April 21, 2004

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

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3 (SONGS) REQUEST FOR RELIEF FROM THE REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE (CODE) CONCERNING UPDATES TO INSERVICE TESTING PROGRAM (TAC NOS. MB9699 AND MB9700)

Dear Mr. Ray:

By letter dated June 18, 2003, as supplemented by letter dated October 10, 2003, Southern California Edison (SCE or the licensee) requested an update of the licensee's Inservice Testing (IST) Program for the third ten-year interval for SONGS. This update requests relief from certain ASME Code requirements for components at SONGS. The NRC staff has completed its review of relief requests IST-3-R-1, IST-3-P-1, IST-3-P-2, IST-3-P-3, and IST-3-V-1 for the IST Program at SONGS. The NRC staff's safety evaluation is enclosed.

The NRC staff concludes that for relief request IST-3-R-1, the licensee's proposal to use the 1998 Edition of the ASME Operation and Maintenance Code (up to and including the 2000 Addenda) is approved pursuant to 50.55a(f)(4)(iv) of Title 10 of the Code of Federal Regulations. The NRC staff also concludes that the licensee's proposed alternatives for relief requests IST-3-P-1 and IST-3-P-2 provide an acceptable level of quality and safety, and are therefore authorized pursuant to 50.55a(a)(3)(i) of Title 10 of the Code of Federal Regulations. In addition, the NRC staff concludes that requests for reliefs IST-3-P-3 and IST-3-V-1 are authorized pursuant to 50.55a(a)(3)(ii) of Title 10 of the Code of Federal Regulations on the basis that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Sincerely,

/RA/

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

Docket Nos. 50-361 and 50-362

Enclosure: Safety Evaluation

cc w/encl: See next page

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Executive Vice President
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Sincerely,
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Division of Licensing Project Management
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Docket Nos. 50-361 and 50-362
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cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUESTS

RELATED TO THE THIRD 10-YEAR INSERVICE TESTING (IST) PROGRAM

SOUTHERN CALIFORNIA EDISON

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By letter dated June 18, 2003 (ML031750254), as supplemented by letter dated October 10, 2003 (ML032890435) , Southern California Edison (SCE or the licensee) submitted proposed revisions to the IST Program for the third 10-year interval at the San Onofre Nuclear Generating Station, Units 2 and 3 (SONGS). SCE proposed relief requests IST-3-R-1, IST-3-P-1, IST-3-P-2, IST-3-P-3, and IST-3-V-1 in order to obtain relief from certain IST requirements of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code). Relief Requests IST-3-R-1, IST-3-P-1, and IST-3-P-2 were submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) (Reference 1), Section 50.55a(a)(3)(i), on the basis of providing an acceptable level of quality and safety using SCE's proposed alternative. Relief requests IST-3-P-3 and IST-3-V-1 were submitted in accordance with 10 CFR 50.55a(a)(3)(ii), on the basis of hardship or unusual difficulty without a compensating increase in the level of quality and safety, resulting if SCE has to comply with the ASME OM Code requirements.

2.0 BACKGROUND

On December 30, 1998 (Reference 2), SCE submitted by letter to the NRC its request to implement a Risk-Informed Inservice Testing (RI-IST) Program (References 2 and 3) that would specify pump and valve testing frequencies in lieu of the testing frequencies specified by the ASME OM Code. SCE's proposed RI-IST Program also addressed test methods, frequencies, and performance-based concepts for IST beyond those required by the ASME Code. Based on subsequent interaction between the NRC staff and the licensee (as described in the NRC staff's RI-IST Program safety evaluation (SE) for SONGS, Reference 4), SCE submitted a revised RI-IST Program description to the staff on November 30, 1999.

By letter dated March 27, 2000 (Reference 4), the NRC staff authorized the RI-IST Program at SONGS, Units 2 and 3, for its second 10-year interval, which began on April 1, 1994, and was scheduled to end on August 17, 2003. By letter dated October 10, 2003 (ML032890435), SCE extended its second 10-year interval to April 30, 2004, in accordance with the ASME Code, Section IX, Article IWA-2430 (c), 1989 Edition, no addenda. The staff's March 27, 2000, SE of the SONGS RI-IST Program concluded (in part) that "implementation of the licensee's RI-IST Program Description is authorized for the remainder of each unit's plant life for SONGS, Units 2 and 3. SCE is not expected to resubmit its RI-IST Program Plan unless significant changes are made to the RI-IST Program Description that could potentially affect the staff's overall conclusions. SCE continues to be required to update its IST Program Plan for pumps and valves every 120 months and submit requests for relief from impractical Code requirements pursuant to 10 CFR 50.55a(f)(4)(ii) and (f)(5)." SCE's June 18, 2003, submittal, as supplemented by letter dated October 10, 2003, is a request to update its Code of record and IST Program plan for pumps and valves, for the third 10-year interval at SONGS.

2.1 REGULATORY EVALUATION

The Regulation at 10 CFR 50.55a, requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the OM Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to 10 CFR 50.55a(a)(3)(i), (a)(3)(ii), or (f)(6)(i). In order to obtain authorization or relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for the facility. Section 50.55(a)(f)(4)(iv) provides that inservice tests of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitation and modifications listed and subject to Commission approval. NRC guidance contained in Generic Letter (GL) 89-04 (Reference 5), "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements determined to be acceptable to the staff and authorizes the use of alternatives in Positions 1, 2, 6, 7, 9, and 10 provided that the licensee follows the guidance delineated in the applicable position. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482 (Reference 6), "Guidance for Inservice Testing at Nuclear Power Plants."

The SONGS third 10-year IST interval begins on May 1, 2004, and is scheduled to end in August 17, 2013. The third 10-year revision to the IST Program was developed in accordance with the 1998 Edition of the ASME OM Code, up to and including the 2000 Addenda. Subsection ISTB provides requirements for IST of pumps and ISTC provides the requirements for IST of valves. The ASME OM Code replaces specific requirements in previous editions of the ASME Code*,* Section XI, Subsections IWP and IWV for pumps and valves, respectively.

Section 50.55a of 10 CFR authorizes the Commission to grant relief from ASME Code requirements or to approve proposed alternatives upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested or authorizing the proposed alternative as part of the licensee's IST Program are contained in this SE. The relief requests evaluated by this SE are summarized in the table below:

Relief Request	Code Section(s)	Summary of Requested Relief
IST-3-R-1	1998 Edition of the ASME OM Code, up to and including the 2000 Addenda	Requests approval of the previously approved RI-IST Program using a later version of the ASME Code
IST-3-P-1	ISTB 3510(b)(1)	Requests relief from the full-scale instrument range requirements of the Code
IST-3-P-2	ISTB 3510(b)(1)	Requests relief from the full-scale instrument range requirements of the Code
IST-3-P-3	ISTB 5121(b) ISTB 5121(c)	Requests relief from the requirement to measure pump flow rate while testing specified pumps on recirculation (no flow meters in the recirculation loops). GL 89-04, Position 9 addresses this issue
IST-3-V-1	ISTC 3510 ISTC-3522	Requests relief from testing internal spring-loaded poppet valves in the upstream side of the shutdown cooling system suction containment isolation motor-operated gate valves

3.0 EVALUATIONS OF RELIEF REQUESTS

3.1 Relief Request IST-3-R-1

3.1.1 Component and Code Requirement

The components affected by this relief request are the various components listed in Table 2.3-1 of the SONGS RI-IST Program. Table 2.3-1 lists Group A pumps, Group B pumps, and valves that shall be tested in accordance with the requirements of the 1998 Edition of the ASME OM Code, up to and including the 2000 Addenda.

