March 16, 2000

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 - RELATED TO THE INSERVICE TESTING (IST) PROGRAM - RELIEF REQUEST FOR ALTERNATIVE TESTING FOR CERTAIN CHECK VALVES (TAC NOS. MA8146 AND MA8147)

Dear Mr. Ray:

On January 28, 2000, you submitted a relief request to the Nuclear Regulatory Commission (NRC) relating to certain internal spring-loaded Marotta poppet valve subassemblies inside certain gate valves (Valve Relief Request Number 1). These gate valves are manufactured by WKM and their internal spring-loaded poppet valves are credited to mitigate pressure locking. You submitted the request as an alternative to certain IST requirements specified in Section XI of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) pursuant to 10 CFR 50.55a(a)(3).

The NRC staff has completed its review of your submittal and concludes that your proposed alternative to the ASME BPV Code Section XI requirements is authorized pursuant to 10 CFR 50.55a(a)(3)(i) because it provides an acceptable level of quality and safety.

Please note that the enclosed safety evaluation addresses only the proposed alternative for testing the internal poppet valves. The testing of WKM motor-operated valves is currently under staff review of your Risk Informed Inservice Testing Program submittal, and, therefore, is not addressed here.

If you have any questions regarding this matter, please write or call the project manager, L. Raghavan, at 301-415-1471.

Sincerely,

/RA/

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

Docket Nos. 50-361/50-362

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the 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 Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting 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 its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. Guidance related to the development and implementation of IST programs is given in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," issued April 3, 1989, and its Supplement 1, issued April 4, 1995. Also see NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," and NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements."

The 1989 Edition of the ASME Code is the latest edition incorporated by reference in paragraph (b) of Section 50.55a. Subsection IWV of the 1989 Edition, which gives the requirements for IST of valves, references Part 10 of the American National Standards Institute (ANSI)/ASME *Operations and Maintenance Standards* (OM-10) as the rules for IST of valves. OM-10 replaces specific requirements in previous editions of Section XI, Subsection IWV, of the ASME Code. Subsection IWP of the 1989 Edition, which gives the requirements for IST of pumps, references Part 6 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-6) as the rules for IST of pumps. OM-6 replaces specific requirements in previous editions of Section XI, Subsection IWP, of the ASME Code.

Pursuant to 10 CFR 50.55a(a)(3)(i) and (ii), by letter dated January 28, 2000, Southern California Edison Company (SCE, the licensee) requested relief to use alternative testing methodology for certain internal spring-loaded Marotta poppet valve subassemblies inside certain gate valves. These gate valves are manufactured by WKM and their internal spring-loaded poppet valves are credited to mitigate pressure locking.

The licensee states that there are two viable methods for discrete quantitative performance monitoring of the Marotta poppet valves. The first method involves a major valve disassembly and removal of the poppet from the valve disk assembly. The second method involves removal of one of two body vent plugs followed by the application of a pressure source to the valve body cavity. Both testing scenarios would require removal of the shutdown cooling system from service and breaching the reactor coolant system (RCS) pressure boundary. Therefore, both alternatives would involve a full-core offload to facilitate specific testing of the poppet valves. The licensee stated that the above two quantitative methods of testing would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety and proposed an indirect method of testing for these poppet valves. The licensee stated that the proposed indirect test method would provide an acceptable level of quality and safety.

2.0 SCOPE

Test Requirement: (As stated by the licensee)

Motor Operated Valves: ASME/ANSI OM-1987 through OMa-1988 Addenda, Part 10, paragraph 4.2, Inservice Tests for Category A and B Valves:

- Determine Seat leakage at least once every two years per paragraph 4.2.2.
- Exercise tested at cold shutdown intervals per paragraph 4.2.1.2(c).

Internal Poppet valves: ASME/ANSI OM-1987 through OMa-1988 Addenda, Part 10, paragraph 4.3, Inservice Tests for Category C Valves:

- Exercise tested at refueling intervals per paragraph 4.3.2.2(e).

Basis for Relief (as stated by the licensee)

The internal spring-loaded poppet valves are component sub-assemblies of the gate and segment of the valve. Periodic diagnostic testing of the motor operated valves [MOVs] 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.

There are two viable methods of quantitative testing for the Marotta poppet valves. The first method entails a major valve disassembly and removal of the

poppet from the valve disk assembly. Once removed the poppet could be tested and inspected. The second method involves removal of one of two body vent plugs 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.

