

INEL-95/0503

**Technical Evaluation Report on the
Second 10-year Interval Inservice Inspection Program Plan:
Southern California Edison Company,
San Onofre Nuclear Generating Station, Units 2 and 3,
Docket Numbers 50-361 and 50-362**

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ABSTRACT

This report presents the results of the evaluation of the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, submitted October 4, 1993, including the requests for relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI requirements that the licensee has determined to be impractical. The *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan* is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The requests for relief are evaluated in Section 3 of this report.

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SUMMARY

The licensee, Southern California Edison Company, has prepared the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, to meet the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI. For both Units 2 and 3, the second 10-year interval began on April 1, 1994 and ends on August 17, 2003.

The information in the *San Onofre Nuclear Generating Station, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, submitted October 4, 1993, was reviewed. Included in the review were the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. As a result of this review, a request for additional information (RAI) was prepared describing the information and/or clarification required from the licensee in order to complete the review. The licensee provided the requested information in the *San Onofre Nuclear Generating Station, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, submitted April 17, 1995.

Based on the review of the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, the licensee's response to the Nuclear Regulatory Commission's RAI, and the recommendations for granting relief from the ISI examinations that cannot be performed to the extent required by Section XI of the ASME Code, no deviations from regulatory requirements or commitments were identified in the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, except those noted in Sections 2.2.2 and 2.2.3 and in the evaluations of Requests for Relief 3.3.5 and 3.3.6.

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SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN:
SOUTHERN CALIFORNIA EDISON COMPANY,
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3,
DOCKET NUMBERS 50-361 and 362

1. INTRODUCTION

Throughout the service life of a water-cooled nuclear power facility, 10 CFR 50.55a(g)(4) (Reference 1) requires that components (including supports) that are classified as American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, Class 2, and Class 3 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 of Nuclear Power Plant Components* (Reference 2), to the extent practical within the limitations of design, geometry, and materials of construction of the components. This section of the regulations also requires that inservice examinations of components and system pressure tests conducted during successive 120-month inspection intervals comply with the requirements in the latest edition and addenda of the Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein. The components (including supports) may meet requirements set forth in subsequent editions and addenda of this Code that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed therein and to Nuclear Regulatory Commission (NRC) approval. The licensee, Southern California Edison Company, has prepared the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, (Reference 3) to meet the requirements of the 1989 Edition of the ASME Code Section XI. The second 10-year interval began April 1, 1994 and ends August 17, 2003.

As required by 10 CFR 50.55a(g)(5), if the licensee determines that certain Code examination requirements are impractical and requests relief from them, the licensee shall submit information and justification to the NRC to support that determination.

Pursuant to 10 CFR 50.55a(g)(6), the NRC will evaluate the licensee's determination that Code requirements are impractical to implement. The NRC may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Alternatively, pursuant to 10 CFR 50.55a(a)(3), the NRC will evaluate the licensee's determination that either (i) the proposed alternatives provide an acceptable level of quality and safety, or (ii) Code compliance would result in hardship or unusual difficulty without a compensating increase in safety. Proposed alternatives may be used when authorized by the NRC.

The information in the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, (Reference 4) submitted October 4, 1993 was reviewed, including the requests for relief from the ASME Code Section XI requirements that the licensee has determined to be impractical. The review of the Inservice Inspection (ISI) Program Plan was performed using the Standard Review Plans of NUREG-0800 (Reference 5), Section 5.2.4, "Reactor Coolant Boundary Inservice Inspections and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components."

In a letter dated November 14, 1994 (Reference 6), the NRC requested additional information that was required to complete the review of the ISI Program Plan. The requested information was provided by the licensee in Revision 3 of the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*. In this response, the licensee, Southern California Edison Company, revised the Code deviations (requests for relief) in Sections 3.3 and 3.4.

The *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan* is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination

exclusion criteria, and (d) compliance with ISI-related commitments identified during the NRC's previous reviews.

The requests for relief are evaluated in Section 3 of this report. Unless otherwise stated, references to the Code refer to the ASME Code, Section XI, 1989 Edition. Specific inservice test (IST) programs for pumps and valves are being evaluated in other reports.

2. EVALUATION OF INSERVICE INSPECTION PROGRAM PLAN

This evaluation consists of a review of the applicable program documents to determine whether or not they are in compliance with the Code requirements and any previous license conditions pertinent to ISI activities. This section describes the submittals reviewed and the results of the review.

2.1 Documents Evaluated

Review has been completed on the following information from the licensee:

- (a) *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, (Reference 4) submitted October 4, 1993; and
- (b) *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3 (Reference 3) submitted April 17, 1995.

2.2 Compliance with Code Requirements

2.2.1 Compliance with Applicable Code Editions

The Inservice Inspection Program Plan shall be based on the Code editions defined in 10 CFR 50.55a(g)(4) and 10 CFR 50.55a(b). Based on the starting date of April 1, 1994, the Code applicable to the second 10-year interval is the 1989 Edition of ASME Section XI. As stated in Section 1 of this report, the licensee has prepared the *San Onofre Nuclear Generating Station, Units 2 and 3 Second 10-Year Inservice Inspection Program Plan* to meet the requirements of 1989 Edition.

