UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUEST

SOUTHERN CALIFORNIA EDISON COMPANY

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NOS. 2 AND 3

DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a(g), requires that inservice testing (IST) of certain 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 and applicable addenda, except where specific written relief has been requested by the licensee and granted by the Commission pursuant to Subsections (a)(3)(i), (a)(3)(ii), or (g)(6)(i) of 10 CFR 50.55a. In 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 compensatory increase in the level of quality and safety; or (3) conformance with certain requirements of the applicable Code edition and addenda is impractical for its facility.

These regulations authorize the Commission to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested as part of the licensee's IST Program are contained in this Safety Evaluation (SE).

In a letter dated July 31, 1991, Southern California Edison Company (SCE) responded to anomalies identified in the Safety Evaluation for San Onofre Units 2 and 3 Inservice Testing Program for Pumps and Valves dated September 24, 1990. In the September 24, 1990, NRC staff Safety Evaluation, two relief requests, VRR-03 and VRR-13, were granted to provide interim relief. Relief request VRR-03 was in reference to the Containment Sump Outlet Check Valves 24-003-C-724 and 24-004-C-724. Relief request VRR-13 was in reference to the Inside Containment Spray Header Check Valves 8-004-C-406 and 8-006-C-406. A supplemental safety evaluation was issued October 2, 1991, in response to SCE's submittals dated April 12, June 18, July 2, and July 31, 1991. Additional information for Relief Requests VRR-03 and VRR-13 was requested by NRC. SCE provided details for these two relief requests in a submittal dated October 28, 1991. The relief requests have been reviewed and evaluated based on the additional information. Results of the review are provided below and are applicable to both Unit 2 and Unit 3.

2.0 RELIEF REQUEST VRR-3

The licensee has requested relief from the inservice test requirements of IWV-3411 for containment emergency sump outlet check valves 24-003-C-724 and 24-004-C-724. These valves are required to open to provide recirculation flow from the containment sump to the suction piping of the high pressure safety injection (HPSI), low pressure safety injection (LPSI), and containment spray pumps.

2.1 Alternative Testing

The valves will be partially disassembled, inspected and manually full-stroked at each refueling outage on a rotating basis (one valve per refueling). During partial disassembly the valve internals will be visually inspected for worn or corroded parts, and the valve disk will be manually exercised. If it is found that the full-stroke capability of the disassembled valve is in question, the other valve will be similarly disassembled and inspected and manually full stroked during the same outage. A method of partial-stroke testing will be used following the partial disassembly and prior to returning the valve(s) to service.

In the September 24, 1990, Safety Evaluation, the staff indicated that its positions regrading check valve disassembly and inspection are explained in detail in Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." The minutes of the public meetings on Generic Letter 89-04 regarding Position 2, "Alternatives to Full Flow Testing of Check Valves," further stipulate that a partial-stroke exercise test using flow is expected to be performed after disassembly and inspection is completed but before the valve is returned to service. This post-inspection testing was to provide a degree of confidence that the disassembled valve had been reassembled properly and that the disk moved freely. The September 24, 1990, Safety Evaluation directed SCE to investigate methods of part-stroke exercising these check valves.

SCE in its letter dated October 28, 1991, stated the partial-stroke flow test for the safety injection system check valves will use the high pressure safety injection (HPSI) pumps taking suction from the containment sumps to provide flow through the check valves. Because the achievable test flow is only a fraction of the design flow rate from the sumps, it is expected the 24-inch sump outlet check valves will not fully open during the tests. However, the test method is the only reasonable means available to perform a flow test without significant plant modifications to provide full flow capability. Additionally, SCE will actively pursue the use of nonintrusive diagnostic techniques to demonstrate acceptable check valve performance during flow testing. Implementation of partial-stroke testing will be prior to the completion of cycle 6 for Units 2 and 3.

The Nuclear Industry Check (NIC) Valve Group report of the final phase of their test program is expected to be available in mid-1992. SCE's current schedule for implementing the nonintrusive testing for the valves discussed in this VRR depends on the outcome of the NIC Group's testing programs and the evaluation of the individual check valves and related nonintrusive examination techniques.

2.2 Licensee's Basis for Relief

Test Methodology:

Normal Plant Operation: The only source of water to the inlet of the containment sump outlet check valves is the containment building sump. During normal plant operation this sump is required to be kept dry and the isolation valves shut. This system lineup precludes either full-stroke or partial-stroke testing of these check valves using flow in this mode.

Cold Shutdown and Refueling Modes: In cold shutdown or reactor refueling modes, part-stroke exercising of these valves is possible by filling the containment sump using temporary hoses. The sump would contain a sufficient quantity of water to perform a partial-stroke flow test for approximately 2 minutes. This partial-stroke flow method in conjunction with valve disassembly is one of the alternate test methods available.

Conclusion: Code required testing could only be performed after significant system modifications involving considerable costs.

These system modifications would involve additional containment penetrations and long runs of large diameter piping with associated supports and isolation valves. NRC Generic Letter 89-04, Attachment 1, Position 2, identifies partial disassembly and inspection as an acceptable alternative for stroking a valve when it is impractical to use flow. In this case, there is no practical way to full-stroke these check valves using flow with the existing system design.

Test Schedule: Disassembly and inspection of these valves each refueling outage requires the associated system piping to be drained. This generates a significant amount of liquid radioactive waste. In addition, considerable radiation exposure can be received by personnel performing the disassembly, hand-stroking, and inspection. As a consequence, there is a clear advantage in reducing the number of these tests required in each refueling.

