UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

December 12, 2011

Mr. R.W. Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: RESPONSE TO THE OCTOBER 28, 2011, EDO LETTER REGARDING THE ADVISORY COMMITTEE ON REACTOR SAFEGUARDS RECOMMENDATIONS ON TOPICAL REPORT NEDC-33173P, SUPPLEMENT 2, PARTS 1, 2, AND 3, "ANALYSIS OF GAMMA SCAN DATA AND REMOVAL OF SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) MARGIN"

Dear Mr. Borchardt:

During the 589th meeting of the Advisory Committee on Reactor Safeguards (ACRS), December 1-3, 2011, we reviewed the Executive Director for Operations (EDO) response dated October 28, 2011, to the August 16, 2011, ACRS letter on the General Electric Hitachi Nuclear Energy (GEH) Licensing Topical Report NEDC-33173P, Supplement 2, Parts 1, 2, and 3, "Analysis of Gamma Scan Data and Removal of Safety Limit Minimum Critical Power Ratio (SLMCPR) Margin."

BACKGROUND

In a letter report dated June 22, 2007, we concurred with the staff in accepting the application of the methods documented in GEH Licensing Topical Report NEDC-33173P-A, "Applicability of GE Methods to Extended Operating Domains," to the extended power uprate (EPU) and the Maximum Extended Load Line Limit Analysis Plus (MELLLA+) expanded operating domains. Our acceptance was subject to certain limitations imposed by the staff, which included an added margin of 0.02 to the SLMCPR for EPU conditions and an added SLMCPR margin of 0.03 for operation in the MELLLA+ expanded domain. These SLMCPR margins in part accounted for the potentially larger uncertainties in the predicted bundle and pin powers at the higher void fractions and harder neutron spectra in the higher power-to-flow ratios that arise in EPU and MELLLA+ conditions.

With the purpose of reducing these added SLMCPR margins, GEH assessed, in NEDC-33173P Supplement 2, Parts 1, 2, and 3, the uncertainties in their predictions against new gamma scan data on axial, nodal and bundle powers taken under EPU conditions, also extending in some part into the MELLLA+ expanded domain, and at pin powers about 4 percent above the original licensed thermal power (OLTP). The EPU data were limited to power-to-flow ratios below 42 MWt/Mlbm/hr.

In our August 16, 2011, letter report, we considered whether the added SLMCPR margins should be reduced or removed in view of the additional gamma scan data and associated GEH methods assessments. We concurred with the staff in removing the 0.02 added SLMCPR margin for EPUs. For MELLLA+ conditions we recommended reducing the added SLMCPR margin to 0.02 rather than the staff's recommendation of 0.01. Your response of October 28, 2011, further elucidated the staff's rationale for reducing the added SLMCPR margin for MELLLA+ conditions to 0.01, and gave us an opportunity to comment before a final safety evaluation was issued.

DISCUSSION

We understand the basis for the staff's recommendation to reduce the 0.03 additional margin on SLMCPR imposed for operation in MELLLA+ conditions. Some of the differences in our views may have arisen because we estimated the core quality and void fraction on somewhat different MELLLA+ conditions. Our estimates were based on 100% OLTP at 55% rated flow, and the staff appeared to have used 120% OLTP at 80% rated flow.

After transmission of our August 16, 2011, letter we became aware that the staff requested additional information from GEH on the distribution of errors between predictions and measurements, as well as uncertainties in the linear heat generation rate (LHGR) predictions. GEH's responses alleviate our concerns about the uncertainties in nodal/axial predictions at the upper range of the power-to-flow data and support the reduction of the added SLMCPR margin to 0.01 in the range of conditions up to 42 MWt/Mlbm/hr. We now agree that the data available support the staff's position up to that limit.

However, in spite of this additional information, we continue to recommend that for power-to-flow ratios above 42 MWth/Mlbm/hr, the additional margin be reduced only from 0.03 to 0.02. This is prudent in view of the uncertainties in extrapolating beyond the range of the available data.

We recommend that further reductions in the added SLMCPR margin for MELLLA+ applications above power-to-flow ratios of 42 MWth/Mlbm/hr be considered only when additional data are available.

Sincerely,

/RA/

Said Abdel-Khalik
Chairman

REFERENCES

1. EDO Memorandum, Response to Advisory Committee on Reactor Safeguards Recommendations on Topical Report NEDC-33173P, Supplement 2, Parts 1, 2, and 3, ”Analysis of Gamma Scan Data and Removal of Safety Limit Minimum Critical Power Ratio (SLMCPR) Margin,” dated October 28, 2011 (ML11266A144)

2. ACRS Letter, Topical Report NEDC-33173P, Supplement 2, Parts 1, 2, and 3, “Analysis of Gamma Scan Data and Removal of Safety Limit Minimum Critical Power Ratio (SLMCPR) Margin,” dated August 16, 2011 (ML11228A234)

3. ACRS Letter, General Electric (GE) Licensing Topical Reports on Maximum Extended Load Line Limit Analysis Plus (MELLLA+) and Applicability of GE Methods to Expanded Operating Domains” dated June 22, 2007 (ML071760346)

4. Response to Supplemental Request for Additional Information Re: GE-Hitachi Nuclear Energy Americas Topical Report NEDC-33173P, Revision 2 and Supplement 2, Parts 1-3 - Analysis of Gamma Scan Data and Removal of Safety Limit Critical Power Ratio Margin (TAC No. ME1891), dated November 16, 2011 (ML113220162)

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1. EDO Memorandum, Response to Advisory Committee on Reactor Safeguards Recommendations on Topical Report NEDC-33173P, Supplement 2, Parts 1, 2, and 3, ”Analysis of Gamma Scan Data and Removal of Safety Limit Minimum Critical Power Ratio (SLMCPR) Margin,” dated October 28, 2011 (ML11266A144)

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Letter to Mr. R.W. Borchardt, Executive Director for Operations from Said Abdel-Khalik, ACRS Chairman, dated December 12, 2011

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