BEFORE THE UNITED STATES NUCLEAR REGULATORY COMMISSION

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| Application of SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY for a Class 104(b) License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 1 of the San Onofre Nuclear Generating Station | ) | DOCKET NO. 50-206<br><br>Supplemental Amendment Application No. 185 |

SOUTHERN CALIFORNIA EDISON COMPANY and SAN DIEGO GAS & ELECTRIC COMPANY, pursuant to 10 CFR 50.90, hereby submit Supplemental Amendment Application No. 185.

This supplemental amendment consists of Revision 1 to Proposed Change No. 227 to Provisional Operating License No. DPR-13. The revision to Proposed Change No. 227 modifies the Technical Specifications incorporated in Provisional Operating License No. DPR-13 as Appendix A.

The revision to Proposed Change No. 227 is a request to revise the Auxiliary Feedwater System minimum flow requirements identified in Technical Specification 3.4.3. The auxiliary feedwater flow venturis will be replaced with new venturis to limit auxiliary feedwater flow to less than 150 gpm per steam generator under all post-trip or post-accident conditions. Limiting flow to less than 150 gpm will minimize the probability of a water hammer. As a result of the venturi replacement the auxiliary feedwater system minimum flow requirements will be reduced.

This supplement also provides an expanded description of startup testing to be performed on the AFWS and a request for a minor editorial change to Technical Specification 3.4.3 Applicability section.

Based on the significant hazards analysis provided in the Description of Proposed Change and Significant Hazards Consideration Analysis of Revision 1 to Proposed Change No. 227, it is concluded that (1) the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92, and (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change.

Subscribed on this 22nd day of August, 1990.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: _____
H. B. Ray
Senior Vice President

Subscribed and sworn to before me this 22nd day of August.

_____
Notary Public in and for the
State of California

HOLLY D. ROSET
Notary Public-California
ORANGE COUNTY
My Commission Expires
July 18, 1994

James A. Beoletto
Attorney for Southern
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By: _____
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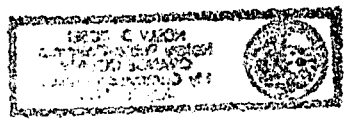

Revision 1

# DESCRIPTION AND SIGNIFICANT HAZARDS CONSIDERATION ANALYSIS PROPOSED CHANGE NO. 227 TO THE TECHNICAL SPECIFICATIONS PROVISIONAL OPERATING LICENSE NO. DPR-13

This is a request to revise Section 3.4.3, "AUXILIARY FEEDWATER SYSTEM, (AFWS)" of the Appendix A Technical Specifications for the San Onofre Nuclear Generating Station, Unit 1 (SONGS 1).

## EXISTING TECHNICAL SPECIFICATION

See Attachment 1

## PROPOSED TECHNICAL SPECIFICATION

See Attachment 2

## DESCRIPTION OF CHANGE

During the Cycle 11 refueling outage the AFWS flow venturis will be replaced to ensure the maximum flow to each steam generator will be 150 gpm. This change will result in a change to the Auxiliary Feedwater System minimum flow requirements as well.

The Basis for Technical Specification 3.4.3 "AUXILIARY FEEDWATER SYSTEM," indicates the Auxiliary Feedwater System must be able to deliver at least 125 gpm per train with two intact main feedwater lines and pressurized steam generators, and 250 gpm per train with two intact main feedwater lines and depressurized steam generators.

Proposed Change No. 227 revises the minimum flow requirements stated in the Basis of Technical Specification 3.4.3 to 100 gpm per train with two intact main feedwater lines and pressurized steam generators and 175 gpm per train with two intact main feedwater lines and depressurized steam generators. The analyses for the minimum AFW flow requirements are discussed in Attachment 3.

Proposed Change No. 227 requested a one time exemption from the operability requirements of the AFWS in the technical specifications. This exemption was requested to allow entry into MODE 1 without declaring the AFWS operable in accordance with the technical specifications. Per discussion with J. Tatum, the NRC Project Manager, we agreed to declare the AFWS operable upon completing the technical specification surveillance testing in MODE 3. This revision to PCN 227 deletes the request for a one time exemption for MODE 1 testing of the AFWS.

