



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 23, 2009

Mr. Ross T. Ridenoure
Senior Vice President and
Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 - RE:
RELIEF REQUESTS ISI-3-27, REVISION 1 AND ISI-3-28, REVISION 1, FOR
THE APPLICATION OF WELD OVERLAY ON DISSIMILAR AND SIMILAR
METAL WELDS (TAC NOS. ME0108 AND ME0109)

Dear Mr. Ridenoure:

By letter dated November 12, 2008, Southern California Edison (SCE, the licensee) submitted Relief Requests (RRs) ISI-3-27, Revision 1, and ISI-3-28, Revision 1, to use alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, 1995 Edition through 1996 Addenda, IWA-4000, for the installation of structural weld overlays on dissimilar and similar metal welds at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. Relief is requested for the remainder of the current SONGS, Units 2 and 3, third 10-year inservice inspection (ISI) interval which began on August 18, 2003.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that Relief Requests ISI-3-27, Revision 1, and ISI-3-28, Revision 1, will provide an acceptable level of quality and safety. Therefore, pursuant to paragraph 50.55a(a)(3)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR), the NRC staff authorizes the use of Relief Requests ISI-3-27, Revision 1, and ISI-3-28, Revision 1, for the installation of full structural weld overlay on the dissimilar and similar metal welds at SONGS, Units 2 and 3. Due to the immediate need of this relief request, verbal authorization for the use of these relief requests was granted on November 20, 2008, for SONGS, Unit 3.

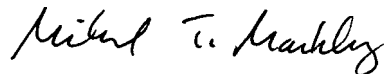
R. T. Ridenoure

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The NRC safety evaluation is enclosed. All other ASME Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact N. Kalyanam, Project Manager, at 301-415-1480 or by electronic mail at kaly.kalyanam@nrc.gov.

Sincerely,



Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosure:
Safety Evaluation

cc w/encl: Distribution via ListServ



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE NUCLEAR REACTOR REGULATION
RELIEF REQUESTS ISI-3-27, REVISION 1, AND ISI-3-28, REVISION 1
STRUCTURAL WELD OVERLAY ON SIMILAR AND DISSIMILAR METAL WELDS
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3
SOUTHERN CALIFORNIA EDISON
DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated November 12, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML083220131), Southern California Edison (SCE, the licensee) requested approval of Revision 1 to Relief Requests (RRs) ISI-3-27 and ISI-3-28 to use alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, 1995 Edition through 1996 Addenda, IWA-4000, for the installation of structural weld overlays on similar and dissimilar metal welds at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3.

By letters dated December 13, 2007, the U.S. Nuclear Regulatory Commission (NRC) approved the original RRs ISI-3-27 and ISI-3-28 (ADAMS Accession Nos. ML073250004 and ML073240437, respectively). The original RR ISI-3-27 is related to weld overlay of Alloy 82/182 dissimilar metal butt welds and stainless steel similar metal welds in the hot leg surge line, hot leg drain line, and shutdown cooling line, and the original RR ISI-3-28 is related to the starting of the 48-hour hold time for the ultrasonic testing (UT) examination of the weld overlay as part of fabrication procedures which are specified in RRs ISI-3-25 and ISI-3-27.

By letter dated June 12, 2007, the NRC approved Relief Request ISI-3-25 which is related to the weld overlay of dissimilar and similar metal welds in the pressurizer surge line (ADAMS Accession No. ML071380013).

The licensee proposed Revision 1 to RRs ISI-3-27 and ISI-3-28 to include an additional stainless steel similar weld to be weld overlaid in Units 2 and 3. For Unit 2, the licensee submitted Revision 1 of these two relief requests on a contingency basis. If the weld overlay is needed for the subject stainless steel similar metal weld based on the inspection of the pipe segment, RRs ISI-3-27, Revision 1, and ISI-3-28, Revision 1, will be used at Unit 2. If the inspection of the pipe segment does not call for the weld overlay of the subject similar metal weld, both relief requests will not be used.

For Unit 3, Revision 1 of these two relief requests will be used because the licensee has determined that the subject similar metal welds are required to be weld overlaid based on the inspection performed.

Enclosure

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(b), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

Pursuant to 10 CFR 50.55a(a)(3), alternatives to requirements may be authorized by the NRC if the licensee demonstrates that (i) the proposed alternatives provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The Code of record for both units for the third 10-year ISI interval is the ASME Code, Section XI, 1995 Edition through 1996 Addenda. For UT examinations, the licensee uses Appendix VIII, Supplement 11 of the ASME Code, Section XI, 1995 Edition through 1996 Addenda.