2.2.2 Acceptability of the Examination Sample

Inservice volumetric, surface, and visual examinations shall be performed on ASME Code Class 1, 2, and 3 components and their supports using sampling schedules described in Section XI of the ASME Code and 10 CFR 50.55a(b). Sample size and weld selection have been implemented in accordance with the Code and 10 CFR 50.55a(b) and appear to be correct with the exception of integrally welded attachments.

Code Case N-509 *Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments Section XI, Division 1*, (Reference 7), has been adopted by the licensee without it being included in NRC Regulatory (Reg) Guide 1.147 (Reference 8). During a conference call on July 25, 1995, the licensee stated that the reference to Code Case N-509 would stay in the program and committed that the Code Case would not be used until it is included in Reg Guide 1.147. The Staff believes this position to be acceptable provided that i) if Code Case N-509 is accepted by the NRC and included in Reg Guide 1.147, the licensee must follow all conditions associated with the Code Case, or ii) if Code Case N-509 is not accepted by the NRC prior to the end of the first period of the second interval, a request for relief or a revised plan will be prepared.

2.2.3 Exemption Criteria

The criteria used to exempt components from examination shall be consistent with Paragraphs IWB-1220, IWC-1220, IWC-1230, IWD-1220, and 10 CFR 50.55a(b). The exemption criteria have been applied by the licensee in accordance with the Code as discussed in the ISI Program Plan, and appear to be correct except for Sections 2.10.2, 2.10.3, and 2.10.4 of the Program Plan. These Sections contain tests used in lieu of ASME Section XI pressure testing. However, there is not sufficient technical description to ensure that ASME Section XI requirements are being satisfied.

2.2.4 Augmented Examination Commitments

In addition to the requirements specified in Section XI of the ASME Code, the licensee has committed to perform the following augmented examinations:

- (a) Reactor vessel examinations in accordance with the requirements of NRC Regulatory Guide 1.150, *Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations*, Revision 1, (Reference 9);

- (b) Volumetric examination of the reactor coolant pump flywheel high stress areas every 3 years, as well as volumetric and surface examinations with the flywheel removed at 10-year intervals, satisfying NRC Regulatory Guide 1.14, *Reactor Coolant Pump Flywheel Integrity*, (Reference 10);
- (c) Ultrasonic examination of all circumferential and longitudinal welds of the "No break zones" in the Main Steam lines and portions of other high energy piping that penetrate containment; and
- (d) Volumetric examination of all low-pressure turbine disc bores.

2.3 Conclusion

Based on the review of the documents listed above, no deviations from regulatory requirements or commitments were identified in the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan, Revision 3*, with the exception of those described in Sections 2.2.2 and 2.2.3 above and in the evaluation of Requests for Relief 3.3.5 and 3.3.6.

3. EVALUATION OF RELIEF REQUESTS

The requests for relief from the ASME Code requirements that the licensee has determined to be impractical for the second 10-year inspection interval are evaluated in the following sections.

3.1 Class 1 Components

3.1.1 Reactor Pressure Vessel

3.1.1.1 Request for Relief 3.3.1, Examination Categories B-A and B-D, Items B1.30, B3.90, and B3.100, Reactor Vessel Shell-to-Flange Weld, Nozzle-to-Vessel Welds, and Nozzle Inside Radius Sections

Code Requirement: Examination Category B-A, Item B1.30 requires a volumetric examination of at least 50% of the weld by the end of the first period.

Examination Category B-D, Items B3.90 and B3.100 require a volumetric examination of at least 25% but not more than 50% of the weld and adjacent base metal by the end of the first period.

Licensee's Code Relief Request: The licensee requested relief from performing the Code-required volumetric examinations of the following welds and inner radius sections during the first period of the second interval:

<u>Weld ID</u>	<u>Description</u>	<u>Category</u>	<u>Item No.</u>
02-001-020	Upper Shell-to-Flange Weld	B-A	B1.30
02-001-021	Hot Leg Nozzle-to-Shell Weld	B-D	B3.90
02-001-024	Hot Leg Nozzle-to-Shell Weld	B-D	B3.90
02-001-021	Hot Leg Nozzle Inner Radius	B-D	B3.100
02-001-024	Hot Leg Nozzle Inner Radius	B-D	B3.100

Licensee's Basis for Requesting Relief (as stated):

"This weld is examined from the inside diameter of the reactor vessel by a remote NDE technique that requires removal of the internals (including the core support barrel) to access the weld.

The installed core barrel renders the shell-to-flange weld inaccessible as shown in Sketch 1-1*.

"These welds were examined during the last refueling outage (1992) which was the full volume first 10-year inservice inspection. No discrepancies were noted at that time and there are no successive inspections pending as a result of indications found in previous inservice examinations. Postponing this examination until the rest of them are done will result in a saving of approximately \$1 million."