3.1.2 Licensee's Proposed Alternative

The licensee proposed:

> Implement a Risk Informed Inservice Testing Program per the guidance detailed in Regulatory Guide, 1.175, "An Approach for Plant-Specific, Risk Informed Decision making: Inservice Testing."
>
> Group A pump, Group B pump, and Valve testing shall be performed in accordance with the requirements stated in ASME OM Code-1998 for Operation

and Maintenance of Nuclear Power Plant, ASME OMa Code-1999 and ASME OMb-2000, except that the test intervals are determined per the methodology outlined in Enclosure 2 of Relief Request IST-001...[References 2 and 3].

Note: Comprehensive pump testing will be performed at the OM Code, ISTB specified frequency (Biennially).

3.1.3 Licensee's Basis for Requesting Relief

The licensee stated:

The proposed alternative testing strategy provides an acceptable level of quality and safety because key safety principles of defense-in-depth and safety margins are maintained. The impact of the proposed changes to the testing strategy has been evaluated and meets the criteria specified in the acceptance guidelines of Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." The complete description and supporting bases reside in the San Onofre Nuclear Generating Station Risk Informed Inservice Testing Program, submitted to the NRC on December 30, 1998 and supplemented by letter dated November 30, 1999...[References 2 and 3] and approved by the NRC on March 27, 2000...[Reference 4].

3.1.4 Evaluation

The Code of record for the third 10-year IST interval at SONGS is the 1995 Edition up to and including the 1996 Addenda of the ASME OM Code. During the second 10-year IST interval, the SCE's RI-IST Program for SONGS was approved by the staff in an SE dated March 27, 2000. The approved SONGS RI-IST Program—which was developed using the requirements of the 1989 Edition of the ASME Code, Section XI—outlines IST frequencies for certain pumps and valves that are categorized as low safety significant and are determined to be consistent with the safety principles of risk-informed applications as discussed in Regulatory Guide 1.174. The NRC staff's approval of SCE's RI-IST Program concluded (in part) that "implementation of the licensee's RI-IST Program Description is authorized for the remainder of each unit's plant life for SONGS. SCE is not expected to resubmit its RI-IST Program Plan unless significant changes are made to the RI-IST Program Description that could potentially affect the staff's overall conclusions."

In a letter dated June 18, 2003, however, as supplemented by letter dated October 10, 2003, SCE proposed to revise its approved RI-IST Program for SONGS in order to update the Code of record to the 1998 Edition of the ASME Code, Section XI, with ASME OMa Code-1999 addenda and ASME OMb Code-2000 Addenda. SCE proposed that Group A pump, Group B pump, and valve testing would be performed in accordance with the 1998 Edition of the ASME Code except where test intervals are determined per the methodology outlined in Enclosure 2 of relief request IST-001. SCE also proposed that comprehensive pump tests be performed biennially as specified in Subsection ISTB of the OM Code.

The NRC staff has reviewed SCE's proposed alternative and has determined that updating to the 1998 Edition of the ASME OM Code through the 2000 Addenda does not affect the staff's overall conclusions related to SCE's approved RI-IST Program at SONGS. The NRC staff has also noted that 10 CFR 50.55a was last amended on September 26, 2002 (67 FR 60520) to incorporate by reference the 1998 Edition of the ASME Code, up to and including the 2000 Addenda. IST of high safety significant components will be conducted at Code-specified frequencies using approved Code methods, and low safety significant components will be performed at extended test intervals determined in accordance with the approved RI-IST Program description. SCE will also conduct Comprehensive pump tests biennially as specified in ISTB of the ASME OM Code.

Based on the above information, the NRC staff concludes that the licensee's proposal to use the 1998 Edition of the OM Code (up to and including the 2000 Addenda) for SONGS for its third 10-year IST interval is approved pursuant 10 CFR 50.55a(f)(4)(iv).

3.2 Relief Request IST-3-P-1

3.2.1 Component and Code Requirement

The components affected by this relief request are the saltwater cooling (SWC) pumps (P112, P113, P114, and P307) and the reactor charging pumps (P190, P191, and P192) for SONGS. In accordance with Table 3.2-1 below, the SWC pumps have installed pressure instrumentation that may be subject to ASME OM Code instrument range and accuracy requirements during Group A and Comprehensive pump testing, while the Reactor Charging pumps have pressure and flow instrumentation that may be subject to the instrument range and accuracy requirements during Group A and Comprehensive pump testing.

Table 3.2-1

Pump	Parameter	Instrument	Instrument Range (Range/Ref Value)	Reference Value(1)	Maximum Inaccuracy Permitted by Code(2)	As Installed Accuracy at full Scale (error at full scale)
Saltwater Cooling Pumps						
P112	Disch. Press.	PI-6230	0 - 160 (5.0)	32.4 psig	1.94 psig	0.5% (0.8 psig)
P113	Disch. Press.	PI-6231	0 - 160 (5.2)	31 psig	1.86 psig	0.5% (0.8 psig)
P114	Disch. Press.	PI-6233	0 - 160 (5.9)	27 psig	1.62 psig	0.5% (0.8 psig)
P307	Disch. Press.	PI-6232	0 - 160 (5.5)	29 psig	1.74 psig	0.5% (0.8 psig)
Reactor Charging Pumps						
P190	Suction Press.	PI-9284	0 - 160 (3.5)	46.0 psig	2.76 psig	0.625% (1.0 psig)
P191	Suction Press.	PI-9285	0 - 160 (3.6)	44.0 psig	2.64 psig	0.625% (1.0 psig)
P192	Suction Press.	PI-9286	0 - 160 (3.2)	50.0 psig	3 psig	0.625% (1.0 psig)
P190	Flow	FI-0212	0 - 150 (3.3)	44.9 gpm	2.69 gpm	1.00% (1.50 gpm)
P191			0 - 150 (3.4)	44 gpm	2.64 gpm	1.00% (1.50 gpm)
P192			0 - 150 (3.3)	45 gpm	2.7 gpm	1.00% (1.50 gpm)

(1) Reference values are based on historical data for like pumps. Future values may be lower, but overall Code Accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.

