February 28, 2005

MEMORANDUM TO: Robert A. Gramm, Chief
Project Directorate Section IV-2
Division of Licensing Project Management

FROM: Terence L. Chan, Chief ***/R/ J. Tsao /For/***
Piping Integrity and NDE Section
Materials and Chemical Engineering Branch
Division of Engineering

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Safety Program Section
Probabilistic Safety Assessment Branch
Division of Systems Safety & Analysis

SUBJECT: SAFETY EVALUATION OF THE PROPOSED RISK-INFORMED INSERVICE INSPECTION PROGRAM FOR SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided by Southern California Edison (the licensee) in its letter dated July 2, 2003. Licensee responses to NRC requests for additional information were provided in Southern California Edison's letter dated September 15, 2004, and a revised WCAP-15882-NP, Risk-informed Inservice Inspection (RI-ISI) program document, dated July 2004. The licensee requested that the NRC approve their proposed RI-ISI Alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Section XI Requirements. The request was made pursuant to 10 CFR Part 50.55a(a)(3)(i). The staff finds the licensee's request acceptable as discussed in the attached safety evaluation. This completes our efforts for TAC No. MC0334.

Docket Nos.: 50-361 and 50-362

Attachment: As stated

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DATE	02/ 8 /05	02/ 23 /05	02/ 28 /05	02/ 25 /05

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RISK-INFORMED INSERVICE INSPECTION PROGRAM
RELIEF REQUEST ISI-3-1
SOUTHERN CALIFORNIA EDISON
SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3
DOCKET NOS. 50-361 AND 50-362

1 INTRODUCTION

By letter dated July 2, 2003 (Reference 1) (the submittal), as supplemented by letter dated September 15, 2004 (Reference 2), and a revised program document dated July 2004 (Reference 3), Southern California Edison (the licensee) submitted relief request ISI-3-1 which proposed a risk-informed inservice inspection (RI-ISI) program as an alternative to a portion of its current inservice inspection (ISI) program for San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. The scope of the RI-ISI program will be limited only to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1 piping, Examination Categories B-F and B-J welds.

The licensee's RI-ISI program was developed in accordance with the methodology contained in the Electric Power Research Institute (EPRI) Report TR-112657, Revision B-A (Reference 4) (the topical), which was previously reviewed and approved by the NRC. The licensee proposed the RI-ISI program as an alternative to the requirements in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i). The licensee requested implementation of this alternative beginning with the final refueling outage of the third period of the third ten-year ISI interval at SONGS, Units 2 and 3.

2 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements set forth in the Code to the extent practical within the limitations of design, geometry, and materials of construction of the components. 10 CFR 50.55a(g) also states that ISI of the ASME Code, Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the NRC. The objective of the ISI program as described in Section XI of the ASME Code and applicable addenda is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary of these components that may impact plant safety.

The regulations also require that, during the first 10-year ISI interval and during subsequent intervals, the licensee's ISI program complies with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference into 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. SONGS, Units 2 and 3 is in the third interval. The applicable edition of Section

ATTACHMENT

XI of the ASME Code for SONGS, Units 2 and 3 for this 10-year ISI interval is the 1989 Edition with no addenda.
According to 10 CFR 50.55a(a)(3), the NRC may authorize alternatives to the requirements of 10 CFR 50.55a(g), if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety, or that the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis," defines the following safety principles that should be met in an acceptable RI-ISI program:

(1) The proposed change meets current regulations unless it is explicitly related to a requested exemption.
(2) The proposed change is consistent with the defense-in-depth philosophy.
(3) The proposed change maintains sufficient safety margins.
(4) When proposed changes result in an increase in risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
(5) The impact of the proposed change should be monitored using performance measurement strategies.

RG 1.178, "An Approach For Plant-Specific Risk-Informed Decisionmaking - Inservice Inspection of Piping," describes methods acceptable to the NRC staff (the staff) for integrating insights from probabilistic risk assessment (PRA) techniques with traditional engineering analyses into ISI programs for piping, and addresses risk-informed approaches that are consistent with the basic elements identified in RG 1.174.

