Omaha Public Power District
444 South 16th Street Mall
Omaha, Nebraska 68102-2247
402/636-2000

March 25, 1994
LIC-94-0068

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station PI-137
Washington, DC 20555

REFERENCES: 1. Docket No. 50-285

2. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated October 8, 1990 (LIC-90-0756)

3. Letter from OPPD (W. G. Gates) to NRC (Document Control Desk) dated November 13, 1992 (LIC-92-320)

4. ASME/ANSI Operation and Maintenance (OM) of Nuclear Power Plants, Part 6, 1987 Edition, 1988 Addenda

Gentlemen:

SUBJECT: Request for Relief for Testing Raw Water (RW) and Component Cooling Water (CCW) Pumps Using Pump Curves

The purpose of this letter is to supplement the Fort Calhoun Station (FCS) ISI Program Plan for the Third Ten-Year Interval (Reference 3) with two requests for relief from RW and CCW Pump testing requirements of the OM Code (Reference 4). The content of this letter was discussed with Patricia Campbell and Steve Bloom (NRR) on March 17, 1994.

The two relief requests were not included with the original submittal due to a misinterpretation of Section 5.2(c) of Reference 4. Omaha Public Power District (OPPD) interpreted the Code to allow testing under the current OPPD method without a request for relief. Subsequently, OPPD determined a request for relief is necessary. This was discovered while reviewing Draft NUREG-1482, "Guidelines for Inservice Testing Programs at Nuclear Power Plants." Relief was previously requested and received in the FCS ISI Program Plan Second Ten-Year Interval, Revision 5 (Reference 2). Upon approval of the relief requests, the FCS ISI Program Plan will be revised to reflect the approval.

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If you should have any questions, please contact me.

Sincerely,

W. G. Gates

W. G. Gates
Vice President

WGG/mah

Enclosure

c: LeBoeuf, Lamb, Greene and MacRae
L. J. Callan, NRC Regional Administrator, Region IV
S. D. Bloom, NRC Project Manager
R. P. Mullikin, NRC Senior Resident Inspector

Request for Relief for Testing Raw Water (RW) and Component Cooling Water (CCW) Pumps Using Pump Curves

4. Code Exception Number E-4 -- Relief Request

Systems: Raw Water
Component Cooling Water
Pumps: AC-10A, AC-10B, AC-10C, AC-10D, AC-3A, AC-3B, AC-3C
Class: 3

OM Part 6 Code Requirements for which Relief is Requested:

OM Part 6, Section 5.2 requires that the system resistance be varied until either the measured differential pressure or measured flow rate equals the corresponding reference value. The quantities of Table 2 of OM Part 6, Section 5.2 are then measured or observed and compared to the corresponding reference value.

Basis for Relief

1. The Raw Water (RW) and Component Cooling Water (CCW) systems at Fort Calhoun Station (FCS) are designed such that the total pump flow cannot be adjusted to one specific value for the purpose of testing without adversely affecting the system flow balance and Technical Specification operability requirements. Therefore, the RW and CCW pumps must be tested in a manner that the RW and CCW loops remain properly flow balanced during and after the testing. In addition, certain supplied loads (e.g., cooling of Control Element Drive Mechanisms) must remain fully operable per Technical Specifications to maintain the required level of plant safety during power operation.

2. The RW and CCW systems loops are not designed with full flow test lines with single throttle valves. Therefore, the flow cannot be throttled to a fixed reference value every time a pump test is performed. Total pump flow rate can only be measured using the total flow indication as installed and read on the supply headers. There are no valves available in any of the loops, on either the supply or return lines, for the purpose of throttling total RW or CCW system flows. Only the flows of the served components are able to be individually throttled. The main loops of RW and CCW are piped in parallel with each other. Many loads are throttled to flow ranges specified in the FCS Design Basis Documents (DBD). All loads are aligned in parallel, and receive RW/CCW flow when the RW/CCW pumps are running regardless of which served components are in service. During power operation, certain loops of RW/CCW are required to be operable per Technical Specifications. Specific loops/components of RW/CCW cannot be taken out of service for testing without entering an action statement for a Limiting Condition for Operation (LCO). Also, exceeding certain individual component flows/temperatures (e.g., reactor coolant pump seals) can require plant shutdown in two hours, depending on the load in question.

