February 1, 2005

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

SUBJECT: COOPER NUCLEAR STATION - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATION 2.1.1.2 FOR THE DUAL RECIRCULATION LOOP AND SINGLE RECIRCULATION LOOP SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) VALUES TO REFLECT RESULTS OF A CYCLE-SPECIFIC CALCULATION (TAC NO. MC4953)

Dear Mr. Edington:

The Commission has issued the enclosed Amendment No. 210 to Facility Operating License No. DPR-46 for the Cooper Nuclear Station. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated October 25, 2004, as supplemented by letters dated December 29, 2004, and January 26, 2005.

The amendment would revise TS 2.1.1.2 for the dual recirculation loop and single recirculation loop SLMCPR values to reflect results of a cycle-specific calculation.

Pursuant to 10 CFR 2.390, we have determined that information provided in the Safety Evaluation (Enclosure 3) contains proprietary information, indicated in **bold**. We have prepared a non-proprietary version of the Safety Evaluation (Enclosure 2). However, we will delay placing Enclosure 2 in the public document room for a period of ten working days from the date of this letter to provide you with the opportunity to comment on the proprietary aspects. If you believe that any information in Enclosure 2 is proprietary, please identify such information line-by-line and define the basis pursuant to the criteria of 10 CFR 2.390.

The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Michelle C. Honcharik, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosures: 1. Amendment No. 210 to DPR-46
2. Safety Evaluation with Non-proprietary Information
3. Safety Evaluation with Proprietary Information

Enclosure 3 transmitted herewith contains sensitivie unclassified information. When separated from Enclosure 3, this document is decontrolled.

cc w/encls: See next page

PROPRIETARY INFORMATION

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

February 1, 2005

SUBJECT: COOPER NUCLEAR STATION - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATION 2.1.1.2 FOR THE DUAL RECIRCULATION LOOP AND SINGLE RECIRCULATION LOOP SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) VALUES TO REFLECT RESULTS OF A CYCLE-SPECIFIC CALCULATION (TAC NO. MC4953)

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PROPRIETARY INFORMATION

NEBRASKA PUBLIC POWER DISTRICT

DOCKET NO. 50-298

COOPER NUCLEAR STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 210
License No. DPR-46

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Nebraska Public Power District (the licensee) dated October 25, 2004, as supplemented by letters dated December 29, 2004, and January 26, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.C.(2) of Facility Operating License No. DPR-46 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 210, are hereby incorporated in the license. The Nebraska Public Power District shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by M.Webb for A.Howe/

Allen G. Howe, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: February 1, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 210

FACILITY OPERATING LICENSE NO. DPR-46

DOCKET NO. 50-298

Replace the following page of the Appendix A Technical Specifications with the enclosed revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE	INSERT
2.0-1	2.0-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 210 TO

FACILITY OPERATING LICENSE NO. DPR-46

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By application dated October 25, 2004 (Reference 1), as supplemented by letters dated December 29, 2004, and January 26, 2005 (References 2 and 3), Nebraska Public Power District (NPPD or the licensee), requested changes to the Technical Specifications (TSs) for Cooper Nuclear Station (CNS). The supplements dated December 29, 2004, and January 26, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 23, 2004 (69 FR 68183).

The proposed changes would revise TS 2.1.1.2 for the dual recirculation loop and single recirculation loop safety limit (SL) minimum critical power ratio (MCPR) (SLMCPR) values to reflect results of a cycle-specific calculation performed by Global Nuclear Fuels (GNF) for CNS Cycle 23 operation.

