PD 41

Nebraska Public Power District

GENERAL OFFICE
P.O. BOX 499, COLUMBUS, NEBRASKA 68601-0499
TELEPHONE (402) 564-8561

NLS8800347
July 8, 1988

MPA B-103

Mr. Robert D. Martin
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Dear Mr. Martin:

Subject: Response to NRC Bulletin No. 88-04
Cooper Nuclear Station
NRC Docket No. 50-298, DPR-46

Reference: 1. NRC Bulletin No. 88-04, "Potential Safety-Related Pump Loss"

2. NRC Information Notice 87-59, "Potential RHR Pump Loss"

In accordance with the action requirements of Reference 1 the District has performed an in depth evaluation of all of its safety-related pumps at CNS. As a result of this evaluation, the District has identified six pumps which require further investigation, those being the two Core Spray pumps and the four Service Water Booster pumps. The District feels the Core Spray pumps presently have adequate minimum flow capacities; however, this can only be verified by testing. The Service Water Booster pumps need further evaluation to verify that they will not experience adverse pump-to-pump interractions at minimum flow. The District will perform the following items to resolve this issue:

1. Test the Core Spray pumps to verify the adequacy of the existing minimum flow capacities. done in 1989 outage

2. Evaluate and, if required, test the Service Water Booster pumps to show there are no adverse pump-to-pump interactions at minimum flow conditions.

cc: RFO
1/1 Per P. O'Connor

These test(s) will consist of vibration and flow monitoring at minimum flow conditions.

In the interim, the District will perform the following:

1. Add statements to the applicable operating procedures which cautions the operators to only run one SWB pump per loop when loop flow rates are less than 5,000 gpm.

2. Add statements to the applicable operating procedures which caution the operators to prevent dead-heading the Core Spray pump against a high reactor vessel pressure.

The above actions will be performed according to the following schedule:

1. The interim operating procedure changes will be implemented by August 5, 1988. Done

2. The evaluation of the Service Water Booster pumps will be completed prior to the next refueling outage. (currently scheduled for Spring 1989) Done

3. All testing will be completed prior to startup from the next refueling outage. Done

4. All long-term resolutions, including modifications if appropriate, will be completed prior to startup from the spring 1990 refueling outage. None Needed

As required by the Bulletin, a Justification for Continued Operation is attached.

If you have any questions regarding this submittal, please contact my office.

L. G. Kuncl
Nuclear Power
Group Manager

LGK:kk32.1c
Attachment

cc: Document Control Desk w/attachment
U.S. Nuclear Regulatory Commission

NRC Resident Inspector w/attachment
Cooper Nuclear Station
bc: NRC Distribution w/attachment

STATE OF NEBRASKA)
)ss
PLATTE COUNTY)

L. G. Kuncl, being first duly sworn, deposes and says that he is an authorized representative of the Nebraska Public Power District, a public corporation and political subdivision of the State of Nebraska; that he is duly authorized to submit this request on behalf of Nebraska Public Power District; and that the statements contained herein are true to the best of his knowledge and belief.

L. G. Kuncl

Subscribed in my presence and sworn to before me this 8th day of July, 1988.

Colleen M Kuta
NOTARY PUBLIC

GENERAL NOTARY-State of Nebraska
COLLEEN M. KUTA
Comm. Exp. Aug. 4, 1989

JUSTIFICATION FOR CONTINUED OPERATION FOR NRC BULLETIN 88-04

The concerns stated in NRC Bulletin 88-04 are summarized as:

1. With two pumps operating in parallel in the minimum flow mode, one of the pumps may be dead-headed resulting in pump damage or failure.

2. Installed minimum pump flows may not be adequate to preclude pump damage or failure.

These concerns are addressed below and provide the basis for concluding that continued operation of Cooper Nuclear Station is justified.

A. All Class 1, 2, and 3 centrifugal and positive displacement-type pumps installed at CNS are required to perform a specific function in shutting down the reactor or in mitigating the consequences of an accident must undergo routine in-service testing per ASME Boiler and Pressure Vessel code Section XI, Article IWP-1000. These quarterly tests are in addition to the Technical Specification surveillance requirements intended to demonstrate compliance with the plant safety analyses. The Section XI tests are intended to detect changes in pump performance; Article IWP-1500 ("Detection of Change") states:

> "The hydraulic and mechanical condition of a pump, relative to a previous condition, can be determined by attempting to duplicate, by test, a set of basic reference parameters. Deviations detected are symptoms of changes and, depending upon the degree of deviation, indicate need for further tests or corrective action."