Licensee's Proposed Alternative Examination (as stated):

"Examination shall be performed by the end of the third inspection period with the rest of the reactor pressure vessel welds."

Evaluation: The licensee stated that the scheduling requirements of Examination Categories B-A and B-D, Items B1.30, B3.90 and B3.100 result in a hardship. Deferral of the first period examinations for these items is acceptable provided that the examinations are completed within the same period in which the preceding examinations were performed, or earlier, so that there is no more than 10 years between examinations.

The licensee has established an acceptable level of quality and safety for the subject welds by examinations performed during the third period of the first 10-year interval. Requiring examination during the first period of the second interval is regarded as a burden. The proposed alternative, performance of all Item B1.30, B3.90, and B3.100 examinations in the third period of the second 10-year interval, should be authorized provided that there is no more than 10 years between examinations, except where the length of a 10-year interval is adjusted in accordance with IWA-2430.

Conclusion: The INEL staff has reviewed the licensee's request for relief from the scheduling requirements for the subject examinations. For the subject welds, performing the required

*Not included in this evaluation.

examinations in the first period of the second interval would result in an unnecessary burden without a compensating increase in the level of quality and safety. Therefore, it is recommended that the alternative scheduling be authorized pursuant to 10 CFR 50.55a(a)(3)(ii), provided that there is not more than 10 years between examinations, except where the length of a 10-year interval is adjusted in accordance with IWA-2430.

3.1.2 Pressurizer

3.1.2.1 Request for Relief 3.3.4 (Part 1), Examination Category B-D, Item B3.110, Pressurizer Nozzle-to-Vessel Welds

Code Requirement: Examination Category B-D, Item B3.110 requires a 100% volumetric examination of pressurizer nozzle-to-vessel welds as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: The licensee requested relief from performing 100% Code-required volumetric examinations of the following nozzle-to-vessel welds:

<u>Weld ID</u>	<u>Description</u>
03-005-009	Surge Nozzle-to-Bottom Head Weld
03-005-010	Spray Nozzle-to-Top Head Weld
03-005-011	Safety Nozzle-to-Top Head Weld
03-005-012	Safety Nozzle-to-Top Head Weld
03-005-013	Safety Nozzle-to-Top Head Weld

Licensee's Basis for Requesting Relief (as stated):

"To achieve full UT coverage of the whole volume required by the code, examination has to be performed on the shell side to scan volume D-E-H-J (Sketch 4-1)^b and on the nozzle side to scan volume A-B-C-J. The nozzle design of the San Onofre pressurizer has geometric configuration that precludes achieving the required volume A-B-C-J."

^bNot included in this TER.

Licensee's Proposed Alternative Examination (as stated):

"Perform volumetric examination (UT) of volume D-E-H-J, Sketch 4-2^c from the shell or head side of the pressure vessel."

Evaluation: The Code requires volumetric examinations of pressurizer nozzle-to-vessel welds. However, the San Onofre pressurizer nozzles have a geometric configuration that precludes achieving 100% of the required examination from the outside. Examination is possible from the internal surface; however, radiation levels of approximately 6 Rem/hr make a manual internal examination impractical.

The design configuration restrictions and high internal dose levels make the Code-required volumetric examination impractical at San Onofre. To obtain complete volumetric coverage, modifications or replacement of the component with one of a design providing for complete coverage would be required. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee proposed no additional examinations. However, based on the significant amount of volumetric coverage that appears to have been obtained, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus, reasonable assurance of continued inservice structural integrity has been provided.

Conclusion: The design configuration restrictions and high internal dose levels make the Code-required volumetric examination impractical. Based on the significant amount of weld coverage obtained, reasonable assurance of operational readiness has been provided. Therefore, it is recommended that relief be granted as requested, pursuant to 10 CFR 50.55a(g)(6)(i).

^cNot included in this TER.

3.1.3 Heat Exchangers and Steam Generators

3.1.3.1 Request for Relief 3.3.4 (Part 2) Examination Category B-D, Item B3.130. Steam Generator Nozzle-to-Vessel Welds

Code Requirement: Examination Category B-D, Item B3.130 requires a 100% volumetric examination of steam generator nozzle-to-vessel welds as defined by Figure IWB-2500-7.

Licensee's Code Relief Request: The licensee requested relief from performing 100% of the Code-required volumetric examinations of the following nozzle-to-vessel welds:

<u>Weld ID</u>	<u>Description</u>
03-003-010	Inlet Nozzle-to-Head Weld
03-003-011	Outlet Nozzle-to-Head Weld
03-003-012	Outlet Nozzle-to-Head Weld
03-004-010	Inlet Nozzle-to-Head Weld
03-004-011	Outlet Nozzle-to-Head Weld
03-004-012	Outlet Nozzle-to-Head Weld

Licensee's Basis for Requesting Relief (as stated):

"To achieve full UT coverage of the whole volume required by the code, examination has to be performed on the shell side to scan volume D-E-H-J (Sketch 4-1)^d and on the nozzle side to scan volume A-B-C-J. The nozzle design of the San Onofre steam generators has geometric configuration that precludes achieving the required volume A-B-C-J.