2.0 REGULATORY EVALUATION

Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), Appendix A, General Design Criterion (GDC) 10 states, in part, that the reactor core and associated coolant, control, and protective system shall be designed to assure that the specified acceptable fuel design limits are not exceeded during any condition of normal operation and anticipated operational occurrences (AOOs). Additionally the Standard Review Plan (SRP) Section 4.4, “Thermal and Hydraulic Design,” states that the critical power ratio (CPR) is to be established such that at least 99.9% of the fuel rods in the core would not be expected to experience departure from nucleate boiling or boiling transition during normal operation or AOOs. The guidance provided within the SRP forms the basis of the NRC staff’s review and ensures that the criteria of GDC 10 are met.

Fuel design limits can be exceeded if the core exceeds critical power. Critical power is a term used for the power at which the fuel departs from nucleate boiling and enters a transition to film

boiling. For boiling water reactors (BWRs), the critical power is predicted using a correlation known as the General Electric (GE) critical quality boiling length correlation, better known as the GEXL correlation. Due to core-wide and operational variations, the margin to boiling transition is most easily described in terms of a CPR, which is defined as the rod critical power as calculated by GEXL, divided by the actual rod power. The more a CPR value exceeds 1.0, the greater the margin to boiling transition. The SLMCPR is calculated using a statistical process that takes into account all operating parameters and associated uncertainties. The operating limit MCPR (OLMCPR) is equal to the SLMCPR plus a CPR margin for transients. At the OLMCPR, at least 99.9 percent of the rods would be expected not to experience boiling transition during normal operation and transients caused by single operator error or equipment malfunction.

Safety limits are required to be included in the TS by 10 CFR 50.36. The SLMCPR is calculated on a cycle-specific basis, because it is necessary to account for the core configuration-specific neutronic and thermal-hydraulic response.

3.0 TECHNICAL EVALUATION

3.1 CNS Cycle 23 Core

CNS is a BWR/4 which has two forced recirculation loops. The licensee proposed to change the SLMCPR value in TS 2.1.1.2 from 1.09 to 1.12 for two-recirculation-loop operation, and from 1.11 to 1.13 for single-recirculation-loop operation with the reactor vessel steam dome pressure greater than or equal to 785 psig and core flow greater than or equal to 10 percent of rated core flow.

CNS Cycle 23 core loading consists of a total of 548 GE14 fuel bundles in the core. There will be 164 fresh fuel bundles, 128 once-burned fuel bundles, 120 twice-burned fuel bundles, and 136 thrice-burned fuel bundles.

3.2 Methodology

GNF performed the revised Cycle 23 SLMCPR limit calculation using the following Nuclear Regulatory Commission (NRC)-approved methodologies and uncertainties:

- NEDC-32601P "Methodology and Uncertainties for Safety Limit MCPR Evaluations" (Reference 4)
- NEDC-32694P "Power Distribution Uncertainties for Safety Limit MCPR Evaluations" (Reference 5)
- NEDE-24011-P-A "General Electric Standard Application for Reactor Fuel" (Reference 6)
- NECD-32505P-A "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel" (Reference 7)

- NEDO-10958-A "General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application" (Reference 8)

Plant-specific use of these methodologies must adhere to certain restrictions, as discussed in Section 3.3 of this safety evaluation (SE).

3.3 Methodology Restrictions

Based on the review of the Topical Reports (TRs) in References 4, 5 and 6, the NRC staff applied the following restrictions on the use of the TRs, in its letter dated March 11, 1999 (Reference 9):

(1) The TGBLA [lattice physics code] fuel rod power calculational uncertainty should be verified when applied to fuel designs not included in the benchmark comparisons of Table 3.1 of NEDC-32601P, since changes in fuel design can have a significant effect on calculation accuracy.

(2) The effect of the correlation of rod power calculation uncertainties should be reevaluated to insure the accuracy of R-Factor uncertainty when the methodology is applied to a new fuel lattice.

(3) In view of the importance of **[ ]** and its potential sensitivity to changes in fuel bundle designs, core loading and operating strategies, the **[ ]** should be reviewed periodically as part of the procedural review process to insure that the specific value recommended in NEDC-32601P is applicable to future designs and operating strategies.