(2) The information in this column represents the gauge error permitted by the code (3 times reference value x code required accuracy of 2% (for Group A testing and for flow only during Comprehensive Pump Testing)

3.2.2 Licensee's Proposed Alternative

The licensee proposed:

> Use installed pressure and flow instrumentation as listed in Table [3.2-]1 for Group A pump test for:
>
> 1. SWC Pumps (Group A)
> 2. Charging Pumps (Group A)
>
> Note: Temporary pressure gauges that meet the range and accuracy requirements of the Code shall be used for Comprehensive Pump Testing.
>
> Use installed flow instrumentation as listed in Table [3.2-]1 for Comprehensive pump test for:
>
> 1. Charging Pumps (Comprehensive)

3.2.3 Licensee's Basis for Requesting Relief

The licensee stated:

> Relief is requested from the full scale range requirements of ISTB-3510(b)(1) for SWC pump discharge pressure when implementing Group A Test Procedure for Vertical Line Shaft Centrifugal Pumps – ISTB-5221; Charging pump suction pressure and flow when implementing Group A Test Procedure for Positive Displacement Pumps – ISTB-5321, and Charging pump flow when implementing Comprehensive Test Procedure – ISTB-5323.
>
> The instruments listed in Table [3.2-]1 do not meet the ISTB-3510(b)(1) requirement (i.e., the full-scale range of each instrument shall not be greater than three times the reference value). However, the manufacturer's stated accuracy for each pressure instrument listed in Table [3.2-]1 exceeds the Group A accuracy requirements. Similarly, although the charging pump flow instrument, FI-0212's range is approximately 3.5 times the reference value, the gauge's accuracy of 1% exceeds the ISTB required accuracy of 2% for Group A and Comprehensive pump tests.
>
> Even though the existing installed station instruments do not meet the code range requirement, their accuracy is better than the code requirements. Thus, the combination of range and accuracy of the installed instrument yields a reading that is better than the reading achieved from instruments that meet the minimum Code requirements.

3.2.4 Evaluation

The SWC and Reactor Charging pumps in question, listed in Table 3.2-1, will be maintained and tested in accordance with the 1998 Edition of the ASME OM Code, up to and including the

2000 Addenda. Specifically, Table ISTB-3400-1 requires that measurement and analysis of pump differential pressures and flow rates be conducted quarterly for Group A and B pump tests and biennially for Comprehensive pump tests. The intent of this testing is to assess the hydraulic conditions of the pumps and to detect degradation. Further, in order to ensure that the instrumentation used during pump testing is sufficiently readable and accurate, paragraph ISTB-3510(a) states that instrument accuracy shall be within the limits of Table ISTB-3500-1, and paragraph ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference value of the parameter. Table ISTB-3500-1 states that pressure instruments are required to have accuracies of ±2% for Group A tests and ±0.5% for Comprehensive tests, while flow instruments are required to have accuracies of ±2% for Group A tests and ±2% for the Comprehensive tests.

However, in accordance with 10 CFR 50.55a(a)(3)(i), SCE proposed alternatives to the above ASME Code requirements in order to use installed pressure instrumentation for the Group A testing of the SWC and Reactor Charging pumps that all have full-scale ranges in excess of three times their applicable reference values. SCE also proposed that temporary pressure instrumentation will be used for the SWC and Reactor Charging pumps during Comprehensive pump testing in order to meet the range and accuracy requirements of the ASME Code. SCE further stated that installed flow instrumentation will be used for measuring the flow of the Reactor Charging pumps during Comprehensive pump tests.

3.2.4.1 SWC Pumps

According to Section 9.2.1 of the SONGS Updated Final Safety Analysis Report (UFSAR), the SWC pumps in question are vertical turbine (centrifugal) pumps. One of the parameters, as specified in Table ISTB-3000-1 of ASME OM Code, that is required to be measured for centrifugal pumps is differential pressure. However, because the SWC pumps have no instrumentation that directly reads the differential pressure, the suction and discharge pressures must be measured in order to determine the differential pressure developed across the SWC pumps. Paragraph ISTB-3510 imposes instrument range and accuracy requirements on these pressure instruments. This assures that all measurements are sufficiently readable and accurate in order to permit detection of pump degradation. The NRC staff has evaluated the discharge pressure instrumentation, for the applicable SWC pumps, in Table 3.2-2 below, pursuant to the range and accuracy requirements of paragraph ISTB-3510(b)(1) and Table ISTB-3500-1, respectively.

Table 3.2-2

Pump	**Inst. Range Pref. (3*Pref.)**	**Instrument "As Installed" Accuracy**	**Code Required Accuracy (Group A or B Tests)**	**Code Required Accuracy (Comprehensive Tests)**	**Group A Pump Testing (1)**	**Comprehensive Pump Testing (2)**
Saltwater Cooling System Pumps						
P112 (Disch. Press.)	0 - 160 32.4 psig (3*32.4 = 97.2)	±0.5% ±0.8 psig	±2.0% ±1.94 psig	±0.5% ±0.486 psig	Acceptable	Not Acceptable
P113 (Disch. Press.))	0 - 160 31 psig (3*31 = 93)	±0.5% ±0.8 psig	±2.0% ±1.86 psig	±0.5% ±0.465 psig	Acceptable	Not Acceptable

P114 (Disch. Press.)	0 - 160 27 psig (3*27 = 81)	±0.5% ±0.8 psig	±2.0% ±1.62 psig	±0.5% ±0.405 psig	Acceptable	Not Acceptable
P307 (Disch. Press.)	0 - 160 29 psig (3*29 = 87)	±0.5% ±0.8 psig	±2.0% ±1.74 psig	±0.5% ±0.435 psig	Acceptable	Not Acceptable

(1) The instrument is found to be **Acceptable** for Group A pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

(2) The instrument is found to be **Acceptable** for Comprehensive pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

The NRC staff has reviewed SCE's proposed alternative and has confirmed that all of the installed discharge pressure instrumentation for the SWC pumps have full-scale ranges that are greater than three times the allowable test reference values (Column 2 of Table 3.2-2). Therefore, installed discharge pressure instrumentation for the SWC pumps do not meet the requirements of paragraph ISTB-3510(b)(1). However, in accordance with Section 5.5.1 of NUREG-1482, the NRC staff notes that when the range of a permanently installed analog instrument is greater than 3 times the reference value, relief can be granted if the combination of the range and accuracy yields a reading that is at least equivalent to the reading achieved from instruments that meet the ASME Code requirements (i.e., up to ±6%).

Upon review of the calculations in Table 3.2-2, the NRC staff notes that the value of every "as installed" pressure instrument for the SWC pumps is more accurate than what is required by the ASME Code for Group A testing (Columns 3 and 4). The NRC staff also notes that the values of the "as installed" pressure instrumentation of the SWC pumps are less accurate than what is required by the ASME Code for Comprehensive testing (Columns 3 and 5). Thus, for Comprehensive testing, the "as installed" discharge pressure instrumentation of the SWC pumps do not meet the guidance contained in Section 5.5.1 of NUREG-1482.

The licensee has, however, proposed to use temporary pressure gauges that meet the range and accuracy requirements of the ASME Code, for the Comprehensive testing of the SWC pumps. Therefore, the NRC staff finds that the use of installed pressure instrumentation for Group A testing and temporary pressure gauges for Comprehensive testing, as described in SCE's proposed alternative, is acceptable and meets the intent of Section 5.5.1 of NUREG-1482, will provide an acceptable level of quality and safety, and will provide sufficiently accurate data for assessing pump degradation.

