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U. S. Nuclear Regulatory Commission
Document Control Desk
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Inservice Testing Relief Requests

Gentlemen:

The 1986 edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Subsection IWP-3230(a) and Section 6.1 of Part 6 to the ASME Operations and Maintenance Standards (OMa-1988) requires that the frequency of testing for a pump with deviations in the alert range be doubled until the cause of the deviation is determined and the condition corrected. In accordance with 10CFR50.55a(f)(5), Entergy Operations requests relief from doubling the testing frequency for high pressure safety injection (HPSI) pump 2P-89B due to vibrations within the alert range.

In the past, the Arkansas Nuclear One, Unit 2 (ANO-2) HPSI pumps have been full flow tested at each refueling outage per the guidance of Position 9 of Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs." Prior to the last refueling outage (2R10), HPSI pump 2P-89B was rebuilt. During the subsequent full flow testing of this pump during 2R10, vibrations measured fell within the alert range of Table 3 of OM-6 (ANO-2 pump vibration testing is conducted per the guidance of OM-6 per Relief Request PR-5 of the ANO-2 Inservice Testing Plan). The pump's flow rate met design requirements and alert range vibration readings have not been observed during the subsequent quarterly mini-flow tests of this pump. Additionally, quarterly differential pressure readings have not indicated any adverse trend.

Previously, full flow testing of the HPSI pumps was determined to be practical only during refueling outages due to concerns that, at other times, the reactor coolant system lacked the expansion volume necessary to accommodate the large volume of water necessary to test these pumps and that reactor vessel pressure-temperature limitations could be exceeded. Subsequent determinations have concluded that the HPSI pumps can be tested during cold

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shutdowns of sufficient duration if the pressurizer is vented. HPSI pump 2P-89B was tested in this manner in January 1995 during planned outage 2P95-1. This test showed that the pump vibration measurements were in the alert range, but at a lower level than identified previously.

Due to the revised practice which allows full flow testing of the HPSI pumps during cold shutdowns, several relief requests previously submitted for staff review require revision or deletion as described below:

- The alternative testing section of Relief Request PR-9 has been revised to indicate that the HPSI pumps can be tested during cold shutdowns. NRC approval of this relief request, submitted on January 21, 1994 (2CAN019402), has not been received.

- Relief Request RC-1 has been modified to delete the previously granted relief from the requirements of IWV-3521, since the affected valves can now be exercised at cold shutdown. A cold shutdown justification for exercising these valves will be written and added to the ANO-2 Inservice Testing Plan. The remainder of this relief request, submitted on January 21, 1994 (2CAN019402), which proposes to leak test the subject valves as valve pairs, is not affected and still requires NRC review and approval.

- Relief Request SI-1, last revised by submittal dated January 21, 1994 (2CAN019402), is withdrawn since the subject valves can be exercised at cold shutdown. A cold shutdown justification will be written and added to the ANO-2 Inservice Testing Plan.

Revisions to Relief Requests PR-9 and RC-1 are attached.

Since 2P-89B can only be full flow tested during cold shutdowns of sufficient duration, doubling the testing frequency for this pump is clearly impractical and therefore, meets the criterion for relief stated in 10CFR50.55a(f)(5)(iii). A new relief request for this condition, PR-10, is attached for your review. If you have any questions regarding this submittal, please contact me.

Very truly yours,

Dwight C. Mims

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Director, Licensing

DCM/jjd

attachment

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RELIEF REQUEST NUMBER PR-10

System: High Pressure Safety Injection

P&ID: M-2232

Pump: 2P-89B

Class: 2

Function: The high pressure safety injection pumps supply high pressure borated water to the reactor coolant system in the event of an accident. These pumps start upon receipt of a safety injection actuation signal.

Impractical Test Requirements: OMa-1988, Part 6, Section 6.1, Acceptance Criteria

If deviations fall within the alert range of Table 3, the frequency of testing specified in paragraph 5.1 shall be doubled until the cause of the deviation is determined and the condition corrected.

Basis For Relief: ANO-2 utilizes OM-6 for vibration testing (Relief Request PR-5, provisionally authorized January 22, 1993, 2CNA019304). This pump's outboard bearing vibration was within the OM-6 alert range (> 0.325 in./sec and ≤ 0.70 in./sec) specified in Table 3. This range was entered when the pump was full flow tested following maintenance during refueling outage 2R10 in accordance with Generic Letter 89-04, Position 9 (see revised Relief Request PR-9, attached). The pump's flow rate met design requirements. Both IWP and OM-6 require that the test frequency be doubled if the results of pump testing falls within the alert range. As in this case, where the pump can only be full flow tested during cold shutdowns, doubling the test frequency is clearly impractical.