The discussion of testing has been expanded to include a more detailed description of the testing to be done to verify the maximum and minimum flowrates of the system with different pump

combinations and varying plant conditions. This revision will also make an editorial change to Technical Specification 3.4.3, Applicability section.

BACKGROUND

The Auxiliary Feedwater System (AFWS) design bases specify that the maximum AFW flow to each steam generator must be limited to less than 150 gpm to minimize the occurrence of water hammer. A review of the results of the AFWS flow testing, performed after Cycle 10 startup, revealed that the total delivered AFWS flow under certain conditions (when Train A AFW pumps G-10 and G-10S are operating concurrently) exceeded the system's design basis flow limit of 150 gpm per steam generator. The results indicated that during the testing at a steam generator pressure of approximately 800 psig, 526 gpm total flow was delivered to the three steam generators by Train A pumps (G-10 and G-10S), exceeding the water hammer flow limit of 450 gpm total flow.

DISCUSSION

Upon discovery of this condition, as a temporary solution, a dedicated individual was stationed at the AFW panel in the control room to notify the operator of the need to take manual action to limit the AFW flow to 150 gpm to each steam generator when necessary. The proposed modification will eliminate the need for a dedicated individual at the AFW panel.

To meet the design and licensing basis of the AFW system with respect to water hammer, the proposed design change to replace the existing venturis with lower flow venturis is to be implemented in the Cycle 11 refueling outage. The modification consists of resizing the three flow venturis in the AFW lines to each steam generator to limit the AFW flow to less than 150 gpm per steam generator during Feedline Break accidents.

This change will enable the AFWS to meet its design basis maximum flow requirement of 150 gpm per steam generator to minimize the probability of a water hammer event while providing sufficient cooling for decay heat removal to meet the acceptance criteria for design basis events.

The resizing of the AFWS venturis reduces the minimum AFW flowrates available for plant transients and accidents. The UFSAR Chapter 15 events were reviewed to determine the impact of the reduced AFW flowrates. Westinghouse has verified that the 7 AFWS design base transients (A-G) listed in Attachment 3 remain the limiting cases. Cases A, B, and C were not reanalyzed since the minimum required AFW flowrate was not impacted by the venturi

replacement.

Feedline breaks-upstream of the in-containment check valve (FLB-U), Cases D and E of UFSAR Section 15.6, at 100% and 50% power are not affected by the venturi resizing but were reanalyzed to increase the margin between required flow and actual flow. Feedline breaks-downstream of the in-containment check valve (FLB-D), Cases F and G of UFSAR Section 15.6, at 100% and 50% power cases were reanalyzed by Westinghouse with the reduced flowrates to demonstrate the acceptance criterion for decay heat removal is met.

Attachment 3 details the analyses concerning the AFWS minimum flow requirements to meet acceptance criteria for design basis events.

The existing venturis are 3" flanged end, ASME, cavitating venturis located in the 3" AFW feedlines. The replacement venturis will be identical to the existing venturis in all respects, except that the throat diameter will be reduced.

The venturis were specified with the following vendor design requirements:

- Each venturi will pass 140 gpm of 60°F water at an inlet pressure of 1162 psig, with ambient back pressure.
- Each venturi will pass at least 100 gpm of 60°F water at an inlet pressure of 775 psig, with ambient back pressure.
- Each venturi will pass at least 55 gpm of 60°F water with a pressure loss of less than 35 psig, when not cavitating.
- Each venturi will pass at least 62.5 gpm of 60°F water with a pressure loss of less than 45 psig, when not cavitating.

The above data is the manufacturing requirements, the actual system requirements are identified in attachments 2 and 3.

