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NLS2004168
December 29, 2004

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

Subject: Response to Request for Additional Information on License Amendment Request to Review Technical Specifications - Safety Limit Minimum Critical Power Ratio. Cooper Nuclear Station, Docket 50-298, DPR-46

Reference:
1. Letter to R.K. Edington (Nebraska Public Power District) From M.C. Honcharik (Nuclear Regulatory Commission) dated December 3, 2004, "Cooper Nuclear Station - Request for Additional Information on License Amendment Request to Review Technical Specifications (TS) - Safety Limit Minimum Critical Power Ratio (SLMCPR)" (TAC NO. MC4953)

2. Letter to U.S. Nuclear Regulatory Commission from Randall K. Edington (Nebraska Public Power District) dated October 25, 2004, "License Amendment Request to Revise Technical Specifications - Safety Limit Minimum Critical Power Ratio" (NLS2004099)

The purpose of this letter is to respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) provided in Reference 1. This RAI refers to information previously provided in Reference 2. The RAI questions and answers are included in Enclosure 1 and contain proprietary information belonging to Global Nuclear Fuel - America (GNF) as described in 10 CFR 2.390(a)(4). The proprietary information in both the questions and answers are included within double brackets. It is requested that this information be withheld from public disclosure. The affidavit required by 10 CFR 2.390(b)(1) is provided as Enclosure 2. A non-proprietary version of Enclosure 1 for public disclosure is provided as Enclosure 3. The RAI response contains no commitments.

This RAI response does not change the original submittal or the answers to the No Significant Hazards Consideration questions.

This response is submitted under oath pursuant to 10 CFR 50.30(b). By copy of this letter and its attachment and Enclosures, the appropriate State of Nebraska official is notified in accordance with 10 CFR 50.91(b)(1). Copies are being provided to the NRC Region IV office and the Cooper Nuclear Station Resident Inspector in accordance with 10 CFR 50.4(b)(1).

A P01

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Should you have any questions concerning this matter, please contact Mr. Paul Fleming at (402) 825-2774.

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

Executed On: 29 Dec 04
Date

Stewart B. Minahan
General Manager of Plant Operations

/cb

Attachment
Enclosures

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

Senior Project Manager w/ attachment and enclosures
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachment and enclosures
USNRC

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

NPG Distribution w/o attachment or enclosures

Records w/ attachment and enclosures

Correspondence Number: NLS2004168

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	

ENCLOSURE 2

AFFIDAVIT

COOPER NUCLEAR STATION
DOCKET 50-298, LICENSE DPR-46

Affidavit

I, Margaret E. Harding, state as follows:

(1) I am Manager, Fuel Engineering Services, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in the attachment, "RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ISSUES RELATED TO REVISION OF TECHNICAL SPECIFICATIONS SAFETY LIMIT MINIMUM CRITICAL POWER RATIO NEBRASKA PUBLIC POWER DISTRICT COOPER NUCLEAR STATION DOCKET NO. 50-298," December 18, 2004. GNF proprietary information is indicated by enclosing it in double brackets. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b., above.

(5) To address the 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC–approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A or its licensor.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 20th day of December, 2004.

Margaret E. Harding

Margaret E. Harding
Global Nuclear Fuel – Americas, LLC

ENCLOSURE 3

NRC Request for Additional Information
Relating to Revision of Technical Specifications
Safety Limit Minimum Critical Power Ratio

NON-PROPRIETARY VERSION

COOPER NUCLEAR STATION
DOCKET 50-298, LICENSE DPR-46

December 18, 2004

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

ISSUES RELATED TO REVISION OF TECHNICAL SPECIFICATIONS

SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

Proprietary Information Notice

This document is the GNF non-proprietary version of the GNF proprietary document. From the GNF proprietary version, the information denoted as GNF proprietary (enclosed in double brackets) was deleted to generate this version.

1. Enclosure 1 of the October 25, 2004, submittal shows an increase in the GEXL R-factor from [[ ]] State whether or not Cooper Nuclear Station (CNS) is experiencing or has recently experienced channel bow as discussed in the GNF-A Part 21 report (MFN-03-045, ADAMS Accession No. ML033280519). If so, provide the technical justification supporting the change in the R-factor from [[ ]] Use sufficient details for the staff to determine if the amount of the increase provides an adequate safety limit minimum critical power ratio (SLMCPR) margin to mitigate the consequences of channel bow. If CNS has not experienced any channel bow, NPPD may instead provide confirmation that they would submit an amendment request with the technical justification supporting the change in the R-factor from [[ ]] at the time that CNS experiences channel bow.

