PROPRIETARY INFORMATION

January 4, 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 - ISSUANCE OF AMENDMENT RE: REVISION TO TECHNICAL SPECIFICATION 2.1.1.2 FOR THE SINGLE LOOP OPERATION SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) (TAC NO. MC6346)

Dear Mr. Edington:

The Commission has issued the enclosed Amendment No. 215 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 March 8, 2005, as supplemented by letter dated August 18, 2005.

The amendment would revise TS 2.1.1.2 for the single recirculation loop SLMCPR value 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 nonproprietary 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/

Brian Benney, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosures:
1. Amendment No. 215 to DPR-46
2. Safety Evaluation with Nonproprietary 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

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ACCESSION NO: **ML060060145** *No substantive changes

OFFICE	NRR/LPL2-1/PE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/SNPB/BC	OGC	NRR/LPL4/BC
NAME	DDuvigneaud	BBenney	LFeizollahi	FAkstulewicz	MSpencer	DTerao
DATE	12/13/2005	01 / 04 /2006	01 /03 /2006	09/22/2005*	12/21/2005	01 /04 /2006

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PROPRIETARY INFORMATION

NEBRASKA PUBLIC POWER DISTRICT

DOCKET NO. 50-298

COOPER NUCLEAR STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 215
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 March 8, 2005, as supplemented by letter dated August 18, 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. 215, 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/

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

Attachment: Changes to the Technical Specifications

Date of Issuance: January 4, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 215

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 an 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. 215 TO

FACILITY OPERATING LICENSE NO. DPR-46

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated March 8, 2005 (Reference 1), and supplemented by letter dated August 18, 2005 (Reference 2), Nebraska Public Power District (the licensee) proposed an amendment to change the Technical Specifications (TS) for Cooper Nuclear Station (CNS). The licensee proposed revision to the previously approved single loop operation (SLO) safety limit minimum critical power ratio (SLMCPR) values in TS Section 2.1.1.2. The changes are due to differences in the predicted and actual end-of-cycle burnup in Cycle 22 which affected the previously approved cycle-specific analysis performed by Global Nuclear Fuel (GNF) for CNS Cycle 23 operation. The calculated dual-loop operation (DLO) SLMCPR limit actually increased as well in the third decimal place, however a TS change was not needed since the licensee rounded up, and the previously approved value of 1.12 is still bounding. In Reference 1 the licensee states that "no changes were made in the methodology or uncertainties that were used in the original [Cycle 23] analysis." The supplement dated August 18, 2005, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the Federal Register on March 29, 2005 (70 FR 15944).

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) for Nuclear Power Plants, NUREG-0800, Section 4.4, "Thermal and Hydraulic Design," states that the critical power ratio (CPR) is to be established such that at least 99.9 percent 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 Nuclear Regulatory Commission (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 GE (General Electric) 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 is the margin to boiling transition. The SLMCPR is calculated using a statistical process that takes into account 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 avoid boiling transition during steady-state 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. For SLO, the licensee proposed to change the SLMCPR value in TS 2.1.1.2 from 1.13 to 1.14 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 548 GE 14 fuel bundles total 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 NRC-approved methodologies and uncertainties. These are:

- NEDC-32601P-A, “Methodology and Uncertainties for Safety Limit MCPR Evaluations” (Reference 3)
- NEDE-24011-P-A-14, “General Electric Standard Application for Reactor Fuel” (Reference 4)
- NEDC-32505P-A, Revision 1, “R-Factor Calculation Method for GE11, GE12 and GE13 Fuel” (Reference 5)
- NEDO-10958-A, “General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application” (Reference 6)

Plant-specific use of these methodologies must adhere to certain restrictions.

GNF calculates the SLO SLMCPR limit by increasing certain uncertainties on the dual loop operation (DLO) SLMCPR calculation to account for the lower flow associated with single loop operations.

3.3 Methodology Restrictions

Based on the review of the Topical Reports (TRs) in References 3 and 4, the NRC staff applied the following restrictions on the use of the TRs in its letter dated March 11, 1999 (Reference 7):

1. The TGBLA [Toshiba GE Bundle Lattice Analysis] 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[three-dimensional]-MONICORE 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 (Reference 5) when this methodology is applied to a new fuel. These restrictions will be considered in Section 3.3.4.

3.3.1 Restrictions (1) and (2)

Restrictions (1) and (2) are addressed in a letter from GNF to the NRC "Confirmation of 10x10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-Factor Methodologies," dated September 24, 2001 (Reference 8). GNF states that these uncertainties are dominated by geometrical considerations in which GE14 is identical to GE12 and, therefore, these uncertainties remain valid for GE14 fuel.