3.0 TECHNICAL EVALUATION

3.1 Proposed Relief Request ISI-3-27, Revision 1

3.1.2 Code Components For Which Relief Is Required

The affected components are high safety significant (HSS) Class 1 dissimilar metal piping welds with Alloy 82/182 dissimilar metal welds and adjacent stainless steel similar metal welds.

Components Affected	Weld Identification	
	Unit 2	Unit 3
Reactor coolant system (RCS) hot leg surge nozzle-to-safe end weld (Alloy 82/182)	02-006-010	03-006-010
RCS hot leg surge nozzle: safe end-to-pipe stainless steel weld	02-016-016	03-016-016
RCS hot leg surge nozzle: pipe-to-elbow stainless steel weld	02-016-015	03-016-015
RCS hot leg drain nozzle-to-safe end weld (Alloy 82/182)	02-006-011	03-006-011
RCS hot leg drain nozzle: safe end-to-pipe stainless steel weld	02-030-001	03-030-010
Shutdown cooling system hot leg nozzle-to-safe end weld (Alloy 82/182)	02-007-009	03-007-009
Shutdown cooling system hot leg nozzle: safe end-to-pipe stainless steel weld	02-021-001	03-021-010

Material Specifications of the Subject Welds and Piping Components

Dissimilar Metal Weld Identifier		Nozzle Material	Safe End Material
Hot Leg Surge Line			
Unit 2	02-006-010	SA-105 Grade II Forging	SA-351, Grade CF8M Stainless Steel Cast
Unit 3*	03-006-010	SA-541 Class 1 Forging	
Hot Leg Drain Line			
Unit 2	02-006-011	SA-105 Grade II Forging	SA-182, F316 Forging
Unit 3*	03-006-011		
Shutdown Cooling Line			
Unit 2	02-007-009	SA-105 Grade II Forging	SA-351, Grade CF8M Stainless Steel Cast
Unit 3*	03-007-009	SA-541 Class 1 Forging	

Adjacent Stainless Steel Weld Identifier		Pipe Material
Hot Leg Surge Line		
Unit 2	02-016-016	SA-376 Grade TP316
Unit 3	03-016-016	
Hot Leg Surge Line		
Unit 2	02-016-015	SA-403 Grade WP 316
Unit 3	03-016-015	
Hot Leg Drain Line		
Unit 2	02-030-001	SA-376 Grade TP316
Unit 3	03-030-010	
Shutdown Cooling Line		
Unit 2	02-021-001	SA-403 Grade WP316
Unit 3	03-021-010	

* As described in the licensee's letter dated August 29, 2008, the nozzle material for the Unit 3 forgings is SA-541, Class 1 rather than SA-105 Grade II as indicated in RR ISI-3-27, Revision 0.

The licensee noted that the Unit 2 stainless steel pipe-to-elbow weld (ISI 02-016-015) at the RCS hot leg surge nozzle is included in this relief request contingent upon final inspection and confirmation of sizing of the Unit 2 weld overlay. If the final inspection of the actual pipe segment and weld axial length shows that the pipe length is consistent with the design length of the weld overlay, the pipe-to-elbow weld will not need to be weld overlaid.

These welds are all ASME Code Class 1 welds located within the reactor coolant pressure boundary.

Code Item No. B9.11 includes "Welds subject to PWSCC [primary water stress-corrosion cracking]" (Weld ISI Designation Nos. 02-006-010, 02-007-009, 03-006-010, and 03-007-009) and "Welds subject to Thermal Fatigue" (Weld ISI Designation Nos. 02-006-010, 02-007-009, 02-016-015, 02-016-016, 02-021-001, 03-006-010, 03-007-009, 03-016-015, 03-016-016, and 03-021-010). Code Item No. B9.21 includes "Welds subject to PWSCC" (Weld ISI Designation Nos. 02-006-011 and 03-006-011) and "Welds subject to Thermal Fatigue" (Weld ISI Designation Nos. 02-006-011, 03-006-011, 02-030-001, and 03-030-010).