The licensee has proposed to use an RI-ISI program for ASME Class 1 piping (Examination Categories B-F and B-J welds), as an alternative to the ASME Code, Section XI requirements. The licensee states that this proposed program was developed using RI-ISI methodology described in the topical. The staff's safety evaluation report (SER) of October 28, 1999, approving the methodology described in the topical, concluded that this methodology conforms to the guidance provided in RGs 1.174 and 1.178, and that no significant risk increase should be expected from the changes to the ISI program resulting from applying the methodology. The transmittal letter for this SER, of the same date, stated that an RI-ISI program as described in the topical utilizes a sound technical approach and will provide an acceptable level of quality and safety. It also stated that, pursuant to 10 CFR 50.55a, any RI-ISI program meeting the requirements of the topical provides an acceptable alternative to the piping ISI requirements with regard to (1) the number of locations, (2) the locations of inspections, and (3) the methods of inspection.

3 TECHNICAL EVALUATION

Pursuant to 10 CFR 50.55a(a)(3)(i), the staff has reviewed and evaluated the licensee's proposed RI-ISI program based on guidance and acceptance criteria provided in the following documents:

- RGs 1.174 and 1.178 (References 6 and 7)
- NRC NUREG-0800, Chapter 3.9.8 (Reference 8)
- EPRI TR-112657 (Reference 4)

- NRC SER for EPRI TR-112657 (Reference 5)

3.1 Proposed Changes to the ISI Program

The scope of the licensee's proposed changes to the licensee's ISI program is limited to ASME Class 1 piping welds for the following Examination Categories: B-F for pressure retaining dissimilar metal welds in vessel nozzles, and B-J for pressure retaining welds in piping. The RI-ISI program is proposed as an alternative to the existing ISI requirements of the ASME Code, Section XI.

The end result of the program changes is that the number and locations of non-destructive examination (NDE) inspections based on ASME Code Section XI requirements will be replaced by the number and locations of these inspections based on the RI-ISI guidelines. The Code requires, in part, that for each successive 10-year ISI interval, 100% of Category B-F welds and 25% of Category B-J welds for the Code Class 1 non-exempt piping be selected for volumetric and/or surface examination based on existing stress analyses and cumulative usage factors. The proposed RI-ISI program for SONGS, Unit 2 selects 83 of 679 Class 1 piping welds for NDE. The proposed RI-ISI program for SONGS, Unit 3 selects 80 of 660 Class 1 piping welds for NDE. The surface examinations required by the ASME Code, Section XI, will be discontinued while system pressure tests and VT-2 visual examinations shall continue. These results are consistent with the concept that, by focusing inspections on the most safety significant welds, the number of inspections can be reduced while at the same time maintaining protection of public health and safety.

The licensee states that none of the augmented piping inspection programs at SONGS, Units 2 and 3 will change as a result of the proposed RI-ISI program.

3.2 Engineering Analysis

In accordance with the guidance provided in RGs 1.174 and 1.178 (References 6 and 7), the licensee provided the results of an engineering analysis of the proposed changes, using a combination of traditional engineering analysis and supporting insights from the PRA. The licensee performed an evaluation to determine susceptibility of components (i.e., a piping weld) to a particular degradation mechanism that may be a precursor to leak or rupture, and then performed an independent assessment of the consequence of a failure at that location. The results of this analysis assure that the proposed changes are consistent with the principles of defense-in-depth because EPRI TR-112657 methodology requires that the population of welds with high consequences following failure will always have some weld locations inspected regardless of the failure potential. No changes to the evaluation of design-basis accidents in the final safety analysis report are being made by the RI-ISI process. Therefore, sufficient safety margins will be maintained.