2.3 Evaluation

It is impractical to full-stroke exercise the subject check valves with the current design configuration and test methods. With no normal source of water in the sump, any flow test performed would require flooding the containment sump and basement to provide sufficient inventory to stroke these valves. Piping modifications to develop a test loop are also impractical since the modifications involve the addition of larger diameter pipe and addition of

containment penetrations. Therefore, the proposed alternative testing method using disassembly and inspection, with a partial-stroke flow test following reassembly, provides an acceptable level of assurance of the operational readiness of the sump outlet check valves. Implementation of the disassembly and inspection program is subject to inspection to ensure the program meets the guidance in Generic Letter 89-04.

2.4 Conclusion

Relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and Generic Letter 89-04, Position 2, to extend the test interval for these valves and to utilize a disassembly and inspection program in conjunction with a partial-stroke flow test. The relief is based on (1) the impracticality of performing the testing at the required frequency, (2) the impracticality of performing the testing with full design basis accident flow, (3) the burden on the licensee if requirements were imposed, and (4) the alternative method of exercising the valves provides an acceptable level of assurance of the operational readiness of the valves.

3.0 RELIEF REQUEST VRR-13

The licensee has requested relief from the inservice test requirements of IWV-3521 for containment spray system isolation stop check valves 8-004-C-406 and 8-006-C-406. The valves open to allow a flow of water from the containment spray pump discharge into the containment spray ring headers in the event of a design basis accident.

3.1 Alternative Testing

At each refueling outage, (1) test the valves by partial disassembly, inspection and manual stroking on a rotating basis (one valve per refueling) and (2) perform a partial-stroke test (open) of each valve. During partial disassembly the valve internals will be visually inspected for worn or corroded parts, and the valve disk will be manually exercised. If it is found that the full-stroke capability of the disassembled valve is in question, the other valve will be similarly disassembled and inspected and manually full-stroked during the same outage.

Following reassembly and prior to return to service, the valve will be tested using air. Air will be passed through these valves from separate test connections upstream of each valve (one valve will be tested at a time). The air will discharge either into the containment directly through a disconnected spool piece, or through the spray ring header nozzles in the containment building. Water may be used in the future with discharge through the removed spool piece connections inside containment. Acceptance will be based on detection of flow through the check valve to assure that the check valve internals move. This test can be performed in conjunction with the spray nozzle air flow test. The spray nozzle air flow test is normally performed every five years. The check valve testing will essentially require the air flow test to be performed every outage. Additionally, SCE will actively

pursue the use of nonintrusive diagnostic techniques to demonstrate acceptable valve performance during partial flow testing.

Implementation of partial-stroke testing will be prior to the completion of cycle 6 for Units 2 and 3.

The Nuclear Industry Check (NIC) Valve Group report of the final phase of their test program is expected to be available in mid-1992. The current schedule for implementing the nonintrusive testing for the valves discussed in this VRR depends on the outcome of the NIC Group's testing programs and the evaluation of the individual check valves and related nonintrusive examination techniques.

3.2 Licensee's Basis for Relief

Full Flow Testing: These valves are in the line leading from the containment spray pump discharge to the riser inside the containment building that leads up to the ring headers and spray nozzles. As a consequence, full-stroke exercising these valves through this flow path using the containment spray pumps would result in a containment spray event with potential equipment damage. The test would also create liquid radwaste.

Conclusion: A usable flow path does not exist in any plant mode to allow a full-stroke test of the containment spray isolation stop check valves. Code required full-stroke testing using flow could only be performed after considerable modification of the system design, such as installation of an instrumented test loop. The high cost of the necessary modifications would not be justified by the improvement of the valve testing capability. Further, the addition of valves, piping, supports and penetrations could result in reduced plant reliability. NRC Generic Letter 89-04, Attachment 1, Position 2, identified partial disassembly and inspection as an acceptable alternative for stroking a valve when it is impractical to use flow. In this case, there is no way to stroke these valves with the existing system design using flow.

Test Schedule: Disassembly and inspection of both of these valves each refueling outage requires draining of the associated system piping. This generates liquid radioactive waste. In addition, considerable radiation exposure can be received by personnel performing the partial disassembly, hand-stroking, and inspection. As a consequence, there is a clear advantage in reducing the number of partial disassembly and hand-stroking tests required in each refueling.

3.3 Evaluation

It is impractical to perform a full-stroke test of these check valves in that no flow path is available other than directly to the spray ring headers. Testing using this flow path results in a spray-down of the entire containment which is not desirable due to the waste water created and potential damage to equipment inside containment. Modifications that would be necessary to

perform full flow testing would be burdensome and costly to the licensee. By disassembling and inspecting one of the two valves, and inspecting the other valve if problems are identified, any degrading condition should be identified. A subsequent partial-stroke flow test of the reassembled valve would provide additional confidence that the valve is operable.

The NRC has identified an acceptable alternative to full-stroke flow testing for check valves when it is impractical to establish or measure design basis accident flow rates. Therefore, the proposed alternative testing method using disassembly and inspection, with a partial flow stroke test following reassembly, provides an acceptable level of assurance of the operational readiness of the containment spray isolation stop check valves. Implementation of the disassembly and inspection program is subject to inspection to ensure the program meets the guidance in Generic Letter 89-04.

3.4 Conclusion

Relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) and Generic Letter 89-04, Position 2, to extend the test interval for these valves and to utilize a disassembly and inspection program in conjunction with a partial-stroke flow test. The relief is based on (1) the impracticality of performing the testing at the required frequency, (2) the impracticality of performing the testing with full design basis accident flow, (3) the burden on the licensee if requirements were imposed, and (4) the alternative method of exercising the valves providing an acceptable level of assurance of the operational readiness of the valves.

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