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SUBJECT: Discusses inservice testing program for pumps & valves.

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NOTES: Incl. Rev 15 to Inservice Testing Program

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R. M. ROSENBLUM  
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June 18, 1991

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U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

Subject: Docket Nos. 50-361 and 50-362  
Inservice Testing Program for Pumps and Valves  
TAC Nos. 55120/1  
San Onofre Nuclear Generating Station  
Units 2 and 3

- References:
1. NRC Safety Evaluation Report of the Inservice Testing Program for Pumps and Valves, San Onofre Nuclear Generating Station, Unit Nos. 2 and 3 (TAC Nos. 55120 and 55121) issued September 24, 1990.
  2. July 5, 1983, letter from K. P. Baskin (SCE) to G. W. Knighton (NRC), Docket No. 50-361 (Forwarded Unit 2 Inservice Testing Program, Revision 5)
  3. April 12, 1991, letter from F. R. Nandy (SCE) to Document Control Desk (NRC), Subject: Docket Nos. 50-361 and 50-362, Status of NRC Safety Evaluation Report, Appendix C, Items for the Inservice Testing Program for Pumps and Valves.

In Reference 3, Southern California Edison committed to resolve Items 2, 3, 6, and 10 of Reference 1, Appendix C, and to provide our justification for Cold Shutdown Testing of the Main Steam Isolation Valves (MSIVs). This letter contains (1) revised pump relief request (PRR) No. 3 and new PRR No. 10 which address Items 2 and 3 from Reference 1, and (2) the justification for Cold Shutdown Testing of the MSIVs (HV 8204 and HV 8205). The resolution for Items 6 and 10 will be provided by July 31, 1991.

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Enclosed are Revisions 15 and 10 to the Inservice Testing (IST) Programs for San Onofre Units 2 and 3, respectively. These revisions to the IST Programs provide a revised pump relief request and two new pump relief requests, which are in compliance with the requirements of 10 CFR 50.55a(g). Additionally, we are providing revised document pages for two pump relief requests and a valve relief request previously withdrawn by Reference 3. In addition, new PRR No. 11 was developed to eliminate an unnecessary practice.

Because the pump bearings discussed in PRR Nos. 3 and 10 are inaccessible for direct measurement, the ASME Code Section XI cannot be met in these cases. We will continue to conduct the alternate testing described in revised PRR's 3 and 10 while they are being reviewed by the NRC. The alternate testing described in PRR No. 11 will not be implemented until NRC approval is received.

By Reference 3, we withdrew Pump Relief Request Nos. 1 (relief from ASME Code, Section XI, Subsection IWP-3230 (b)) and 8 (Relief from IWP-4510 and 4520 (b)) for the Charging Pumps and Chemical Volume Control System, and Valve Relief Request No. 19 (Relief from the Frequency Requirements of IWV-3412) for exercising the containment normal purge supply and exhaust valves. Enclosed are the required page revisions for the IST Program.

The following is a summary of the enclosed relief requests:

1. Revised Pump Relief Request No. 3, Diesel Fuel Transfer System and Salt Water Cooling System. The NRC stated in Item 2 of Appendix C to the SER, "Notes 2 and 3 of Table 1 in the Licensee's pump IST program indicate that pump vibration measurements may not be in conformance with the requirements of IWP-4510. If this is the case, a relief request should be submitted for not making vibration measurements near the pump bearings for the diesel fuel transfer and salt water cooling pumps; ...."

Pump Relief Request No. 3 was submitted with Reference 2 and requested relief only from measuring pump bearing temperature. By Reference 1, this relief was granted. However, in light of the recommendation in the SER to submit a relief request addressing vibration measurements, we are enclosing a revised PRR No. 3 to address vibration measurement of the diesel generator fuel oil transfer pumps and the salt water cooling pumps.

2. Pump Relief Request No. 10, Diesel Fuel Transfer System and Salt Water Cooling System. The NRC noted (Item 3 of Appendix C to the SER, Reference 1) our program indicates pump inlet pressure is calculated for the diesel fuel transfer and salt water cooling pumps. Because the code requires this inlet pressure to be measured, we are submitting a relief request.