TESTING

This revision to PCN 227 is withdrawing the request for the one time exemption from the operability requirements of the AFWS to allow entry into MODE 1 to perform startup testing prior to declaring the AFWS operable. This was based on a conservative interpretation that the MODE 1 flow testing needed to be completed prior to declaring the AFWS operable. During a discussion with J. Tatum, the NRC Project Manager, we agreed to declare the AFWS operable upon completing the technical

specification testing in MODE 3. Therefore, the request for a one time exemption from the operability requirements of the AFWS is not required to enter MODE 1 and is being withdrawn.

In order to provide the NRC with more details on the startup testing, the following description of testing has been expanded. Design verification testing will be performed in addition to the required standard construction and technical specification surveillance testing.

The purpose of the testing is to verify that the new venturis function as designed. The specific test objectives are to demonstrate the AFWS meets the design basis for the system. The new venturis will be pretested by the vendor prior to delivery to the Site. The Vendor test results will be combined with the station system performance tests to demonstrate that all AFW flow requirements will be met.

MODE 5 testing will test Train B pump G-10W and Train A pump G-10S to develop the cavitating points of each pump. In addition, system pressure drop testing will be performed. This testing will require the installation of temporary test fixtures in place of the existing venturis. Both pumps G-10W and G-10S will be operated over an extended flow range and monitored by test instrumentation. The data acquired, (AFW flows, suction and discharge pressures and process fluid temperatures), will be used to develop the pump and system flow resistance curves.

Train B (Pump G-10W) testing will also confirm that pump G-10W will not exceed 450 gpm total flow to all three steam generators to prevent a possible water hammer. This testing, along with the required surveillance testing, will ensure Train B operability.

Train A pump G-10S will also be tested to confirm the cavitating flow rate and that it is capable of supplying at least 100 GPM to two depressurized steam generators. This test will verify the maximum flow rate from G-10S.

Testing in MODE 1 is required to complete the design verification testing. This will ensure sufficient steam pressure and flow for the turbine AFW pump (G-10) while maintaining stable plant conditions, allowing automatic controls for the feedwater and reactor rod control systems. Testing in MODE 1 will provide an accurate pump and system curve for measurement of flow resistance to the steam generators and inlet losses at a variety of pressures with accurate flow rates.

Attachment 4 details the testing in MODE 1. The flow tests will be performed below 25% power (nominally at 15% to 20% of full

power). This attachment discusses the safety considerations for testing in MODE 1.

Train A testing will verify by actual flow test that the combined G-10 and G-10S flow rates to each steam generator does not exceed 450 gpm total flow. This test will determine the maximum AFW flow rate to steam generators under cavitating conditions.

Train B testing will verify by actual flow testing the operating point for Pump G-10W for the same power level. The operating point will be used to determine the system losses for the whole AFW flow loop under normal conditions.

In addition, an editorial change is being made to the Applicability section of Technical Specification 3.4.3. Amendment 125, dated April 25, 1989 deleted the phrase "Motor-driven" from the Applicability section. Amendment 130, dated August 21, 1989 used the previous Technical Specification 3.4.3 page. This editorial change deletes "motor-driven" to return the Technical Specification page back to the intent of Amendment 125. This change has no affect on the safety analysis.

SIGNIFICANT HAZARD CONSIDERATION ANALYSIS

As required by 10CFR 50.91(a)(1), this analysis is provided to demonstrate that the proposed license amendment to allow for the implementation of the reduced size of the three auxiliary feedwater line flow reducing venturis for San Onofre Unit 1 does not represent a significant hazards consideration. As demonstrated below, in accordance with the three factor test of 10 CFR 50.92(c), implementation of the proposed amendment was analyzed using the following standards and found not to: 1) involve a significant increase in the probability or consequences of an accident previously evaluated; or 2) create the possibility of a new or different kind of accident from any accident previously evaluated; or 3) involve a significant reduction in a margin of safety.

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of any accident previously evaluated?