The predominant vibration frequency present is at the vane pass. The pump vendor was contacted and indicated that this pump design normally has high vane pass vibration at mini-flow and at full flow (near run out conditions). According to the vendor, when the vane pass vibration is predominant at the outboard bearing, it is indicative of a bad flow angle against the pump vanes. This can occur during mini-flow and full flow testing. As the pump "wears in," it is probable that the vane pass amplitude will decrease because "feathering" of the vane tips will allow a better flow angle.

RELIEF REQUEST NUMBER PR-10
(CONT'D)

During 2R10 testing, both the horizontal and vertical vibration measurements on the outboard bearing were in the alert range. During the next practical test, during 2P95-1, the vertical vibration level had decreased to below the alert range. The horizontal level also had decreased, but was still within the alert range.

Alternative Testing: This pump will continue to be tested quarterly on mini-flow. If the pump falls within any alert range during the mini-flow test, the pump mini-flow testing frequency will be doubled. The cold shutdown frequency for full flow testing this pump will be continued.

Approval: New.

RELIEF REQUEST NUMBER PR-9

System: High Pressure Safety Injection

P&ID: M-2232

Pumps: 2P-89A, 2P-89B, 2P-89C

Class: Class 2

Function: The high pressure safety injection pumps supply high pressure borated water to the RCS in the event of an accident. These pumps start upon the receipt of a safety injection actuation signal.

Impractical Test Requirements: IWP-3100 Inservice Test Procedure

The test quantities shown in Table IWP-3100-1 shall then be measured or observed and recorded as directed in this Subsection. Each measured test quantity shall then be compared with the reference value of the same quantity. Any deviation determined shall be compared with the limits given in Table IWP-3100-2 and the specified corrective action taken.

Basis For Relief: The only means available to test these pumps during power operation is through their mini-flow line. The mini-flow lines have pressure gauges and are orificed, but do not have any flow measuring devices.

Alternative Testing: These pumps will be tested on mini-flow each quarter and vibration and differential pressure data will be taken and analyzed. **The HPSI pumps will be full flow tested during cold shutdowns** through a fully instrumented flow path. Full flow differential pressure and vibration data will be taken and analyzed. This alternative testing is allowed by Generic Letter 89-04, Position 9.

Approval: **Revised**. Approved by GL 89-04, Position 9.

RELIEF REQUEST NUMBER RC-1

System: Reactor Coolant

Valves: 2SI-27A, 2SI-27B, 2SI-28A and 2SI-28B

Category: AC

Class: 1

Function: Prevents reversal of reactor coolant flow into a lower pressure system and allows flow during long-term core cooling to prevent boron precipitation.

Impractical Test Requirement: IWV-3422 Test Frequency

Category A valves shall be leak tested at least once every two years.

Basis For Relief: The absence of isolation valves on the downstream side does not allow individual leak rate testing of these valves. The low pressure side of these valves are monitored for back leakage.

Alternative Testing: 2SI-27A and 2SI-28A will be treated as one valve. 2SI-27B and 2SI-28B will also be treated as one valve. These valve pairs are demonstrated to be leak tight during power operation. Per IWV-3421 these valves do not require a leak test. The low pressure side of these valve pairs is instrumented, 2PI-5105 and 2PI-5106, and will alarm in the control room in the event of high pressure; hence demonstrating that these valves, as a pair, are leak tight. If one or both of these valve pairs were leaking and if other valves were leaking such that no pressure buildup is observed on 2PI-5105 and/or 2PI-5106, then leakage though these valve pairs would still be detected as an increase in unknown leakage when the daily reactor coolant system leakage test is performed. In the event the RCS unknown leakage becomes significant (greater than 1 gpm), then additional steps will be performed to determine if the leakage is through 2SI-27A and 2SI-28A and/or 2SI-27B and 2SI-28B.

In addition, 2SI-26A and 2SI-26B will be individually leak rate tested to provide another pressure isolation valve between the high and low pressure piping. The leak rate testing performed on 2SI-26A and 2SI-26B will meet the requirements of IWV-3420.

RELIEF REQUEST NUMBER RC-1
(CONT'D)

Approval: Interim relief granted until next refueling outage (2R10). **Revised to delete relief from IWV-3521.**