3.1.3 Code Requirements For Which Relief Is Requested

1995 Edition through the 1996 Addenda of the ASME Code Section XI, IWA-4610(a).

1995 Edition with the 1996 Addenda, of the ASME Code, Section XI, Appendix VIII, Supplement 11.

3.1.4 Proposed Alternatives

The licensee proposed to use modified Code Case N-504-2 in combination with Appendix Q of the 2005 Addenda of the ASME Code, Section XI for the weld overlay. The licensee will also use modified Code Case N-638-1 for the ambient temperature temper bead welding for the portion of the overlay applied over the ferritic base material.

When Revision 0 of RR ISI-3-27 was originally submitted, Code Case N-504-2 was the latest version of this Code Case approved by the NRC as stated in NRC Regulatory Guide (RG) 1.147, Revision 14, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." Revision 0 of RR ISI-3-27 was approved by the NRC allowing, in part, use of Code Case N-504-2 with the modifications proposed by the licensee. In October of 2007, NRC issued Revision 15 of RG 1.147, which adopts Code Case N-504-3. The licensee has performed a review of Code Case N-504-3 to determine the differences between the two revisions of the Code Case. The licensee determined that the changes incorporated into Code Case N-504-3 either do not apply to the proposed weld overlays or are met by the proposed modifications to Code Case N-504-2 and approved by the NRC in the safety evaluation dated December 13, 2007.

Full Structural Weld Overlay Design Criteria

The licensee will design the structural weld overlay in accordance with Code Case N-504-2 and Nonmandatory Appendix Q of the ASME Code, Section XI. The temper bead welding technique will be implemented in accordance with ASME Code, Section XI Code Case N-638-1 for that portion of the overlay applied over the ferritic base material for which the Construction Code requires post-weld heat treatment. Temperature monitoring requirements contained within Code Case N-638-1 will be performed using contact pyrometers in lieu of thermocouples required by IWA-4610(a) of the ASME Code, Section XI, 1995 Edition through 1996 Addenda.

The weld overlays will be sized as full-structural weld overlays designed to satisfy the ASME Code, Section III requirements without crediting the existing pipe. The licensee will also

consider the piping loads in the overlay sizing. 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 percent of the original wall thickness, based on a conservative estimate of the detection threshold for the non-destructive examination (NDE).

This structural weld overlay will completely cover the existing Alloy 82/182 weld metal and will extend onto the ferritic and austenitic stainless steel material on each end of the weld. To avoid stress risers, the weld material will be extended and tapered across the pipe and nozzle side. The end slope will be required to be no steeper than 45 degrees to minimize stress concentration. Sufficient overlay length will be provided to allow for adequate transfer of axial loads between the pipe and the weld overlay. Therefore, the length of the actual structural weld overlay will exceed the minimum length required by ASME Code Case N-504-2 and Section XI, Appendix Q for load redistribution and inspection purposes.

The length of the structural weld overlay will be sufficient for inspection of an area that is 1/2 inch beyond the required repair length and the outer 25 percent of the original wall thickness. The length of the structural weld overlay may be extended and blended into the low alloy steel nozzles outer diameter taper to permit UT inspection of the weld and minimize stress concentration on the nozzle outer diameter. Since generally the outside diameter of the nozzle is larger than that of the safe end, the structural weld overlay thickness on the safe end will be increased to allow a smooth transition surface for UT inspection. Therefore, the final structural weld overlay length and thickness after taking into consideration the UT inspection requirements will exceed the length required for a structural weld overlay repair in accordance with the ASME Code Case N-504-2 and the ASME Code, Section XI, Appendix Q.

The licensee will complete flaw evaluations and shrinkage stress effects evaluations prior to returning Unit 2 and Unit 3 to service from their respective Cycle 15 refueling outage. The evaluation records will be maintained on site and available for NRC review.

Pre-Weld Overlay NDE

The licensee will perform NDE prior to installation of the weld overlay in accordance with the requirements of Appendix VIII, Supplement 10, as modified by the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) Program. However, because the material of the safe ends of the hot leg surge line and the shutdown cooling line is made of cast austenitic stainless steel, the licensee will use the following approaches.

For the Alloy 82/182 dissimilar metal welds, the licensee will perform UT examination from the nozzle side in accordance with Appendix VIII, Supplement 10, as modified by the PDI Program.

For the nozzles of the hot leg surge line and shutdown cooling line, the licensee will perform UT examination from the cast austenitic stainless steel safe-end side in accordance with ASME Code, Section XI, Appendix III.

