

October 23, 2006

Mr. Randall K. Edington  
Vice President-Nuclear and CNO  
Nebraska Public Power District  
P.O. Box 98  
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION RE: RISK-INFORMED INSERVICE  
INSPECTION PROGRAM FOR THE FOURTH 10-YEAR INTERVAL;  
RELIEF REQUEST NO. RI-34 (TAC NO. MD0283)

Dear Mr. Edington:

By letter dated February 23, 2006, and supplemented by a request for additional information response dated August 24, 2006, Nebraska Public Power District (the licensee) submitted Relief Request No. RI-34 to extend the Risk-Informed Inservice Inspection (RI-ISI) Program Plan for Cooper Nuclear Station (CNS) to the fourth 10-year inservice inspection (ISI) interval.

The Nuclear Regulatory Commission (NRC) staff has completed its review of relief request RI-34 and the safety evaluation is enclosed. Based on the information provided, the NRC staff concluded in the enclosed safety evaluation that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, paragraph 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternative for the fourth 10-year ISI interval for CNS.

Sincerely,

**/RA/**

David Terao, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR RELIEF RI-34

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated February 23, 2006, and supplemented by a request for additional information response dated August 24, 2006, Nebraska Public Power District (the licensee) requested, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), that the Nuclear Regulatory Commission (NRC) approve Relief Request RI-34, to extend the Risk-Informed Inservice Inspection (RI-ISI) Program Plan for Cooper Nuclear Station (CNS) to the fourth 10-year inservice inspection (ISI) interval. The CNS RI-ISI program was initially submitted to the NRC staff in a letter dated March 11, 2004, during the third inspection period of the third 10-year ISI interval, and supplemented in letters dated May 20 and July 29, 2004. The CNS RI-ISI program was reviewed and approved by the NRC for use in the third 10-year ISI interval in a letter dated December 9, 2004.

The licensee's submittal proposes to extend the same RI-ISI program from the third 10-year ISI interval to the fourth 10-year ISI interval.

2.0 BACKGROUND AND REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations*, paragraph 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 50.55a(a)(3) of 10 CFR states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The licensee's RI-ISI program was developed in accordance with the methodology contained in the Electric Power Research Institute's (EPRI's) report EPRI Topical Report (TR)-112657, Revision B-A, which was reviewed and approved by the NRC staff. The CNS RI-ISI program is an alternative pursuant to 10 CFR 50.55a(a)(3)(i). In its letter dated February 23, 2006, the licensee requested NRC's authorization to utilize the RI-ISI program previously approved for use in the third 10-year ISI interval, in the fourth 10-year ISI interval at CNS. The scope of the

RI-ISI program is limited to the inspection of ASME Code Class 1 piping (Categories B-F, B-J, and C-F-2 welds).

### 3.0 TECHNICAL EVALUATION

The licensee is requesting relief to use the proposed RI-ISI program plan in the fourth 10-year ISI interval instead of the ASME Code, Section XI, program. An acceptable RI-ISI program plan is expected to meet the five key principles discussed in Regulatory Guide (RG) 1.178, Standard Review Plan (SRP) 3.9.8, and EPRI TR-112657, as stated below:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.
2. The proposed change is consistent with the defense-in-depth philosophy.
3. The proposed change maintains sufficient safety margins.
4. When proposed changes result in an increase in Core Damage Frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
5. The impact of the proposed change should be monitored by using performance measurement strategies.

The first principle is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(3)(i) and, therefore, an exemption request is not required.

The second and third principles require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected.

In accordance with the guidance provided in EPRI TR-112657 and SRP 3.9.8, the licensee provided the results of an engineering analysis of the proposed changes, using a combination of traditional engineering analysis and supporting insights from the probabilistic risk assessment (PRA). The licensee performed an evaluation to determine susceptibility of components (i.e., a piping weld) to a particular degradation mechanism that may be a precursor to leak or rupture and then performed an independent assessment of the consequences of a failure at that location. The results of this analysis ensure that the proposed changes are consistent with the principles of defense-in-depth. Principles of defense-in-depth are met because EPRI TR-112657 methodology requires that the population of welds with high consequences following failure will always have some weld locations inspected regardless of the failure potential. No changes to the evaluation of design-basis accidents in the final safety analysis report are being made by the RI-ISI process. Therefore, sufficient safety margins will be maintained.