These are submerged, vertical shaft, centrifugal pumps. The pump inlet pressure is calculated as a result of the head imposed by the pumped fluid in the diesel fuel storage tank for the diesel fuel transfer pumps or the level of sea water in the inlet bay for the salt water cooling pumps. The velocity head at the pump inlet is calculated from the pump estimated flow rate and inlet cross-sectional flow area.

For the salt water cooling pumps, subtraction of pump dynamic inlet head from the static head yields the true pump inlet static head with good accuracy. For the diesel fuel transfer pumps, the inlet head term is very small and is not subtracted from the static head.

Measuring inlet pressure to the pumps is not practical in these cases due the arrangements of the pump inlets. The pump suctions are located in the bottom of the fluid supply (diesel generator fuel oil tank for the diesel generator fuel oil pumps and the intake structure for the salt water cooling pumps). The suction is through an opening with a screen across it at the pump impeller inlet.

3. New Pump Relief Request No. 11, not discussed in the SER, addresses Bearing Temperature Measurement, as specified by Article IWP-4310 of the ASME Code, Section XI, and proposes alternate testing.

This pump relief request applies to all pumps in the IST program and proposes additional vibration monitoring in lieu of measuring pump bearing temperature.

It is unlikely that bearing failure would be detected by a yearly test. The code does not require continuous monitoring of bearing temperature, and this parameter is only indicative of impending pump bearing failure when it is continuously monitored. Annual bearing temperature measurement is required by the code, but if a bearing is failing, temperature increases rapidly until bearing failure. Furthermore, this temperature increase is only seen for those bearings outside of the

pumped fluid flow path (bearings in separate housings) and does not, therefore, afford reliable detection of bearing degradation for bearings submerged in and cooled by the pumped fluid.

Based on more than two years of experience at San Onofre, velocity vibration measurements have proven sensitive to pump degradation. Because the temperature measurements are ineffective and the velocity vibration measurements are sensitive to pump bearing degradation the ASME issued OM-6, "Inservice Testing of Pumps in Light Water Reactor power Plants," adopting velocity vibration measurements in lieu of bearing temperature measurements.

4. By Reference 3 we withdrew Pump Relief Request No. 1 (Relief from IWP-3230(b)) discussed in Item 1 of Appendix C to the SER, Pump Relief Request No. 8 (Relief from IWP-4510 and 4520(b)) discussed in Item 5 of Appendix C to the SER, and Valve Relief Request No. 19, (Relief from the Frequency Requirements IWV-3412) discussed in Item 11 of Appendix C to the SER.

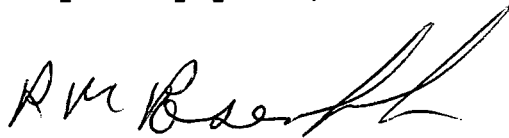
The Units 2 and 3 IST Programs have been revised to comply with the Code and NRC GL-89-04 requirements for these cases, and the revised program document pages for these changes are enclosed.

5. In the SER, Appendix C, Item 15, the NRC stated: "The cold shutdown justification for main steam valves HV-8204 and HV-8205 states that full exercising of these valves is not practical during plant operation. The licensee has provided no justification which demonstrates the impracticality of testing these valves, therefore, these valves should be tested quarterly as required by the Code."

Full stroke exercising of each MSIV while the plant is at power (each valve is individually stroked) will cause a loss of 50 percent of our heat removal from the primary coolant system. This would result in a reactor trip on asymmetric reactor core power and actuation of the steam and pressurizer (primary) relief valves. Accordingly, full stroke testing of these valves while at power is not practical. Therefore, testing will continue to be conducted at cold shutdown.

If you have any additional questions or would like additional information, please let me know.

Very truly yours,

A handwritten signature in cursive script, appearing to read "R. M. Basch". The signature is written in dark ink and is positioned below the typed name "R. M. Basch".

Enclosures

cc: J. B. Martin, Regional Administrator, NRC Region V  
C. Caldwell, NRC Senior Resident Inspector, San Onofre Units  
1, 2 and 3

INSERVICE TESTING PROGRAM

REVISION 15

SAN ONOFRE NUCLEAR GENERATING STATION

UNIT 2

June 1991

PUMP RELIEF REQUEST NO. 1  
(Withdrawn)



INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 2

PUMP RELIEF REQUEST NO. 3

SYSTEM: Diesel Fuel Transfer System and Salt Water Cooling System

COMPONENTS: Diesel Fuel Transfer Pumps 2P093, 2P094, 2P095 and 2P096, and Salt Water Cooling Pumps 2P112, 2P113, 2P114 and 2P307.