For the stainless steel (safe end-to-pipe) welds adjacent to the hot leg surge line and shutdown cooling line nozzles, the licensee will perform UT examination from the cast austenitic stainless steel safe-end side in accordance with ASME Code, Section XI, Appendix III, and from austenitic stainless steel pipe side in accordance with Appendix VIII, Supplement 2, as modified by the PDI Program.

For the pipe-to-elbow austenitic stainless steel weld in the hot leg surge line, the licensee will perform the UT examination in accordance with Appendix VIII, Supplement 2, as modified by the PDI Program UT examination.

Post-Weld Overlay NDE

The licensee will examine the completed full structural weld overlay and heat-affected zone (HAZ) beneath the weld overlay will in accordance with the requirements of the ASME Code, Section XI, Code Case N-504-2 and Appendix Q, including the flaw acceptance standards specified in Article Q-4000 of Appendix Q. These inspections, and associated acceptance standards provide assurance that the weld and adjoining base material are fully capable of performing their intended function.

ASME Code, Section XI pre-service acceptance standards, as specified in Appendix Q, are the appropriate standards for pre-service ultrasonic examinations of weld overlay repairs to nuclear plant components. These standards are consistent with the highly sensitive ultrasonic examination procedures being used, which are qualified in accordance with ASME Code, Section XI, Appendix VIII, Supplement 11, as implemented via the PDI. The post-repair inspection volume includes the full thickness of the weld overlay plus 25% of the underlying base metal/weldment thickness.

Qualification requirements for full structural overlaid wrought austenitic piping welds, (i.e., ASME Code, Section XI, Appendix VIII, Supplement 11 as modified by the PDI program) are not currently qualified for cast austenitic stainless steel. The hot leg surge line and shutdown cooling line nozzle safe end are cast austenitic stainless steel. For the 25 percent of the underlying cast austenitic stainless steel of the structural weld overlay, the licensee will perform an UT examination using the best available technique for the pre-service and inservice inspections for these welds. This is consistent with information provided to support previously NRC-approved RRs ISI-3-18 and ISI-3-24 for SONGS, Units 2 and 3.

ASME Code, Section XI, 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, Units 2 and 3, this technique will be used to apply a non-ferritic overlay to the P1 ferritic nozzle base material adjacent to the dissimilar metal weld. The PDI qualified UT examination procedure is designed and qualified to examine the entire volume of the overlay weld as well as the region of the P1 material containing the weld 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 the licensee 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.

ASME Code Case N-638-1 specifies a limit of 100 square inches for a temper bead weld. Approval to exceed this limit will be needed for the hot leg surge line and the shutdown cooling line nozzles. The intent of the code case is clarified to limit the area of an individual weld over the ferritic material. EPRI Technical Report 1003616 provides justification for a maximum area of 500 square inches. The licensee requested to use 300 square inches of weld overlay area on ferritic material using ambient temperature temper bead welding. The licensee is anticipating the weld overlays on ISI Designation Nos. 02-006-010, 03-006-010, 02-007-009, and 03-007-009 will exceed 100 square inches. The weld overlays on 02-006-011 and 03-006-011 will not exceed 100 square inches.

Post-Weld Overlay NDE Report

The licensee will submit a report that summarizes the results of the examinations within 14 days of completion of the final UT examination.

1. The report will include a listing of indications detected. The recording criteria of the ultrasonic examination procedure to be used for the examination of the SONGS, Units 2 and 3, RCS hot leg overlays will require that all indications, regardless of amplitude, be investigated to the extent necessary to provide accurate characterization, identity, and location. Additionally, the procedure requires that all indications, regardless of amplitude, that cannot be clearly attributed to the geometry of the overlay configuration be considered flaw indications.
2. The report will include the disposition of all indications using the standards of ASME Code, Section XI, IWB-3514-2 and/or IWB-3514-3 criteria and, if possible.
3. The report will include the type and nature of the indications. The ultrasonic examination procedure requires that all suspected flaw indications are to be plotted on a cross-sectional drawing of the weld and that the plots should accurately identify the specific origin of the reflector.
4. The report will include a discussion of any repairs to the overlay material and/or base metal and the reason for the repair.