"UT scan of the nozzle from the inside surface is possible. However, the dose rate in the primary side is about 6000 mr/Hr or 3000 mr per half hour just for the examiner alone not considering the support crew that would be required for this examination."

Licensee's Proposed Alternative Examination (as stated):

"Perform volumetric examination (UT) of volume D-E-H-J, Sketch 4-2^d from the shell or head side of the pressure vessel."

^dNot included in this TER.

Evaluation: The Code requires volumetric examinations of the steam generator nozzle-to-vessel welds. However, the San Onofre steam generator nozzles have a geometric configuration that precludes examining 100% of the required volume. Examination of the subject area from the outside is limited due to nozzle configuration. While examination from the internal surface is possible, radiation levels of approximately 6 Rem/hr make a manual internal examination impractical.

The design configuration restrictions and the high internal dose levels make the Code-required volumetric examination impractical at San Onofre. To obtain complete volumetric coverage, modifications or replacement of the component with one of a design providing for complete coverage would be required. Imposition of this requirement would cause a considerable burden on the licensee.

The licensee proposed no additional examinations. However, based on the significant amount of volumetric coverage that is being obtained, it is reasonable to conclude that a pattern of degradation, if present, would have been detected. Thus, reasonable assurance of continued inservice structural integrity has been provided.

Conclusion: The design configuration restrictions of the steam generator nozzles and the high internal dose levels make the Code-required volumetric examination impractical at San Onofre. However, the significant volumetric coverage attained provides reasonable assurance of operational readiness. Therefore, it is recommended that relief be granted as requested, pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.4 Piping Pressure Boundary

3.1.4.1 Request for Relief 3.3.2, Examination Category B-J, Items B9.11 and B9.12, Circumferential and Longitudinal Welds in Class 1 Pressure-Retaining Piping

Code Requirement: Examination Category B-J, Items B9.11 and B9.12 require volumetric and surface examination of Class 1 piping NPS 4 inches or larger per Figure IWB-2500-8.

Licensee's Code Relief Request: The licensee requested relief from performing the Code-required surface examination of the following welds:

<u>Weld ID</u>	<u>Description</u>
02-001-033	Hot Leg Nozzle-to-Ext Piece Weld
02-001-034	Cold Leg Nozzle-to-Ext Piece Weld
02-001-035	Cold Leg Nozzle-to-Ext Piece Weld
02-001-036	Hot Leg Nozzle-to-Ext Piece Weld
02-001-037	Cold Leg Nozzle-to-Ext Piece Weld
02-001-038	Cold Leg Nozzle-to-Ext Piece Weld
02-006-005	Pipe Long Weld
02-006-006	Pipe Long Weld
02-006-007	Pipe-to-Outlet Nozzle Ext Pc Weld
02-007-005	Pipe Long Weld
02-007-006	Pipe Long Weld
02-007-007	Pipe-to-Outlet Nozzle Ext Pc Weld
02-009-005	Pipe-to-Elbow
02-009-003	Pipe Longitudinal Weld
02-009-004	Pipe Longitudinal Weld
02-009-006	Elbow Long Weld
02-009-007	Elbow Long Weld
02-009-008	Elbow-to-Inlet Nozzle Ext Pc Weld
02-011-005	Pipe-to-Elbow
02-011-003	Pipe Longitudinal Weld
02-011-004	Pipe Longitudinal Weld
02-011-006	Elbow Long Weld
02-011-007	Elbow Long Weld
02-011-008	Elbow-to-Inlet Nozzle Ext Pc Weld
02-013-005	Pipe-to-Elbow
02-013-003	Pipe Longitudinal Weld
02-013-004	Pipe Longitudinal Weld
02-013-006	Elbow Long Weld
02-013-007	Elbow Long Weld
02-013-008	Elbow-to-Inlet Nozzle Ext Pc Weld

<u>Weld ID</u>	<u>Description</u>
02-015-005	Pipe-to-Elbow
02-015-003	Pipe Longitudinal Weld
02-015-004	Pipe Longitudinal Weld
02-015-006	Elbow Long Weld
02-015-007	Elbow Long Weld
02-015-008	Elbow-to-Inlet Nozzle Ext Pc Weld

Licensee's Basis for Requesting Relief (as stated):

"These welds are located inside the primary reactor shield cavity. The surface examination is done manually while the volumetric examination (UT) is done using remote UT technique and equipment. Those performing the manual surface examinations (and supports such as builders of scaffolding, removal of insulation, preparing and grinding the welds, fire watch, HP among others) shall be exposed to a dose rate of from 250 to 8000 mRem/Hr. The estimated number of hours required for these examinations are as follows: Build scaffolding: 64 hours, remove insulation: 32 hours, weld prep: 48 hours, NDE examination for 24 welds: 96 hours, reinstall insulations: 32 hours and remove scaffolding: 32 hours. Total man-hours is 304. For a minimum 1/4 or 0.25 R/Hr times 304 Hrs, this amounts to 76 Rem.