3.2.1 Failure Potential

Piping systems within the scope of the RI-ISI program were divided into piping segments. Pipe segments are defined as lengths of pipe whose failure (anywhere within the pipe segment) would lead to the same consequence and which are exposed to the same degradation mechanisms. That is, some lengths of pipe whose failure would lead to the same consequence may be split into two or more segments when two or more regions are exposed to different degradation mechanisms. The licensee's submittal states that failure potential assessment, summarized in Table 3.3 of the submittal, was accomplished utilizing industry failure history, plant-specific failure history, and other relevant information using the guidance provided in the topical.

In Table 3.3-1 of the original submittal, the safety injection system (SIS) is not identified as susceptible to thermal transients (TT) or to any sort of stress corrosion cracking (SCC). Nor is the chemical and volume control (CVCS) system identified as susceptible to any sort of SCC. However, in Reference 2, the licensee indicates that these systems should have been designated as susceptible to TT and to thermal stratification, cycling, and striping (TASCS). The licensee also indicates that all ASME Class 1 systems are susceptible to primary water stress corrosion cracking (PWSCC). This revision in the scope of susceptibility to these degradation mechanisms led to an increase in the number of weld locations to be selected for NDE, as well as a revision to the change in risk calculations.

The staff concludes that the licensee has met the SRP 3.9.8 guidelines to confirm that a systematic process was used to identify the component's (i.e., pipe segments) susceptibility to common degradation mechanisms, and to categorize these degradation mechanisms into the appropriate degradation categories with respect to their potential to result in a postulated leak or rupture.

3.2.2 Consequence Analysis

The licensee states that the consequences of pressure boundary failures were evaluated and ranked based on their impact on core damage and containment performance (isolation, bypass and large early release). Also, the licensee indicates that impact on the above measures due to both direct and indirect effects was considered. Specifically, in Reference 1, the licensee notes that all of the in-scope piping is inside containment, and that all indirect effects of pipe breaks inside containment, such as pipe whip, jet impingement, pressurization, temperature excursions, are analyzed as documented in the SONGS, Units 2 and 3 Updated Final Safety Analysis Report (UFSAR). It also notes that there are no indirect effects from flooding, inside containment. In the submittal, the licensee notes that direct effects include loss of coolant initiating events. In Reference 2, the licensee clarifies that the scope of direct effects also includes the loss or degradation of one or more trains of affected mitigating systems, depending upon the location of the postulated pipe break. The licensee reports no deviations from the approved consequence evaluation guidance provided in the topical. Therefore, the staff considers the consequence analysis performed by the licensee for this application to be acceptable.

3.2.3 Probabilistic Risk Assessment

As stated in the submittal, the licensee used the SONGS, Units 2 and 3 living PRA for evaluation of the consequences of pipe ruptures. Per Reference 2, the licensee updates the PRA "continuously," and the specific PRA model used for this application is dated October 2, 2001. The licensee indicates in the submittal that the scope of its internal events PRA covers both Level 1 and Level 2 consequences, and addresses accidents initiated both at full power and at shutdown.

In the submittal and in Reference 3, the licensee states that the baseline core damage frequency (CDF) estimated from this PRA model is 4.1E-05/yr and the baseline large early release frequency (LERF) estimated is 1.4E-06/yr.

3.2.3.1 Staff/Industry Review of the PRA

The original SONGS, Units 2 and 3 individual plant examination (IPE) was submitted to the NRC in April 1993. The IPE estimated a CDF of 3E-05/yr. The SER of the IPE, dated December 28, 1995, concluded that the IPE met the intent of Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." The SER did not identify any significant weaknesses with the IPE.

The licensee states in the submittal that the Level 1 and Level 2 PRAs for both full power and shutdown operations were subjected to a comprehensive, independent peer review between August 1996 and April 1997. The review was based primarily on the guidance provided in the PRA procedure guides such as NUREG/CR-2300 "PRA Procedures Guide: a Guide to The Performance of Probabilistic Risk Assessments for Nuclear Power Plants" and NUREG/CR4550 "Analysis of Core Damage Frequency: Internal Events Methodology," as well as PRA application documents such as EPRI TR-105396 "PRA Applications Guide" and NUREG-1489 "A Review of NRC Staff Uses of Probabilistic Risk Assessment." All comments were entered in the SONGS PRA Punch List database for review and disposition. In Reference 2, the licensee notes that each item in this Punch List was assigned a priority from 1 through 10, with items 7 through 10 being essentially equivalent to an A or B level Fact and Observation (F&O) based on F&O level definitions described in the various nuclear plant owners' groups' peer review guidance documents and in NEI 00-02 "Probabilistic Risk Assessment (PRA) Peer Review Process Guidance." The licensee states that all of the Priority 7 through 10 Punch List items have been resolved and incorporated into the SONGS PRA model.

