Nebraska Public Power District
Always there when you need us

50.90

NLS2012040
May 30, 2012

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: License Amendment Request to Revise Technical Specifications - Safety Limit Minimum Critical Power Ratio
Cooper Nuclear Station, Docket 50-298, DPR-46

Dear Sir or Madam:

Pursuant to 10 CFR 50.90 and 50.4, Nebraska Public Power District (NPPD) requests an amendment to Renewed Facility Operating License DPR-46 to revise the Cooper Nuclear Station (CNS) Technical Specifications (TS). This proposed change to TS Section 2.0, Safety Limits, will revise two recirculation loop and single recirculation loop Safety Limit Minimum Critical Power Ratio (SLMCPR) values to reflect results of a cycle specific calculation. NPPD has concluded that the proposed changes do not involve a significant hazards consideration and that they satisfy the categorical exclusion criteria of 10 CFR 51.22(c).

NPPD requests Nuclear Regulatory Commission (NRC) approval of the proposed TS change and issuance of the requested license amendment by October 10, 2012. This change is needed to ensure unrestricted full power operation for the up-coming operating cycle (Cycle 28) which is scheduled to start November 9, 2012 following Refuel Outage RE27. Further, the core for the next operating cycle is being designed based on these requested values of SLMCPR. Once approved, the amendment will be implemented prior to startup from RE27.

Attachment 1 provides a description of the TS change, the basis for the amendment, the no significant hazards consideration evaluation pursuant to 10 CFR 50.91(a)(1), and the environmental impact evaluation pursuant to 10 CFR 51.22. Attachment 2 provides the proposed changes to the current CNS TS in marked up format. Attachment 3 provides the final typed TS pages to be issued with the amendment. No Bases pages are affected by this amendment request. No formal regulatory commitments are being made by this submittal.

This proposed change is supported by a report prepared by Global Nuclear Fuel - Americas (GNF-A). This report contains information considered by GNF-A to be proprietary as described in 10 CFR 2.390(a)(4). Specific proprietary text is enclosed within double brackets. It is requested that this information be withheld from public disclosure. The proprietary and non-proprietary versions of the GNF-A report are included as Enclosures 1 and 2, respectively. An affidavit executed by an official of GNF-A requesting withholding from public disclosure in accordance with 10 CFR 2.390(b)(1) is provided as Enclosure 3.

This proposed change is also supported by a report prepared by Studsvik Scandpower, Inc (SSP). This report contains information considered by SSP to be proprietary as described in 10 CFR 2.390(a)(4). Specific proprietary text is enclosed within double brackets. It is requested that this information be withheld from public disclosure. The proprietary and non-proprietary versions of the SSP report are included as Enclosures 4 and 5, respectively. An affidavit executed by an official of SSP requesting withholding from public disclosure in accordance with 10 CFR 2.390(b)(1) is provided as Enclosure 6.

This proposed TS change has been reviewed by the necessary safety review committees (Station Operations Review Committee and Safety Review and Audit Board). Amendments to the CNS Facility Operating License through Amendment 241, issued February 16, 2012, have been incorporated into this request. This request is submitted under affirmation pursuant to 10 CFR 50.30(b).

By copy of this letter and its attachments and enclosures, the appropriate State of Nebraska official is notified in accordance with 10 CFR 50.91(b)(1). Copies to the NRC Region IV office and the CNS Resident Inspector are also being provided in accordance with 10 CFR 50.4(b)(1).

Should you have any questions concerning this matter, please contact Mr. David Van Der Kamp, Licensing Manager, at (402) 825-2904.

I declare under penalty of perjury that the foregoing is true and correct.

Executed On: May 30 2012
Date

Sincerely,

Brian J. O'Grady
Vice President Nuclear and
Chief Nuclear Officer

/em

Attachments: 1. License Amendment Request to Revise Technical Specifications Safety Limit Minimum Critical Power Ratio
2. Proposed Technical Specifications Revisions – Markup Format
3. Proposed Technical Specifications Revisions – Final Typed Format

