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September 29, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: **Docket Nos. 50-361 and 50-362**
Additional Information Supporting the Third Ten-Year Inservice Inspection (ISI) Interval Relief Requests ISI-3-24 and ISI-3-25 for the Use of Structural Weld Overlay and Associated Alternative Repair Techniques
San Onofre Nuclear Generating Station, Units 2 and 3

References: 1) Letter from A.. E. Scherer to the U. S. Nuclear Regulatory Commission dated June 30, 2006; Subject: Docket No. 50-362, Third Ten-Year Inservice Inspection (ISI) Interval Relief Request ISI-3-24, Use of Structural Weld Overlay and Associated Alternative Repair Techniques, San Onofre Nuclear Generating Station, Units 3

2) Letter from A. E. Scherer to the U. S. Nuclear Regulatory Commission dated July 14, 2006; Subject: Docket Nos. 50-361 and 50-362, Third Ten-Year Inservice Inspection (ISI) Interval Relief Request ISI-3-25, Use of Structural Weld Overlay and Associated Alternative Repair Techniques, San Onofre Nuclear Generating Station, Units 2 and 3

Dear Sir or Madam:

This letter provides additional information in response to questions from Nuclear Regulatory Commission staff reviewers. The answers to the questions are provided in the enclosure to this letter. The additional information provided in the answers to questions 1, 2, 3, and 6, are applicable to both ISI-3-24 and ISI-3-25 (references 1 and 2).

Should you have any questions, please contact me.

Sincerely,

Enclosures: As stated

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Southern California Edison (SCE)

San Onofre Nuclear Generating Station (SONGS), Units 2 and 3

Docket Nos. 50-361 and 50-362

Enclosure

Responses to NRC Staff Questions Regarding ISI-3-24 and ISI-3-25

NRC Question 1:

In your submittal dated June 30, 2006, you state in Section 4.0 that structural weld overlays are proposed for the welds listed. You also state that the thickness of the overlay determined by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI requirement that "no flaw of depth greater than 75% through-wall is acceptable, along with the consideration of applied loading." Since there is no mention in your submittal whether you are doing full-structural overlays, please clarify whether full-structural overlays are to be performed and that no design/optimized overlays will be implemented.

SCE Response to Question 1: (Applies to both ISI-3-24 and ISI-3-25)

Full-structural overlay is the prime objective as indicated in the Unit 2 sizing calculations (SONG-08Q-301 and SONG-08Q-302) for the pressurizer safety relief and spray nozzles. These two calculations were referenced in the summary report (SIR-06-143, "Weld Overlay Design and Analysis for Pressurizer Safety Relief and Spray Nozzle-to-Safe-End Welds at San Onofre Nuclear Generating Station, Unit 2) SCE submitted to the NRC by letter dated May 10, 2006, in support of the relief request ISI-3-18. As noted in the cover letter of ISI-3-24 the calculations supporting ISI-3-18 also support ISI-3-24.

In the sizing calculations, SCE assumed the crack depth for weld overlay (WOL) sizing is equal to the original wall thickness ($t_{orig\ pipe}$). To meet the general Section XI requirement that no flaw of depth greater than 75% through-wall is acceptable, this requires:

$$\text{crack depth} / (t_{orig\ pipe} + t_{WOL}) = 0.75$$

SCE also considered the piping loads in the WOL sizing, however, the 75% criterion of Section XI governs the design.

The planned full-structural WOL is designed to be more conservative than an "optimized" WOL that assumes a crack depth equivalent to 75% of the original wall thickness only.

NRC Question 2:

Please indicate what types of nondestructive examinations (NDEs) will be performed prior to the weld overlay installation. If pre-welding NDEs are not to be performed, expand your justification for not performing the NDE prior to welding your overlays.