The licensee states in the submittal that, in February 2002, Westinghouse performed a pre-owners' group certification evaluation, using the CEOG Peer Certification Guidance document, as well as the high-level requirements of the current draft of the ASME standard. Westinghouse concluded that the PRA is adequate for supporting ASME Category II applications, including in-service inspection.

In response to a staff question about a CEOG Peer Certification of the SONGS, Units 2 and 3 PRA, the licensee states in Reference 2 that a CEOG Owners' Group Peer Review was conducted in June 2003, using the published ASME PRA standard. However, a list of the F&Os from that review was not available until after the submittal was transmitted to the NRC. The licensee provided a copy of this list in Reference 2. For each F&O on the list, the licensee documents its assessment of the F&O's impact on this application. None of them was found to have any more than negligible impact. The staff reviewed this list with the assessments of the F&O's impacts, and finds the licensee's assessments to be reasonable.

The staff concludes that the licensee has adequately demonstrated that significant comments from the two industry peer reviews (there were no significant comments from the staff's review of the IPE) of the SONGS, Units 2 and 3 PRA which have not yet been incorporated into the PRA will not measurably affect this RI-ISI application. The staff did not review the October 2, 2001, PRA models to assess the accuracy of their quantitative estimates. The staff recognizes that the quantitative results of the PRA model are used as order of magnitude estimates to support the assignment of segments into three broad consequence categories. Inaccuracies in the models or in assumptions large enough to invalidate the broad categorizations developed to support the RI-ISI should have been identified during the staff's review of the IPE, and by the licensee's model update control program that included peer review/certification of the PRA model. Minor errors or inappropriate assumptions will affect only the consequence categorization of a few segments and will not invalidate the general results or conclusions.

3.2.3.2 Change in Risk

As required by Section 3.7 of the topical, the licensee evaluated the expected change in risk resulting from replacing the current ISI program with the RI-ISI program. The calculations estimated the change in risk due to removing locations and adding locations to the inspection program.

In the submittal, the licensee states that the expected change in risk was both qualitatively and quantitatively evaluated per Section 3.7 of the topical.

For the qualitative evaluation, the licensee states that it considered (1) the potential for risk impacts for each pipe segment due to increases and decreases in the number of examinations, and (2) expected enhancements to the inspection detection probability due to the implementation of expanded weld inspection volumes prescribed in Section 4.0 of EPRI TR-112657 Revision B-A.

For the quantitative evaluation, the licensee states that it employed a conservative approach, using rupture frequencies from Table A-8 of Reference 10, taking no credit for the differences in the probability of detection (POD) expected by the current ASME Section XI NDE techniques as compared to those expected when using the techniques prescribed in the topical. The licensee states that the calculated results were then evaluated using the decision criteria described in Figure 3-6 of the topical.

In the submittal the licensee provides results of this bounding analysis (without taking credit for an increased POD), which is replicated in the table below:

Unit	Change in CDF		Change in LERF	
	With Increased POD	Without Increased POD	With Increased POD	Without Increased POD
Unit 2	NA	4.79E-07/yr	NA	3.39E-09/yr
Unit 3	NA	4.24E-07/yr	NA	4.45E-09/yr

The change of risk evaluation results also indicate that the change in CDF (ªCDF) for the reactor coolant system exceeded the system level guidelines of 1.0E-07/yr, and therefore, the decision criteria of Figure 3-6 (also specified on page 3-85) of the topical was exceeded. A more detailed evaluation, discussed below, indicates that the system level guidelines value of 1.0E-07/yr is not exceeded.