Based on the determination that the licensee's proposed alternative will provide an acceptable level of quality and safety, the NRC staff authorizes the licensee's alternative pursuant to 10 CFR 50.55a(a)(3)(i). The licensee will use installed pressure instrumentation for all the Group A tests on applicable SWC pumps and shall use temporary pressure gauges, that meet the range and accuracy requirements of the ASME Code, during the Comprehensive tests.

3.2.4.2 Reactor Charging Pumps

According to Table 9.3-7 of the SONGS UFSAR the Reactor Charging pumps in question are positive displacement pumps. One of the parameters, as specified in Table ISTB-3000-1 of ASME OM Code, that is required to be measured for positive displacement pumps is discharge pressure. However, in accordance with Subsection ISTB of the ASME OM Code, suction pressure is not required to be measured or evaluated for positive displacement pumps.

Therefore, the Code range and accuracy requirements do not apply to the Reactor Charging pump suction pressure instrumentation and relief is not necessary for these instruments.

However, as specified in Table ISTB-3000-1 of ASME OM Code, flow rate shall be measured and determined for positive displacement pumps. Thus, the ASME OM Code range and accuracy requirements do apply to the Reactor Charging pumps flow instrumentation listed in Table 3.2-1. The ASME OM Code range and accuracy requirements are outlined in paragraph ISTB-3510 and are written to ensure that all measurements obtained from flow instruments are sufficiently readable and accurate to permit detection of pump degradation. The NRC staff has evaluated the flow instrumentation for the three Reactor Charging pumps in Table 3.2-3 below:

Table 3.2-3

Pump	**Inst. Range Pref. (3*Pref.)**	**Instrument "As Installed" Accuracy**	**Code Required Accuracy (Group A or B Tests)**	**Code Required Accuracy (Comprehensive Tests)**	**Group A Pump Testing (1)**	**Comprehensive Pump Testing (2)**
Reactor Charging Pumps						
P190 (Suction Press.)	0 - 160 46 psig (3*46 = 138)	±0.625% ±1.0 psig	±2.0% ±2.76 psig	±0.5% ±0.690 psig	Not Applicable	Not Applicable
P191 (Suction Press.)	0 - 160 44 psig (3*44 = 132)	±0.625% ±1.0 psig	±2.0% ±2.64 psig	±0.5% ±0.660 psig	Not Applicable	Not Applicable
P192 (Suction Press.)	0 - 160 50 psig (3*50 = 150)	±0.625% ±1.0 psig	±2.0% ±3.00 psig	±0.5% ±0.750 psig	Not Applicable	Not Applicable
P190, (Flow)	0 - 150 44.9 gpm (3*44.9=134.7)	±1.00% ±1.50 gpm	±2.0% ±2.69 gpm	±2.0% ±2.69 gpm	Acceptable	Acceptable
P191 (Flow)	0 - 150 44 gpm (3*44=132)	±1.00% ±1.50 gpm	±2.0% ±2.64 gpm	±2.0% ±2.64 gpm	Acceptable	Acceptable
P192 (Flow)	0 - 150 45 gpm (3*45=135)	±1.00% ±1.50 gpm	±2.0% ±2.70 gpm	±2.0% ±2.70 gpm	Acceptable	Acceptable

(1) The instrument is found to be **Acceptable** for Group A pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

(2) The instrument is found to be **Acceptable** for Comprehensive pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

The NRC staff has reviewed SCE's proposed alternative and has confirmed that all of the installed flow instrumentation for the Reactor Charging pumps have full-scale ranges that are greater than three times the allowable test reference values (Column 2 of Table 3.2-3). The applicable installed flow instrumentation does not, therefore, meet the requirements of Paragraph ISTB-3510(b)(1). However, in accordance with Section 5.5.1 of NUREG-1482, the NRC staff notes that when the range of a permanently installed analog instrument is greater than 3 times the reference value, relief can be granted if the combination of the range and accuracy yields a reading at least equivalent to the reading that is achieved from instruments that meet the ASME Code requirements (i.e., up to ±6%).

Upon review of the calculations in Table 3.2-3, the NRC staff notes that the value of every "as installed" flow instrument for the Reactor Charging pumps is more accurate than what is required by the ASME Code for Group A testing (Columns 3 and 4). The NRC staff also notes that the values of the "as installed" flow instrumentation of the Reactor Charging pumps are more accurate than what is required by the ASME Code for Comprehensive pump testing (Columns 3 and 5). Therefore, all of the "as installed" flow instruments for the Reactor Charging pumps, as described in SCE proposed alternative, meet the guidance in Section 5.5.1 of NUREG-1482 and are adequate for both Group A and Comprehensive pump testing. SCE's proposed alternative will provide an acceptable level of quality and safety and will provide sufficiently accurate data for assessing pump degradation.

Based on the determination that the licensee's proposed alternative for the Reactor Charging pumps will provide an acceptable level of quality and safety, the NRC staff authorizes the licensee's alternative pursuant to 10 CFR 50.55a(a)(3)(i). The licensee may use installed flow instrumentation, for the applicable Reactor Charging pumps listed in Table 1, during Group A and Comprehensive pump testing.

3.3 Relief Request IST-3-P-2

3.3.1 Component and Code Requirement

The components affected by this relief request are the Emergency Chilled Water (ECW) pumps (P160 and P162), Component Cooling Water (CCW) Seismic Make-up pumps (P1018 and P1019), Diesel Generator Fuel Oil (DGFO) Transfer pumps (P093, P094, P095, and P096), Containment Spray System (CSS) pumps (P012 and P013), and the Low Pressure Safety Injection (LPSI) pumps (P015 and P016). These pumps are shown in Tables 3.3-1 and 3.3-2.

Table 3.3-1

Pump	Parameter	Instrument	Instrument Range (Range/Ref Value)	Reference Value[1]	Maximum Inaccuracy Permitted by Code[2]	As Installed Accuracy at full Scale (error at full scale)
Emergency Chilled Water Pumps						
P160 P162	Suction Pressure	PI-9883B PI-9883A	0 - 160 (5.9)	27 psig	1.62 psig	0.5% (0.8 psig)
Component Cooling Water Seismic Make-up Pumps						
P1018 P1019	Suction Pressure	PI-6566 PI-6565	0 - 30 (3.3)	9.0 psig	.54 psig	0.5% (0.15 psig)
Diesel Generator Fuel Oil Transfer Pumps						

Pump	Parameter	Instrument	Instrument Range (Range/Ref Value)	Reference Value[(1)]	Maximum Inaccuracy Permitted by Code[(2)]	As Installed Accuracy at full Scale (error at full scale)
P093 P094 P095 P096	Discharge Pressure	PI-5973 PI-5975 PI-5976 PI-5974	0 - 60 (6.2)	9.7 psig	.58 psig	0.5% (0.3 psig)

(1) Reference values are based on historical data for like pumps. Future values may be lower, but overall Code Accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.
(2) The information in this column represents the gauge error permitted by the code (3 times reference value x code required accuracy of 2% (for Group A testing and for flow only during Comprehensive Pump Testing)