The licensee has provided assurance that the methodology used to develop the fourth 10-year RI-ISI interval program will go unchanged from the methodology approved for use in the third 10-year RI-ISI interval program and, therefore, the second and third principles are met.

The fourth principle requires an estimate of the change in risk, and the change in risk is dependent on the location of inspections in the proposed ISI program compared to the location of inspections that would be inspected using the requirements of ASME Code, Section XI.

As required by Section 3.7 of EPRI TR-112657, the licensee evaluated the change in risk expected from replacing the current ISI program with the RI-ISI program. The calculations estimated the change in risk due to removing locations and adding locations to the inspection program. The expected change in risk was quantitatively evaluated using the "Simplified Risk Quantification Method" described in Section 3.7 of EPRI TR-112657. For high-consequence category segments, the licensee used the conditional core damage probability (CCDP) and conditional large early release probability (CLERP) based on the highest estimated CCDP and CLERP. For medium-consequence category segments, bounding estimates of CCDP and CLERP were used. The licensee estimated the change in risk using bounding pipe failure rates from the EPRI methodology. The licensee performed its bounding analysis with and without taking credit for an increased probability of detection (POD). The aggregate change in risk estimates are provided in the following table:

| Change In CDF      |                       | Change In Large Early Release Frequency (LERF) |                       |
|--------------------|-----------------------|--|-----------------------|
| With Increased POD | Without Increased POD | With Increased POD                             | Without Increased POD |
| 1.26E-09/year      | 1.32E-09/year         | 1.26E-09/year                                  | 1.32E-09/year         |

The staff finds the licensee's process to evaluate and bound the potential change in risk reasonable, because it (1) accounts for the change in the number and location of elements inspected, (2) recognizes the differences in degradation mechanisms related to failure likelihood, and (3) considers the synergistic effects of multiple degradation mechanisms within the same piping segment. System level and aggregate estimates of the changes in CDF and LERF are less than the corresponding guideline values in EPRI TR-112657. The staff finds that redistributing the welds to be inspected with consideration of the safety significance of the segments provides assurance that segments whose failure has a significant impact on plant risk receive an acceptable and often improved level of inspection. The NRC staff concludes that the implementation of the RI-ISI program will have a small impact on risk consistent with the guidelines of EPRI TR-112657; therefore, the fourth principle is met.

Implementation and performance monitoring strategies require careful consideration by the licensee and are addressed in Element 3 of EPRI TR-112657 and Section 3.9.8 of the SRP. The objective of Element 3 is to assess performance of the affected piping systems under the proposed RI-ISI program by utilizing monitoring strategies that confirm the assumptions and analyses used in the development of the RI-ISI program. Pursuant to 10 CFR 50.55a(a)(3)(i), a proposed alternative — in this case the implementation of the RI-ISI program, including

inspection scope, examination methods, and methods of evaluation of examination results — must provide an acceptable level of quality and safety.

The licensee stated that, upon approval of the RI-ISI program, procedures that comply with EPRI TR-112657 guidelines will be prepared to implement and monitor the RI-ISI program. The licensee stated in its letter dated February 23, 2006, that the applicable aspects of the ASME Code not affected by the proposed RI-ISI program would be retained.

The licensee indicated in Section 4 of its letter dated February 23, 2006, that the RI-ISI program is a living program and its implementation will require feedback of new relevant information to ensure the appropriate identification of safety-significant piping locations. The licensee also stated that, as a minimum, risk ranking of piping segments will be reviewed and adjusted on an ASME period basis, and that significant changes may require more frequent adjustment as directed by NRC bulletin or generic letter requirements, or by industry and plant-specific feedback. This periodic review and adjustment of the risk-ranking of segments ensures that changes to the PRA, which the licensee will make to incorporate the peer review results, will also be incorporated in the RI-ISI program as necessary.

