

August 28, 2000

Mr. Harold B. Ray
Executive Vice President
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 - STAFF
EVALUATION RE: REACTOR PRESSURE VESSEL SURVEILLANCE
CAPSULE WITHDRAWAL SCHEDULES (TAC NOS: MA8801 AND MA8802)

Dear Mr. Ray:

By letter dated April 26, 2000, you submitted for the U.S. Nuclear Regulatory Commission (NRC) staff's approval a revised reactor pressure vessel (RPV) surveillance program capsule withdrawal schedule for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. The proposed schedules were based on the American Society for Testing and Materials (ASTM) E 185-70 recommendations. The purpose of your submittal was to provide more effective surveillance capsule withdrawal schedules for SONGS, Units 2 and 3. Specifically, you proposed these withdrawal schedules to reflect the results from the SONGS Unit 3 capsule removal at 4.33 effective full-power years (EFPYs).

The NRC staff has reviewed your submittal and finds that your proposed RPV capsule withdrawal and testing schedules are in accordance with the recommendations of the ASTM E185-70 Code. Also, the NRC staff has independently verified that your proposed RPV surveillance capsule withdrawal schedules comply with the requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix H. Therefore, the NRC staff finds your proposed schedule acceptable. The NRC staff's safety evaluation is enclosed. This completes our effort under our technical assignment control (TAC) numbers MA8801 and MA8802, and the TACs are closed.

Sincerely,

/RA/

Stephen Dembek, Chief, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosure: Safety Evaluation

cc w/encl: See next page

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Division of Licensing Project Management
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Docket Nos. 50-361 and 50-362

Enclosure: Safety Evaluation

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**See previous concurrence

San Onofre Nuclear Generating Station, Units 2 and 3

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STAFF EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REQUEST TO REVISE THE REACTOR VESSEL SURVEILLANCE
CAPSULE WITHDRAWAL SCHEDULE FOR
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3
DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated April 26, 2000, Southern California Edison (SCE, the licensee) submitted for the U.S. Nuclear Regulatory Commission's (NRC's) approval, its revised withdrawal schedules for San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, which were based on the American Society for Testing and Materials (ASTM) E 185-70 recommendations. The purpose of the licensee's submittal was to provide more effective surveillance capsule withdrawal schedules for SONGS, Units 2 and 3. Specifically, the licensee proposed these withdrawal schedules to reflect the results from the SONGS Unit 3 capsule removal at 4.33 effective full-power years (EFPYs).

2.0 BACKGROUND

The surveillance programs for SONGS, Units 2 and 3 were implemented to monitor the radiation-induced changes in the mechanical and impact properties of the pressure vessel materials. The surveillance programs for SONGS, Units 2 and 3 are discussed in the Technical Specifications and will be incorporated in the next revision of the Updated Safety Analysis Report for each of the units. These surveillance programs were established in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

Appendix H to 10 CFR Part 50 requires licensees to monitor changes in the fracture toughness properties of ferritic materials in the reactor vessel beltline region of light-water nuclear power reactors. Appendix H states that the design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E 185 that is current on the issue date of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code to which the reactor vessel was purchased. Later editions of ASTM E 185 may be used including those editions through 1982.

The RPV surveillance program for each of the SONGS units was initially determined per ASTM E 185-70, which was the edition of the ASTM standard that was in effect on the issue date of Section III of the ASME Code (1971), to which the SONGS Units 2 and 3 reactor vessels were purchased.

The surveillance capsule withdrawal schedule and testing criteria for ASTM E 185-70 recommends that sets of specimens be withdrawn at three or more separate times. It specifically recommends that one of the data points obtained shall correspond to the neutron

exposure of the reactor vessel at no greater than 30 percent of its design life. There is no specific requirement for when the data point shall be obtained for the second capsule. The third data point obtained shall correspond to the neutron exposure of the reactor vessel near the end of its design life.

3.0 EVALUATION

The licensee has opted to continue to use the ASTM E 185-70 standard in determining the number of capsules to be withdrawn and the schedule of withdrawing and testing the capsules of the SONGS Units 2 and 3 RPV surveillance program. As stated previously, ASTM E 185-70 recommends that three capsules are to be withdrawn at three or more separate times.