Enclosures:
1. GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR – Cooper Cycle 28 (GNF-A Report No. S-0000-0140-2518-R0-P) Proprietary Version
2. GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR – Cooper Cycle 28 (GNF-A Report No. S-0000-0140-2518-R0-NP) Non-Proprietary Version
3. 10 CFR 2.390 Affidavit from Global Nuclear Fuels - Americas
4. Studsvik Scandpower Report, GARDEL BWR – Cooper Nuclear Station Power Distribution Uncertainties (Report No. SSP-07/405-C, Rev. 0) Proprietary Version
5. Studsvik Scandpower Report, GARDEL BWR – Cooper Nuclear Station Power Distribution Uncertainties (Report No. SSP-07/405-C, Rev. 1) Non-Proprietary Version
6. 10 CFR 2.390 Affidavit from Studsvik Scandpower, Incorporated

cc: Regional Administrator w/ attachments and enclosures
USNRC - Region IV

Cooper Project Manager w/ attachments and enclosures
USNRC – NRR Project Directorate IV-1

Senior Resident Inspector w/ attachments and enclosures
USNRC – CNS

Nebraska Health and Human Services w/ attachments and enclosures
Department of Regulation and Licensure

NPG Distribution w/o attachments or enclosures

CNS Records w/ attachments and enclosures

ATTACHMENT 1

License Amendment Request to Revise Technical Specifications Safety Limit Minimum Critical Power Ratio

Cooper Nuclear Station, NRC Docket 50-298, License DPR-46

<u>Revised Technical Specification Page</u>

2.0-1

1.0 SUMMARY DESCRIPTION

This letter is a request for amendment of Renewed Operating License DPR-46 for Cooper Nuclear Station (CNS). The proposed change is to revise the value of the Safety Limit Minimum Critical Power Ratio (SLMCPR) for two recirculation loop operation (TLO) and for single recirculation loop operation (SLO) in Technical Specification (TS) 2.1.1.2 based on analysis performed for CNS operation in Cycle 28.

CNS requests approval of this license amendment request (LAR) by October 10, 2012. Once approved, the amendment will be implemented prior to plant startup from refuel outage RE27.

2.0 DETAILED DESCRIPTION

The following revisions are proposed to TS Section 2.1.1.2.

2.1 Proposed Change

This LAR proposes to revise the Safety Limit (SL) in TS 2.1.1.2 by changing the value of Minimum Critical Power Ratio (MCPR) for TLO from ≥ 1.10 to ≥ 1.11 and the value of MCPR for SLO from ≥ 1.12 to ≥ 1.13.

2.2 Need for Change

This change is being proposed in order to ensure unrestricted full power operation of CNS during the up-coming Operating Cycle 28. The reactor core for Operating Cycle 28 is being designed based on these requested values of SLMCPR. As a result, these values will be bounding for Cycle 28, scheduled to begin November 9, 2012.

2.3 Bases Changes

No changes to the associated Bases are needed.

3.0 TECHNICAL EVALUATION

3.1 System Description

CNS is a boiling water reactor (BWR) of General Electric BWR4 design, with a Mark 1 containment. The design of the BWR core and fuel is based on a proper combination of design variables, such as moderator-to-fuel volume ratio, core power density, thermal-hydraulic characteristics, fuel exposure level, nuclear characteristics of the core and fuel, heat transfer, flow distribution, void content, bundle power, and operating pressure. The CNS Cycle 28 core has 180 GNF2 and 368 GE14 fuel assemblies, and will be licensed by approval of the Cycle 28 Core Operating Limits Report (COLR). Cycle 28 is scheduled to end the middle of November 2014.

3.2 Updated Safety Analysis Report (USAR) Safety Design Basis

The safety design basis provided in USAR Section III-7 is that the thermal hydraulic design of the core shall establish a thermal hydraulic safety limit for use in evaluating the safety margin relating the consequences of fuel barrier failure to public safety. To ensure that adequate margin is maintained, a design requirement based on a statistical analysis was selected as follows. Moderate frequency transients caused by a single operator error or equipment malfunction shall be limited such that, considering uncertainties in manufacturing and monitoring the core operating state, at least 99.9% of the fuel rods would be expected to avoid boiling transition. The lowest allowable transient MCPR limit which meets the design requirement is termed the fuel cladding integrity SLMCPR.