The licensee addressed additional examinations in Section 3.5.1 of its letter dated February 23, 2006, which states that examinations performed that reveal flaws or relevant conditions exceeding the applicable acceptance standards shall be extended to include additional examinations. These additional examinations shall include piping structural elements with the same postulated failure mode and the same or higher failure potential. Additional examinations will be performed on these elements up to a number equivalent to the number of elements with the same postulated failure mode originally scheduled for that fuel cycle. If the additional required examinations reveal flaws or relevant conditions exceeding the acceptance standards, the examinations shall be further extended to include all elements subject to the same failure mechanism, throughout the scope of the program, during the same outage.

The fifth principle states that risk-informed applications should include performance monitoring and feedback provisions. The staff finds that the proposed process for RI-ISI program implementation, monitoring, feedback, and updating meets the guidelines given in RG 1.174. Therefore, the licensee's proposed process for program implementation, monitoring, feedback, and updating is acceptable.

Based on the above discussion, the staff finds that the five key principles of risk-informed decision making are ensured by the licensee's proposed fourth 10-year ISI interval RI-ISI program.

#### 4.0 CONCLUSION

Based on the information provided in the licensee's submittals, and upon meeting the NRC staff's condition to inspect ASME Code, Categories B-F and B-J dissimilar welds, the NRC staff has determined that the proposed alternative provides an acceptable level of quality and safety. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the fourth 10-year ISI interval at CNS.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: G. Georgiev  
J. Walker

Date: October 23, 2006

Cooper Nuclear Station

cc:

Mr. Ronald D. Asche  
President and Chief Executive Officer  
Nebraska Public Power District  
1414 15<sup>th</sup> Street  
Columbus, NE 68601

Mr. Gene Mace  
Nuclear Asset Manager  
Nebraska Public Power District  
P.O. Box 98  
Brownville, NE 68321

Mr. John C. McClure  
Vice President and General Counsel  
Nebraska Public Power District  
P. O. Box 499  
Columbus, NE 68602-0499

Mr. Paul V. Fleming  
Licensing Manager  
Nebraska Public Power District  
P.O. Box 98  
Brownville, NE 68321

Mr. Michael J. Linder, Director  
Nebraska Department of Environmental  
Quality  
P. O. Box 98922  
Lincoln, NE 68509-8922

Chairman  
Nemaha County Board of Commissioners  
Nemaha County Courthouse  
1824 N Street  
Auburn, NE 68305

Ms. Julia Schmitt, Manager  
Radiation Control Program  
Nebraska Health & Human Services R & L  
Public Health Assurance  
301 Centennial Mall, South  
P.O. Box 95007  
Lincoln, NE 68509-5007

Mr. H. Floyd Gilzow  
Deputy Director for Policy  
Missouri Department of Natural Resources  
P. O. Box 176  
Jefferson City, MO 65102-0176

Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
P. O. Box 218  
Brownville, NE 68321

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, TX 76011

Director, Missouri State Emergency  
Management Agency  
P. O. Box 116  
Jefferson City, MO 65102-0116

Chief, Radiation and Asbestos  
Control Section  
Kansas Department of Health  
and Environment  
Bureau of Air and Radiation  
1000 SW Jackson  
Suite 310  
Topeka, KS 66612-1366

Mr. Don Flater  
Bureau of Radiological Health  
Iowa Department of Public Health  
Lucas State Office Building, 5th Floor  
321 East 12th Street  
Des Moines, IA 50319

Mr. Keith G. Henke, Planner  
Division of Community and Public Health  
Office of Emergency Coordination  
930 Wildwood P.O. Box 570  
Jefferson City, MO 65102

October 2006



Cooper Nuclear Station

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Jerry C. Roberts, Director of Nuclear  
Safety Assurance  
Nebraska Public Power District  
P.O. Box 98  
Brownville, NE 68321

Mr. John F. McCann, Director  
Licensing, Entergy Nuclear Northeast  
Entergy Nuclear Operations, Inc.  
440 Hamilton Avenue  
White Plains, NY 10601-1813

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