   Response: No

   Installation of smaller diameter flow reducing venturis into the three auxiliary feedwater system lines will not impact the probability or consequence of accidents previously evaluated. Calculations were made using the Westinghouse LOFTRAN code to simulate feedline break accidents. The results from these analysis show that the proposed minimum AFW flowrates are sufficient to remove core decay heat. In all cases the core remains covered with water and in a coolable geometry at all times.

   The Westinghouse analyses, attachment 3, were performed on the four worst case events reported in the Updated Final Safety Analysis Report (UFSAR), Section 15.6. They are 1) the feedline break upstream of the in-containment check valve (FWLB-U) at 100% power, Case D, 2) the feedline break upstream of the in-containment check valve (FWLB-U) at 50% power, Case E, 3) the feedline break downstream of the in-containment check valve (FWLB-D) at 100% power, Case F, and 4) the feedline break downstream of the in-containment check valve (FWLB-D) at 50% power, Case G.

   The events discussed in UFSAR Section 15.5 were not reanalyzed since the resizing of the AFWS venturis does not affect AFW performance in these cases. They are the partial loss of normal feedwater at 100% power with an AFW flow of 165 gpm, (LONF Case A), the complete loss of normal

feedwater at 100% power with an AFW flow of 185 gpm (LONF Case B), and the complete loss of normal feedwater at 50% power with an AFW flow of 185 gpm, (LONF Case C). The existing analyses are still valid in these cases since the minimum flow did not change with the modification.

The reanalysis of main feedwater line break events support SONGS 1 operation with the reduced AFW flows of 100 gpm for FWLB-U (Cases D and E) and 175 gpm for FWLB-D (Cases F and G). In all cases, the core remains covered and in a coolable geometry at all times. Thus, all applicable acceptance criteria are shown to be met. The radiological consequences following a feedline break, for all cases analyzed are bounded by the radiological consequences as reported in the UFSAR, section 15.6. Therefore, the reduced AFW flows are demonstrated to be acceptable and do not involve a significant increase in the probability or consequences of an accident previously evaluated.

Normal Technical Specification Surveillance testing will verify operability of both Trains of AFW.

Design verification testing will be performed in MODES 5 and 1 in addition to the surveillance testing required by the Technical Specifications. This additional testing of the Auxiliary Feedwater System (AFWS) will be performed to confirm that the AFWS meets the design basis requirements.

Train B pump G-10W and Train A pump G-10S will be tested in MODE 5 to determine cavitating points of the venturis. The testing will also develop design quality pump curves.

Train B testing will confirm that pump G-10W will not exceed 450 gpm total flow to all three steam generators. This design verification testing, plus the standard construction testing will ensure Train B operates within the design basis.

Train A motor driven Pump G-10S will also be tested to verify it is capable of supplying at least 100 gpm to two intact main feedlines and depressurized steam generators.

MODE 1 is required to allow sufficient steam pressure to run the Turbine AFW pump (G-10), use automatic controls for Main Feedwater and Reactor Rod Control, and maintain stable plant conditions.

In MODE 1, testing will confirm the flowrates for the Turbine AFW pump, G-10 in combination with the motor driven

AFW pump G-10S. Actual flow testing will ensure the pumps meet the minimum requirement of 100 gpm total flow to two intact main feedlines and pressurized steam generators and the maximum of 150 gpm flow per steam generator to prevent water hammer. This testing will provide accurate system curves for measurement of flow resistance to the steam Generators and inlet losses at a variety of pressures with accurate flow rates.

SCE calculations and Westinghouse analyses shows that acceptable AFW flow rates to the steam generators are achieved for all AFWS design basis events. This testing will verify the analyses results. It will not affect the accident probabilities since the purpose of the system is to mitigate an accident. The accident consequences will not be affected in MODE 5 since the AFW system is not required in that MODE and accidents are not postulated. During Mode 1 testing, if an accident were to occur, Train B would actuate. If Train B were to fail, Train A would actuate as designed. As discussed in Attachment 4 the minimum AFW flow required at or below 25% power is well below the calculated flow of the Train A pumps G-10 and G-10S. The operation of either Train of AFW at or below 25% power will ensure that all acceptance criteria are met in the event of a feedline break or loss of normal feedwater flow.