The in-service tests measure speed (if variable speed), inlet pressure, differential pressure, flow rate, vibration amplitude, motor amps and bearing temperature. Alert ranges and required action ranges are strictly defined, and require either increased frequency of testing or declaring the pump inoperative. Performance outside of the required action range would require prompt evaluation and resolution.

Although these tests themselves would not detect pump dead-heading or inadequate minimum flow (since these are intended to be full flow tests), any deleterious effects of operating with inadequate flow would be detected in advance of significant pump performance degradation. Therefore, any changes in pump performance would be detected and corrected per routine pump testing in advance of pump degradation due to cumulative low flow effects from pump surveillance testing and normal system use.

B. The potential for pump excessive wear attributable to minimum flow operation and/or dead-heading is negligible, since system operation in the minimum flow mode is primarily limited for short durations during monthly surveillance testing.

C. BWR operating experience demonstrates that short term operation in the minimum flow mode and/or dead-heading has little or no impact on pump life. Recent inspections of BWR RHR pumps have indicated no pump impeller excessive wear due to minimum flow. It is estimated that the pumps had been operating for up to 30 hours in the minimum flow mode in the period since the previous inspection.

There have been occurrences in the industry when pumps have operated dead-headed inadvertently (i.e., dead-heading was not caused by minimum flow operation but, for instance, by incorrectly closing a valve). These pumps have continued to function normally.

D. Pump wear attributable to minimum flow and/or dead-heading is not a significant contributor to total system unavailability. Other factors (such as loss of emergency power, loss of cooling, etc.) are more significant. BWR and CNS operating history indicates no occurrences of system unavailability due to pump excessive wear attributable to low flow operation.

E. In a CNS specific evaluation, the four RHR pumps have been shown, by actual test results, to have adequate minimum flow capacities and to not have adverse pump-to-pump interractions. These pumps, therefore, are not adversely affected by the problems suggested in NRC Bulletin 88-04.

F. For the core spray pumps, the only design basis events that would lead to pumps running in the minimum flow mode and/or dead-heading are events that result in an ECCS initiation signal while the reactor is at high pressure (above the pump shutoff head). These events are typically small break LOCAs. Of these, only certain small break LOCAs actually require ECCS injection from RHR or core spray after running at low flow.

Once initiated, the maximum duration that a core spray pump may operate in the minimum flow mode for the spectrum of hypothetical LOCAs is less than 30 minutes. This is derived from postulated small break LOCAs, wherein reactor depressurization to below the shut-off head of these pumps is delayed. For large break LOCAs, the reactor inherently depressurizes through the break. The present minimum flow bypass line is expected to provide adequate protection for these pumps for the short durations postulated during both the small and large break LOCAs.

For other scenarios, there is adequate time to secure the core spray pumps, and restart them as necessary, precluding extended operation in the minimum flow mode.

G. As discussed in Item F above, only certain small break LOCAs actually require ECCS injection from RHR or core spray where the pumps may be operated for short periods in the minimum flow mode. Because of the excess ECCS capacity that is available, limiting LOCA scenarios do not depend on all 6 ECCS pumps to operate in order to satisfy 10 CFR 50.46 requirements and General Design Criteria 35 of 10 CFR 50 Appendix A. In fact, a realistic LOCA analysis would show that only one low pressure ECCS pump is typically necessary to satisfy core-cooling requirements during and following a LOCA; therefore, even if both Core Spray pumps were to be rendered inoperable due to dead-heading, and a single failure is assumed to block one RHR loop, two RHR pumps will still be available for short and long term core cooling.

Based upon the above, the District concludes that the continued operation of Cooper Nuclear Station is justified because 1) the potential for pump damage due to minimum flow operation or dead-heading is negligible, 2) sufficient redundancy and ECCS capacity exists to meet the requirements of 10CFR 50.46 and GDC 35, and 3) routine testing is expected to detect any pump damage before system performance is degraded.

kk(dk29.2b)