

February 24, 2000

Mr. J. H. Swailes
Vice President of Nuclear Energy
Nebraska Public Power District
P. O. Box 98
Brownville, NE 68321

SUBJECT: COOPER INSERVICE INSPECTION RELIEF REQUEST PR-04, REVISION 1
(TAC NO. MA5090)

Dear Mr. Swailes:

By letter dated March 19, 1999, as supplemented by a teleconference on October 19, 1999, and a letter dated November 12, 1999, Nebraska Public Power District (NPPD) submitted inservice inspection (ISI) relief request (RR) PR-04, Revision 1, regarding pressure testing of the Cooper Nuclear Station (CNS) reactor pressure vessel (RPV) head flange seal leak detection system. Specifically, NPPD requested relief from the system pressure test required by Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code).

RR PR-04, Revision 0, was submitted by letter dated October 18, 1995, and approved by the Nuclear Regulatory Commission (NRC) by letter dated October 23, 1997. The NRC safety evaluation concluded that the pressure test required by Section XI of the ASME Code is impractical due to the possibility of damage to the RPV head flange O-ring seals. Granted pursuant to 10 CFR 50.55a(g)(6)(i), RR PR-04, Revision 0, allowed the licensee to perform a visual inspection of the RPV head flange seal leak detection line while the vessel head is off and the reactor cavity is flooded.

Due to a scheduling error during Refueling Outage 18, which concluded in December 1998, NPPD performed a pneumatic test instead of the approved visual inspection. The scheduling error and the alternate test methodology were discussed on-site and with the NRC project manager. The licensee also took corrective actions to address the scheduling error. Although the error was of minimal safety significance and not reportable per the requirements of 10 CFR 50.72 or 50.73, NRC review and approval for past and future use of the pneumatic test is required because the test methodology was changed from that previously approved in RR PR-04, Revision 0.

The staff has determined that the pneumatic test meets or exceeds the ability of the approved test methodology (i.e., the visual inspection) to detect leakage. However, the conduct of the pneumatic test requires the removal and reinstallation of pipe insulation. This results in the pneumatic test taking significantly more time to complete than the visual test and consequently the dose received by personnel performing the test is greater. Therefore, the preferred method of testing should be the visual inspection with the reactor cavity flooded.

The provisions of 10 CFR 50.55a(g)(6)(i) allow the staff to grant relief from ASME Code requirements if the requirements are impractical.

The staff has determined that the code-required system leakage test is impractical for the reactor vessel head flange seal leak detection system. Also, the staff has reviewed NPPD's submittals and has determined that the alternative test methodologies (the visual inspection and the pneumatic test) are acceptable as options to test the RPV head flange seal leak detection system. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), RR PR-04, Revision 1, is granted for the duration of the third 10-year interval of the ISI program. The third 10-year interval began March 1, 1996, and ends February 28, 2006. The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the code requirements were imposed on your facility.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: Safety Evaluation

cc w/encl: See next page

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Cooper Nuclear Station

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January 2000

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST PR-04, REVISION 1

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

According to Title 10 of the Code of Federal Regulations, Section 50.55a(a)(1) (10 CFR 50.55a(a)(1)), "[s]tructures, systems, and components [of nuclear power generating facilities] must be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed." According to 10 CFR 50.55a(a)(2), "[s]ystems and components of boiling and pressurized water-cooled nuclear power reactors must meet the requirements of the ASME [American Society of Mechanical Engineers] Boiler and Pressure Vessel Code [ASME Code] specified in...this section." However, the Director of the Office of Nuclear Reactor Regulation may grant relief of the ASME Code requirements if, pursuant to 10 CFR 50.55a(g)(6)(i), "code requirements are impractical."

By letter dated March 19, 1999 (Ref. 1), as supplemented by a teleconference on October 19, 1999, and a letter dated November 12, 1999 (Ref. 2), Nebraska Public Power District (NPPD) submitted inservice inspection (ISI) relief request (RR) PR-04, Revision 1, regarding pressure testing of the Cooper Nuclear Station (CNS) reactor pressure vessel (RPV) head flange seal leak detection system. Specifically, the licensee requested relief from the system pressure test required by Section XI of the ASME Code.

The original version of this relief request (ISI RR PR-04, Revision 0) was submitted by letter dated October 18, 1995, and approved by NRC letter dated October 23, 1997 (Ref. 3). The NRC safety evaluation concluded that the pressure test required by ASME Section XI is impractical due to the possibility of damage to the RPV head flange O-ring seals (i.e., the licensee would have to purposely fail the inner O-ring in order to perform the test). ISI RR PR-04, Revision 0, allowed the licensee to perform a visual inspection of the RPV head flange seal leak detection line while the vessel head is off and the reactor cavity is flooded. However, due to a scheduling error during Refueling Outage 18 (RFO-18), the licensee performed a pneumatic test instead of the approved visual inspection.

The scheduling error and the alternate test methodology were discussed by the CNS nuclear licensing and safety manager, the engineering support division manager, and the NRC project manager. In addition, the licensee took corrective actions to address the scheduling error. The

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alternate inspection performed during RFO-18 demonstrated that the flange seal leak detection line was capable of containing reactor inventory and remained operable.

Although the error was of minimal safety significance and not reportable under the requirements of 10 CFR 50.72 or 50.73, NRC review and approval is required because the test methodology was changed.

2.0 BASIS FOR THE RR

2.1 Component for Which Relief is Requested

The component for which relief is requested is the reactor vessel head flange seal leak detection system (line number 1-MS-152-1").