3.1.5 Duration of Proposed Relief Request

This request will be applied for the remainder of the current SONGS, Units 2 and 3, third 10-year ISI interval that started on August 18, 2003. Once these structural weld overlays are installed they will remain in place for the design life of the repair that is defined by the evaluation required in paragraph (g) of AMSE Code Case N-504-2 and corresponding requirements in Nonmandatory Appendix Q to the ASME Code, Section XI. The structural weld overlays are

also subject to the satisfactory examination requirements of Article Q-4000 of Appendix Q for inservice inspection. Those requirements include adding any installed structural weld overlay repairs into the SONGS, Units 2 and 3, ISI plan per Subarticle Q-4300 to Appendix Q for at least one inservice examination to be completed within the next two refueling cycles following the weld overlay installation.

3.1.6 NRC Staff Evaluation

RR ISI-3-27, Revision 0 is related to weld overlay of Alloy 82/182 dissimilar metal butt welds in hot leg surge line, hot leg drain line, and shutdown drain piping. RR ISI-3-27, Revision 1, is the same as RR ISI-3-27, Revision 0, except that the licensee added weld 02-016-015 in Unit 2 and weld 03-016-015 in Unit 3 on the hot leg surge line nozzle to be weld overlaid.

During implementation of the overlays of the welds in RR ISI-3-27, Revision 0, the licensee discovered that the physical configuration of the Unit 3 hot leg surge line includes additional Code-allowed weld buildup that is not specifically detailed on the engineering drawings. The weld overlay was designed to cover the hot leg surge nozzle to safe end dissimilar metal weld and the adjacent stainless steel weld joining the safe end to the pipe. The pipe segment adjacent to the stainless steel safe end-to-pipe weld, however, was found to be slightly shorter than was shown on the engineering drawings and it contains bands of weld material buildup on either end of the pipe segment. With this configuration, the weld overlay as originally designed would have ended on top of a weld buildup rendering the buildup, as well as the adjacent pipe-to-elbow weld, 03-016-015, impossible to inspect via UT. To resolve this issue, the design of the weld overlay is being modified to increase the length of the overlay and fully cover the weld material buildup on the pipe segment as well as the pipe-to-elbow weld, 03-016-015, and provide an overlay that is UT inspectable. Therefore, the licensee submitted Revision 1 to RR ISI-3-27 to require pipe-to-elbow weld, 03-016-015, to be weld overlaid.

For Unit 2, the licensee has not inspected the actual length of hot leg surge line nozzle and associated components (e.g., safe end, pipe and elbow) to determine whether the designed weld overlay length is sufficient and whether the pipe-to-elbow weld, 02-016-015 is needed to be overlaid. However, the licensee includes pipe-to-elbow weld, 02-016-015 of Unit 2 in RR ISI-3-27, Revision 1, on a contingency basis in case weld 02-016-015 needs to be overlaid in the future outages.

As the licensee stated above, the weld overlay design was based on ASME Code Case N-504-2. Regulatory Guide 1.147, Revision 15 specifies that Code Case N-504-3, which is a later version of N-504-2, be used. The NRC staff compared Code Cases N-504-2 and N-504-3 and found that RR ISI-3-27, Revision 1, includes the differences in requirements between Code Cases N-504-2 and N-504-3. Therefore, RR ISI-3-27, Revision 1, satisfies Code Case N-504-3.

The weld methodology and design as documented in RR ISI-3-27, Revision 0, has been approved for use on stainless steel weld metals such as welds 02-016-015 and 03-016-015 as shown in the NRC's safety evaluation dated December 13, 2007. Therefore, the NRC staff finds that the weld overlay methodology and design as approved in RR ISI-3-27, Revision 0, are applicable to pipe-to-elbow welds 02-016-015 and 03-016-015 in the hot leg surge line in RR ISI-3-27, Revision 1 for SONGS, Units 2 and 3, respectively.

Revision 1 to RR ISI-3-27 also corrects the following inconsistencies in RR ISI-3-27, Revision 0:

1. RR ISI-3-27, Revision 0, referred inconsistently to the base material of the RCS hot leg surge, drain, and shutdown cooling surge nozzles as P1 or P3 ferritic steel. In RR ISI-3-27, Revision 1, the base material for these nozzles has been changed to P1 ferritic steel.
2. A footnote in RR ISI-3-27, Revision 0, referred to the recording criteria of the UT examination procedure for examination of the pressurizer overlays which should have been RCS hot leg. RR ISI-3-27, Revision 1, changed pressurizer to RCS hot leg.
3. Table 3 of RR ISI-3-27, Revision 0, stated that the weld overlay would extend to the transition taper of the low alloy steel nozzle which should have been carbon steel. In RR ISI-3-27, Revision 1, the RCS hot leg nozzles has been changed to carbon steel.