"The entire volume of these welds and heat affected zones were examined by Ultrasonic Test (UT) in the first 10-year interval. No relevant indications were found. This relief request will result in dose savings of 76 Rem for this interval."

Licensee's Proposed Alternative Examination (as stated):

"Examination surface area A-B as shown in sketch 2-3° shall be examined by Ultrasonic Test (UT). This surface examination (A-B) shall be performed at the same time with remote UT examination of volume C-D-E-F. This examination will cover 100% of the weld volume instead of the 33% volume now required by the code."

Evaluation: For the subject Category B-J welds, the Code requires a volumetric examination of the inner 1/3 of the weld and a surface examination. However, the licensee proposed to perform a remote UT examination of 100% of each of the subject weld volumes. These welds are located inside the primary reactor shield cavity. The surface examination is typically done manually while the volumetric examination (UT) is done using remote UT techniques and equipment. However, using the proposed

*Not included in this TER.

alternative will result in savings of approximately 76 Man-Rem for this interval.

The INEL staff believes that the alternative examination technique is acceptable, provided that the ultrasonic examination technique has been demonstrated to be capable of detecting OD surface-connected cracks.

Conclusion: The alternative examination will provide an acceptable level of quality and safety. Therefore, it is recommended that this alternative be authorized, pursuant to 10 CFR 50.55a(a)(3)(i), provided that the ultrasonic examination technique has been demonstrated to be capable of detecting OD surface-connected cracks.

3.1.5 Pump Pressure Boundary (No requests for relief)

3.1.6 Valve Pressure Boundary

3.1.6.1 Request for Relief 3.3.3, Examination Category B-M-1, Item B12.40, Pressure-Retaining Welds in Valve Bodies

Code Requirement: Examination Category B-M-1, Item B12.40 requires volumetric examination of Class 1 welds in valve bodies NPS 4 inches or larger per Figure IWB-2500-17.

Licensee's Code Relief Request: The licensee requested relief from performing the Code-required volumetric examination of the following welds:

<u>Weld ID</u>	<u>Description</u>
02-019-013	Valve Body Upper Section Weld
02-019-014	Valve Body Lower Section Weld
02-019-010	Valve Body Lower Section Weld
02-019-010A	Valve Body Upper Section Weld
02-019-010	Valve Body Lower Section Weld
02-019-010A	Valve Body Upper Section Weld
02-020-010	Valve Body Lower Section Weld
02-020-010A	Valve Body Upper Section Weld
02-021-026	16" Valve Body Upper Section Weld

<u>Weld ID</u>	<u>Description</u>
02-021-027	16" Stop Valve Body Lower Section Weld
02-021-034	16" Stop Valve Body Lower Section Weld
02-021-035	16" Stop Valve Body Upper Section Weld
02-021-044A	10" Stop Valve Body Lower Section Weld
02-021-044	10" Stop Valve Body Upper Section Weld
02-021-054E	10" Stop Valve Body Lower Section Weld
02-021-054B	10" Stop Valve Body Upper Section Weld

Licensee's Basis for Requesting Relief (as stated):

"These valves are made of cast austenitic stainless steels with body welds using the electroslag welding process. The large grain structure of the cast material results in sound dispersion and attenuation that will not provide meaningful examinations for the component being inspected.

"Ultrasonic Test (UT) of cast austenitic stainless steel materials have not provided meaningful results as of this date. If and when a newly developed technique becomes available, it will be used and adopted for this examination."

Licensee's Proposed Alternative Examination (as stated):

"In lieu of the Volumetric Examination required, the following examinations will be performed:

- "1. Surface Examination (PT) of the weld and heat affected zone (area L-M).
- "2. Visual Examination (VT-3) of the valve internals when the valve is disassembled for maintenance or repair.
- "3. Visual Examination (VT-2) of the component in conjunction with the reactor coolant system pressure test following each refueling or repairs to this component."

Evaluation: The Code requires volumetric examinations of Class 1 welds in valve bodies NPS 4 inches or larger. The licensee proposed to perform a surface examination (PT) of the weld and heat affected zone, a VT-3 visual examination of the valve internals when the valve is disassembled for maintenance or repair, and the Code-required VT-2 visual examination in conjunction with the reactor coolant system pressure test following each refueling outage or repairs to this component.

The attenuative properties of the cast stainless steel valve body and of electroslag welds make the Code-required volumetric examination impractical for the subject welds. To obtain complete volumetric coverage, modifications and/or replacement of the valves with ones of a design providing for complete coverage would be required. Imposition of this requirement would cause a considerable burden on the licensee.

Conclusion: The valve body weld examination areas listed above have large grain structures, resulting in sound dispersion and attenuation, that make the Code-required volumetric examination impractical. The licensee's alternative examinations will provide reasonable assurance of operational readiness. Therefore, it is recommended that relief be granted, pursuant to 10 CFR 50.55a(g)(6)(i).

