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~~Proprietary – Withhold under 10 CFR 2.390~~. Attachment 4 contains PROPRIETARY information

NOV 17 2014

GO2-14-139

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397 LICENSE AMENDMENT REQUEST FOR TECHNICAL SPECIFICATION CHANGE TO SAFETY LIMIT MINIMUM CRITICAL POWER RATIO**

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Energy Northwest, hereby requests a license amendment to revise the Columbia Generating Station (Columbia) Technical Specification (TS) Safety Limit Minimum Critical Power Ratio (SLMCPR).

Attachment 1 contains an evaluation of the proposed changes and includes a no significant hazards determination and environmental consideration. Attachment 2 contains the marked up version of the proposed changes to the Columbia TS. Attachment 3 contains the clean version of the proposed changes to the Columbia TS Attachment 4 contains the summary of the technical bases for the SLMCPR values and is considered proprietary information by Global Nuclear Fuels - Americas, LLC (GNF). In accordance with 10 CFR 2.390(b)(1), an affidavit attesting to the proprietary nature of the enclosed information and requesting withholding from public disclosure is included in first few pages of Attachment 4. Attachment 5 is a redacted version of the report and is provided for public disclosure.

Columbia has reviewed the proposed Technical Specification change in accordance with 10 CFR 50.92(c) and concluded that the proposed change involves no significant hazards consideration.

Columbia has evaluated the proposed amendment against the criteria of 10 CFR 51.22 for environmental considerations and concludes that the proposed change is eligible for a categorical exclusion from the requirements for an environmental review in accordance with 10 CFR 51.22(c)(9).

In accordance with 10 CFR 50.91, Energy Northwest is notifying the State of Washington of this proposed amendment request by transmitting a copy of this letter and attachments to the designated State Official.

A001
NRR

Regarding our proposed schedule for this amendment, Energy Northwest requests your review and approval of the proposed amendment by May 9, 2015, to support the refuel outage schedule, with implementation to coincide with start-up from the refueling outage.

This letter and its attachments contain no regulatory commitments.

If there are any questions or if additional information is needed, please contact Ms. L. L. Williams, Licensing Supervisor, at 509-377-8148.

When Attachment 4 is removed from this letter, the letter and remaining Attachments are NON-PROPRIETARY.

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

Executed this 27 day of October, 2014.

Respectfully,

A. L. Javorik
Vice President, Engineering

Attachments: As stated

cc: NRC RIV Regional Administrator
NRC NRR Project Manager
NRC Senior Resident Inspector/988C
M Jones - BPA/1399 (email) without Attachment 4
JO Luce – ESFEC (email) without Attachment 4
RR Cowley – WDOH (email) without Attachment 4

Evaluation of Proposed Change

1.0 SUMMARY DESCRIPTION

This evaluation supports a License Amendment Request (LAR) to revise the Columbia Generating Station (Columbia) Technical Specification (TS) Section 2.1.1.2, Safety Limit Minimum Critical Power Ratio.

2.0 DETAILED DESCRIPTION

2.1 Description of the Proposed Change

Pursuant to 10 CFR 50.90, Energy Northwest proposes to amend the Columbia TS Section 2.1.1.2, Safety Limit Minimum Critical Power Ratio (SLMCPR). The proposed changes to the Technical Specifications are as follows:

Page 2.0-1, Specification 2.1.1.2 – Replace the listed SLMCPR values of 1.09 for two recirculation loop operation (TLO) and 1.10 for single recirculation loop operation (SLO) with new values of 1.10 and 1.13, respectively.

2.2 Reason for the Proposed Change

The current SLMCPR values for TLO and SLO contained in the Columbia TS (1.09 and 1.10, respectively) are not applicable for the upcoming operating cycle due to core loading design changes. Based upon the core loading, the cycle specific SLMCPR values were determined to be 1.10 for TLO and 1.13 for SLO for the upcoming operating cycle.

3.0 TECHNICAL EVALUATION

3.1 System Description

Columbia is a boiling water reactor (BWR) of General Electric Company (GE) single-cycle, forced circulation system, BWR/5 design. The containment vessel contains both a drywell and a suppression chamber, which is consistent with the features of a BWR Mark II 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 Columbia Cycle 23 core will have 248 GNF2 and 516 GE14 fuel assemblies.

3.2 Final Safety Analysis Report (FSAR) Design Basis

The Columbia FSAR Section 4.4, Thermal-Hydraulic Design (Reference 2), states that the thermal–hydraulic design of the core shall establish the thermal–hydraulic safety

limits for use in evaluating the safety margin relating the consequences of fuel cladding failure to public safety. For the purposes of maintaining adequate thermal margin during normal steady-state operation, the minimum critical power ratio (MCPR) must not be less than the required MCPR operating limit, and the maximum linear heat generation rate (MLHGR) must be maintained below the design linear heat generation rate (LHGR) for the plant. The core and fuel design basis for steady-state operation (i.e., MCPR and LHGR limits) have been defined to provide margin between the steady-state operating conditions and any fuel damage condition to accommodate uncertainties and to ensure that no fuel damage results even during the worst anticipated transient condition at any time in life.