SCE Response to Question 2: (Applies to both ISI-3-24 and ISI-3-25)

SCE will perform the same type of NDE as performed during the Unit-2 Cycle-14 refueling outage, as discussed in the February 22, 2006, letter from A. E. Scherer to the U.S. Nuclear Regulatory Commission; Subject: Docket Nos. 50-361, Third Ten-Year Inservice Inspection (ISI) Interval Relief Request ISI-3-18 Use of Structural Weld Overlay and Associated Alternative Repair Techniques, San Onofre Nuclear Generating Station, Unit 2.

Specifically, the pressurizer spray line weld inspection will be performed to meet the requirements of Appendix VIII, Supplement 10, as modified by the Performance Demonstration Initiative (PDI) Program. However, because the material of the three safety valve line safe ends and the surge safe end is cast austenitic stainless steel SCE will perform the qualified Appendix VIII, Supplement 10, as modified by the PDI Program UT exam, on the Alloy 82/182 welds from the nozzle side, which is ferritic steel. Appendix VIII, Supplement 9 "Qualification Requirements for Cast Austenitic Piping Welds" is in course of preparation and is not required by 10CFR50.55a(g)(6)(ii)(C). Therefore, to meet the RI-ISI UT examination requirement of the safety valve lines, SCE will perform UT examination from the cast austenitic stainless steel side in accordance with ASME Section XI, Appendix III. Additionally, the UT examination of the stainless steel weld adjacent to the surge nozzle will be performed in accordance with ASME Section XI, Appendix III from the cast austenitic stainless steel side and Appendix VIII, Supplement 2, as modified by the PDI Program UT exam, from austenitic stainless steel side.

NRC Question 3:

Please discuss your repair strategy as a result of pre-welding NDE. The cover letter indicates that full-structural overlays will be performed as a preemptive application. If a flaw is detected in the weld by NDE prior to a weld overlay, confirm that the weld overlay thickness calculation is based on the worst case flaw.

SCE Response to Question 3: (Applies to both ISI-3-24 and ISI-3-25)

See answer to Question 1. The structural sizing calculations have already considered the worst case of through wall flaw.

Crack growth calculations will be performed to determine the time for any observed flaw indications to grow to the overlay design basis in the structural sizing calculations (through wall flaw) due to fatigue and stress corrosion crack growth. These calculations will use as an initial flaw size the flaw depth detected by NDE (if any) prior to the weld overlay. If no flaws are detected, the initial flaw

size will be assumed to be 10% of the original wall thickness, based on a conservative estimate of the detection threshold for the NDE.

NRC Question 4:

Please identify when the flaw evaluations and shrinkage stress effects analyses required under Code Case N-504-2(g), Items 2 and 3, will be performed as they relate to your outage schedule. It is the staff's expectation that this requirement will be satisfied prior to placing the welds/plant into service. This expectation is reflected in recent safety evaluations since your Relief Request ISI-2-18, dated February 22, 2006. If you cannot complete these analyses prior to startup, relief from this requirement must be requested with sufficient justification for the staff to grant relief.

SCE Response to Question 4: (Applies to ISI-3-24)

The calculations supporting ISI-3-18 also support ISI-3-24. The Unit 2 flaw evaluations and shrinkage stress effects evaluations were completed and referenced in the summary report (SIR-06-143, "Weld Overlay Design and Analysis for Pressurizer Safety Relief and Spray Nozzle-to-Safe-End Welds at San Onofre Nuclear Generating Station, Unit 2). The shrinkage effects referenced in the summary report were based on the Unit 2 measurements. Unit 3 measurements will be taken after the Unit 3 overlays are completed and compared to the Unit 2 evaluation prior to restarting Unit 3. If additional Unit 3 calculations are required, based on the Unit 3 measurements, they will be completed prior to the restart of Unit 3.

NRC Question 5:

Please indicate the maximum surface area of the part of the overlay that is deposited on the ferritic portions of the weld to confirm whether the 100 square inches limitation of Code Case N-638-1 is met.