The NRC staff has reviewed these three changes and found them to be acceptable because the changes are editorial in nature and do not change the technical basis of the weld overlay design and methodology.

3.2 Proposed Relief Request ISI-3-28, Revision 1

3.2.1 Code Components For Which Relief Is Required

RR ISI-3-28, Revision 1, is applicable to the following components in RR ISI-3-25 and ISI-3-28, Revision 1.

Components in RR ISI-3-25

1. Unit 2 Pressurizer S21201ME087 surge line: nozzle to safe end HSS dissimilar metal weld (ISI Designation No. 02-005-031) with Alloy 82/182 weld material subject to PWSCC.
2. Unit 2 Pressurizer S21201ME087 surge line: safe end-to-pipe stainless steel weld (ISI Designation No. 02-016-001).
3. Unit 3 Pressurizer S31201ME087 surge line: nozzle to safe end HSS dissimilar metal weld (ISI Designation No. 03-005-031) with Alloy 82/182 weld material subject to PWSCC.
4. Unit 3 Pressurizer S31201ME087* surge line: safe end-to-pipe stainless steel weld (ISI Designation No. 03-016-001). *Note that this component was erroneously identified in ISI-3-25 as S21201ME087.

Components in RR ISI-3-27, Revision 1

The Unit 2 weld number is designated 02 (e.g., 02-006-010) and Unit 3 weld number is designated as 03 (e.g., 03-006-010)

5. Reactor coolant system hot leg surge line nozzle-to-safe end HSS dissimilar metal welds (ISI Designation No. 02-006-010/03-006-010) with Alloy 82/182 weld material subject to PWSCC.
6. Reactor coolant system hot leg surge line safe end-to-pipe stainless steel welds (ISI Designation No. 02-016-016/03-016-016), and adjacent pipe-to-elbow stainless steel welds (ISI Designation No. 02-016-015/03-016-015).
7. Reactor coolant system hot leg drain nozzle-to-safe end HSS dissimilar metal welds (ISI Designation No. 02-006-011/03-006-011) with Alloy 82/182 weld material subject to PWSCC.
8. Reactor coolant system hot leg drain line safe end-to-pipe stainless steel welds (ISI Designation No. 02-030-001/03-030-010).
9. Shutdown cooling system hot leg nozzle-to-safe end HSS dissimilar metal weld (ISI Designation No. 02-007-009/03-007-009) with Alloy 82/182 weld material subject to PWSCC.
10. Shutdown cooling system hot leg safe end-to-pipe stainless steel welds (ISI Designation No. 02-021-001/03-021-010).

The Unit 2 stainless steel pipe to elbow weld (ISI 02-016-015) is included in this request contingent upon final inspection and confirmation of sizing of the Unit 2 weld overlay.

3.2.2 Proposed Alternatives

The temper bead welding technique will be implemented in accordance with the ASME Code, Section XI, Code Case N-638-1 for that portion of the overlay applied over the ferritic base material for which the Construction Code requires post-weld heat treatment.

Paragraph 4.0(b) of Code Case N-638-1 states in part: "The final weld surface and the band around the area defined in para. 1.0(d) shall be examined using surface and ultrasonic methods when the completed weld has been at ambient temperature for at least 48 hours...."

The licensee proposed to modify the above requirement to allow the starting of the 48-hour hold time to begin following completion of the third temperbead layer. Any applicable requirements not addressed by RR ISI-3-28, or by Tables 1, 2, and 3 of RR ISI-3-25 and RR ISI-3-27, will be satisfied as described in Section XI, 1995 Edition through 1996 Addenda, IWA-4000; Appendix VIII, Supplement 11; Code Case N-504-2; and Code Case N-638-1.

3.2.3 Duration of Proposed Relief Request

This request will be applied for the remainder of the current SONGS, Units 2 and 3, third 10-year ISI interval that started on August 18, 2003. Once these structural weld overlays are installed, they will remain in place for the design life of the repair that is defined by the evaluation required in paragraph (g) of Code Case N-504-2 and corresponding requirements in Nonmandatory Appendix Q of the ASME Code, Section XI. The structural weld overlays are also subject to the satisfactory examination requirements of Article Q-4000 for inservice inspection. Those requirements include adding any installed-structural weld overlay repairs into the SONGS, Units 2 and 3, ISI plan per Subarticle Q-4300 for at least one inservice examination to be completed within the next two refueling cycles after the installation of the weld overlays.