Response:

The approved R-factor uncertainty of [[ ]] already accounts for up to [[ ]] channel bow averaged for the core. The basis for determining the R-factor uncertainty has been extensively reviewed by the NRC staff as indicated by the following questions and their associated responses in NEDC-32601P-A: (1) questions 1-5 in section II on pages A-8 through A-10; (2) questions 10-13 on pages A-14 through A-17; (3) question II.5 on pages B-6 and B-7; (4) question II.13 on pages B-10 through B-12; (4) all of Appendices C, D and E. The NRC staff has stated that they have an issue with the basis for increasing the R-factor uncertainty to [[ ]] to account for potential increases in channel bow since the calculation performed by GNF-A has not been explicitly reviewed and approved by the NRC. GNF-A contends that such approval is not required since the approved methodology for calculating the uncertainty value has not changed and that the NRC SER explicitly allows and even requires higher, more conservative uncertainty values to be used when necessary. GNF-A has decided to conservatively account for the potential for control blade shadow corrosion-induced channel bow in all SLMCPR evaluations even though this type of channel bow mechanism has been observed in only some C-lattice and some S-lattice BWRs. This proactive stance accounts for possible increases in the R-factor uncertainty in the licensing basis should control blade shadow corrosion-induced channel bow occur in a BWR that is currently not experiencing this phenomena. NPPD concurs with the GNF-A decision.

Cooper is a D-lattice BWR-4 operating with 21 month fuel cycles in a Control Cell Core operating strategy that does not normally require fuel to be controlled during its first cycle of operation in the core, nor is the fuel typically required to be controlled for extended periods of time during its second cycle of operation. Therefore, it is considered unlikely that the plant will experience control blade shadow corrosion-induced channel bow in Cycle 23. Furthermore, there is no evidence that the Cooper core has ever experienced control blade shadow corrosion-induced channel bow in the past. Should Cooper 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 SLMCPR value that constitutes the licensing basis. Furthermore, NPPD is committing to request a licensing amendment for Cooper if such action is found to be necessary in accordance with applicable laws and regulations.

2. In the submittal the licensee shows that the core flow rate and random effective TIP reading uncertainties were increased by the inverse of the core flow fraction to conservatively account for an increase in relative uncertainty that may occur as core flow decreases. Provide technical justification as to why this increase is adequate to account for the uncertainty at the 75 percent rated flow/rated power condition.

Response:

For dual loop operation (DLO) calculations performed at 75 percent core flow, the uncertainty values for the core flow rate and the random effective TIP reading are those values indicated in Table 2b of the attachment. The standard value for the core flow rate uncertainty for DLO calculations is 2.5 percent as indicated in Table 2a. Similarly, the standard value for the random effective TIP reading for DLO calculations is the 1.2 percent value indicated in Table 2a. Historically, these values have been construed to be somewhat dependent on the core flow conditions as evidenced by the fact that higher values have always been used when performing single loop operation (SLO) calculations. It is for this reason that GNF-A determined that it is appropriate to consider an increase in these two uncertainties when the core flow is reduced. The amount of increase is determined in a conservative way. For both parameters, it is assumed that the absolute uncertainty remains the same as the flow is decreased so that the percentage uncertainty increases inversely proportional to the change in core flow. This is conservative relative to the core flow uncertainty since the variability in the absolute flow is expected to decrease somewhat as the flow decreases. For the random effective TIP uncertainty, there is no reason to believe that the percentage uncertainty should increase as the core flow decreases for DLO. Nevertheless, this uncertainty is also increased as is done in the more extreme case for SLO primarily to preserve the historical precedent established by the SLO evaluation. Note that the DLO condition is different than the SLO condition because for DLO there is no expected tilting of the core radial power shape.

3. For a given operating statepoint (power/flow condition), the bundle power distribution is a function of the control blade pattern assumed. In Appendix A of NEDC 32601-P-A, in discussing limiting control blade patterns, it is stated that [[

]] 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. State explicitly that the rod patterns used to calculate the SLMCPR at minimum core flow (75 percent rated flow) at rated power would result in power distribution and core thermal-hydraulic conditions (radial and axial power peaking and distribution and void distribution) that would reasonably bound the conditions CNS would operate under throughout Cycle 23, such that the calculated SLMCPR would not be invalidated during the plant operation.

Response:

The rod patterns used to calculate the SLMCPR at 75 percent of rated core flow and 100 percent of rated core power produce a limiting MCPR distribution that reasonably bounds the MCPR distributions that would be expected during the operation of the Cooper 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.

4. Explain why the reduced power distribution uncertainties from NEDC-32694-P-A were used for the 75 percent rated flow condition for Cycle 22 and the GETAB power distribution uncertainties for the 75 percent rated flow condition for Cycle 23. Which power distribution uncertainties were used for the 100 percent rated flow/rated power condition for Cycle 23?