3.3 Analytical Methods

The SLMCPR calculations for Columbia Cycle 23 are performed in accordance with NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel." NEDE-24011-P-A is listed in Columbia TS 5.6.3.b.21 as an approved analytical method for determining core operating limits (References 3 and 4 respectively).

3.4 Technical Justification of Proposed Changes

The purpose of the SLMCPR is to ensure that specified acceptable fuel design limits are not exceeded during steady state operation, normal operational transients, and anticipated operational occurrences (AOOs). The fuel cladding is one of the physical barriers that separate the radioactive materials from the environs. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Although some corrosion or use related cracking may occur during the life of the cladding, fission product migration from this source is incrementally cumulative and continuously measurable. Fuel cladding perforations, however, can result from thermal stresses, which occur from reactor operation significantly above design conditions. 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 cladding damage could occur. Although it is recognized that the onset of transition boiling would not result in damage to the BWR fuel rod cladding, the critical power at which boiling transition is calculated to occur has been adopted as a convenient and conservative 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 SLMCPR is defined as the critical power ratio in the limiting fuel assembly for which at least 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 revised SLMCPR for Columbia was determined using cycle-specific fuel and core parameters, with NRC approved methodology. 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 analyses performed by Global Nuclear Fuel - Americas, LLC (GNF) include a higher R-Factor uncertainty to account for an increase in channel bow due to control blade shadow corrosion-induced channel bow. No power shape penalties were required to be applied to the calculated Columbia Cycle 23 SLMCPR values.

The proposed changes to the SLMCPR values are based on an analysis by GNF for Columbia Cycle 23 operations. The GNF report, GNF-001N8896-R3-P, "GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, Columbia Cycle 23," Proprietary Version, dated October 2014 (Reference 1), supports changing the TLO value of the SLMCPR from 1.09 to 1.10 and the SLO value of the SLMCPR from 1.10 to 1.13. Proprietary and non-proprietary versions of the GNF report are included as Attachments 4 and 5, respectively.

No plant hardware or operational changes are required with this proposed change.

3.5 Precedent Applicability

The first precedent identified in Section 4.3 is applicable since the Peach Bottom Cycle 19 core design has the same total fuel assemblies as Columbia and a similar number of GNF2 fuel assemblies. The Columbia Cycle 23 core will contain 248 GNF2 fuel assemblies and 516 GE14 fuel assemblies; the Peach bottom Cycle 19 core contains 268 GNF2 fuel assemblies and 496 GE14 fuel type assemblies. Additionally, the Peach Bottom GNF analysis used a higher R-Factor uncertainty and did not require any power shape penalties.

The second precedent identified in Section 4.3 is applicable since the Limerick Cycle 15 core design has the same total fuel assemblies as Columbia and a similar number of GNF2 fuel assemblies. The Columbia Cycle 23 core will contain 248 GNF2 fuel assemblies and 516 GE14 fuel assemblies; the Limerick Cycle 15 core contains 280 GNF2 fuel assemblies and 484 GE14 fuel assemblies. Additionally, the Limerick GNF analysis also used a higher R-Factor uncertainty and did not require any power shape penalties.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements

10 CFR 50, Appendix A, General Design Criteria (GDC):

- *Criterion 10—Reactor design*. 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.

As documented in Columbia FSAR Section 3.1.2.2, the reactor core components consist of fuel assemblies, control rods, in-core ion chambers, neutron sources, and related items. The mechanical design is based on conservative application of stress limits, operating experience, and experimental test results. The fuel is designed to maintain integrity over a complete range of power levels including transient conditions. The core is sized with sufficient heat transfer area and coolant flow to ensure that fuel design limits are not exceeded under normal conditions or AOOs.

Columbia FSAR Section 3.1.2.2 also states that an analysis and evaluation have been made of the effects on core fuel following adverse plant operating conditions. The results of abnormal operational transients are presented in FSAR Chapter 15 and show that the MCPR does not fall below the transient MCPR limit, thereby satisfying the transient design basis.

The values of SLMCPR for TLO and SLO provide assurance that the integrity of the fuel and cladding will be maintained, thus preventing the potential for release of fission products during normal operation or AOOs. Therefore, the proposed change meets the requirements of Criterion 10.

4.2 Applicable Regulatory Guidance

NUREG-0800, Standard Review Plan (SRP) Section 4.4, "Thermal and Hydraulic Design," states that the limiting (minimum) value of departure from nucleate boiling ratio (DNBR), critical heat flux ratio (CHFR), or critical power ratio (CPR) correlations is to be established such that at least 99.9 percent of the fuel rods in the core will not experience boiling transition during normal operation or AOOs.

The GNF analyses 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 during normal operation or AOOs.

4.3 Precedent

The NRC has approved similar SLMCPR changes for a number of plants which involve cores containing GNF fuel types GE14 and GNF2.