Table 3.3-2

Pump	Parameter	Instrument	Nominal Quarterly Reference[(1)]	Worst Case Refueling Reference[(2)]	Instr. Range (Range/Ref. Value)	Error Permitted by Code[(3)]	As Installed Accuracy at Full Scale (error at full scale)
Containment Spray System Pumps							
P012 P013	Suction Pressure	PI-9087 PI-9085	30 psig	19.7 psig	0 - 75 (3.8)	1.18 psig	0.25% (0.19 psig)
LPSI							
P015 P016	Suction Pressure	PI-9081 PI-9083	31 psig	13 psig	0 - 60 (4.6)	0.78 psig	0.25% (0.15 psig)
P015 P016	Discharge Pressure	PI-9082 PI-9084	215 psig	149 psig	0 - 500 (3.4)	8.94 psig	0.25% (1.25 psig)

(1) Reference values are based on historical data for like pumps. Future values may be lower, but overall Code Accuracy requirements would be met or exceeded under all conditions under which an IST would be performed.
(2) For the worst case refueling reference, the gauges read below the Code required range (i.e. less than 1/3 of full scale)
(3) The information in this column represents the gauge error permitted by the code (3 times reference value x code required accuracy of 2% (for Group A testing and for flow only during Comprehensive Pump Testing)

3.3.2 Licensee's Proposed Alternative

The licensee proposed:

(A) Use installed instrumentation as listed in Table [3.3-]1 for Group A and B pump testing for:

1. Emergency Chilled Water Pumps (Group B)
2. Component Cooling Water Seismic Make-up Pumps (Group B)
3. Diesel Generator Fuel Oil Transfer Pumps (Group A)

Note: Temporary pressure gauges that meet the range and accuracy requirements of the Code shall be used for Comprehensive Pump Testing.

(B) Use installed instrumentation as listed in Table [3.3-]2 for Group A, B, and Comprehensive pump testing for:

1. Containment Spray System Pumps (CSS) (Group B and Comprehensive)
2. Low Pressure Safety Injection (LPSI) Pumps (Group A and Comprehensive)

3.3.3 Licensee's Basis for Requesting Relief

The licensee stated:

(A) Relief is requested from the full scale range requirements of ISTB-3510(b)(1) for the ECW Pumps' suction pressure gauges, the CCW Seismic Make-up Pumps' suction pressure gauges, and the Diesel Generator Fuel Oil (DGFO) Transfer Pumps' discharge pressure gauges. The instruments listed in Table 1 do not meet the ISTB-3510(b)(1) requirement (i.e., the full-scale range of each instrument shall not be greater than three times the reference value). As seen in Table [3.3-]1, the ratios of Instrument Range to Reference Value (Range/Ref. Value) vary from 3.3 to 6.2. However, the manufacturer's stated accuracy for each pressure instrument listed Table [3.3-]1 exceeds the Group A and Group B accuracy requirements as stated in Table ISTB-3500-1. Thus, the combination of range and accuracy of the installed instrumentation yields a reading that is better than the reading achieved from instruments that meet the minimum Code requirements.

(B) Relief is requested from the full scale range requirements of ISTB-3510(b)(1) under certain scenarios for CSS pump suction pressures and LPSI pump suction and discharge pressures. For quarterly Group A and B tests, which are performed on mini flow, these gauges meet the Code required limits. However, during refueling outages, the water from the Refueling Water Storage Tanks (RWSTs), which provides suction head to the pumps, is transferred to the refueling canal. This lowers the water level in the RWSTs and thus the reference suction pressure for the Inservice Tests (ISTs). In these circumstances of reduced suction pressure, the gauges do not always meet the ISTB-3510(b)(1) requirements (i.e., they read less than one-third of full scale, See Table [3.3-]2).

The reference discharge pressure readings for the LPSI pumps are greater than one-third of the instrument range during the Group A mini flow tests conducted quarterly. Comprehensive Pump Tests are conducted biennially in accordance with Table ISTB-3400-1. During these Comprehensive Pump Tests, due to the lower RWST level and the change in system line-up, the reference discharge pressure drops below one-third of full scale of the installed instrumentation. As a consequence, the limits of ISTB-3510(b)(1) are not met during the Comprehensive Pump Tests.

The manufacturer's stated accuracy for each pressure instrument listed in Table [3.3-]2 exceeds the required accuracy in Table ISTB-3500-1 (+/-2% for Group A and B tests and +/-0.5% for Comprehensive Tests).

3.3.4 Evaluation

According to the SONGS UFSAR, all of the pumps listed in Tables 3.3-1 and 3.3-2 are centrifugal pumps. At SONGS, the applicable Code and Addenda for the maintenance and testing of centrifugal pumps is the 1998 Edition of the ASME OM Code, up to and including the 2000 Addenda. Specifically, one of the parameters, as specified in Table ISTB-3000-1 of ASME OM Code, that is required to be measured for centrifugal pumps is differential pressure. However, because these pumps have no instrumentation that directly reads the differential pressure, the suction and discharge pressures must be measured in order to determine the differential pressure. The frequency of conducting this analysis and obtaining the differential pressure is specified in Table ISTB-3400-1, i.e., quarterly for Group A and B pump testing, and biennially for Comprehensive pump testing.

Further, the intent of obtaining the differential pressure in Group A, B, and Comprehensive pump testing is to assess pump hydraulic conditions and to detect degradation. In order to do so, assurance is needed that the instrumentation used during testing is sufficiently readable and accurate. Instrument accuracy requirements are outlined in Paragraph ISTB-3510(a), stating that instrument accuracy shall be within the limits of Table ISTB-3500-1, and instrument range requirements are outlined in Paragraph ISTB-3510(b)(1), stating that the full-scale range of each analog instrument shall not be greater than three times the reference value of the parameter. Table ISTB-3500-1 states that the required pressure instrument accuracy is ±2% for Group A and B tests and ±0.5% for Comprehensive tests.

In accordance with 10 CFR 50.55a(a)(3)(i), however, SCE proposed an alternative to the paragraph ISTB-3510(b)(1) requirements. SCE proposed to use installed pressure instruments that have full-scale ranges in excess of three times their applicable reference values during the Group A and B testing of the pumps in Table 3.3-1, and during the Group A, B, and Comprehensive testing of the pumps in Table 3.3-2. SCE additionally stated that temporary pressure gauges would be used during the Comprehensive testing of the pumps listed in Table 3.3-1.