The SONGS Unit 2 capsule removal at 2.85 EFPYs represented the original standard core for both units. Following the SONGS Unit 2 capsule removal, the cores in both units were reconfigured in a low leakage loading pattern which reduced the vessel and capsule fluxes. The SONGS Unit 3 capsule removal at 4.33 EFPYs represented the combined results of the standard and low leakage core designs. Therefore, the licensee determined that the target fluence values obtained from the results of the Unit 3 capsule removal at 4.33 EFPYs provide better predicted values for Unit 2. Therefore, the proposed schedules for SONGS Units 2 and 3 are based upon SCE's use of the Unit 3 results.

3.1 SONGS Unit 2

The estimated peak end-of-life (EOL) fluence for SONGS Unit 2 is 4.2×10^{19} n/cm². Currently, SCE has withdrawn one capsule for SONGS Unit 2. The first capsule was removed and tested from the vessel at 2.85 EFPYs with an accumulated neutron fluence of 5.07×10^{18} n/cm². This meets the recommendation of ASTM E 185-70 for the first capsule to be withdrawn and tested. As stated above, ASTM E 185-70 recommends that one of the data points obtained shall correspond to the neutron exposure of the reactor vessel at no greater than 30 percent of its design life. The second capsule is scheduled to be removed and tested from the vessel at 13.6 EFPYs. This will meet the ASTM E 185-70 recommendation of the second capsule to be withdrawn and tested since there is no specific requirement for when the data point shall be obtained for the second capsule. Finally, the third capsule is scheduled to be withdrawn and tested at 24 EFPYs, which will also meet the recommendation of ASTM E 185-70 for the third capsule. The recommendation of ASTM E 185-70 for the third capsule is that the third data point obtained shall correspond to the neutron exposure of the reactor vessel near the end of its design life. In addition, SCE has three standby capsules for SONGS Unit 2.

The staff verified that the proposed capsule withdrawal and testing schedule for the capsules of the SONGS Unit 2 RPV surveillance program is in accordance with the recommendations of ASTM E 185-70. The staff has also verified that the proposed withdrawal schedule for the capsules for the SONGS Unit 2 RPV surveillance program complies with the requirements of 10 CFR Part 50, Appendix H.

3.2 SONGS Unit 3

The estimated peak EOL fluence for SONGS Unit 3 is 4.2×10^{19} n/cm². Currently, SCE has withdrawn one capsule for SONGS Unit 3. The first capsule was removed and tested from the vessel at 4.33 EFPYs with an accumulated neutron fluence of 8×10^{18} n/cm². This meets the

recommendation of ASTM E 185-70 for the first capsule to be withdrawn and tested. As stated above, ASTM E 185-70 recommends that one of the data points obtained shall correspond to the neutron exposure of the reactor vessel at no greater than 30 percent of its design life. The second capsule is scheduled to be withdrawn and tested from the vessel at 15.2 EFPYs. This will meet the ASTM E 185-70 recommendation of the second capsule to be withdrawn and tested, since there is no specific requirement for when the data point shall be obtained for the second capsule. Finally, the third capsule is scheduled to be withdrawn and tested at 24 EFPYs, which will also meet the recommendation of ASTM E 185-70 for the third capsule. The recommendation of ASTM E 185-70 for the third capsule is that the third data point obtained shall correspond to the neutron exposure of the reactor vessel near the end of its design life. In addition, SCE has three standby capsules for SONGS Unit 3.

The staff verified that the proposed capsule withdrawal and testing schedule for the capsules of the SONGS, Unit 3 RPV surveillance program is in accordance with the recommendations of ASTM E 185-70. The staff has also verified that the proposed withdrawal schedule for the capsules for the SONGS Unit 3 RPV surveillance program complies with the requirements of 10 CFR Part 50, Appendix H.

4.0 CONCLUSION

Based on the staff's review of the SCE submittal, the NRC staff finds that the revised withdrawal schedules of the SONGS Units 2 and 3 RPVs, satisfy the requirements of Appendix H to 10 CFR Part 50, and are therefore acceptable.

5.0 REFERENCES

1. Letter from Mr. A.E. Scherer (SCE) to NRC Document Control Desk, "Surveillance Capsule Withdrawal Schedule San Onofre Nuclear Generating Station Units 2 and 3," dated April 26, 2000.
2. *Code of Federal Regulations*, Title 10, Part 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements," dated January 1998.
3. American Society for Testing and Materials, "Standard Recommended Practice for Surveillance Tests for Nuclear Reactor Vessels," ASTM E 185-70.
4. NUREG-1511 "Reactor Pressure Vessel Status Report," dated December 1994.

Principal Contributor: M. Khanna

Date: August 28, 2000