A plant unique operating limit MCPR (OLMCPR) is established to provide adequate assurance that the fuel cladding integrity SLMCPR is not exceeded for any anticipated operational transients. The OLMCPR is obtained by adding the maximum delta critical power ratio (ΔCPR) value for the most limiting transient postulated to occur at the plant to the fuel cladding integrity SLMCPR. Cycle specific ΔCPR values are determined as part of the reload analysis and are reported in the Supplemental Reload Licensing Report.

3.3 Current TS Bases

The fuel cladding integrity SL is set such that no significant fuel damage is calculated to occur if the limit is not violated. Since the parameters that result in fuel damage are not directly observable during reactor operation, the thermal and hydraulic conditions that result in the onset of transition boiling have been used to mark the beginning of the region in which fuel damage could occur. Although it is recognized that the onset of transition boiling would not result in damage to BWR fuel rods, the critical power at which boiling transition is calculated to occur has been adopted as a convenient limit. However, the uncertainties in monitoring the core operating state and in the procedures used to calculate the critical power result in an uncertainty in the value of the critical power. Therefore, the fuel cladding integrity SL is defined as the critical power ratio in the limiting fuel assembly for which more than 99.9% of the fuel rods in the core are expected to avoid boiling transition, considering the power distribution within the core and all uncertainties.

The MCPR SL is determined using a statistical model that combines all the uncertainties in operating parameters and the procedures used to calculate critical power. The probability of the occurrence of boiling transition is determined using the approved General Electric Critical Power correlations. Details of the fuel cladding integrity SL calculation are given in Reference 1 [NEDE-24011-P-A, General Electric Standard Application for Reactor Fuel, (Revision specified in the COLR)]. Reference 1 also includes a tabulation of the uncertainties used in the determination of the MCPR SL and of the nominal values of the parameters used in the MCPR SL statistical analysis.

3.4 Analytical Methods, Standards, Data & Results

Analyses have been performed which show that at least 99.9% of the fuel rods in the core are expected to avoid boiling transition (and, therefore, cladding damage due to overheating) if the MCPR is equal to or greater than the fuel cladding integrity SLMCPR.

The proposed changes to the SLMCPR values are based on an analysis by Global Nuclear Fuels - Americas (GNF-A) for CNS Cycle 28 operations. The GNF-A report, S-0000-0140-2518-R0-P, "GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR," dated April 25, 2012, supports changing the TLO value of SLMCPR from 1.10 to 1.11, and the SLO value of SLMCPR from 1.12 to 1.13. These values are based on Nuclear Regulatory Commission (NRC) approved methods and procedures. Proprietary and non-proprietary versions of the GNF-A report are included as Enclosures 1 and 2, respectively.

The GNF-A analyses include an uncertainty to account for an increase in channel bow due to control blade shadow corrosion-induced channel bow. CNS has not experienced channel bow. The current practice at CNS is to place a new fuel channel on each fresh fuel assembly when it is initially loaded into the core. In accordance with this practice, a new fuel channel is placed on each fresh fuel assembly that will be loaded into the core for Cycle 28. Current procedures require installation of new fuel channels on new fuel assemblies. These procedures will ensure that a new fuel channel is installed on the new fuel assemblies that will be loaded into the core for Cycle 28, and for subsequent cycles.

The uncertainties in the adaptive relative power distribution were evaluated by Studsvik Scandpower (SSP). The methodology used for this evaluation and the results are described in the report SSP-07/405-C, "GARDEL BWR – Cooper Nuclear Station Power Distribution Uncertainties," Revision 0, dated February 5, 2007. Proprietary and non-proprietary versions of the SSP report are included as Enclosures 4 and 5, respectively.

3.5 Technical Justification of Proposed Changes

The required information to justify this requested change to the SLMCPR values is provided in the GNF-A and SSP reports.

3.6 Precedent Applicability

The precedent discussed in Section 4.2 below is directly applicable to CNS, because it is the previous CNS SLMCPR LAR submittal.

3.7 Conclusion

In summary, the proposed change is technically sound and continues to maintain the same level of safety as the current licensing basis.

4.0 REGULATORY SAFETY ANALYSIS

4.1 Applicable Regulatory Requirements/Criteria

4.1.1 Appendix A to 10 CFR 50, General Design Criteria for Nuclear Power Plants.

General Design Criterion (GDC) 10, Reactor Design, from Section II, *Protection by Multiple Fission Product Barriers*, states:

> *"The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences."*

The fuel cladding must not sustain damage as a result of normal operation and abnormal operational transients. The reactor core safety limits are established to preclude violation of the fuel design criterion such that at least 99.9% of the fuel rods in the core would not be expected to experience the onset of transition boiling.