(4) The 3D-MON ICORE bundle power calculational uncertainty should be verified when applied to fuel and core designs not included in the benchmark comparisons in Tables 3.1 and 3.2 of NEDC-32694P.

Data from GE14 fuel has not been used in the development of the approved methodologies, therefore, it is considered a change in fuel design and a new fuel in context of these four restrictions. There are also restrictions on NEDC-32505P-A when this methodology is applied to a new fuel, as discussed in Section 3.3.4 of this SE.

3.3.1 Restrictions (1) and (2)

In addressing restrictions (1) and (2) above, in the September 24, 2001, letter from GNF to the NRC (Reference 10), GNF stated that these uncertainties are dominated by geometrical considerations in which GE14 is identical to GE12; therefore, these uncertainties remain valid for GE14 fuel.

3.3.2 Restriction (3)

The NRC staff requested information demonstrating the validity of the criterion in restriction (3), **[ ]**, for GE14 fuel and the minimum core flow condition. See Section 3.6 of this SE. In GNF's response, they show the limiting versus the nominal rod patterns used in terms of **[ ]** for the 100 percent rated power at 100 percent, 93 percent (nominal operation) and 75 percent rated core flow for GE14 fuel for CNS Cycle 23. GNF shows that the **[ ]** for limiting rod patterns used for the SLMCPR determination are conservative in relation to the nominal rod patterns, and that the **[ ]** is still valid for the CNS Cycle 23 evaluations.

3.3.3 Restriction (4)

Restriction (4) refers specifically to use of the reduced power uncertainties as defined in NEDC-32694P. The licensee uses the higher, more conservative GETAB NECO-10958-A uncertainties in CNS Cycle 23 evaluations and, therefore, is not subject to this restriction.

3.3.4 Restrictions Related to the R-factor Methodology

For NEDC-32505P-A, Revision 1, the NRC staff imposed the specific restriction that "...if new fuel is introduced, GENE [GE Nuclear Energy] must confirm that the revised R-factor method is still valid based on new test data." **[**

]

The NRC staff finds that the licensee has adequately addressed the restrictions of the TRs in References 4 through 7, and that the use of these reports to evaluate the CNS Cycle 23 SLMCPR is acceptable.

3.4 Axial Power Shape Penalty Associated with GEXL14

[

] Based on GNF's conclusion, the NRC staff finds it acceptable that the licensee does not take any SLMCPR penalty associated with the presence of these power shapes. See Section 3.3.4 of this SE.

3.5 Uncertainties

The uncertainties used for the SLMCPR calculation for CNS Cycle 23 are listed in the following table.

SLMCPR Methodology Uncertainties	
Non-Power Distribution Uncertanties	Power Distribution Uncertainties
Feedwater system flow	GEXL R-factor
Feedwater temperature measurement	Random effective transverse in-core probe (TIP) reading
Reactor pressure measurement	Systematic effective TIP reading
Core inlet temperature measurement	Effective total bundle power uncertainty
Total core flow measurement	
Channel flow area variation	
Channel friction factor multiplier	
Channel to channel non-uniformity friction factor multiplier	

3.5.1 Non-power Distribution Uncertainties

CNS used the approved values from NEDC-32601P for the non-power distribution uncertainties, with the exception of the total core flow measurement uncertainty. The NRC staff finds the use of approved values applicable and, therefore, acceptable for CNS Cycle 23.

3.5.2 Total Core Flow Measurement Uncertainty

GNF increased the total core flow measurement uncertainty due to performing the SLMCPR evaluation at the 100 percent rated power / 75 percent rated flow instead of the 100 percent rated power / 100 percent rated flow statepoint (see Section 3.6 of this SE). GNF increased this value by the inverse of the core flow fraction. In response to the NRC staff's inquiries, GNF states that this increase is conservative based on the expectation that the variability in the absolute flow will decrease as flow decreases. GNF has decided to increase this uncertainty based on their historical precedent in which they increase this value when performing single loop operation (SLO) calculations. The NRC staff finds this conservative and acceptable for CNS Cycle 23.