1. Letter from J. Hughey (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), Peach Bottom Atomic Power Station, Unit 3 – Issuance of Amendment RE: Safety Limit Minimum Critical Power Ratio Value Change (TAC No. ME6391), dated September 30, 2011 (ADAMS Accession No. ML11860015)

2. Letter from P. Bamford (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), Limerick Generating Station, Unit 1 – Issuance

of Amendment RE: Safety Limit Minimum Critical Power Ratio Changes (TAC No. ME7333), dated February 17, 2012 (ADAMS Accession No. ML120330196)

5.0 SIGNIFICANT HAZARDS CONSIDERATION

Pursuant to 10 CFR 50.92, Energy Northwest has reviewed the proposed change and concludes that the change does not involve a significant hazards consideration since the proposed change satisfies the criteria in 10 CFR 50.92(c). These criteria require that operation of the facility in accordance with the proposed amendment will not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. The discussion below addresses each of these criteria and demonstrates that the proposed amendment does not constitute a significant hazard.

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

   Response: No.

   The basis of the Safety Limit Minimum Critical Power Ratio (SLMCPR) is to ensure no mechanistic fuel damage is calculated to occur if the limit is not violated. The new SLMCPR values preserve the existing margin to transition boiling. The derivation of the revised SLMCPR for Columbia, for incorporation into the Technical Specifications and its use to determine plant and cycle-specific thermal limits, has been performed using NRC approved methods. The revised SLMCPR values do not change the method of operating the plant and have no effect on the probability of an accident initiating event or transient.

   Based on the above, Energy Northwest has concluded that the proposed change will not result in a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously analyzed?

   Response: No.

   The proposed changes result only from a specific analysis for the Columbia core reload design. These changes do not involve any new or different methods for operating the facility. No new initiating events or transients result from these changes.

Based on the above, Energy Northwest has concluded that the proposed change will not create the possibility of a new or different kind of accident from those previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

   Response: No.

   The new SLMCPR is calculated using NRC approved methods with plant and cycle specific parameters for the current core design. The SLMCPR value remains conservative enough to ensure that at least 99.9% of all fuel rods in the core will avoid transition boiling if the limit is not violated, thereby preserving the fuel cladding integrity. The operating limit minimum critical power ratio (MCPR) is established to ensure that no fuel damage results during anticipated operational occurrences (AOOs). Accordingly, the margin of safety is maintained with the revised values.

   As a result, Energy Northwest has determined that the proposed change will not result in a significant reduction in a margin of safety.

6.0 CONCLUSIONS

On the basis of the above, Energy Northwest has determined that operation of the facility in accordance with the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92(c), in that it: (1) does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) does not involve a significant reduction in a margin of safety.

7.0 ENVIRONMENTAL CONSIDERATION

The proposed Technical Specification changes were reviewed against the criteria of 10 CFR 51.22 for environmental considerations. The proposed changes do not involve a significant hazards consideration, a significant increase in the amounts of effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Based on the foregoing, Energy Northwest concludes the proposed Technical Specifications meet the criteria in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.

8.0 REFERENCES

1. GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, Columbia Cycle 23, Proprietary Version, GNF-001N8896-R3-P, dated October 2014

2. Energy Northwest, Columbia Generating Station, Final Safety Analysis Report Amendment 62

3. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel"

4. Energy Northwest Columbia Generating Station, Technical Specifications, Amendment 226

Attachment 2

Proposed Columbia Technical Specification Changes (Mark-Up)

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:

The MCPR shall be ≥ ~~1.09~~1.10 for two recirculation loop operation or ≥ ~~1.10~~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 ≤ 1325 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 Columbia Technical Specification Changes (Clean)

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:

The MCPR shall be ≥ 1.10 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 ≤ 1325 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.

Global Nuclear Fuel – Americas

AFFIDAVIT

I, James F. Harrison, state as follows:

(1) I am Vice President, Fuel Licensing, Regulatory Affairs, GE-Hitachi Nuclear Energy Americas, LLC (GEH), 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 Enclosure 1 of GNF's letter, VSP-ENW-KK1-14-093, Vickie Perry (GNF-A) to Miguel Armenta (Energy Northwest), entitled "Revised GNF Additional Information for SLMCPR Technical Specification Submittal Letter for Columbia Cycle 23," dated October 21, 2014. GNF-A proprietary information in Enclosure 1, which is entitled "GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, Columbia Cycle 23," is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]]. Figures and some tables containing GNF-A proprietary information are identified with double square brackets before and after the object. 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 (Exemption 4). The material for which exemption from disclosure is here sought also qualifies 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, 975 F.2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (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 aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. 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 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. 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. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(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.

(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 this methodology, along with the testing, development and approval was achieved at a significant cost to GNF-A.

The development of the fuel design and licensing methodology along with the interpretation and application of the analytical results is derived from an extensive experience database that constitutes a major GNF-A asset.

(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 information 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.

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 is true and correct.

Executed on this 21st day of October 2014.

James F. Harrison
Vice President, Fuel Licensing
Regulatory Affairs
GE-Hitachi Nuclear Energy Americas, LLC
3901 Castle Hayne Road
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