Therefore, operating San Onofre Unit 1 in accordance with this proposed change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

Resizing the AFW flow reducing venturis to prevent the possibility of a water hammer event has been analyzed, as discussed above. After installation of the new venturis, the AFWS will function as designed.

The flow verification tests will be performed shortly after MODE 1 entry at or below 25% power. If a feed water system design basis accident were to occur before testing pump G-10, AFW Train B would actuate and provide the required AFW flow for the intact steam generators. If Train B fails, Train A AFW pumps G-10 and G-10S would be available to actuate as required. As discussed in part 1 above, the

minimum AFW flow required at or below 25% power is well below the calculated flow of the Train A pumps G-10 and G-10S. Operating either Train of AFW at or below 25% power will ensure that all acceptance criteria are met in the event of a feedline break or loss of normal feedwater flow.

Therefore, it is concluded that operation of the facility in accordance with this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

Response: No

As discussed above, this proposed modification will resize the AFW venturis to limit maximum AFW to 150 gpm and results in a lower flow to the steam generators in the event of a feedwater line break accident. Analyses has shown there is no significant reduction in any margin of safety, i.e., core decay heat removal is sufficient, the core remains in a coolable state, and is never uncovered.

Testing of Train A in MODE 1 below 25% power will not significantly reduce the margin of safety. In the event of a FWLB-U, AFW Train B is available. In addition, AFW Train A with pumps G-10 and G-10S is also available and capable of delivering the required flows at 25% power. Therefore, the operation of the facility in accordance with this proposed change does not involve a significant reduction in a margin of safety.

SAFETY AND SIGNIFICANT HAZARD CONSIDERATION DETERMINATION

Based on the above Safety Analysis, it is concluded that: (1) Proposed Change No. 227 does not constitute a significant hazard consideration as defined by 10 CFR 50.92; and (2) there is a reasonable assurance that the health and safety of the public will not be endangered by the proposed change.

Attachment 1 - Existing Technical Specification

Attachment 2 - Proposed Technical Specification

Attachment 3 - Auxiliary Feedwater Accident Analyses

Attachment 4 - Auxiliary Feedwater System Flow test

ATTACHMENT 1

EXISTING TECHNICAL SPECIFICATION

## 3.4.3 AUXILIARY FEEDWATER SYSTEM

APPLICABILITY: Applies to the motor driven auxiliary feedwater pumps and valves for MODES 1, 2 and 3.

OBJECTIVE: To ensure the availability of auxiliary feedwater to remove decay heat from the core.

SPECIFICATION: Two trains of auxiliary feedwater including associated pumps and valves, shall be OPERABLE.

ACTION:

A. With one Train of auxiliary feedwater inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

B. With both Trains of auxiliary feedwater inoperable, be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

BASIS: The OPERABILITY of the auxiliary feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350•F from normal operating conditions in the event of a total loss of offsite power.

Two auxiliary feedwater trains and the steam system relief valves provide core decay heat removal capability in the event of a sustained loss of off-site power. Either auxiliary feedwater train has the capability to satisfy decay heat removal requirements from the core, with a delivered flow of at least 185 gpm per train with three intact main feedwater lines and pressurized steam generators, 125 gpm per train with two intact main feedwater lines and pressurized steam generators, and 250 gpm per train with two intact main feedwater lines and depressurized steam generators.(1)

AFW System Train A pumps and valves consist of AFW pumps G-10S and G-10 and associate valves, including flow control valves FCV-2300A, FCV-2300B, and FCV-2300C.

AFW System Train B pump and valves consist of AFW pump G-10W and associated valves, including flow control valves FCV-3300A, FCF-3300B, and FCV-3300C.

REFERENCES:

(1) SCE letter dated November 20, 1987, from M. O. Medford to NRC Document Control Desk.