3.5.3 Power Distribution Uncertainties

For the power distribution uncertainties, except for the GEXL R-Factor and the random effective TIP reading, GNF used uncertainties from GETAB NEDO-10958-A. Under NRC-approved methodologies, GNF is able to use either the reduced NEDC 32694P-A uncertainties or the

more conservative GETAB NEDO-10958-A. CNS has chosen to use the more conservative GETAB uncertainties. The NRC staff finds the use of approved values applicable and, therefore, acceptable for CNS Cycle 23.

3.5.4 R-Factor Uncertainty

The R-factor is an input into the GEXL correlation used to describe the local pin-by-pin power distribution and the fuel assembly and channel geometry on the fuel assembly critical power. The R-factor uncertainty analysis includes an allowance for power peaking modeling uncertainty, manufacturing uncertainty and channel bow uncertainty. GNF has increased this uncertainty for all SLMCPR calculations to account for the potential impact of control blade shadow corrosion-induced bow. The licensee stated that it has no evidence that CNS is experiencing control blade shadow corrosion-induced bow. However, GNF has decided to conservatively account for this effect in all SLMCPR evaluations, which would proactively account for this condition should it occur at a currently unaffected nuclear station.

The NRC staff finds that using the increased R-factor uncertainty is conservative. However, the NRC staff has not reviewed the adequacy of the increased value to account for the impact of control blade shadow corrosion-induced bow on CNS. Should CNS conclusively experience control blade shadow corrosion-induced bow, the licensee committed to submit to NRC for review, justification for the higher R-factor uncertainty.

3.5.5 Random Effective TIP Reading Uncertainty

GNF increased the random effective TIP reading uncertainty due to performing the SLMCPR evaluation at the 100 percent rated power / 75 percent rated flow instead of the 100 percent rated power / 100 percent rated flow statepoint (see Section 3.6 of this SE). GNF increased this value by the inverse of the core flow fraction. In response to the NRC staff's inquiries, GNF stated that there is no reason to believe that the uncertainty should increase as the core flow decreases for dual loop operation. GNF decided to increase this uncertainty based on their historical precedent in which they increase this value when performing SLO calculations. The NRC staff finds this conservative and acceptable for CNS Cycle 23.

3.6 Low-Flow Condition

On September 29, 2004, GNF submitted to the NRC a SLMCPR 10 CFR Part 21 Report, "Part 21 Final: Non-conservative SLMCPR," (MFN 04-108) (Reference 11). GNF and GENE determined that the current GNF process for determination of the SLMCPR can result in a non-conservative SLMCPR. In the approved methodologies, the SLMCPR is calculated at rated power/flow conditions. GNF discovered that it is possible that a lower flow condition at rated power can produce a more limiting (higher) SLMCPR value. In the instances where this concern was discovered, the control rod patterns used at the off-rated flow condition created a more limiting MCPR distribution than the control rod patterns used at 100 percent rated power / 100 percent rated flow. A flatter MCPR distribution produces a more limiting SLMCPR value because, at a given critical power, there would be a larger number of rods that would reach boiling transition.

CNS is one of the plants listed in the Part 21 Report as being affected by this off-rated flow condition. The Cycle 23 SLMCPR calculation was performed at both the minimum core flow (75 percent core flow) at rated power and at 100 percent core flow at rated power. The 75 percent core flow statepoint was the more limiting of the two SLMCPR evaluations.