3. Certain RW/CCW loops are flow balanced during each refueling outage (at a nominal 18-month frequency) to ensure that all loads are adequately supplied. Flow ranges are specified for these loads in order to balance flows against each other. Once properly flow balanced, minimal flow adjustment can be made for any one particular load without adversely impacting the operability of the remaining loads (i.e., increasing flow for one load reduces flow for all of the others). Each time the system is flow balanced, proper individual component flows are produced, but this in turn does not necessarily result in one specific value for total flow. Because certain loads have an acceptable flow range, overall system full flow (the sum of the individual component flows) also has a range. Consequently, the Code requirement to quarterly adjust RW/CCW loop flow to one specific flow value for the performance of inservice testing conflicts with FCS system design and component operability requirements (i.e., flow balance) as required by the Technical Specifications.

Alternate Testing to be Performed:

As discussed above in the Basis for Relief Section, it is extremely difficult to return to a specific value of flow rate or differential pressure for testing of these pumps. Multiple reference points could be established according to the Code, but obtaining reference values at every possible point, even over a small range is not feasible. An alternative to the testing requirements of OM Part 6, Section 5.2 is to base the acceptance criteria on a reference pump curve. Flow rate and differential pressure are measured/calculated during inservice testing and compared to an established baseline reference curve. In addition, trending is accomplished by taking the ratio of the reference curve ΔP vs. Flow and the actual ΔP vs. Flow.

The following elements are used in developing and implementing the reference pump curves:

1. A reference pump curve (differential pressure vs. flow) has been established for RW pumps AC-10A, AC-10B, AC-10C and AC-10D, and for CCW pumps AC-3A, AC-3B and AC-3C from data taken on these pumps when they were known to be operating acceptably. These pump curves represent pump performance close to the original manufacturer's pump test data.

2. Pump curves are based on four or more test points whenever possible. Rated capacities of these pumps are 6,000 - 7,000 gpm for the RW pumps and 4,500 - 5,500 gpm for the CCW pumps.

3. To reduce the uncertainty associated with the pump curves and to ensure the adequacy of the acceptance criteria, all instruments used in establishing the baseline reference pump curves either meet or exceed the Code required accuracy.

4. The reference baseline pump curves are compared to the manufacturer's pump curves which were validated during plant preoperational testing.

5. Review of the pump hydraulic data trend plots indicates close correlation with established pump reference curves, thus validating the accuracy of the pump curves to assess the pumps' operational readiness.

6. The reference pump curves are based on differential pressure vs. flow. See the attached sample AC-3A and AC-10A pump acceptance criteria sheets (Attachments A and B). Areas for Required Action are as shown for AC-3A in Attachment A. Areas for Acceptable, Alert and Required Action are as shown for AC-10A in Attachment B. These acceptance criteria limits do not conflict with operability criteria (Minimum Operability) as shown on Attachments A and B to the enclosure.

7. Only a small portion of the established reference curve is being used to accommodate flow rate variance due to flow balancing of various system loads.

8. Review of recent vibration data trend plots indicates that the change in vibration readings over the range of the pump curves being used is insignificant; therefore, only one fixed reference value has been assigned for each vibration measurement location.

9. After maintenance or repair that may affect the existing baseline reference pump curves, a new reference pump curve is determined or the existing pump curve revalidated by an inservice test.

Quality/Safety Impact:

The design of the FCS RW and CCW systems and the Technical Specification requirements make it impractical to adjust system flows to a fixed reference value for inservice testing without adversely affecting the system flow balance and Technical Specification operability requirements. Proposed alternate testing using a reference pump curve for each pump provides adequate assurance and accuracy in monitoring pump condition to assess pump operational readiness and will adequately detect pump degradation. The proposed alternate testing will have no adverse impact on plant or public safety.