The NRC staff has evaluated the installed pressure instrumentation in Table 3.3-3 below:

Table 3.3-3

Pumps	**Inst. Range Pref. (3*Pref.)**	**Instrument "As Installed" Accuracy**	**Code Required Accuracy (Group A or B Tests)**	**Code Required Accuracy (Comprehensive Test)**	**Group A or B Pump Testing (1)**	**Comprehensive Pump Testing (2)**
ECW pumps	0 - 160 27 psig (3*27 = 81)	±0.5% ±0.8 psig	±2.0% ±1.62 psig	±0.5% ±0.405 psig	Acceptable	Not Acceptable
CCWS Make-up pumps	0 - 30 9 psig (3*9 = 27)	±0.5% ±0.15 psig	±2.0% ±0.54 psig	±0.5% ±0.135 psig	Acceptable	Not Acceptable
DGFO Transfer Pumps	0 - 60 9.7 psig (3*9.7 = 29.1)	±0.5% ±0.3 psig	±2.0% ±0.582 psig	±0.5% ±0.145 psig	Acceptable	Not Acceptable
CSS Pumps	0 - 75 19.7 psig (3*19. 7 = 59.1)	±0.25% ±0.19 psig	±2.0% ±1.182 psig	±0.5% ±0.295 psig	Acceptable	Acceptable

Pumps	Inst. Range Pref. (3*Pref.)	Instrument "As Installed" Accuracy	Code Required Accuracy (Group A or B Tests)	Code Required Accuracy (Comprehensive Test)	Group A or B Pump Testing (1)	Comprehensive Pump Testing (2)
LPSI Pumps (Suction)	0 - 60 13 psig (3*13 = 39)	±0.25% ±0.15 psig	±2.0% ±0.78 psig	±0.5% ±0.195 psig	Acceptable	Acceptable
LPSI Pumps (Discharge)	0 - 500 149 psig (3*149 = 447)	±0.25% ±1.25 psig	±2.0% ±8.94 psig	±0.5% ±2.235 psig	Acceptable	Acceptable

(1) The instrument is found to be **Acceptable** for Group A or B pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

(2) The instrument is found to be **Acceptable** for Comprehensive pump testing when the "as installed" accuracy is less than (more accurate) than the Code required accuracy.

The NRC staff has reviewed SCE's proposed alternative, and has confirmed that all of the installed pressure instruments have full-scale ranges that are greater than three times the allowable test reference values (Column 2 of Table 3.3-3). The applicable installed pressure instruments do not, therefore, meet the requirements of Paragraph ISTB-3510(b)(1). However, in accordance with Section 5.5.1 of NUREG-1482, the NRC staff notes that when the range of a permanently installed analog instrument is greater than three times the reference value, relief can be granted when the combination of the range and accuracy yields a reading that is at least equivalent to the reading achieved from instruments that meet the ASME Code requirements (i.e., up to ±6%).

Upon review of the calculations in Table 3.3-3, the NRC staff notes that the value of every "as installed" instrument is more accurate than what is required by the ASME Code for Group A and B pump testing (Columns 3 and 4). The NRC staff also notes that the values of the "as installed" pressure instrumentation for the CSS and LPSI pumps are more accurate than what is required by the ASME Code for Comprehensive testing, while the values of the "as installed" pressure instrumentation for the ECW, CCW Seismic Make-up, and DGFO Transfer pumps are less accurate than what is required by the ASME Code for Comprehensive testing (Columns 3 and 5). The "as installed" instrumentation for the ECW, CCW Seismic Make-up, and DGFO Transfer pumps do not meet the guidance in Section 5.5.1 of NUREG-1482 and are, therefore, not adequate for Comprehensive pump testing.

The licensee has, however, proposed to use temporary pressure gauges that meet the range and accuracy requirements of the ASME Code, for the Comprehensive testing of the ECW, CCW Seismic Make-up, and DGFO Transfer pumps. The NRC staff finds the combination of the installed pressure instrumentation and the temporary pressure gauges as described in SCE's proposed alternative meets the intent of Section 5.5.1 of NUREG-1482. Therefore, SCE's proposed alternative will provide an acceptable level of quality and safety and will provide sufficiently accurate data for assessing pump degradation.

Based on the determination that the licensee's proposed alternative will provide an acceptable level of quality and safety, the NRC staff authorizes the licensee's alternative pursuant to 10 CFR 50.55a(a)(3)(i). The licensee's may use the installed pressure instrumentation for the Group A and B testing of the pumps in Table 3.3-1, and for the Group A, B, and Comprehensive testing of those pumps in Table 3.3-2. However, temporary pressure gauges shall be used for the Comprehensive testing of those pumps in Table 3.3-1.

3.4 Relief Request IST-3-P-3

3.4.1 Component and Code Requirement

The components affected by this relief request are Auxiliary Feedwater (AFW) Pumps S21305MP140, S21305MP141, S21305MP504, S31305MP140, S31305MP141, and S31305MP504. The AFW pumps are Group A, centrifugal pumps (SONGS UFSAR) that are subject to quarterly inservice testing in accordance Subsection ISTB-5121 of the ASME OM Code.

3.4.2 Licensee's Proposed Alternative

The licensee proposed:

> Group A quarterly testing of the AFW pumps will be performed on mini-flow recirculation measuring the differential pressure across the pump in lieu of measuring flow.
>
> Note: Pump flow rate will be measured during performance of biennial Comprehensive pump test when an instrumented flow path is available.

3.4.3 Licensee's Basis for Requesting Relief

The licensee stated:

> The AFW pumps, each have a non-instrumented minimum-flow path that can be utilized for the respective Group A tests. The minimum flow lines used for these pumps provide a fixed resistance flow path from the pump discharge to the Condensate Storage Tank (T-121) and then back to the suction of each pump. During the performance of the quarterly Group A pump testing, pump differential pressure and vibration parameters are measured and trended. This provides a reference value for differential pressure that can be duplicated during subsequent tests in accordance with OM-ISTB-3300 (d).
>
> The performance of Group A pump tests using a fixed resistance flow path is an acceptable alternative to the Code requirements as per NUREG-1482, NRC Staff Position 9, 'Pump Testing Using Minimum-Flow Return Line With Or Without Flow Measuring Devices.' This methodology provides for the acquisition of repeatable differential pressure and vibration measurement, which is an adequate means of monitoring pump degradation.
>
> Therefore, the cost of installing either temporary or permanent flow instrumentation imposes an undue burden without a compensating increase in the level of quality and safety.

3.4.4 Evaluation

Inservice testing, of the six AFW pumps in question, shall be conducted in accordance with Subsection ISTB-5121 of the 1998 Edition of the ASME OM Code, up to and including the

2000 Addenda. ISTB-5121 states that Group A tests shall be conducted with the pumps operating at a specified reference point. ISTB-5121 also specifies that the test parameters of Table ISTB-3000-1 shall be determined and recorded as required by paragraphs ISTB-5121(a), (b), (c), (d), and (e). However, in accordance with 10 CFR 50.55a(a)(3)(ii), SCE proposed an alternative to the ASME OM Code requirements, Paragraphs ISTB-5121(b) and (c), in order to measure the differential pressure across the AFW pumps in lieu of the flow during the performance of quarterly Group A testing. SCE additionally specified that Comprehensive pump tests would be conducted biennially and that the pump flow rate would be measured when an instrumented flow path is available.

Paragraph ISTB-2000 specifies that Group A pumps are “operated continuously or routinely during normal operation, cold shutdown, or refueling operations.” The NRC staff notes, in accordance with SCE’s request for relief, that all of the AFW pumps in question are Group A pumps because they are routinely run during start-up and shut-down operations. They are not, however, used during normal, full-power operation. Running the AFW pumps at power while using their normal flow paths would challenge the at-power operation of the plant and could result in damage to equipment. Thus, in order to test the six AFW pumps quarterly, they have to be re-aligned from their normal flow paths to recirculate water through the condensate storage tank.