SCE Response to Question 5: (Applies only to ISI-3-24)

As with the similar welds performed in Unit 2 under ISI-3-18, and as shown in the sizing calculations (SONG-08Q-301 and SONG-08Q-302), the minimum required overlay length plus extensions for inspection do not exceed the 100 in^2 maximum length limitation.

Since SCE is not exceeding the 100 in^2 maximum, SCE does not need relief from this requirement.

NRC Question 6:

On page 1 to Table 3 of your submittal, you state: "In lieu of the required ultrasonic examination of 4.0(b) only the required liquid penetrant will be performed. The ultrasonic examination will be in accordance with N-504-2 and Appendix Q." You state that ". . . it is believed that for this type of repair that any major base material cracking would take place in the HAZ [heat-affected zone] directly below the weld overlay or in the underlying Inconel 82/182 weld deposit and not in the required band of material out beyond the overlay. Therefore, it is assumed that if this cracking were to occur it would be identified by the ultrasonic examination of the weld overlay and not performing the required base material ultrasonic examination should be considered acceptable." Your statements "it is believed" and "it is assumed" do not meet the staff's threshold for an acceptable technical justification in accordance with paragraph 50.55a(a)(3)(i) of Title 10 of the Code of Federal Regulations.

SCE Response to Question 6: (Applies to both ISI-3-24 and ISI-3-25)

Additional technical justification supporting the basis for the proposed alternative: "In lieu of the required ultrasonic examination of 4.0(b) only the required liquid penetrant will be performed. The ultrasonic examination will be in accordance with N-504-2 and Appendix Q."

Code Case N-638-1 addresses the use of the temper bead welding technique including those welds made in deep cavities in ferritic material. In the case of weld overlays to be applied at SONGS Unit 3, this technique will be used to apply a non-ferritic overlay to the P3 ferritic nozzle base material adjacent to the dissimilar metal weld (DMW). The PDI qualified ultrasonic examination procedure is designed and qualified to examine the entire volume of the overlay weld as well as the region of the P3 material containing the weld heat affected zone (HAZ) and a volume of unaffected base material beyond the HAZ. In addition to verifying the soundness of the weld, a purpose of these examinations is to assure that delayed cracking that may be caused by hydrogen introduced during the temper bead welding process is not present. In the unlikely event that this type of cracking does occur, it would be initiated on the surface on which the welding is actually performed or in the HAZ immediately adjacent to the weld. The most appropriate technique to detect surface cracking is the surface examination technique that SCE will perform on the weld overlay and the adjacent base material in a band at least 1.5 times the thickness of the base material on either side of the overlay. The maximum achievable inspection volume is 100 percent of the volume susceptible to weld induced flaws.

While it would be possible to extend the examination volume to a larger extent on either side of the weld overlay, it would not be possible with current technology to ultrasonically inspect 100 percent of the volume within 1.5 times the thickness of

the base material because of geometric considerations. Inspection of an increased volume would result in increased dose to inspection personnel without a compensating increase in safety or quality because there is no plausible mechanism for formation of new flaws or propagation of existing flaws in the region. The overlay volume is small relative to the volume of the underlying pipe and does not present the same concerns as those related to welds in deep cavities contemplated by the requirements of Code Case N-638-1. Therefore, the examinations tailored for overlay inspection and required by Code Case N-504-2 and Appendix Q as modified in the request for relief provide full assurance that the weld and adjoining base material are fully capable of performing their intended function.

Later revisions to Code Case N-638-1 (N-638-2 and N-638-3), approved by ASME Code in 2005 and 2006 respectively recognize that inspection of the larger volume is not necessary to assure quality and safety.

The NRC has previously granted relief on this specific issue for temper bead welding for use at other plants for the reasons mentioned above. Specifically, San Onofre Nuclear Generating Station Unit 2 in the Spring of 2006, Millstone Power Station, Unit No. 3 in January 2006, and Three Mile Island Unit 1 in Fall 2003 have received approval to use inspection methods essentially identical to those proposed by SCE for San Onofre Unit 3.