As part of a reload core design, cycle specific transient analyses are performed to determine the required SLMCPR and the change in Critical Power Ratio (CPR) [ΔCPR] for specific transients. To ensure that adequate margin is maintained, a design requirement based on a statistical analysis was selected, in that moderate frequency transients caused by a single operator error or equipment malfunction shall be limited such that, considering uncertainties in manufacturing and monitoring the core operating state, at least 99.9% of the fuel rods would be expected to avoid boiling transition. The lowest allowable transient MCPR limit which meets the design requirement is termed the fuel cladding integrity SLMCPR.

NUREG-0800, Standard Review Plan, Section 4.4, "Thermal and Hydraulic Design," Acceptance Criterion No. 1.B, states, in part, that the limiting (minimum) value of 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 during normal operation or anticipated operational occurrences.

A plant unique operating limit MCPR (OLMCPR) is established to provide adequate assurance that the fuel cladding integrity SLMCPR is not exceeded for any anticipated operational transients. The OLMCPR is obtained by adding the maximum value of ΔCPR for the most limiting transient postulated to occur at the plant to the fuel cladding integrity SLMCPR.

4.1.2 CNS USAR Appendix F

CNS was designed and constructed to meet the intent of the 70 General Design Criteria (GDC) issued by the Atomic Energy Commission (AEC), as originally proposed in July 1967. These GDCs constitute the licensing basis for CNS, except where specific commitments have been made to the 1971 GDCs. The AEC conducted their technical review of the CNS design against the 1971 GDC, and concluded that the CNS design conforms to the intent of the 1971 GDCs.

The 1967 Proposed GDC and CNS conformance with the criteria are discussed in Appendix F of the CNS USAR. Group II of the 1967 Proposed GDC is titled Protection by Multiple Fission Product Barriers. Criterion 6, of Group II, is titled Reactor Core Design. This criterion states:

> *"The reactor core shall be designed to function throughout its design lifetime, without exceeding acceptable fuel damage limits which have been stipulated and justified. The core design, together with reliable process and decay heat removal systems shall provide for this capability under all expected conditions of normal operation with appropriate margins for uncertainties and for transient situations which can be anticipated, including the effects of the loss of power to recirculation pumps, tripping out of a turbine generator set, isolation of the reactor from its primary heat sink, and loss of all offsite power."*

The equivalent criterion from the 1971 GDC, 10 CFR 50 Appendix A, is Criterion 10, Reactor Design. Using the sum of the maximum ΔCPR and cycle specific SLMCPR to determine the OLMCPR preserves compliance with Criterion 6 of the CNS USAR Appendix F, and the equivalent GDC 10. CNS continues to meet Criterion 6 from the CNS USAR Appendix F.

4.2 Precedent

CNS submitted a LAR to revise TS SLMCPR in letter NLS2007032 dated August 10, 2007. This request was approved and the TS was changed in Amendment 229 to the CNS license dated February 14, 2008.

4.3 No Significant Hazards Consideration

10 CFR 50.91(a)(1) requires that licensee requests for operating license amendments be accompanied by an evaluation of significant hazard posed by issuance of an amendment. Nebraska Public Power District (NPPD) has evaluated this proposed amendment with respect to the criteria given in 10 CFR 50.92(c).

The proposed change would revise the Cooper Nuclear Station (CNS) Operating License by increasing the values of the Safety Limit Minimum Critical Power Ratio (SLMCPR) for two recirculation loop operation (TLO) and for single recirculation loop operation (SLO) in Technical Specification 2.1.1.2. The TLO value of SLMCPR is increased from 1.10 to 1.11 and the SLO value of SLMCPR is increased from 1.12 to 1.13. The revised values of SLMCPR are based on analyses performed by Global Nuclear Fuels – Americas (GNF-A) to determine the SLMCPR for the current operating cycle, as supported by analyses performed by Studsvik Scandpower (SSP).