3.2.4 NRC Staff Evaluation

RR ISI-3-28, Revision 0, is related to the starting of the 48-hour hold time for the UT examination of the weld overlay as part of fabrication procedures which are discussed in RRs ISI-3-25 and ISI-3-27, Revision 0.

The weld overlay performed under RRs ISI-3-25 and ISI-3-27, Revision 0, requires UT examination be performed 48 hours after the completed weld surface temperature cooled to ambient temperature. As an alternative to the starting point of the 48-hour hold time, RR ISI-3-28, Revisions 0 and 1, requested when a weld overlay is performed per RRs ISI-3-25 and ISI-3-27, Revisions 0 and 1, that the 48-hour hold time be started after the completion of the third temper bead layer in lieu of the completion of the weld overlay and cooled to the ambient temperature.

The contents of RR ISI-3-28, Revision 1, are the same as RR ISI-3-28, Revision 0, except that the licensee added weld 02-016-015 in Unit 2 and weld 03-016-015 in Unit 3 on the hot leg surge line nozzle to be weld overlaid.

As stated above, during implementation of the overlays of the welds in RR ISI-3-27, Revision 0, the licensee discovered that the physical configuration of the Unit 3 hot leg surge line includes additional Code-allowed weld buildup that is not specifically detailed on the engineering drawings. The weld overlay was designed to cover the hot leg surge nozzle to safe end dissimilar metal weld and the adjacent stainless steel weld joining the safe end to the pipe. The pipe adjacent to the stainless steel weld, however, was found to be slightly shorter than was shown on the engineering drawings and it contains bands of weld material buildup on either end of the pipe. With this configuration, the weld overlay as originally designed would have ended on top of a weld buildup rendering the buildup, as well as the adjacent pipe-to-elbow weld, 03-016-015, impossible to inspect via UT. To resolve this issue, the design of the weld overlay is being modified to increase the length of the overlay and fully cover the pipe weld material buildup as well as the pipe-to-elbow weld, 03-016-015, and provide an overlay that is UT inspectable.

There is no difference in the technical basis for the starting point of the 48 hour-hold time for UT examination between RR ISI-3-28, Revision 1 and ISI-3-28, Revision 0. The staff has approved the starting of the 48-hour hold time after the third temper bead layer when it approved

RR ISI-3-28, Revision 0, on December 13, 2007. The NRC staff finds that the 48-hour hold time for performing UT examination after the third temper bead layer is acceptable to be applied to pipe-to-elbow weld 02-016-015 and 03-016-015 in the hot leg surge line at SONGS, Units 2 and 3, respectively. On the basis of the above, the NRC staff finds that RR ISI-3-28, Revision 1, is acceptable.

4.0 CONCLUSION

On the basis of the information submitted, the NRC staff finds that RR ISI-3-27, Revision 1, and RR ISI-3-28, Revision 1, have not changed significantly from RR-ISI-3-27, Revision 0, and RR ISI-3-28, Revision 0. The significant difference is that in Revision 1 of both relief requests, the licensee included pipe-to-elbow weld, 02-016-015 and 03-016-015 for SONGS, Units 2 and 3, respectively. The NRC staff finds that these two welds are acceptable to be included in both relief requests because weld overlay of these welds will follow NRC approved weld design and methodology in RR ISI-3-27, Revision 0, and RR ISI-3-28, Revision 0. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff finds that RRs ISI-3-27, Revision 1, and ISI-3-28, Revision 1, provide an acceptable level of quality and safety, and, therefore, are acceptable.

The NRC staff verbally authorized these two relief requests for SONGS, Unit 3 on November 20, 2008. The safety evaluation documents the NRC staff basis for the verbal authorization.

All other requirements of the ASME Code, for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice inspector.

Principal Contributor: J. Tsao

Date: January 23, 2009

R. T. Ridenoure

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The NRC safety evaluation is enclosed. All other ASME Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact N. Kalyanam, Project Manager, at 301-415-1480 or by electronic mail at kaly.kalyanam@nrc.gov.

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

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Safety Evaluation

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