In Reference 2, the licensee explains that the change in risk analyses were refined using the "Simplified Risk Quantification Method" described in Section 3.7 of the topical. This method credits the enhanced inspection effectiveness associated with using RI-ISI inspection techniques by adjusting the PODs of NDEs performed under the RI-ISI program, relative to those performed under the current ASME Section XI program. The licensee discusses the equation used to calculate the change in risk between the current ASME Section XI program and the RI-ISI program, and points out it employed POD values similar to those approved for use in the pilot RI-ISI applications at Arkansas Nuclear One Unit 2 and at Vermont Yankee (References 11 and 12). The staff finds the equation used to be correct, and that the assumed values for POD are consistent with those used in the pilot RI-ISI applications, and therefore, acceptable. In addition, the licensee states that it again used rupture frequencies from Table A-8 of Reference 10. The staff notes that these frequencies are greater than (i.e., conservative with respect to) the frequencies used in the pilot RI-ISI applications at Arkansas Nuclear One, Unit 2 and at Vermont Yankee (References 11 and 12).

In addition, the licensee explains that the conditional core damage probabilities (CCDPs) and conditional large early release probabilities (CLERPs) were taken from the PRA model and is tabularized in Reference 2, Table 9-1. These CCDP and CLERP values are consistent with the topical, on page 3-86, which states that, “These CCDP values can be bounded by using the upper bound of the consequence range, e.g., medium consequence locations would be assigned a value of 10^{-4}, or estimated from the plant-specific PSA. If one substitutes $CLERP_j$ representing the conditional probability of a large early release for $CCDP_j$ in the above Equation (3-9), the change in large early release frequency due to inspection program changes can be determined.”

By using these refinements, the licensee provides results of this analysis in Reference 3, which is replicated in the table below:

Unit	**Change in CDF**		**Change in LERF**	
	With Increased POD	Without Increased POD	With Increased POD	Without Increased POD
Unit 2	-3.15E-08/yr	9.27E-07/yr	-2.33E-09/yr	5.04E-09/yr
Unit 3	-2.63E-08/yr	8.69E-07/yr	-1.99E-09/yr	5.73E-09/yr

The licensee notes that the “Without Increased POD” results (i.e., the bounding estimates for [a]CDF and [a]LERF) increased in Reference 2 relative to the estimates in the submittal because of the identification of primary water stress corrosion cracking (PWSCC) susceptibility in all Class 1 systems, which ultimately led to an increase in the number Category 2 (high risk) welds. Per Reference 10, the rupture frequency for PWSCC is considerably higher than for the only other damage mechanism identified at SONGS - thermal fatigue. This directly contributes to an increase in [a]CDF and [a]LERF when the risk-related benefits of the RI-ISI NDE methodology (reflected in POD values) are not taken into consideration. But, by taking these benefits into consideration, the licensee demonstrates a net overall reduction in risk, and that no individual system’s CDF or LERF increases more than1E-07/yr or 1E-08/yr respectively due to the transition from the current ASME Section XI ISI to the RI-IS program, meeting the guidelines specified in the topical.

The staff finds the licensee's process to evaluate and bound the potential change in risk reasonable because it (1) accounts for the change in the number and location of elements inspected, (2) recognizes the differences in degradation mechanisms related to failure likelihood, and (3) considers the synergistic effects of multiple degradation mechanisms within the same piping segment. System level and aggregate estimates of the changes in CDF and LERF are less than the corresponding guideline values in the topical. The staff finds that re-distributing the welds to be inspected with consideration of the safety significance of the segments provides assurance that segments whose failure have a significant impact on plant risk receive an acceptable and often improved level of inspection. Therefore, the staff concludes that the implementation of the RI-ISI program, as described in the licensee's submittal, will have a small impact on risk consistent with the guidelines of RG 1.174.