3.1.7 General (No requests for relief)

3.2 Class 2 Components

3.2.1 Pressure Vessels

3.2.1.1 Request for Relief 3.3.6, Examination Categories C-A, C-C, and F-A, Items C1.20, C1.30, C3.10, and F1.40, Regenerative Heat Exchanger Examinations

Code Requirement: Examination Categories C-A, C-C, and F-A, Items C1.20, C1.30, C3.10, and F1.40 require volumetric, surface, or visual examination of Regenerative Heat Exchanger pressure-retaining welds, integral welded attachments, and supports, respectively.

Licensee's Code Relief Request: The licensee requested relief from performing the following Code-required Regenerative Heat Exchanger examinations:

<u>ISI ID</u>	<u>Description</u>	<u>Cat./Item</u>	<u>Method</u>
03-080-010	Tubesheet-to-Shell Weld	C-A/C1.30	Vol
03-080-020	Tubesheet-to-Shell Weld	C-A/C1.30	Vol
03-080-030	Head Circumferential Weld	C-A/C1.20	Vol
03-080-040	Head Circumferential Weld	C-A/C1.20	Vol
03-080-050	Head Circumferential Weld	C-A/C1.20	Vol
03-080-060	Head Circumferential Weld	C-A/C1.20	Vol
03-080-070	Head Circumferential Weld	C-A/C1.20	Vol
03-080-080	Tubesheet-to-Shell Weld	C-A/C1.30	Vol
03-080-090	Tubesheet-to-Shell Weld	C-A/C1.30	Vol
03-080-100	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-110	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-120	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-130	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-140	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-150	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-160	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-170	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-180	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-190	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-200	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-210	Integrally Welded Attachment	C-C/C3.10	Surface
03-080-220	Support, Cradle Bands - Upper	F-A/F1.40	VT-3
03-080-230	Support, Cradle Bands - Lower	F-A/F1.40	VT-3

Licensee's Basis for Requesting Relief (as stated):

"Radiation exposure rates in the Regenerative Heat Exchanger room are approximately 300 mR/Hr. Estimates for the Regenerative Heat Exchanger portion of the ISI program are approximately 160 manhours. The effective jobsite dose rate is 60 mR/Hr in the Regenerative Heat Exchanger room. The ALARA dose estimate for this work is 9.54 person Rem."

Licensee's Proposed Alternative Examination (as stated):

"Perform Visual (VT-2) examination for Items C1.20 and C1.30 each Period in lieu of the surface examination required by the code."

Evaluation: The Code requires volumetric examination for the Item C1.20 and C1.30 welds, surface examination for the Item C3.10 attachments, and VT-3 visual exam for the supports. The licensee proposed to perform a VT-2 visual examination in lieu the Code-required surface examination. However, the proposed VT-2 visual examination is already required by the Code. The licensee has not provided an adequate reason for impracticality

or provided technical bases why the alternative will provided a reasonable assurance of operational readiness.

Conclusion: The technical information currently provided by the licensee does not support a determination of impracticality or provide a reasonable assurance of operational readiness. Therefore, it is recommended that relief be denied.

3.2.2 Piping (No requests for relief)

3.2.3 Pumps (No requests for relief)

3.2.4 Valves (No requests for relief)

3.2.5 General (No requests for relief)

3.3 Class 3 Components (No requests for relief)

3.4 Pressure Tests (No requests for relief)

3.5 General

3.5.1 Ultrasonic Examination Techniques (No requests for relief)

3.5.2 Exempted Components (No requests for relief)

3.5.3 Other

3.5.3.1 Request for Relief 3.3.5, Paragraph IWA-2312, Certification and Recertification

Code Requirement: Paragraph IWA-2312 requires personnel performing visual examinations to be qualified and certified to qualification levels comparable to those defined in SNT-TC-1A.

Licensee's Code Relief Request: The licensee requested to use non-certified personnel to perform the Code-required VT-3 visual examination on the following valve bodies:

<u>Weld ID</u>	<u>Description</u>
02-025-120A	6" Safety Valve Body
02-025-230A	6" Safety Valve Body

Licensee's Basis for Requesting Relief (as stated):

"These relief valves are sent out to a qualified vendor testing facility whose repair and replacement program was approved by the utility. The components are reworked, repaired, refurbished and tested using a qualified repair program. The vendor performing the visual examinations are not certified to SNT-TC-1A or other comparable level of qualification defined in SNT-TC-1A. However, they have field expertise equal or superior to the level of training required by the code, and the scope of the maintenance or investigation activities is superior to the scope of the Code required examination.

"In the past, components have been inspected during a maintenance overhaul or investigated by personnel highly qualified but not necessarily certified in the code requirements. In some cases a complete root cause analysis was performed in addition to those performed within the scope of the ISI program. In order to prevent redundant inspection and reduce exposure, credit should be taken for the inspection which these individuals do. The component inspection will remain in the ISI program, however, credit for the inspection will be taken utilizing the vendor's inspection report, or the root cause report as applicable, in lieu of an additional VT-3 report."

