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10 CFR 50.90

February 13, 2006

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

Limerick Generating Station, Unit 1
Facility Operating License No. NPF-39
NRC Docket No. 50-352

Subject: License Amendment Request
Response to Request for Additional Information - Single Loop Operation
Safety Limit Minimum Critical Power Ratio (SLO SLMCPR) Change

Reference: Letter from P. B. Cowan (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, dated December 14, 2005

In the Referenced letter, Exelon Generation Company, LLC (Exelon) requested an amendment to the Technical Specifications (TS), Appendix A of Operating License No. NPF-39 for Limerick Generating Station (LGS), Unit 1. This proposed change will revise Technical Specification (TS) Section 2.1. This Section will be revised to incorporate a revised Single Loop Operation Safety Limit Minimum Critical Power Ratio (SLO SLMCPR) due to the cycle specific analysis performed by Global Nuclear Fuel for LGS, Unit 1, Cycle 12. The two-loop SLMCPR will not change.

In a conference call with the U. S. Nuclear Regulatory Commission staff on Thursday, February 2, 2006, Exelon was requested to provide responses to several requests for additional information. Enclosed is our response.

There are no commitments contained within this letter.

Information supporting this response is contained in Enclosure 1 to this letter. Enclosure 1 contains information proprietary to Global Nuclear Fuel. Global Nuclear Fuel requests that the document be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4). An

affidavit supporting this request is also contained in Enclosure 1. Enclosure 2 contains a non-proprietary version of the Global Nuclear Fuel document.

If any additional information is needed, please contact Tom Loomis at (610) 765-5510.

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

Respectfully,

2/13/06
Executed On

Pamela B. Cowan
Director, Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures: 1-GNF Transmittal Letter, Affidavit, Proprietary Version of GNF Letter
2-Non-Proprietary Version of GNF Letter

cc: S. J. Collins, Administrator, USNRC Region I
S. Hansell, USNRC Senior Resident Inspector, LGS
T. Valentine, Project Manager, USNRC
R. R. Janati, Commonwealth of Pennsylvania

ENCLOSURE 2

LIMERICK GENERATING STATION
UNIT 1

Docket No. 50-352

License No. NPF-39

LICENSE AMENDMENT REQUEST

NON-PROPRIETARY VERSION OF GLOBAL NUCLEAR FUEL LETTER

February 8, 2006

Response to:

LIMERICK GENERATING STATION, UNIT 1

LICENSE AMENDMENT REQUEST TO CHANGE TECHNICAL SPECIFICATIONS

CYCLE 12 SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

REQUEST FOR ADDITIONAL INFORMATION (TAC NO. MC9231)

Proprietary Information Notice

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

February 8, 2006

Response to:

LIMERICK GENERATING STATION, UNIT 1

LICENSE AMENDMENT REQUEST TO CHANGE TECHNICAL SPECIFICATIONS

CYCLE 12 SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

REQUEST FOR ADDITIONAL INFORMATION (TAC NO. MC9231)

1. [[{3}]] State whether Limerick Generating Station, Unit 1 (Limerick 1) is experiencing or has recently experienced channel bow as discussed in the GNF-A Part 21 report (MFN-03-045, ML033280519). If so, [[{3}]] Use sufficient details for the staff to determine if the amount of the increase provides an adequate SLMCPR margin to mitigate the consequences of channel bow. If Limerick 1 has not experienced any channel bow, Exelon Nuclear may instead provide confirmation that they would submit an amendment request with [[{3}]] at the time that Limerick 1 experiences channel bow.

Response:

At this time, Exelon has performed the recommended testing of control rods in Limerick 1 Cycle 11 in accordance with the GNF-A Part 21 report (MFN-03-045, ML033280519) and none of the affected control rods has reached a level of channel control blade interference which results in inoperability. This indicates that Cycle 11 is not experiencing significant control blade shadow corrosion-induced channel bow. Limerick 1 Cycle 12 has been designed such that no control rods are expected to require the Part 21 recommended testing as the result of Cycle 12 experiencing significant control blade shadow corrosion-induced channel bow. The design for Cycle 12 is not expected to actually develop a no-settle condition due to shadow corrosion-induced channel bow in any cell. However, Exelon has decided to conservatively account for any reasonable potential of control blade shadow corrosion-induced channel bow in this SLMCPR amendment. See GNF document FLN-2004-030 for the technical justification of using a GEXL R-Factor uncertainty of [[{3}]] to account for an increase in channel bow due to control blade shadow corrosion-induced channel bow. This document technically justifies that a GEXL R-Factor uncertainty of [[{3}]] accounts for a channel bow uncertainty of up to [[{3}]]. The Limerick 1 Cycle 12 analysis shows a channel bow uncertainty of [[{3}]], which is bounded by the use of a GEXL R-Factor uncertainty of [[{3}]].