3.2.4 Integrated Decisionmaking

The licensee used an integrated approach in defining the proposed RI-ISI program by considering in concert the traditional engineering analysis, the risk evaluation, the implementation of the RI-ISI program, and performance monitoring of piping degradation. This is consistent with the guidelines given in RG 1.178 and is, therefore, acceptable.

3.2.4.1 Risk Characterization

The licensee states in the submittal that pipe segments (and ultimately the elements within, which are defined as all having the same degradation susceptibility) are ranked in accordance with definitions given in the topical and is therefore acceptable.

3.2.4.2 Selection of Element Population for Inspection

By indicating that the topical requires that 25% of the locations in high risk regions and that 10% of the locations in medium risk regions must be selected for NDE, the licensee has opted to use the element selection guidance provided in the topical under Section 3.6.4.2 "ASME Code Case N-578." The staff notes that the specific requirement in the topical is that at least 25% of the locations in each high risk category and that at least 10% of the locations in each medium risk category must be selected for NDE.

The licensee provides detailed information on the results of the evaluation in the following tables in the submittal:

- Tables 3.1-1A and 3.1-1B identify on a per system basis, the number of segments and number of elements (welds) for Units 2 and 3, respectively.

- Table 3.3-1 provides the degradation mechanism assessment summary for Units 2 and 3.

- Tables 3.4-1 identifies on a per system basis, the number of segments by risk category for Units 2 and 3.

- Tables 3.4-2A and 3.4-2B identify on a per system basis, the number of elements (welds) by risk category for Units 2 and 3, respectively.

- Tables 3.5-1A and 3.5-1B identify on a per system basis, the number of inspection locations by risk category for Units 2 and 3, respectively.

- Tables 3.8-1A and 3.8-1B provide the risk impact analysis results for each system, as well as a summary comparing the number of inspections required under the 1995 ASME Code, Section XI, ISI program with the alternative RI-ISI program, for Units 2 and 3 respectively.

In reviewing the above tables, both in the submittal and in the final program described in Reference 3, the staff concludes that the topical's requirement that at least 25% of the locations in each high risk category, and that at least 10% of the locations in each medium risk category must be selected for NDE has been met.

In the original submittal, the licensee reported that approximately 11% of Class 1 piping welds were selected for RI-ISI NDEs, for both units. Because of the additional welds selected for NDE in order to monitor for PWSCC, Reference 3 indicates that approximately 12% of Class 1 piping welds are now selected for RI-ISI NDEs, for both units. Section 3.6.4.2 of the topical states that if the percentage of Class 1 piping locations selected for examination falls substantially below 10%, then the basis for selection needs to be investigated. The licensee has met this expectation of the topical, and no investigation is required.

Based on the staff's review of the above tables (containing the results of element selection), the staff concludes that the element selection results are consistent with the described process, and with EPRI TR-112657 guidelines. Hence, the licensee's selection of element locations, which includes consideration of degradation mechanisms in addition to those covered by augmented inspection programs, is judged to be acceptable.

The staff observed that, in the initial submittal, a low ratio of bimetallic welds were selected. In response to the staff's questions, the licensee revised its selection as documented in Reference 3. The licensee identified a total of 38 bimetallic welds in each of the units, among which 18 were selected for NDE in order to monitor for the effects of PWSCC. The staff finds it acceptable as the number and percentage of welds selected are reflective of the weld population, and are high.

3.2.4.3 Examination Methods

As noted in Section 2 of this SE, the objective of ISI is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary that may impact plant safety. To meet this objective, the risk-informed location selection process, per the topical, employs an "inspection for cause" approach. To address this approach, Section 4 of the topical provides guidelines for the areas and/or volumes to be inspected, as well as the examination method, acceptance standard, and evaluation standard for each degradation mechanism. Based on its review and acceptance of the topical, the staff concluded that these examination methods are appropriate since they are selected based on specific degradation mechanisms, pipe sizes, and materials of concern. The licensee states that Section 4 of the topical was used as guidance in determining the examination methods and requirements for these locations.

Based on these considerations, the staff concludes that the licensee's determination of examination methods is acceptable.