Response:

Cycle 22 at Cooper utilized GNF's 3DMONICORE system to monitor the core performance. Therefore, either standard GETAB or reduced power distribution uncertainties with revised methodology may be used for the SLMCPR evaluation. GNF-A uses reduced power uncertainties and revised methodology in the evaluation if the customer has contracted for these services. The original SLMCPR evaluation for Cycle 22 was performed using standard GETAB uncertainties. However, when the Cycle 22 SLMCPR was determined for the 75 percent rated flow/rated power condition during the recent Part 21 SLMCPR evaluation a significantly higher value was calculated compared to the approved plant Technical Specification value. Therefore, to account for the higher SLMCPR value during the remainder of the Cycle 22 operation, the OLMCPR value needed to be increased. To minimize the OLMCPR increase, the SLMCPR was recalculated using the reduced power distribution uncertainties with revised methodology, as reported in the amendment submittal.

NPPD selected the standard GETAB uncertainties option for the SLMCPR evaluation for Cooper Cycle 23 operation. Both the 100 percent rated flow/rated power and the 75 percent rated flow/rated power SLMCPR analyses used the standard GETAB uncertainties.

5. What are the MCPR importance Parameter (MIP) and R-factor Importance Parameter (RIP) values for the 100 percent rated flow/rated power SLMCPR evaluation for Cycle 23?

Response:

The Cycle 23 100 percent rated flow/rated power MIP and RIP values (at EOC) are [[ ]] respectively.

6. In Reference 4 of Enclosure 1 of the October 25, 2004 submittal, GNF-A states that there were "scoping analyses" performed which indicate that the MIP criteria should not be changed. Provide further justification that this statement is currently valid. Provide the updated Figure III.5-1 (Updated Figure 4.4) and Figure III.5-2 from NEDC-32601-P-A showing the impact from data from GE14 fuel. Also describe how the off-rated flow/ rated power condition has been considered in the MIP criterion.

Response:

Adding a significant amount of GE14 data to provide an updated Figure III.5-1 and Figure III.5-2 will take significant time and needs to be delayed until a future date, consistent with a planned GNF-A review of the SLMCPR methodology. However, to demonstrate that the current MIP criterion remains valid for Cooper Cycle 23 operation, the Cooper Cycle 23 SLMCPR data has been added to Figure III.5-1 and Figure III.5-2 in the attached Figure 1 and Figure 2, respectively. The 75 percent rated flow/rated power state point is handled using the same methodology as the 100 percent rated flow/rated power state point. The Cycle 23 data points are explicitly indicated in the figures.

Figure 1 shows that the limiting rod patterns that determined the Cooper Cycle 23 GE14 fuel bundle MCPR distributions used in the SLMCPR evaluations for both the 75 percent rated flow/rated power and the 100 percent rated flow/rated power state point conditions result in [[

]] Similarly, adding the Cooper Cycle 23 data points to Figure 2 shows that the Cooper Cycle 23 data points lie within the statistical population of the historical plant data.

This confirms the existing MIP criterion is applicable for the Cooper Cycle 23 SLMCPR evaluations.

7. Enclosure 1 of the October 25, 2004 submittal, stated that [[

]] Provide the limiting power shapes and the power/flow condition at which these power shapes were determined. What were the limiting axial power shapes that were determined for the 100 percent rated power/75 percent rated flow and 100 percent rated power/100 percent rated flow conditions?

Response:

Axial bundle power shapes corresponding to the limiting SLMCPR control blade blade patterns are determined using the PANACEA 3D core simulator. These axial power shapes are classified as inlet peaked (I), middle peaked (M), outlet peaked (O) or double humped (D) as defined in Table 1 below. Table 2 provides example inlet, middle peaked, outlet peaked and double humped bundle axial power shapes.

Figure 3 and Figure 4 show the axial power shape classification of the fuel bundles that participated in the SLMCPR evaluation at the EOC 75 percent rated flow/rated power and 100 percent rated flow/rated power limiting state point conditions, respectively. [[

]] were incurred in the determination of the Cooper Cycle 23 SLMCPR.

Table 1 Algorithm for Axial Bundle Power Shape Discrimination in SLMCPR evaluations

Power Shape	Criterion	Characteristic Parameter
[[		
		]]

Where:

[[

]]

Table 2 Axial Bundle Power Shape Classification Examples

Normalized Power Shape:	Inlet Peaked (I)	Middle Peaked (M)	Outlet Peaked (O)	Double Humped (D)
[[				
				]]

Figure 1 Updated Version of Figure 4.4 from NEDC-32601P

[[

{3}]]

Figure 2 How MIP Ratio is Related to CPR Margin

[[

{3}]]

Figure 3 Quarter Core Axial Power Shapes for bundles participating in the SLMCPR evaluation for 75 percent rated flow/rated power at EOC

[[

]]

Figure 4 Quarter Core Axial Power Shapes for bundles participating in the SLMCPR evaluation for rated flow/rated power at EOC

[[

]]