Licensee's Proposed Alternative Examination (as stated):

"In addition to the thorough visual inspections by the vendor, the valves will be dimensionally inspected, damaged parts will be replaced and the refurbished valves tested. Records of repair and replacement in accordance with IWA-7520 shall be maintained by the Owner."

Evaluation: The Code requires that personnel performing visual examinations be certified to levels comparable to those defined in SNT-TC-1A. The licensee requested that a vendor whose personnel are not certified to SNT-TC-1A or other comparable standard be allowed to perform VT-3 visual examinations on the

subject valves. The licensee did not provide sufficient justification regarding burden or impracticality for relief.

Conclusion: The technical information currently provided by the licensee does not support a determination of impracticality or provide a reasonable assurance of operational readiness. Therefore, it is recommended that relief be denied.

3.5.3.2 Request for Relief 3.4, Paragraph IWA-4511, General Requirements for Repair Welding Using Half-Bead Welding Technique

Code Requirement: Paragraph IWA-4511 requires that only the shielded metal arc welding (SMAW) process using low hydrogen electrodes be used.

Licensee's Code Relief Request: The licensee requested relief to use IWA-4500, *Alternative Repair Welding Methods*, of the 1992 Edition of ASME Section XI, which allows the use of gas tungsten arc welding (GTAW).

Licensee's Basis for Requesting Relief (as stated):

"SCE prefers the automatic/machine GTAW process over the manually operated SMAW process for temper bead repairs. The automatic/machine GTAW process is inherently superior for controlling important process variables that affect the overall quality of the weld. Additionally, the automatic/machine GTAW process is more suited for adverse field environment than manual welding is due to the remote operation feature of the automatic/machine GTAW equipment.

"Welding variables that affect the quality of the weld are automatically controlled by microprocessor or are controlled by the welding operator from a remote location with the automatic/machine GTAW process. On the other hand, with a manual welding process such as SMAW, the quality of the weld is contingent on the welder's ability to skillfully manipulate the welding electrode. The welder's freedom of movement is severely restricted by the multiple layers of protective clothing that must be worn in a radioactive environment. Therefore, the automatic/machine GTAW process provides a higher level of confidence that the desired weld properties can be obtained, even under adverse environmental conditions.

"SCE is aware of ASME Section XI Code Case N-432 that permits the use of the automatic/machine GTAW process, however, would point out that significant advances in using this technology and process since the Code's approval of N-432.

"The following are examples of the differences between Code Case N-432 and Section XI, IWA-4500, 1992 edition: The later Code requires the base materials for procedure qualification test coupons be the same P Number and Group Number whereas the N-432 Code Case requires they be the same specification and grade of the production material. The N-432 Code Case limits the repair area to a maximum of 54 square inches whereas the later code rules permit repair areas up to 100 square inches. The N-432 Code Case mandates a single set of acceptance criteria for impact testing of the procedure qualification test assembly that are more stringent than the original requirements of our design specification. The later Code rules, in recognition of this, specify that the impact acceptance criteria meet the requirements of the design specification. These changes in the later Code save the users the expense and time of qualifying a multitude of temper bead weld procedures for the same P number and Group number materials and permit the temper bead weld procedures that are qualified to have a much broader scope than would otherwise be possible under Code Case N-432"

Licensee's Proposed Alternative Examination (as stated):

"ASME XI, IWA-4500, 1992 edition, No addenda (Temperbead Technique, Auto/Machine GTAW)"

Evaluation: The Code of record only allows the shielded metal arc welding (SMAW) process to be used for alternative welding procedures contained therein, whereas the 1992 Edition allows the gas tungsten arc welding (GTAW) process to be used. The licensee proposes to use the 1992 Edition.

The NRC staff reviewed IWA-4500 of the 1992 Edition in an NRC Safety Evaluation Report dated June 10, 1993. It was concluded that those provisions, which allow use of the GTAW process, provide an acceptable level of quality and safety.

Conclusion: The alternative welding process in the 1992 Edition will provide an acceptable level of quality and safety. Therefore, it is recommended that this alternative be authorized as requested, pursuant to 10 CFR 50.55a(a)(3)(i).

4. CONCLUSION

It has been determined that certain inservice examinations cannot be performed to the extent required by Section XI of the ASME Code. In the cases of Requests for Relief 3.3.3, 3.3.4 (Part 1), and 3.3.4 (Part 2), the licensee has demonstrated that specific Section XI requirements are impractical; it is therefore recommended that relief be granted as requested, pursuant to 10 CFR 50.55a(g)(6)(i). The granting of relief will not endanger life, property, or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Pursuant to 10 CFR 50.55a(a)(3)(i), it is concluded that the licensee's proposed alternative to the Code requirement stated in Request for Relief 3.4 will provide an acceptable level of quality and safety; it is recommended that the proposed alternative be authorized. In the case of Request for Relief 3.3.2, it is recommended that the proposed alternative be authorized only if the licensee satisfies the conditions stated in the evaluation of the relief request.