The NRC staff has reviewed SCE’s proposed alternative and has determined that, due to the AFW system design, the mini-flow return lines are the only flow paths that can be utilized for the Group A quarterly testing of AFW pumps. However, the NRC staff notes that the installed mini-flow lines are not designed for pump testing purposes. The installed mini-flow lines only provide a fixed resistance flow path from the pump discharge to the Condensate Storage Tank (T-121) and back to the suction of each pump. The mini-flow lines are also not equipped with instrumentation that can provide measurements of pump flow. Therefore, testing the six AFW pumps through the mini-flow lines would not meet the ISTB-5121(b) or (c) ASME OM Code requirements.

Additional guidance for the use of mini-flow lines is outlined in NUREG-1482, and in Position 9, “Pump Testing Using Minimum-Flow Return Line With Or Without Flow Measuring Devices,” of NRC GL 89-04. Position 9 provides guidelines for conducting quarterly pump tests using mini-flow lines. SCE’s proposed alternative will conduct quarterly Group A pump tests on mini-flow recirculation and will measure the differential pressure across the six AFW pumps in lieu of measuring the flow, which meets the guidance contained in Position 9. SCE’s proposed alternative also specified that biennial Comprehensive pump tests will be conducted which would measure pump flow rates when an instrumented flow path is available. The NRC staff finds that, by following the guidance provided in Position 9 and by performing biennial Comprehensive pump tests, SCE’s proposed alternative is an acceptable alternative to the requirements of ISTB-5121(b) and (c) and will provide reasonable assurance that the AFW pumps will be operationally ready.

SCE also stated that the cost would exceed $90,000 annually to install temporary flow measurement devices or up to $400,000 to install permanent flow devices into the mini-flow lines in order to meet the ASME Code requirements and support the Group A quarterly testing of the six AFW pumps. The NRC staff considers this cost to be an undue burden when compared to the questionable benefits gained by the results of the tests using mini-flow lines. Therefore, the NRC staff has determined that installing flow measurement devices in order to comply with the ISTB-5121(b) and (c) Code requirements would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on a determination that requiring the installation of flow measurement devices would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety, and because the licensee's proposed alternative provides reasonable assurance that AFW pumps will be operationally ready, the NRC staff authorizes the licensee's proposed alternative pursuant to 10 CFR 50.55a(a)(3)(ii). This authorization will allow the licensee to measure the differential pressure (in lieu of flow rate) in order to assess the AFW pumps' hydraulic performance during Group A tests. All other Group A and Comprehensive pump test requirements of the of the ASME Code continue to apply (e.g., test requirements, test acceptance criteria, corrective actions).

3.5 Relief Request IST-3-V-1

3.5.1 Component and Code Requirement

The components affected by this relief request are the internal spring-loaded poppet valves in the upstream (high-pressure) segment of the Shutdown Cooling System (SDC) gate valves listed in Table 3.5-1 below:

Table 3.5-1 WKM Gate Valves

Valve ID	Size (in)	Description	Poppet Valve Removed
2HV9337	16	SDC suction containment isolation valve	No
3HV9337	16	SDC suction containment isolation valve	No
2HV9339	16	SDC suction containment isolation valve	No
3HV9339	16	SDC suction containment isolation valve	No
2HV9377	8	SDC suction containment isolation valve	No
3HV9377	8	SDC suction containment isolation valve	Yes
2HV9378	8	SDC suction containment isolation valve	No
3HV9378	8	SDC suction containment isolation valve	Yes

3.5.2 Licensee's Proposed Alternative

The licensee proposed:

> Diagnostic testing of the motor operated gate valves coupled with the normal operation during the course of the plant shutdown evolutions associated with placing the shutdown cooling (SDC) system in service provide adequate indication of the Marotta poppet valve performance. Satisfactory operation of the motor-operated valve (MOV) and continued diagnostic testing satisfy periodic verification that pressure-locking scenarios are not affecting the valves' material condition. In addition, any maintenance activity requiring disassembly of the valve will include permanent removal of the poppet assembly to mitigate reliance on the poppet to minimize pressure-locking concerns...[Reference 7].

3.5.3 Licensee's Basis for Requesting Relief

The licensee stated:

> The internal spring-loaded poppet valves are component sub-assemblies of the segment of the valve. Periodic diagnostic testing of the motor operated valves coupled with the normal valve operation during the course of plant shutdown evolutions associated with placing the SDC system in service provide adequate indication of poppet valve performance. While diagnostic testing and operation of the motor operated valve does not provide direct trending information for the poppet valve performance, it does provide objective evidence that pressure locking is not occurring. Successive periodic MOV diagnostic tests clearly indicate no evidence of damage to the gate, segment, or seating surfaces as a result of pressure locking, even though the valve bonnets are exposed to RCS pressure.
>
> The poppet valve is a mechanically simple and extremely reliable component. Review of the poppet valve performance history reveals no failures or degradation noted in the sixteen safety related and non-safety related valves that have been inspected. The most probable failure mode for the poppet valve is open, which satisfies the function of the valve. The poppet valve, which is installed in the upstream segment, has no close function, as the down stream gate is the rated seating member of the valve.
>
> There are two viable methods of quantitative testing for the Marotta poppet valves.
>
> 1. The first method entails a major valve disassembly and removal of the poppet from the valve segment. Once removed, the poppet can then be tested and inspected. Disassembly of the valves in Table [3.5-]1 can only be accomplished with the reactor defueled and the reactor coolant system (RCS) loops drained. Based on the recent overhaul of 3HV9377 in January 2003 per MO's 0101102001, 01030323000, 02091841000, and 02040318000, which included the complete disassembly of the valve, the replacement of the poppet valve with a fixed orifice plug, reassembly

of the valve, followed by MOV diagnostic testing took over 750 man-hours to complete.

Given that there are four (4) valves per unit, SCE would have to defuel the reactor each refueling outage, drain the RCS loops and expend over 3,000 man-hours per refueling outage to disassemble the MOV's in order to test the poppet valves. The outage impact of the man-hours associated with testing the poppet valves at a refueling interval frequency represent a significant hardship without a compensating increase in level of quality or safety.

2. The second method involves removal of one body plug followed by the application of a pressure source to the valve body cavity. The attendant pressure profile generally characterizes poppet valve performance, although the results may be confused by seat leakage.

Both Poppet test scenarios disable the shutdown cooling system and require breaching the reactor coolant system pressure boundary. Both scenarios require a de-fueled condition with the reactor coolant loops drained. The outage impact and the man-hours cost associated with testing the poppet valves at a refueling interval frequency represent a significant hardship without a compensating increase in level of quality or safety.

3.5.4 Evaluation

The exercising of Category C Check Valves shall be conducted in accordance with Subsections ISTC-3510 and ISTC-3522 of the 1998 Edition of the ASME OM Code, up to and including the 2000 Addenda. ISTC-3510 requires that active Category C check valves be exercised nominally every 3 months. ISTC-3522 requires Category C check valves to be exercised per the specifications of paragraphs (a), (b), (c), (d), (e), and (f). However, in accordance with 50.55a(a)(3)(ii), SCE proposed an alternative to the ISTC-3510 and ISTC-3522 requirements that would allow continued diagnostic testing and normal operation of the associated motor-operated valves (MOVs) to provide adequate indication of Moratta poppet valve performance. SCE also proposed to remove the poppet assembly if any maintenance activity requires the disassembly of the valve in order to mitigate reliance of the poppet to minimize pressure-locking concerns.