Of the four valves, the most recent valve disassembly was 3HV9339 (Maintenance Order 95071161, 8/9/95 – 8/23/95). The disassembly was a result of abnormal MOV diagnostic traces and incurred 15 days of de-fueled time, more than 750 man-hours labor, and a dose of approximately 1 man-REM. These values include only work on the valve and do not include interference removal and other supporting activities to perform the repairs. The core offload/reload process nominally requires 71 hours for offload, and 82 hours for reload based on the baseline outage-planning schedule. The combination of these items imposes a significant hardship.

The poppet valve is a mechanically simple and extremely reliable component as discussed below. Review of the poppet valve performance history shows there were no failures or degradation noted in the sixteen safety related and non-safety related valves that have been inspected. Five of the eight (four per unit) valves addressed in this request are included in the inspection population. 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 gate segment, has no required function to close, as the down stream gate is the rated seating member of the valve.

Alternate Testing (As stated by the licensee)

Motor Operated Valves: Test per San Onofre Nuclear Generating Station Risk Informed Inservice Testing Program and OMN-1, when approved, as follows:

- Determine Seat leakage at the interval determined by the Integrated Decisionmaking Process.
- Exercise at least once during each fuel cycle.
- Perform diagnostic testing at an interval not to exceed 6 years until such a time that accumulated data indicates further extension is warranted.

or

ASME/ANSI OM-1987 through OMa-1988 Addenda, Part 10, paragraph 4.2, Inservice Tests for Category A and B Valves:

	• Determine Seat leakage at least once every two years per paragraph 4.2.2.
	• Exercise test at cold shutdown intervals per paragraph 4.2.1.2(c).
Internal Poppet valves:	Satisfactory operation of the MOV and continued diagnostic traces 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.

3.0 EVALUATION

This safety evaluation addresses the proposed alternatives for testing of the internal poppet valves. The testing of WKM motor-operated valves is currently under staff review of the licensee's Risk Informed Inservice Testing Program submittal, and, therefore, is not addressed here.

The simplicity of design, inherent reliability, and diagnostic testing of the MOV actuator and valve assembly provide reasonable assurance that pressure locking of the poppet valve will not occur. In addition, SCE will remove the poppet if valve disassembly is required for other maintenance or performance issues.

The function of the internal poppet valves is to provide the relief path, thus reducing the potential for high bonnet pressure. These poppet valves are equipped with a spring-loaded poppet installed in the segment, which together with the gate make up the valve disc. The relieving function is achieved by providing a path between the bonnet and the upstream side of the valve. Limiting the pressure differential between the bonnet and the upstream side minimizes the potential for pressure locking. The poppet valves do not protect the code class boundary. They are neither capacity rated nor set point adjustable. Therefore, they are considered check valves.

The design of the valve internals with only one moving part and short length of the compression spring minimize the potential for buckling under a compressive load. Further, the materials of the valve internals are corrosion resistant and the material combination, stainless steel on stellite, would preclude potential binding under operating conditions. Thus, the design of the poppet valve ensures a high level of reliability.

Since January 1998 the licensee has added these valves to its Maintenance Procedure SO123-I-6.75 and tested them whenever the valves had been disassembled for other reasons. The licensee has thus far inspected, tested, or replaced 16 out of 37 safety-related and non-safety-related poppet valves. None of the tested valves resulted in any lift off testing failures, nor did the inspection reveal valves in any condition that would have prevented the valve from performing its pressure-relieving function.

Under the existing inservice inspection program, the MOVs are periodically inspected, and exercise tested at cold shutdown intervals. These required periodic inspections and diagnostic testing of MOVs, in addition to normal valve operation during the course of plant shutdown evolutions, would provide adequate indication of poppet valve performance.

Based on the above considerations, the staff finds that the capability to provide a relief path and limit valve bonnet pressure will not be impacted by any potential damage to the poppet valve during operation. Therefore, the staff concludes that the alternative proposed by the licensee for testing of the poppet valves would result in an acceptable level of quality and safety.

4.0 CONCLUSION

On the basis of its review, the staff has determined that the alternative proposed by the licensee for testing of the poppet valves would provide an acceptable level of quality and safety. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

Principal Contributor: L. Raghavan, NRR/DLPM

Date: March 16, 2000