2.2 Code Requirement

1989 Edition, no Addenda, of the ASME Code (Ref. 4):

Section XI, Paragraph IWB-5210(a)(1) requires that pressure retaining components following opening and closing within each system boundary be subjected to a system leakage test after pressurization to nominal operating pressure.

Section XI, Paragraph IWB-5210(a)(2) requires the pressure retaining components within each system boundary to be subjected to a system hydrostatic pressure test.

2.3 Content of the RR

Relief is requested from performing the system pressure test required by Paragraphs IWB-5210(a)(1) and IWB-5210(a)(2) of Section XI of the ASME Code.

2.4 Basis for Relief

The reactor vessel head flange leak detection line is separated from the reactor pressure boundary by a silver plated O-ring located on the vessel flange. A second O-ring is located on the opposite side of the tap in the vessel flange. This line is required during plant operation in order to indicate failure of the inner O-ring.

The configuration of the vessel tap as well as the high test pressure requirement (1000 psig minimum) precludes hydrostatic testing while the vessel head is removed because the tap cannot be temporarily plugged. Hydrostatic testing cannot be adequately performed with the vessel head installed because the seal prevents complete filling of the line. In addition, the line has no available vent. The line cannot be tested while in operation because it will only be pressurized in the event of a failure of the inner O-ring, and it is impractical to purposely fail the O-ring in order to perform a pressure test.

2.5 Proposed Alternative Program

The licensee proposed two test methodologies as alternatives to the ASME Code requirements for pressure testing. Option 1 is the preferred method, and was previously approved by letter

dated October 23, 1997. Option 2 is requested as an alternative only if scheduling or plant operations prevent Option 1 from being performed (as was the case during RFO-18).

- Option 1: A VT-2 visual examination will be performed on the line when the reactor cavity is flooded. The minimum hydrotest pressure while the reactor cavity is flooded is based on the flood depth of the cavity when the vessel head is removed. This flood depth is approximately 20 feet of water (8-10 psi). This option would require a four hour hold time prior to conducting the VT-2 inspection, and does not require insulation to be removed. Therefore, the time needed to be in the drywell is reduced which would reduce radiation dose to personnel.
- Option 2: As an alternative to Option 1, a pneumatic test at 100 psig will be performed. During the performance of this test, the insulation will be removed. The line will be pressurized to 100 psig and "snooped."¹ A VT-2 visual inspection will also be performed. This is the method that the licensee used to perform the pneumatic test during RFO-18 after the scheduling error that prevented Option 1 from being performed. The pneumatic test meets or exceeds the ability of the approved test methodology to detect leakage. The piping insulation removal and reinstallation, and snooping the line adds significant time to the inspection.

Either of the testing alternatives will be performed with the frequency specified in Table IWB-2500-1 of Section XI of the ASME Code.

2.5 Applicable Time Period

Relief is requested for the third 10-year interval of the ISI. The third 10-year interval began March 1, 1996, and ends February 28, 2006.

3.0 EVALUATION

The staff evaluated the information provided by the licensee in its submittal for RR PR-04, Revision 1. The staff reviewed the basis for relief from the ASME Code pressure testing requirements for the RPV head flange leak detection line. As an alternative to the Code requirements, the licensee proposed a VT-2 visual examination on the RPV head flange leak detection line when the reactor cavity is flooded. The option of a pneumatic pressure test is proposed in the event that scheduling or plant operations prevent Option 1 from being performed.

The staff concludes that the system pressure test required by Section XI of the ASME Code for the RPV head flange leak detection line is impractical because of the possibility of damage to the RPV head flange O-ring seals. The minimum hydrotest pressure while the reactor cavity is flooded, based on a flood depth of 20 feet of water, during conduct of the visual inspection is 8 to 10 psi. The pneumatic test is performed at 100 psig. Both the visual examination and the

¹ Snooping is a recognized industry term for a soap bubble test. Once the line is pneumatically pressurized, a spray of liquid soap, specifically manufactured for this application, is applied to the connections along the line. Any leakage will be indicated by the formation of bubbles.

pneumatic test utilize sufficient pressure to provide reasonable assurance that any gross inservice flaws will be detected in the subject line. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the CNS RPV head flange leak detection line.

4.0 CONCLUSION

The staff concludes that the system pressure test required by Section XI for the RPV head flange leak detection line is impractical, and the licensee's proposed alternatives provide reasonable assurance of the structural integrity of the subject line. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), RR PR-04, Revision 1, is granted for the duration of the third 10-year interval of the ISI program. The third 10-year interval began March 1, 1996, and ends February 28, 2006. The relief granted is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the code requirements were imposed on the facility.

5.0 REFERENCES

1. Letter to the USNRC Document Control Desk from J. H. Swailes (NPPD) "Inservice Inspection Relief Request, PR-04, Revision 1 Cooper Nuclear Station...", March 19, 1999.
2. Letter to USNRC Document Control Desk from P. J. Caudill (NPPD) "Inservice Inspection Relief Request PR-04, Revision 1 - Additional Information Cooper Nuclear Station...", November 12, 1999.
3. Letter to G. R. Horn (NPPD) from J. W. Clifford (USNRC) "Evaluation of the Third Ten-Year Interval Inspection Program Plan and Associated Requests for Relief for Cooper Nuclear Station (TAC M94000)," October 23, 1997.
4. ASME Boiler and Pressure Vessel Code, Section XI, Rules for In-Service Inspection of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1989 Edition, Paragraphs IWB-5210(a)(1) and IWB-5210(a)(2).

Principal Contributor: A. Lee

Date: February 24, 2000