Additional guidance for the testing and exercising of MOVs is provided in ASME Code Case OMN-1, NRC GL's 89-10 and 96-05, and Section ISTC-3600. Code Case OMN-1, "Alternative Rules for Preservice and Inservice Testing of Certain Electric Motor-Operated Valve Assemblies in Light-Water Reactor Power Plants" establishes the requirements for preservice and inservice testing to assess the operational readiness of certain MOVs in light-water reactor power plants. NRC GL 89-10 and 96-05 required all licensees to submit a written response verifying on a periodic basis that safety-related MOVs continue to be capable of performing their safety function within the current licensing bases of the facility. Also, Section ISTC-3600, "Leak Testing Requirements" provides the requirements for leak testing containment isolation valves.

According to SCE's RI-IST Program, authorized on March 27, 2000, testing of low safety-significant MOVs will be performed in accordance with Code Case OMN-1. SCE's RI-IST Program further states that MOVs with a passive function (such as those listed in Table 3.5-1) will be tested in accordance with the Code of record, except where the evaluation of design, service condition, performance history, and compensatory actions at a test frequency do not exceed six years or are exercised at least once a refueling cycle per paragraph 3.6.1 of OMN-1. Also, in accordance with commitments of NRC GL's 89-10 and 96-05, the testing of low safety-significant MOVs will be performed at an initial interval, not to exceed six years, until sufficient data exists to determine a more appropriate test frequency. SCE's RI-IST Program additionally requires that the containment isolation valves listed in Table 3.5-1 are to be leakage rate tested every six years.

The NRC staff has reviewed SCE's proposed alternative and has determined that the design of the WKM gate valves is significantly different from the design of other gate valves. One of the unique design characteristics of the WKM double disk gate valve is that each valve is equipped with an internal spring-loaded Marotta poppet subassembly. The internal spring-loaded Marotta poppet subassembly is credited in mitigating pressure locking by limiting the differential pressure between the bonnet and upstream side of the valve. The poppet valves do not, however, protect a Code class boundary and are neither capacity rated nor set point adjustable. Therefore, the poppet valves are considered Category C check valves in accordance with ISTC-1300(c).

Further, in analyzing the design of the poppet valves, their internals have only one moving part, a short length compression spring that minimizes the potential for buckling under a compressive load. The materials of the valve internals are corrosion resistant and the material combination, stainless steel on stellite, would preclude potential binding under operating conditions. SCE also stated that component aging factors do not have an effect on the poppet valves as these valves are mechanically simple and extremely reliable. Poppet valve performance history shows there were no failures or degradations noted in the 16 safety-related and non-safety related valves that have been inspected. SCE did, however, propose to inspect or remove the poppet valve if valve disassembly is required for other maintenance or performance issues.

There are two methods of direct, quantitative testing for poppet valves. The first method entails a major valve disassembly and removal of the poppet so that it could be tested and inspected. The second method involves removal of one of the two body vent plugs followed by the application of a pressure source to the valve body cavity. Both test scenarios require a defueled condition with the reactor coolant loops drained and would require extensive man-hours (up to 3,000 hours) in order to test the poppet valves. Thus, based on these considerations, the NRC staff finds that the direct testing of the poppet valves would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Additionally, in accordance with SCE's RI-IST Program, the MOVs are to be diagnostically tested and periodically exercised. During the course of plant shutdown and placing the SDC system in operation, the pressure on the upstream side of the MOV drops considerably while pressure between the disks of the MOV may remain relatively high. Any high pressure fluid trapped between the valve disks would have to be relieved by the poppet valve to prevent pressure locking of the MOVs. Accordingly, because these MOVs have not shown any signs of being thermally bound while the system is being placed in service, there is adequate indication that the poppet valves have been functioning properly.

The NRC staff finds, therefore, that SCE's proposed alternative provides reasonable assurance that the eight Marotta poppet valves will be operationally ready. Further, based on that determination and that the direct testing of poppet valves would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety, the NRC staff authorizes the licensee's alternative pursuant to 10 CFR 50.55a(a)(3)(ii). SCE shall conduct periodic diagnostic testing of the MOVs in order to verify that pressure-locking scenarios are not affecting the valves' material condition. SCE shall also remove the poppet assembly if any maintenance activity requires the disassembly of the valve.

4.0 CONCLUSION

The NRC staff concludes that for Relief Request IST-3-R-1, the licensee's proposal to use the 1998 Edition of the ASME OM Code (up to and including the 2000 Addenda) is approved pursuant to 10 CFR 50.55a(f)(4)(iv). For Relief Requests IST-3-P-1 and IST-3-P-2, the staff concludes that the licensee's alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the they provide an acceptable level of quality and safety. The staff also concludes that requests for relief IST-3-P-3 and IST-3-V-1 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternatives provide reasonable assurance of the operational readiness of the components.

5.0 REFERENCES

1. Title 10 of the *Code of Federal Regulations*, Part 50, Chapter I, "Energy" Section 50.55a, Codes and standards, Domestic Licensing of Production and Utilization Facilities.

2. Letter from A. Edward Scherer (Southern California Edison) to U. S. Nuclear Regulatory Commission's Document Control Desk, "Request to Implement a Risk-Informed Testing Program During the Remainder of the Second Ten-Year Interval, San Onofre Nuclear Generating Station, Units 2 and 3," dated December 30, 1998, ADAMS Accession No. ML9901050033.

3. Letter from A. Edward Scherer (Southern California Edison) to U. S. Nuclear Regulatory Commission's Document Control Desk, "Request to Implement a Risk-informed Testing Program During the Remainder of the Second Ten-Year Interval, San Onofre Nuclear Generating Station, Units 2 and 3," dated November 30, 1999, ADAMS Accession No. ML993370342.

4. Letter from Stephen Dembek (U. S. Nuclear Regulatory Commission) to H.B. Ray (Southern California Edison), "San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 - Risk-Informed Inservice Testing Program for Pumps and Valves (TAC NOS. MA4509 and MA4510)," dated March 27, 2000, ADAMS Accession No. ML003695622.

5. U.S. Nuclear Regulatory Commission, "Guidance on Developing Acceptable Inservice Testing Program, " Generic Letter 89-04, through Supplement 1, April 4, 1995.

6. U.S. Nuclear Regulatory Commission, "Guidance for Inservice Testing at Nuclear Power Plants," NUREG-1482, April 1995.

7. Letter from A. Edward Scherer (Southern California Edison) to U. S. Nuclear Regulatory Commission, "Request for Proposed Alternative Testing for Check Valves which are Internally Mounted in Motor Operated Valves, in Accordance with 10 CFR 50.55a(a)(3) San Onofre Nuclear Generating Station, Units 2 and 3 (TAC Nos. M93515 and M93516)," dated January 28, 2000, ADAMS Accession No. ML003679388.

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