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

Four accidents have been evaluated previously as reflected in the CNS Updated Safety Analysis Report (USAR). These four accidents are (1) loss-of-coolant, (2) control rod drop, (3) main steam line break, and (4) fuel handling. The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. Changing the SLMCPR values does not increase the probability of an evaluated accident. The change does not require any physical modifications to the plant or any components, nor does it require a change in plant operation. Therefore, no individual precursors of an accident are affected.

The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. This proposed change makes no modification to the design or operation of the systems that are used in mitigation of accidents. Limits have been established, consistent with Nuclear Regulatory Commission (NRC) approved methods, to ensure that fuel performance during normal, transient, and accident conditions is acceptable. The proposed change to the values of the SLMCPR continues to conservatively establish this safety limit such that the fuel is protected during normal operation and during any plant transients or anticipated operational occurrences.

Based on the above, NPPD concludes that the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?**

   Response: No.

   Creation of the possibility of a new or different kind of accident from an accident previously evaluated would require creation of precursors of that accident. New accident precursors may be created by modification of the plant configuration or changes in how the plant is operated. The proposed change does not involve a modification of the plant configuration or in how the plant is operated. The proposed change to the SLMCPR values assures that safety criteria are maintained.

   Based on the above, NPPD concludes that the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Do the proposed changes involve a significant reduction in a margin of safety?**

   Response: No.

   The values of the proposed SLMCPR provides a margin of safety by ensuring that no more than 0.1% of fuel rods are expected to be in boiling transition if the Minimum Critical Power Ratio limit is not violated. The proposed change will ensure the appropriate level of fuel protection is maintained. Additionally, operational limits are established based on the proposed SLMCPR to ensure that the SLMCPR is not violated during all modes of operation. This will ensure that the fuel design safety criteria are met (i.e., that at least 99.9% of the fuel rods do not experience transition boiling during normal operation as well as anticipated operational occurrences).

   Based on the above, NPPD concludes that the proposed changes do not involve a significant reduction in a margin of safety.

From the discussions above, NPPD concludes that the proposed amendment involves no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (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.

5.0 ENVIRONMENTAL CONSIDERATION

10 CFR 51.22(c) provides categories of actions which are categorical exclusions from performing an environmental assessment. An action which is a categorical exclusion does not require an environmental assessment or an environmental impact statement. 10 CFR 51.22(c)(9) allows as a categorical exclusion issuance of an amendment to a license for a reactor pursuant to 10 CFR Part 50 provided that (1) the amendment involves no significant hazards consideration, (2) there is no significant change in the types or significant increase in the amounts of any effluents that may be released off-site, and (3) there is no significant increase in individual or cumulative occupational radiation exposure.

NPPD has reviewed the proposed license amendment and concludes that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with issuance of the proposed license changes. The basis for this determination is as follows:

1. The proposed license amendment does not involve significant hazards as described previously in the No Significant Hazards Consideration Evaluation.

2. The proposed license amendment does not introduce any new equipment, nor does it require any existing equipment or systems to perform a different type of function than they are presently designed to perform. NPPD has concluded that this proposed change does not result in a significant change in the types or significant increase in the amounts of any effluents that may be released off-site.

3. The proposed changes do not adversely affect plant systems or operation and therefore, do not significantly increase individual or cumulative occupational radiation exposure beyond that already associated with normal operation.

6.0 REFERENCES

6.1 NEDE-24011-P-A, General Electric Standard Application for Reactor Fuel (Revision specified in COLR).

6.2 NEDC-32601P-A, Methodology and Uncertainties for Safety Limit MCPR Evaluations (August 1999).

6.3 NEDC-32694P-A, Power Distribution Uncertainties for Safety Limit MCPR Evaluations (August 1999).

6.4 NEDO-10958-A, General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation, and Design Application (January 1977).

ATTACHMENT 2

Proposed Technical Specifications Revisions – Markup Format

Cooper Nuclear Station
NRC Docket 50-298, License DPR-46

Revised Technical Specification Page

2.0-1

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ ~~1.10~~ 1.11 for two recirculation loop operation or ≥ ~~1.12~~ 1.13 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1337 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

ATTACHMENT 3

Proposed Technical Specifications Revisions – Final Typed Format

Cooper Nuclear Station
NRC Docket 50-298, License DPR-46

Revised Technical Specification Page

2.0-1

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ 1.11 for two recirculation loop operation or ≥ 1.13 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1337 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.