In Request for Relief 3.3.1 the licensee has demonstrated that specific Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. In this case, it is recommended that the proposed alternative be authorized, pursuant to 10 CFR 50.55a(a)(3)(ii), provided the licensee satisfies the conditions stated in the above request for relief evaluation.

For Requests for Relief 3.3.5 and 3.3.6, the licensee has not provided sufficient technical justification to support the determination that i) the Code requirements are impractical, or that ii) requiring the licensee to comply with the Code requirements would result in hardship. Therefore, in these cases it is recommended that relief be denied.

This technical evaluation has not identified any practical method by which the licensee can meet all the specific inservice inspection requirements of Section XI of the ASME Code for the existing San Onofre Nuclear Generating Station, Units 2 and 3, facility. Compliance with all of the Section XI

examination requirements would necessitate redesign of a significant number of plant systems, procurement of replacement components, installation of the new components, and performance of baseline examinations for these components. Even after the redesign efforts, complete compliance with the Section XI examination requirements probably could not be achieved. Therefore, it is concluded that the public interest is not served by imposing certain provisions of Section XI of the ASME Code that have been determined to be impractical.

The licensee should continue to monitor the development of new or improved examination techniques. As improvements in these areas are achieved, the licensee should incorporate these techniques into the ISI program plan.

Based on the review of the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan, Revision 3*, the licensee's response to the NRC's request for additional information, and the recommendations for **granting** relief from the ISI examinations that cannot be performed to the extent required by Section XI of the ASME Code, no deviations from regulatory requirements or commitments were identified, except those noted in Sections 2.2.2 and 2.2.3 and in Requests for Relief 3.3.5 and 3.3.6.

5. REFERENCES

1. Code of Federal Regulations, Title 10, Part 50.
2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, Division 1, 1989 Edition.
3. *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 3, submitted April 17, 1995.
4. *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection Program Plan*, Revision 0, submitted October 4, 1993.
5. NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, Section 5.2.4, "Reactor Coolant Boundary Inservice Inspection and Testing," and Section 6.6, "Inservice Inspection of Class 2 and 3 Components," July 1981.
6. Letter, dated November 14, 1994, Mel Fields (NRC) to Mr. Harold B. Ray (Southern California Edison Company), containing request for additional information on the second 10-year interval ISI program plan.
7. Code Case N-509 *Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments Section XI, Division 1*, November 25, 1992.
8. NRC Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1*, Revision 11, October 1994.
9. NRC Regulatory Guide 1.150, *Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations*, Revision 1, February 1983.
10. NRC Regulatory Guide 1.14, *Reactor Coolant Pump Flywheel Integrity*, Revision 1, August 1975.

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11. ABSTRACT (200 words or less)

This report presents the results of the evaluation of the *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval Inservice Inspection (ISI) Program Plan*, submitted October 4, 1993 including the requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI requirements that the Licensee has determined to be impractical. The *San Onofre Nuclear Generating Station, Units 2 and 3, Second 10-Year Interval ISI Program Plan* is evaluated in Section 2 of this report. The ISI Program Plan is evaluated for (a) compliance with the appropriate edition/addenda of Section XI, (b) acceptability of examination sample, (c) correctness of the application of system or component examination exclusion criteria, and (d) compliance with ISI-related commitments identified during previous Nuclear Regulatory Commission (NRC) reviews. The requests for relief are evaluated in Section 3 of this report.

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TABLE 1
SUMMARY OF RELIEF REQUESTS

Relief Request Number	System or Component	Exam Category	Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Status
3.3.1	Reactor Vessel	B-A B-D	B1.30 B3.90 B3.100	Shell-to-Flange Welds Nozzle-to-Vessel Welds Nozzle Inner Radius Sections	Volumetric examination of 50% during first period	Deferral of examinations to third period	Authorized Conditionally
3.3.2	Class 1 Piping Systems	B-J	B9.11 B9.12	Circumferential and Longitudinal Welds	Volumetric and surface examination	Volumetric exam of 100% of weld volume	Authorized Conditionally
3.3.3	Class 1 Valves	B-M-1	B12.40	Pressure-retaining welds in valve bodies	Volumetric examination	Surface, VT-3, and VT-2 Visual examinations	Granted
3.3.4 (Part 1)	Pressurizer	B-D	B3.110	Nozzle-to-Vessel Welds	Volumetric examination	Perform volumetric exam to the extent practical	Granted
3.3.4 (Part 2)	Steam Generator	B-D	B3.130	Nozzle-to-Vessel Welds	Volumetric examination	Perform volumetric exam to the extent practical	Granted
3.3.5		IWA-2312		Certification and recertification	Use of certified personnel for Code VT-3 visual examinations	Use of non-certified personnel for Code VT-3 visual examinations	Denied
3.3.6	Regenerative Heat Exchanger	C-A C-C F-A	C1.20 C1.30 C3.10 F1.40	Pressure-retaining welds, integral welded attachments, and supports	Volumetric, surface, or visual examinations	None	Denied
3.4		IWA-4511		Half bead repair welding	Shielded metal arc welding process to perform half bead repair welding	Perform Gas tungsten arc welding	Authorized