3.3.2 Restriction (3)

As part of the review of the previous Cycle 23 SLMCPR amendment dated October 25, 2004 (Reference 9), 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 safety evaluation (SE)). In GNF's response (Reference 10), 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's Cycle 23. GNF shows that the **[ ]** for limiting rod patterns used for the SLMCPR determination is conservative in relation to that of nominal rod pattens and that the **[ ]** is still valid for the CNS Cycle 23 evaluations. In Reference 1, GNF shows that with the more accurate burnup the **[ ]** increased slightly, however, the **[ ]** used in the SLMCPR limit calculation is still conservative in relation to that used for the nominal rod patterns in CNS Cycle 23 evaluations.

3.3.3 Restriction (4)

Restriction (4) refers specifically to use of reduced power uncertainties as defined in NEDC-32694P. The licensee uses the higher and 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 (Reference 5), 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 Topical Reports NEDC-32601P-A, NEDC-32694P-A, Amendment 25 to NEDC-24011-P-A (GESTAR II) and NEDC-32505P-A, and that the use of these reports to evaluate the CNS Cycle 23 SLMCPR is acceptable.

3.4 Axial Power Shape Penalty Associated with GEXL 14

[

] 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).

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 Uncertainties	**Power Distribution Uncertainties**
Feedwater system flow	GEXL R-factor
Feedwater temperature measurement	Random effective transversing 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 (Reference 3) 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's Cycle 23 SLMCPR evaluation.

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 Reference 10, GNF stated that this increase is conservative based on the expectation that the variability in the absolute flow will decrease as flow decreases. GNF decided to increase this uncertainty based on their historical practice of increasing this value when performing SLO calculations. The NRC staff finds this conservative and acceptable for CNS's Cycle 23 SLMCPR evaluation.

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's Cycle 23 SLO SLMCPR evaluation.

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 effect of 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 for 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. During the review of the previous Cycle 23 SLMCPR amendment the licensee committed in Reference 10 to submit to NRC for review, justification for the higher R-factor uncertainty should CNS conclusively experience control blade shadow corrosion-induced bow.

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). GNF increased this value by the inverse of the core flow fraction. During the review of the previous Cycle 23 SLMCPR amendment, GNF stated in Reference 10 that there is no reason to believe that the uncertainty should increase as the core flow decreases for DLO. GNF decided to increase this uncertainty based on their historical practice of increasing this value when performing SLO calculations. The NRC staff finds this conservative and acceptable for the CNS Cycle 23 SLMCPR evaluation.

3.6 Low-Flow Condition

GNF documented a potential non-conservatism in their SLMCPR methodology in a 10 CFR Part 21 Report, "Part 21 Final Report: Non-conservative SLMCPR," [MFN 04-108] dated September 29, 2004 (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 minimum critical power ratio (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 Part 21 as 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.

The currently approved SLMCPR methodology does not identify the limiting rod patterns that would be selected in calculating the SLMCPR at the minimum core flow statepoints at rated power. The licensee stated in Reference 11 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 Cooper Cycle 23. The NRC staff accepts the licensee's assurance 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 Conclusion

The NRC staff finds the licensee's proposed SLO SLMCPR value of 1.14 acceptable for CNS Cycle 23. Based on the technical information provided by the licensee, the use of NRC-approved methodologies to perform the SLMCPR calculation, and the licensee's conservative increase in uncertainties, the NRC staff concludes that the increase in the Cycle 23 SLO SLMCPR is acceptable.

4.0 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.

5.0 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 March 29, 2005 (70 FR 15944). 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.

6.0 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.

7.0 REFERENCES

1. Letter from S. B. Minahan (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission Dated March 8, 2005, “License Amendment Request to Revise Technical Specifications - Single Loop Operation Safety Limit Minimum Critical Power Ratio;” Cooper Nuclear Station, Docket 50-298, DPR-46 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML050750167).

2. Letter from R.K. Edington (Nebraska Public Power District) to U.S. Nuclear Regulatory Commission Dated August 18, 2005, “Response to U.S. Nuclear Regulatory Commission Request for Additional Information Regarding License Amendment to Revise Technical Specifications - Single Loop Operation Safety Limit Minimum Critical Power Ratio (TAC No. MC6346);” Cooper Nuclear Station, Docket 50-298, DPR-46 (ADAMS Accession No. ML052370342).

3. General Electric Nuclear Energy Licensing Topical Report NEDC-32601P-A, “Methodology and Uncertainties for Safety Limit MCPR Evaluations,” August 1999.

4. Global Nuclear Fuels Licensing Topical Report NEDE-24011-P-A-14, “General Electric Standard Application for Reactor Fuel,” June 2000.

5. General Electric Nuclear Energy Licensing Topical Report NEDC-32505P-A, Revision 1, “R-Factor Calculation Method for GE11, GE12, and GE13 Fuel,” January 1999.

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

7. 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.

8. 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.

9. 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;” Cooper Nuclear Station, Docket 50-298, DPR-46.

10. 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,” Cooper Nuclear Station, Docket No 50-298, DPR-46.

11. Letter from J.S. Post (GE), MFN 04-108, “Part 21 Final Report: Non-Conservative SLMCPR,” September 29, 2004.

Principal Contributor: V. Klein

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