SERIAL: HNP-11-082
10 CFR 50.90

Progress Energy

SEP 07 2011

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING MEASUREMENT UNCERTAINTY RECAPTURE
POWER UPRATE LICENSE AMENDMENT REQUEST

References:
1. Email from B. Mozafari, Nuclear Regulatory Commission, to J. Caves, "MUR RAI (Mat)(ME6169)," dated August 8, 2011.

2. Letter from C. L. Burton to the Nuclear Regulatory Commission (Serial: HNP-11-001), "Shearon Harris Nuclear Power Plant, Unit 1, Docket No. 50-400/Renewed License No. NPF-63, Request for License Amendment, Measurement Uncertainty Recapture Power Uprate," dated April 28, 2011. (ADAMS Accession ML11124A180)

Ladies and Gentlemen:

On August 8, 2011, the Harris Nuclear Plant (HNP) received a request from the NRC (Reference 1) for additional information needed to facilitate the review of the License Amendment Request to increase the rated thermal power (RTP) level from 2900 megawatts thermal (MWt) to 2948 MWt, and make Technical Specification changes as necessary to support operation at the uprated power level. The proposed change is an increase in RTP of approximately 1.66 percent. The proposed uprate is characterized as a measurement uncertainty recapture using the Cameron Leading Edge Flow Meter CheckPlus System to improve plant calorimetric heat balance measurement accuracy. This original request was submitted as Serial: HNP-11-001 (Reference 2).

The Enclosure to this submittal contains HNP's response to the NRC's request for additional information.

This document contains no new Regulatory Commitment.

In accordance with 10 CFR 50.91(b), HNP is providing the state of North Carolina with a copy of this response.

Please refer any questions regarding this submittal to Mr. David Corlett, Supervisor – HNP Licensing/Regulatory Programs, at (919) 362-3137.

Progress Energy Carolinas, Inc.
Harris Nuclear Plant
P. O. Box 165
New Hill, NC 27562

A001
NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on [9-7-11].

Sincerely,

Keith Holbrook
Manager – Support Services
Harris Nuclear Plant

RKH/kab

Enclosure: Response to Request for Additional Information

cc: Mr. J. D. Austin, NRC Sr. Resident Inspector, HNP
Mr. W. L. Cox, III, Section Chief, N.C. DENR
Mr. V. M. McCree, NRC Regional Administrator, Region II
Mrs. B. L. Mozafari, NRC Project Manager, HNP

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Summary

By letter dated April 28, 2011, (ADAMS Accession No. ML11124A180), Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., submitted a proposed amendment for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The proposed amendment will increase the rated thermal power (RTP) level from 2900 megawatts thermal (MWt) to 2948 MWt, and make Technical Specification (TS) changes as necessary to support operation at the uprated power level. The proposed change is an increase in RTP of approximately 1.66 percent. The proposed uprate is characterized as a measurement uncertainty recapture (MUR) using the Cameron Leading Edge Flow Meter (LEFM) CheckPlus System to improve plant calorimetric heat balance measurement accuracy. The proposed change will revise Renewed Operating License NPF-63 Maximum Power Level; Appendix A, TS definition of RTP; Reactor Core Safety Limits; Reactor Trip System Instrumentation; Minimum Allowable Power Range Neutron Flux high setpoint with Inoperable Steam Line Safety Valves; and TS Bases Section 3/4.7.1 to reflect the uprated reactor core power level.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information submitted by the licensee, and based on this review determined the following information is required to complete the evaluation of the subject amendment request:

Request 1:

Section II.2.40.b, *Short-term LOCA Mass and Energy Release Analysis*, page 56, states that "...HNP is approved for leak-before-break, so Case 1 through 5 breaks [hot and cold leg pipe and pump suction breaks] have been eliminated and only breaks in the largest branch lines (Cases 6 and 7) require evaluation...Since RCS piping breaks have been eliminated by the leak-before-break methodology...the only breaks evaluated for the power uprate are those in the pressurizer subcompartment (pressurizer surge line and pressurizer spray line breaks)..."

The NRC staff notes that the dynamic effects of the LBB pipe break should still be considered in the containment design as stated in the Statement of Consideration of the final rule to modify General Design Criterion 4, dated April 11, 1986 (51 FR 12502). Clarify why the dynamic effect for pipe breaks in Cases 1 through 5 have been eliminated and not evaluated for the impact of the power uprate on the containment design.

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Response:

Cases 1 through 5 are breaks that were analyzed for subcompartment analyses prior to the revision to general design criteria (GDC) 4 that allowed leak-before-break (LBB) technology to be applied to the dynamic effects of high energy line breaks in containment subcompartments. Please note that large breaks in the reactor coolant system (RCS) piping are still used to calculate the global pressure (Reference 1) internal to the containment. However, the revision to GDC-4 has allowed application of LBB to breaks within a containment subcompartment if that subcompartment does not provide a containment related function (Reference 2). Dry containments such as the HNP containment do not rely on the subcompartments for long-term containment cooling post loss-of-coolant accident (LOCA). Therefore, application of LBB technology, that limits the break size within a subcompartment, has been accepted by the NRC and has been the industry practice subsequent to revising GDC-4.

