering Mode 3). Since the steam-driven AFW pump is of no value in cooling down the plant until steam is available, the staff concludes that the proposed change is acceptable. (The basis for approving the 72-hour period is discussed below.)

Section 4.1.9.D currently requires all normally closed manual valves in the alternate AFWS suction line periodically to be demonstrated operable. The licensee has proposed to delete this provision because the new AFWS design meets regulatory requirements without reliance on an alternate AFWS suction line. Because of the implementation of the new design, the staff finds this change appropriate and acceptable.

The proposed revision to Section 4.1.9.E (to be renumbered 4.1.9.D) defines an acceptable interval following extended shutdown for performance of a flow test using the steam-driven AFW pump. The revision also identifies the Auxiliary Feedwater Storage Tank as the water source for the revised design (instead of the Condensate Storage Tank). Regarding the first item, the present definition of the acceptable test interval is "as soon as steam becomes available," and the proposed revision is "Within 72 hours after entering Mode 3,..." Based on the need for providing a defined period for performance of this test and the 72-hour inoperable period typically permitted by the STS for a single train of a redundant system, the proposed test interval is acceptable. The identification of the AFW Storage Tank as the water source is an editorial change which reflects the new system design and is, therefore, acceptable.

3.2.7 Section 4.1.10, Auxiliary Feedwater Storage Tank Surveillance

This proposed change would add surveillance requirements for the AFW Storage Tank, which was added as part of the revised AFWS design. The proposed surveillance would require determination of the contained water volume at least once per 12 hours to verify an adequate inventory per specification 3.4.4.

The proposed specification conforms with the model provided in the STS. Accordingly, the staff finds the proposed change acceptable.

3.2.8 Section 4.4.E, Emergency Power System Periodic Test

This proposed change would delete Section 4.4.E in its entirety. The licensee's basis for the deletion is that other specifications essentially duplicate the provisions of this paragraph. For example, in addition to the AFW pump testing required by Section 4.4.E, AFW pump testing is also addressed in existing specification 4.1.9.A. This section requires testing in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. Although deletion of Section 4.4.E would effectively extend the required pump test interval from "every second week" to the test interval specified by ASME Section XI (monthly for the currently applicable Code Edition and Addenda), it will require more meaningful pump testing because the Section XI test requirements are well defined, comprehensive and require formal acceptance criteria. In addition, 10 CFR 50.55a(g) and the STS require safety-related pumps and valves to be tested in accordance with Section XI at the frequency specified therein without additional requirements. Therefore, since acceptable test requirements are specified in Section 4.1.9.A, this proposed deletion is acceptable.

Another provision in Specification 4.4.E proposed for deletion is a requirement for AFW pump testing following extended outage periods (i.e., when the reactor coolant system pressure is less than 500 psig for a period in excess of two weeks). This requirement duplicates another current Specification, 4.1.9.E. The only significant difference is that 4.1.9.E defines 30 days as the length of outage after which testing is required, rather than 2 weeks, as stated in Specification 4.4.E. The staff finds the 30-day interval specified in Section 4.1.9.E corresponds logically with the monthly testing frequency required by the Edition and Addenda of ASME Section XI currently applicable to this facility. On the other hand, the staff finds no apparent technical or regulatory basis for the 2-week interval specified in Section 4.4.E. Accordingly, based on the monthly pump

testing frequency specified by Section XI for this facility, i.e. the use of a 30-day outage interval as specified in Section 4.1.9.E, is considered acceptable. On the same basis the staff concludes the deletion of this element of Specification 4.4.E is acceptable.

Based on the existence of substantially equivalent and acceptable test requirements in Specifications 4.1.9.A and 4.1.9.E, the deletion of Section 4.4.E is acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined by 10 CFR Part 20 and changes to the Surveillance Requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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 this amendment.

5.0 CONCLUSION

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

6.0 ACKNOWLEDGEMENT

G. Zwetzig and E. McKenna prepared this evaluation.

Dated: October 24, 1984