CLASS: 3

FUNCTION: The Diesel Fuel Transfer Pumps are used to transfer diesel fuel from the diesel fuel storage tanks to the day tank for the emergency diesels. The Salt Water Cooling pumps provide salt water to the component cooling water, shutdown cooling and other systems.

TEST REQUIREMENT: Measure pump bearing vibration (Paragraph IWP-4510) and temperature (IWP-4310), and observe lubrication level (IWP-3100).

BASIS FOR RELIEF: These are submerged, vertical shaft, centrifugal pumps. The pump bearings are inaccessible. It is, therefore, not possible to measure bearing vibration or temperature. Being submerged, the pump fluid (diesel fuel and salt water) provides lubrication and cooling for the pump bearings.

ALTERNATE TESTING: Vibration of the pump motor thrust bearing will be measured and trended on a quarterly basis to provide indirect indication of pump degradation.

NOTE: (1) See NRC SER, Appendix C, Item 2.

PUMP RELIEF REQUEST NO. 8  
(WITHDRAWN)

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 2

PUMP RELIEF REQUEST NO. 10

SYSTEM: Diesel Fuel Transfer System and Salt Water Cooling System

COMPONENTS: Diesel Fuel Transfer Pumps 2P093, 2P094, 2P095 and 2P096, and Salt Water Cooling Pumps 2P112, 2P113, 2P114 and 2P307.

CLASS: 3

FUNCTION: The Diesel Fuel Transfer Pumps are used to transfer diesel fuel from the diesel fuel storage tanks to the day tank for the emergency diesels. The Salt Water Cooling pumps provide salt water to the component cooling water, shutdown cooling and other systems.

TEST REQUIREMENT: Measure pump inlet pressure (IWP-3100).

BASIS FOR RELIEF: The inlet pressure is determined by the variation normally occurring in tank level/sea level.

These are submerged, vertical shaft, centrifugal pumps. The pump inlet pressure is a result of the head imposed by:

- (1) the pumped fluid in the diesel fuel storage tanks in the cases of the diesel fuel transfer pumps, and
- (2) the level of sea water in the inlet bay in the case of the salt water cooling pumps.

Measuring inlet pressure to the pumps is not practical in these cases due to the nature and location of the pump inlets. The pump suction are located in the bottom of the tank/inlet bay. The suction proper consist of openings with screen across them at the pump impeller inlet.

ALTERNATE TESTING: Calculate inlet pressure using a measurement of the level of fluid over the pump inlet, accounting for the fluid specific gravity use

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 2

PUMP RELIEF REQUEST NO. 10 (Continued)

accepted engineering practices to determine inlet pressure from standard references. Document the calculation for each test in the test records.

NOTE: (1) See the NRC SER, Appendix C, Item 3.

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 2

PUMP RELIEF REQUEST NO. 11

SYSTEM: All Systems.

COMPONENTS: All pumps in the IST Program.

CLASS: 2 and 3

FUNCTION: Depends on the pump.

TEST  
REQUIREMENT: Article IWP-4310 of the ASME Code, Section XI, Bearings, requires that the temperature of all centrifugal pump bearings outside the main flow path and the main shaft bearings of reciprocating pumps shall be measured at points selected to be responsive to changes in temperature of the bearing. Lubricant temperature when measured after passing through the bearing, and prior to entering a cooler, shall be considered the bearing temperature. Article IWP-3300 of the ASME Code, Section XI, Scope of Tests, requires that bearing temperatures shall be measured during at least one inservice test each year.

BASIS FOR  
RELIEF: It is unlikely that bearing failure would be detected by a yearly test. The code does not require continuous monitoring of bearing temperature and this parameter is only indicative of impending pump bearing failure when it is continuously monitored. Annual bearing temperature measurement is required by the code, but if a bearing is failing, temperature increases rapidly until bearing failure. Furthermore, this temperature increase is only seen for those bearings outside of the pumped fluid flow path (bearings in separate housings) and does not, therefore, afford reliable detection of bearing degradation for bearings submerged in and cooled by the pumped fluid.