Note that the subcompartments at HNP were designed prior to the revision to GDC-4 and thus were designed to accommodate breaks in the largest high energy piping within a given subcompartment, including the double ended severance of the main RCS piping. Application of LBB for the MUR continues to meet the recommended margins, which eliminates the need for full reanalysis of the subcompartments.

References:

1) Federal Register Notice 53 FR No.66 Page 11311, "Leak Before Break Technology Solicitation of Public Comment on Additional Applications," April 06, 1988.

2) NRC Inspection Manual, Part 9900: 10 CFR Guidance, "Definition of Leak-Before-Break Analysis and its Application to Plant Piping Systems," Change Notice 96-020, September 26, 1996.

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Request 2:

Section IV.1.B.vii.2, *Leak-Before-Break Evaluation,* page 94, states that "...[t]he leak-before-break acceptance criteria are based on SRP Section 3.6.3. The acceptance criteria are satisfied for primary loop piping at power uprate conditions. The recommended margins are satisfied, and the existing analyses conclusions remain valid. Therefore, the dynamic effects of RCS primary loop piping breaks are not considered in the structural design basis at MUR power uprate conditions..."

(a) Discuss in detail exactly how the acceptance criteria and the recommended margins are shown to be satisfied, and how the existing analyses conclusions remain valid for primary loop piping at power uprate conditions.

(b) Clarify which structural design basis will not include the dynamic effects of RCS primary loop piping breaks at MUR power uprate conditions and for what components.

Response:

(a) A Leak-Before-Break (LBB) evaluation for the HNP primary loop piping due to the MUR power uprate was performed using the recommendations and criteria proposed in NRC Standard Review Plan (SRP) Section 3.6.3, "Leak-Before-Break Evaluation Procedures." The applicable pipe loadings, normal operating pressure, and temperature parameters at MUR power uprate conditions were used to evaluate LBB. The evaluation result shows that the LBB acceptance criteria (margin of 10 on Leak Rate, margin of 2.0 on Flaw Size and margin of 1.0 on Loads, using absolute summation method for faulted load combination) are satisfied at MUR power uprate conditions. The LBB acceptance criteria are satisfied and therefore, the existing analyses conclusion to eliminate the dynamic effects of reactor coolant system (RCS) primary loop piping breaks from the structural design basis remain valid at MUR power uprate conditions.

(b) The structural design basis of RCS primary loop piping breaks at MUR power uprate conditions has been eliminated for all applicable components.

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Request 3:

(a) List all piping that have been approved for LBB (LBB piping).

(b) List all approved LBB piping that contain nickel-based Alloy 82/182 dissimilar metal welds which are susceptible to primary water stress corrosion cracking.

(c) If mitigation has been implemented on the subject welds, discuss whether the original LBB evaluation has been updated per NRC Regulatory Issue Summary 2010-07.

(d) If the mitigation has not been implemented, discuss plans to mitigate the subject welds. If mitigation is not planned, provide justification.

Response:

(a) Leak-Before-Break (LBB) only impacts the HNP reactor coolant system (RCS) primary loop piping.

(b) Alloy 82/182 dissimilar metal (DM) welds are present in the RCS primary loop piping at the reactor vessel (RV) hot leg and cold leg nozzle connections to the reactor coolant loop piping.

(c) During Refueling Outage 16 (RFO-16) in the fall of 2010, HNP mitigated the RV nozzle hot leg Alloy 82/182 DM welds via the mechanical stress improvement process (MSIP®). Regulatory Issue Summary 2010-07 (RIS 2010-07) states that "Licensees may install mechanical stress improvement without NRC authorization since it does not affect the Code design or inspection requirements." RIS 2010-07 also states that "Mechanical stress improvement and Alloy 52 inlays and onlays would not substantially change the weld geometry or the original design-basis assumptions of the weld and, therefore, likely would not invalidate the original LBB analyses submitted to the NRC for approval." The original HNP LBB evaluation has been updated to show that all LBB margins are satisfied in the HNP primary loop including the Alloy 82/182 weld locations after the MSIP application and that the LBB evaluation continues to be valid.

(d) HNP mitigated the three hot leg nozzle DM welds during RFO-16. The three cold leg nozzle DM welds are mandated to be inspected during RFO-17 (spring 2012).

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There is no requirement to mitigate either the hot leg or cold leg DM welds during either outage. HNP decided to mitigate the hot leg DM welds during RFO-16 to reduce the risk of a future unplanned outage due to primary water stress corrosion cracking (PWSCC), which is prevalent in DM welds at hot leg temperatures. To date the PWR Industry has not experienced PWSCC in the RV nozzle cold leg DM welds.

The experience gained during the RFO-16 hot leg mitigation will become useful if it is decided to mitigate the cold leg nozzle DM welds in the future. It is recognized that the cold legs are more challenging to mitigate due to existing interferences in the RV Gallery. This RFO-16 MSIP® experience will be used to plan a successful and efficient cold leg mitigation project if implemented in the future.