AC-3A PUMP CURVE

(Per data obtained on 03/17/90)

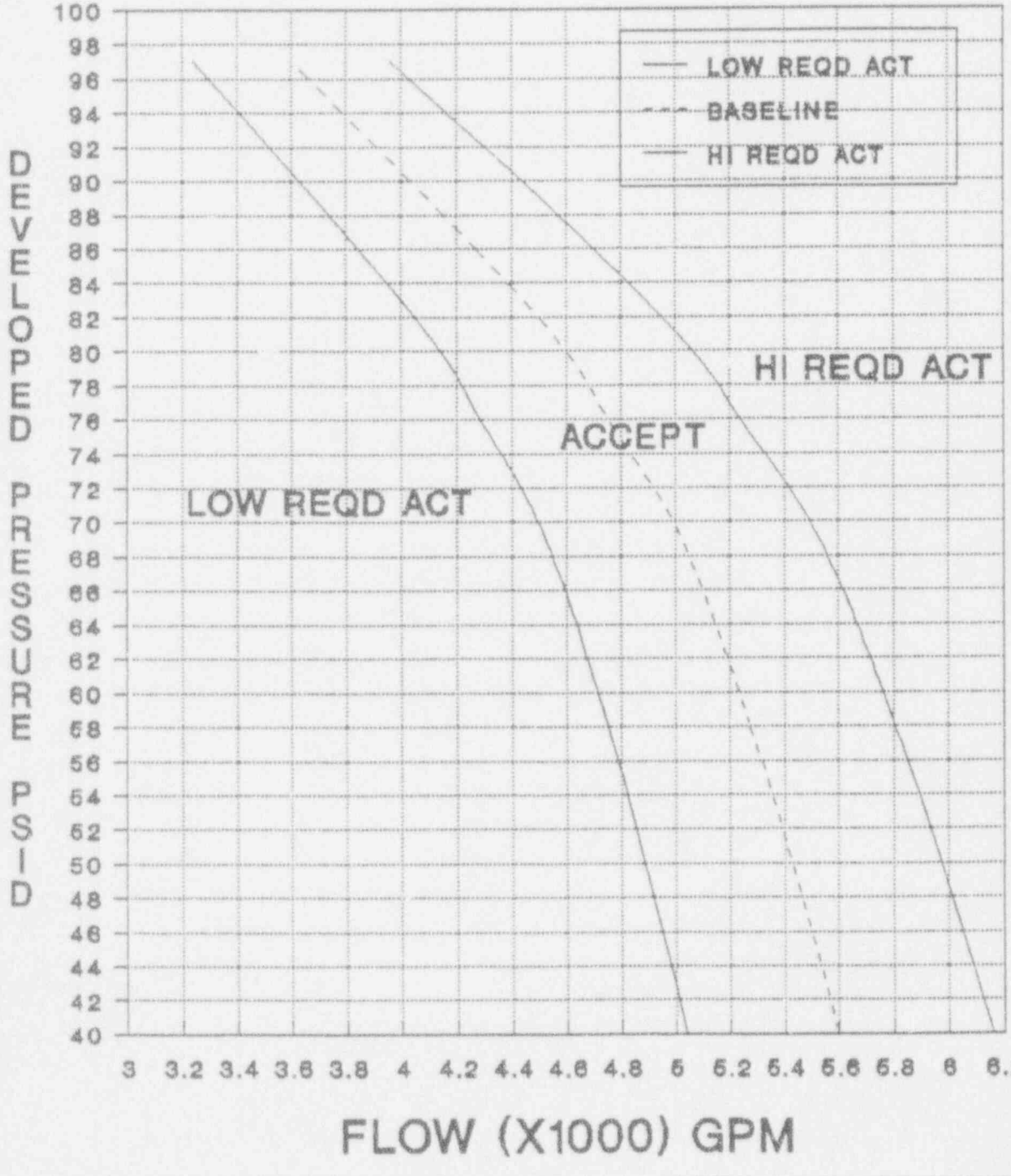
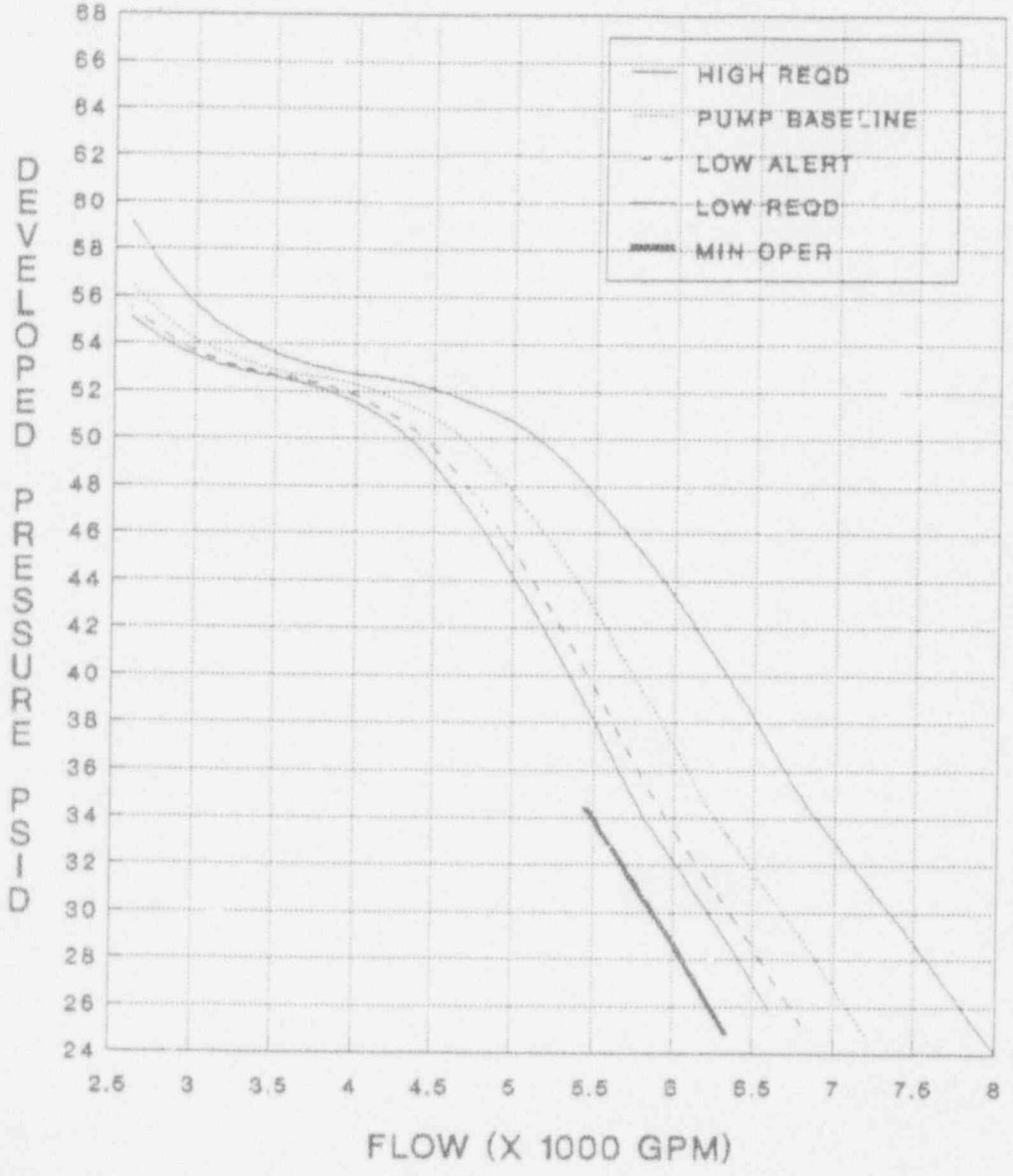


Figure 1
AC-3AQ2.WPG

AC-10A PUMP CURVE



SE-ST-RW-3002 performed 11/11/93

{AC-10AQ6.WPG}