3.2.4.4 Relief Requests for Examination Locations and Methods

As required by Section 6.4 of the topical, the licensee has completed an evaluation of existing relief requests to determine if any should be withdrawn or modified due to changes that occur from implementing the RI-ISI program.

In the submittal, the licensee did not identify any relief requests that need to be withdrawn in order to implement the RI-ISI program.

The licensee states that any examination location where greater than 90% volumetric coverage cannot be obtained, the process outlined in the topical will be followed. The staff finds that the licensee's proposed treatment of existing relief requests to be acceptable.

3.2.5 Implementation and Monitoring

Implementation and performance monitoring strategies require careful consideration by the licensee and are addressed in Element 3 of RG 1.178 and the SRP 3.9.8. The objective of Element 3 is to assess performance of the affected piping systems under the proposed RI-ISI program by utilizing monitoring strategies that confirm the assumptions and analyses used in the development of the RI-ISI program. Pursuant to 10 CFR 50.55a(a)(3)(i), a proposed alternative, in this case the implementation of the RI-ISI program, including inspection scope, examination methods, and methods of evaluation of examination results, must provide an acceptable level of quality and safety.

The licensee states that upon approval of the RI-ISI program, procedures that comply with EPRI TR-112657 guidelines will be prepared to implement and monitor the RI-ISI program. The licensee stated in its submittal that the applicable aspects of the ASME Code not affected by the proposed RI-ISI program would be retained.

The licensee indicates in Section 4 of the submittal that the RI-ISI program is a living program and its implementation will require feedback of new relevant information to ensure the appropriate identification of safety significant piping locations. The licensee also states that, as a minimum, risk ranking of piping segments will be reviewed and adjusted on an ASME period basis and that significant changes may require more frequent adjustment as directed by NRC Bulletin or Generic Letter requirements, or by industry and plant-specific feedback. This periodic review and adjustment of the risk-ranking of segments ensure that changes to the PRA that the licensee will make to incorporate the peer review results will also be incorporated into the RI-ISI program as necessary.

The licensee addresses additional examinations in Section 3.6 of the submittal, which states that examinations performed that reveal flaws or relevant conditions exceeding the applicable acceptance standards shall be extended to include additional examinations. These additional examinations shall include piping structural elements with the same postulated failure mode and the same or higher failure potential. Additional examinations will be performed on these elements up to a number equivalent to the number of elements initially required to be inspected. If the additional required examinations reveal flaws or relevant conditions exceeding the acceptance standards, the examinations shall be further extended to include all elements subject to the same failure mechanism, throughout the scope of the program. In Reference 2, the licensee clarifies that these additional examinations will be completed during the same outage that identified the flaws or conditions. The staff finds the licensee's approach acceptable since the additional examinations, if required, will be performed during the outage that the indications or relevant conditions are identified**.**

The staff finds that the proposed process for RI-ISI program implementation, monitoring, feedback, and update meets the guidelines of RG 1.174 which states that risk-informed applications should include performance monitoring and feedback provisions. Hence, the licensee's proposed process for program implementation, monitoring, feedback, and update is judged to be acceptable.

4 CONCLUSIONS

Pursuant to 10 CFR 50.55a(a)(3)(i), alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if the licensee demonstrates that the proposed alternatives will provide an acceptable level of quality and safety. In this case, the licensee, Southern California Edison, has proposed an alternative to use the risk-informed process described in NRC-approved EPRI TR-112657.

RG 1.174 establishes requirements for risk-informed decisions involving a change to a plant's licensing basis. RG 1.178 establishes requirements for risk-informed decisions involving alternatives to the requirements of 10 CFR 50.55a(g) (ISI program requirements), and its directive to follow the requirements of the ASME Code, Section XI. These two RGs, taken together, define the elements of an integrated decisionmaking process that assesses the level of quality and safety embodied in a proposed change to the ISI program. EPRI TR-112567 RI-ISI methodology contains the necessary details for implementing this process. This methodology provides for a systematic identification of safety-significant pipe segments, for a determination of where inspections should occur within these segments (i.e., identification of locations), and for a determination how these locations will be inspected. Such segments/locations are characterized as having active degradation mechanisms, and/or whose failure would be expected to result in a significant challenge to safety (either immediately by initiating an event or later on in response to an unrelated event).