2. In your submittal you state that the Core Flow Rate and Random Effective TIP reading uncertainties were [[{3}]]

Provide technical justification as to why this increase is adequate to account for the uncertainty at the 81% rated flow/rated power condition.

Response to:

LIMERICK GENERATING STATION, UNIT 1

LICENSE AMENDMENT REQUEST TO CHANGE TECHNICAL SPECIFICATIONS

CYCLE 12 SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

REQUEST FOR ADDITIONAL INFORMATION (TAC NO. MC9231)

Response:

For Dual Loop Operation (DLO) calculations performed at 81% core flow, the uncertainty values for the core flow rate and the random effective TIP reading are those values indicated in Table 2b of Enclosure 4 to the License Amendment Request (December 14, 2005). The standard value for the core flow rate uncertainty for DLO calculations is 2.5% as indicated in Table 2a. Similarly, the standard value for the random effective TIP reading for DLO calculations is the 1.2% 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. State that the SLMCPR calculation for Cycle 12 complies with all the restrictions associated with the NRC-approved SLMCPR licensing methodology. Specifically state that the Limerick 1 cycle-specific SLMCPR calculations adhere to the restrictions identified on Page 3 of NRC's Safety Evaluation relating to the General Electric Licensing Topical Reports NEDC-32601P, NEDC-32694P, and Amendment 25 to NEDE-24011-P-A (ML993140059, March 11, 1999).

Response:

The four restrictions identified on Page 3 of NRC's Safety Evaluation relating to the General Electric Licensing Topical Reports NEDC-32601P, NEDC-32694P, and Amendment 25 to NEDE-24011-P-A (March 11, 1999) are addressed in References 4, 5, and 7 of Enclosure 4 to the License Amendment Request (December 14, 2005).

4. On November 18, 2005, Limerick 1 submitted a Licensee Event Report (LER) addressing an evaluation of the impact of a General Electric Part 21 report dated September 20, 2005, which determined that Limerick 1 operated in non-compliance with TS 3.2.3, "Minimum Critical Power Ratio (MCPR)", on two occasions during control rod pattern adjustments. The event was caused by a deformation in the zircaloy spacer

during GE-14 ATLAS critical power testing which resulted in a non-conservative error in the test results.

a. The LER states that "Unit 1 is no longer vulnerable to a repeat occurrence of this condition." Explain what actions have been taken to ensure that Unit 1 is no longer vulnerable to a repeat occurrence of this condition.

b. The LER states a new databank and coding will be installed in Unit 1 and Unit 2 3D Monicore by March 31, 2006. State if any penalties or uncertainties have been applied to the calculation of the proposed SLMCPR to account for the non-conservative error in the GE-14 ATLAS critical power test results? If no adjustments were made, justify why the proposed SLMCPR remains bounding.

Response to part a and b:

For the Limerick 1 Cycle 12 SLMCPR amendment, this non-conservative condition does not exist, since the R-Factors used have been recalculated in accordance with Reference 2 of Enclosure 4 to the License Amendment Request (December 14, 2005) based on the GE-14 ATLAS corrected test data. Therefore, no adjustments and/or penalties are necessary for the Cycle 12 SLMCPR.

5. 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 [[

{3}]]

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.

a. Given that control rod pattern adjustments contributed to the recent LER submitted for Limerick 1, state explicitly that the rod patterns used to calculate the SLMCPR at minimum core flow (81% 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 Limerick 1 would operate under throughout Cycle 12, such that the calculated SLMCPR would not be invalidated during the plant operation.

b. In addition, Table 1 of your submittal states the MCPR Importance Parameter (MIP) used to calculate SLMCPR is [[{3}]] for Limerick 1, Cycle 12. Submit the Limerick 1, Cycle 12 nominal MIP value corresponding to 81% rated flow/rated power. Provide justification why the MIP value used in your SLMCPR

evaluation is conservative in relation to the nominal MIP value at 81% rated flow/rated power.

Response to part a:

The requested statement with respect to the radial and axial power distribution, power peaking, void distribution and thermal-hydraulic conditions (not specified) cannot be made. These factors combine in a complicated way to determine the core MCPR distribution which is the basis for the SLMCPR. For example the radial and axial peaking factors for reduced power may be higher, yet the MCPR distribution is less limiting for such reduced power scenarios. It is more appropriate to make the following statement: "The rod patterns used to calculate the SLMCPR at 81% of rated core flow and 100% of rated core power produce a limiting MCPR distribution that reasonably bound the MCPR distributions that would be expected during the operation of the Limerick 1 core throughout Cycle 12 such that 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 Limerick 1 Cycle 12."

Response to part b:

The MCPR Importance Parameter (MIP) value of [[{3}]] in Table 1 of Enclosure 4 to the License Amendment Request (December 14, 2005) corresponds to the 81% rated flow/rated power condition. The MCPR Importance Parameter (MIP) corresponding to the rated flow/rated power condition at the same exposure point is [[{3}]].