GNF states that the rod patterns used to calculate the SLMCPR at 100 percent rated power / 75 percent rated flow produce a limiting MCPR distribution that reasonably bounds the MCPR distributions that would be expected during the operation of the CNS core throughout Cycle 23. Consequently, the SLMCPR value calculated from the limiting MCPR distribution reasonably bounds a SLMCPR value that would be obtained using any MCPR distribution obtained during the operation of CNS Cycle 23. The NRC staff accepts the licensee's assurance, based on the GNF analysis, that they will operate CNS with rod patterns that would result in an SLMCPR response that is bounded by the calculated SLMCPR value for the rated and off-rated conditions.

3.7 Technical Conclusion

The NRC staff accepts the licensee's proposed Cycle 23 SLMCPR values of 1.12 for two-recirculation-loop operation, and 1.13 for single-recirculation-loop operation for CNS Cycle 23. Based on the technical information provided by the licensee and the use of NRC-approved methodologies to perform the SLMCPR calculations, the NRC staff concludes that the increase in the Cycle 23 SLMCPR for CNS is acceptable.

4.0 REGULATORY COMMITMENT

In Reference 3, NPPD made the following regulatory commitment:

> Should CNS have conclusive evidence that control blade shadow corrosion-induced channel bow is occurring at a level that would cause the approved basis for the R-factor uncertainty to be exceeded, NPPD will submit to the NRC for review the justification that the higher R-factor is sufficiently conservative so as to not invalidate the SLMPCR value that constitutes the licensing basis.

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitment are best provided by the licensee's administrative processes, including its commitment management program. (See Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff"). The above regulatory commitment does not warrant the creation of regulatory requirements (items requiring prior NRC approval of subsequent changes).

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Nebraska State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding published November 23, 2004 (69 FR 68183). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

8.0 REFERENCES

1. Letter from R.K. Edington (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission dated October 25, 2004, "License Amendment Request to Revise Technical Specifications - Safety Limit Minimum Critical Power Ratio." ADAMS Accession No. ML043020453.

2. Letter from R.K. Edington (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission dated December 29, 2004, "Response to Request for Additional Information on License Amendment Request to Review Technical Specifications - Safety Limit Minimum Critical Power Ratio." ADAMS Accession No. ML050040254.

3. Letter from R.K. Edington (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission dated January 26, 2005, "Regulatory Commitment Related to Control Blade Shadow Corrosion-Induced Channel Bow." ADAMS Accession No. ML050310393.

4. General Electric Nuclear Energy Licensing Topical Report NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999. ADAMS Accession No. ML003740145.

5. General Electric Nuclear Energy Licensing Topical Report NEDC-32694P "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," August 1999. ADAMS Accession No. ML003740151.

6. Global Nuclear Fuels Licensing Topical Report NEDE-24011-P-A-14, "General Electric Standard Application for Reactor Fuel," June 2000. ADAMS Accession no. for package ML003724992, for transmittal letter ML03724977, for proprietary report ML003724986.

7. General Electric Nuclear Energy Licensing Topical Report NEDC-32505P-A, Revision 1, "R-Factor Calculation Method for GE11, GE12, and GE13 Fuel," July 1999.

8. General Electric Nuclear Energy Licensing Topical Report NEDO-10958-A "General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application," January 1977.

9. Letter, Frank Akstulewicz (NRC) to Glen A. Watford (GE), "Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, Methodology and Uncertainties for Safety Limit MCPR Evaluations, NEDC-32694P, Power Distribution Uncertainties for Safety Limit MCPR Evaluation; and Amendment 25 to NEDE-24011-P-A on Cycle-Specific Safety Limit MCPR," March 11, 1999. ADAMS Accession No. ML993140059.

10. Letter, G.A. Watford (GNF-A) to U.S. Nuclear Regulatory Commission Document Control Desk with attention to R. Pulsifier (NRC), "Confirmation of 10x10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-Factor Methodologies," FLN-2001-016, September 24, 2001. ADAMS Accession No. ML012710272.

11. Letter from J.S. Post (GENE), MFN 04-108 "Part 21 Final: Non-conservative SLMCPR," September 29, 2004. ADAMS Accession No. ML042780496.

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