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 2

PUMP RELIEF REQUEST NO. 11 (Continued)

As a result of this reasoning, OM-6 entitled "Inservice Testing of Pumps in Light Water Reactor Power Plants," does not require bearing temperature to be measured.

ALTERNATE  
TESTING:

In lieu of measuring the bearing temperature for pumps in the Inservice Testing Program, substitute additional vibration monitoring. In addition to the code required unfiltered displacement vibration measurements, measure vibration in units of velocity during each Inservice Test. Record these measurements and use them as a substitute for bearing temperature measurements.

The acceptance criteria for the vibration measurements, shall be those provided in OM-6, with Addenda through May 31, 1989.

VALVE RELIEF REQUEST NO. 19  
(WITHDRAWN)

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

INSERVICE TESTING PROGRAM  
REVISION 10  
SAN ONOFRE NUCLEAR GENERATING STATION  
UNIT 3

June 1991



PUMP RELIEF REQUEST NO. 1  
(WITHDRAWN)

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

PUMP RELIEF REQUEST NO. 3

SYSTEM: Diesel Fuel Transfer System and Salt Water Cooling System

COMPONENTS: Diesel Fuel Transfer Pumps 3P093, 3P094, 3P095 and 3P096, and Salt Water Cooling Pumps 3P112, 3P113, 3P114 and 3P307.

CLASS: 3

FUNCTION: The Diesel Fuel Transfer Pumps are used to transfer diesel fuel from the diesel fuel storage tanks to the day tank for the emergency diesels. The Salt Water Cooling pumps provide salt water to the component cooling water, shutdown cooling and other systems.

TEST REQUIREMENT: Measure pump bearing vibration (Paragraph IWP-4510) and temperature (IWP-4310), and observe lubrication level (IWP-3100).

BASIS FOR RELIEF: These are submerged, vertical shaft, centrifugal pumps. The pump bearings are inaccessible. It is, therefore, not possible to measure bearing vibration or temperature. Being submerged, the pump fluid (diesel fuel and salt water) provides lubrication and cooling for the pump bearings.

ALTERNATE TESTING: Vibration of the pump motor thrust bearing will be measured and trended on a quarterly basis to provide indirect indication of pump degradation.

NOTE: (1) See NRC SER, Appendix C, Item 2.

PUMP RELIEF REQUEST NO. 8  
(WITHDRAWN)

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

PUMP RELIEF REQUEST NO. 10

SYSTEM: Diesel Fuel Transfer System and Salt Water Cooling System

COMPONENTS: Diesel Fuel Transfer Pumps 3P093, 3P094, 3P095 and 3P096, and Salt Water Cooling Pumps 3P112, 3P113, 3P114 and 3P307.

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INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

PUMP RELIEF REQUEST NO. 10 (Continued)

ALTERNATE  
TESTING:

Calculate inlet pressure using a measurement of the level of fluid over the pump inlet, accounting for the fluid specific gravity use accepted engineering practices to determine inlet pressure from standard references. Document the calculation for each test in the test records.

NOTE:

- (1) See the NRC SER, Appendix C, Item 3.

INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

PUMP RELIEF REQUEST NO. 11

SYSTEM: All Systems

COMPONENTS: All pumps in the IST Program.

CLASS: 2 and 3

FUNCTION: Depends on the pump.

TEST  
REQUIREMENT: Article IWP-4310 of the ASME Code, Section XI, Bearings, requires that the temperature of all centrifugal pump bearings outside the main flow path and the main shaft bearings of reciprocating pumps shall be measured at points selected to be responsive to changes in temperature of the bearing. Lubricant temperature when measured after passing through the bearing, and prior to entering a cooler, shall be considered the bearing temperature. Article IWP-3300 of the ASME Code, Section XI, Scope of Tests, requires that bearing temperatures shall be measured during at least one inservice test each year.

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INSERVICE TESTING PROGRAM  
SAN ONOFRE - UNIT 3

PUMP RELIEF REQUEST NO. 11 (Continued)

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The acceptance criteria for the vibration measurements, shall be those provided in OM-6, with Addenda through May 31, 1989.

VALVE RELIEF REQUEST NO. 19  
(Withdrawn)