EPRI TR-112657 methodology also provides for implementation and performance monitoring strategies, to insure a proper transition from the current ISI program, and to assure that changes in plant performance, and new information from the industry and/or from the NRC, is incorporated into the licensee's ISI program as needed.

Other aspects of the licensee's ISI program, such as system pressure tests and visual examination of piping structural elements will continue to be performed on all Class 1, 2, and 3 systems in accordance with ASME Code, Section XI. This provides a measure of continued monitoring of areas that are being eliminated from the NDE portion of the ISI program. As required by EPRI TR-112657 methodology, the existing ASME Code performance measurement strategies will remain in place. In addition, EPRI TR-112657 methodology provides for increased inspection volumes for those locations that are included in the NDE portion of the program.

The staff concludes that the licensee's development of its RI-ISI program is consistent with the methodology described in the topical. Hence, the staff concludes that the licensee's proposed program which is consistent with the methodology as described in the topical, will provide an acceptable level of quality and safety pursuant to 10CFR50.55a(a)(3)(i) for the proposed alternative to the piping ISI requirements with regard to (1) the number of locations, (2) the locations of inspections, and (3) the methods of inspection.

The staff concludes that the licensee's proposed RI-ISI program is an acceptable alternative to the current ISI program for Class 1 piping welds at SONGS, Units 2 and 3. Therefore, the proposed RI-ISI program is authorized for the third 10-year ISI interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that this alternative will provide an acceptable level of quality and safety.

5 REFERENCES

1. Letter from A. Edward Scherer, Southern California Edison, to U.S. Nuclear Regulatory Commission, "Docket Nos. 50-361 and 50462, Notification of Updating the Inservice Inspection Program and Submittal of Relief Requests for the Third 10-Year Inspection Interval, San Onofre Nuclear Generating Station Units 2 and 3," dated July 2, 2003.

2. Letter from A. Edward Scherer, Southern California Edison, to U.S. Nuclear Regulatory Commission, "Additional Information Supporting Third Ten-Year Inservice Inspection (ISI) Interval Relief Request ISI-3-1 Request to Use Risk-Informed Inservice Inspection (RI-ISI), San Onofre Nuclear Generating Station Units 2 and 3," dated September 15, 2004.

3. WCAP-15882-NP, Revision 04, "San Onofre Nuclear Generating Station Units 2 and 3 Risk-Informed Inservice Inspection Program Evaluation," July 2004.

4. EPRI TR-112657, Revision B-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, Final Report, December 1999.

5. NRC Staff Safety Evaluation on EPRI TR-112657, Revision B-A, dated October 28, 1999.

6. NRC Regulatory Guide 1.174, *An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis*, Revision 1, November 2002.

7. NRC Regulatory Guide 1.178, *An Approach for Plant-Specific Risk-Informed Decisionmaking for Inservice Inspection of Piping*, Revision 1, September 2003.

8. NRC NUREG-0800, Chapter 3.9.8, *Standard Review Plan For the Review of Risk-Informed Inservice Inspection of Piping*, Revision 1, September 2003.

9. Letters dated February 28, 2001, and March 28, 2001, from P.J. O'Regan (EPRI) to Dr. B. Sheron (USNRC), "Extension of Risk-Informed Inservice Inspection Methodology."

10. EPRI TR-111880, "Piping System Failure Rates and Rupture Frequencies for Use In Risk Informed In-Service Inspection Applications," Final Report, September 1999.

11. ANO-2 Code Case N578 Application Submittals, Letter #2CAN099706 dated

September 30, 1997, and Letter #2CAN039808, dated March 31, 1998.

12. Vermont Yankee Code Case N-S 60 Application Submittals Letter # BVY97-99, dated August 6, 1997, and Letter #BVY97-105, dated August 15, 1997.

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Date: February 8, 2005