

November 7, 2014

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

Limerick Generating Station, Units 1 and 2  
Renewed Facility Operating License Nos. NPF-39 and NPF-85  
NRC Docket Nos. 50-352 and 50-353

Subject: Response to Draft Request for Additional Information - License Amendment Request – Main Steam Line Flow-High Isolation Response Time Change from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds

- References:
- 1) Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request – Main Steam Line Flow-High Isolation Response Time Change from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds," dated November 15, 2013
  - 2) Internal Memorandum from R. B. Ennis (Senior Project Manager, U.S. Nuclear Regulatory Commission) to M. K. Khanna, Chief, Plant Licensing Branch I-2, U.S. Nuclear Regulatory Commission), "Limerick Generating Station, Units 1 and 2, Draft Request for Additional Information (TAC Nos. MF3085 and MF3086)," dated March 7, 2014, (ML14066A097)
  - 3) Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information - License Amendment Request – Main Steam Line Flow-High Isolation Response Time Change from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds," dated April 16, 2014 (ML14202A518)
  - 4) Internal Memorandum from R. B. Ennis (Senior Project Manager, U.S. Nuclear Regulatory Commission) to R.G. Schaaf, Acting Chief, Plant Licensing Branch I-2, U.S. Nuclear Regulatory Commission), "Limerick Generating Station, Units 1 and 2, Draft Request for Additional Information (TAC Nos. MF3085 and MF3086)," dated July 21, 2014 (ML14202A518)
  - 5) Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information - License Amendment Request – Main Steam Line Flow-High Isolation Response Time Change from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds," dated September 11, 2014 (ML14255A088)

- 6) Internal Memorandum from R. B. Ennis (Senior Project Manager, U.S. Nuclear Regulatory Commission) to M. K. Khanna, Chief, Plant Licensing Branch I-2, U.S. Nuclear Regulatory Commission), "Limerick Generating Station, Units 1 and 2, Request for Additional Information (TAC Nos. MF3085 and MF3086)," dated October 7, 2014 (ML14280A505)

In the Reference 1 letter, Exelon Generation Company, LLC (Exelon) requested changes that would modify Technical Specifications (TS) Table 3.3.2-3, "Isolation System Instrumentation Response Time," for the Main Steam Line Flow-High from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds. In the References 2 and 4 memoranda, the U.S. Nuclear Regulatory Commission requested additional information regarding instrument channel response. Exelon responded in References 3 and 5. In the Reference 6 memorandum, the U.S. Nuclear Regulatory Commission requested additional information regarding accident analysis. Attachments 1 and 2 contain our response.

Exelon has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the U.S. Nuclear Regulatory Commission in Reference 1. The additional information provided in this response does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. Furthermore, the additional information provided in this response does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no commitments contained in this response.

Should you have any questions concerning this letter, please contact Frank Mascitelli at (610) 765-5512.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7<sup>th</sup> day of November 2014.

Respectfully,



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James Barstow  
Director, Licensing & Regulatory Affairs  
Exelon Generation Company, LLC

- Attachments: 1) Response to Request for Additional Information  
2) GEH 002N2662 R0 titled: Response to RAI #1 of the Limerick Main Steam Line Flow-High Isolation Response Time Proposed Licensing Amendment.

U.S. Nuclear Regulatory Commission  
Response to Request for Additional Information –  
LAR - Main Steam Line Flow-High Isolation Response Time  
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cc: USNRC Region I, Regional Administrator  
USNRC Senior Resident Inspector, LGS  
USNRC Senior Project Manager, LGS  
Director, Bureau of Radiation Protection - PA Department of Environmental Protection

**ATTACHMENT 1**

**License Amendment Request**

**Limerick Generating Station, Units 1 and 2**

**Docket Nos. 50-352 and 50-353**

**Response to Request for Additional Information**

**License Amendment Request Regarding  
Main Steam Line Flow-High Isolation Response Time**

**Response to Request for Additional Information  
License Amendment Request Regarding  
Main Steam Line Flow-High Isolation Response Time**

In the Reference 1 letter, Exelon Generation Company, LLC (Exelon) requested changes that would modify the Limerick Generating Station (LGS) Technical Specifications (TS) Table 3.3.2-3, "Isolation System Instrumentation Response Time," for the Main Steam Line Flow-High from  $\leq 0.5$  seconds to  $\leq 1.0$  seconds. The NRC reviewed the license amendment request and identified the need for additional information in order to complete their evaluation of the amendment request. A request for additional information (RAI) was electronically transmitted to Exelon on October 7, 2014 (Reference 6). The question is restated below along with Exelon's response.

**RAI Question 1**

In Attachment 4 to the application dated November 15, 2013 (General Electric Hitachi Nuclear Energy (GEH) report 0000-0158-9651-NP), GEH states that the SAFER04A code is approved for use in main steam line break outside of containment (STMO) analyses examining fuel integrity and mass release. The report also states that the analysis of record for the LGS STMO event is documented in GE Nuclear Energy Report NEDC-32170-P.

During a telephone conference between the NRC staff and Exelon on October 6, 2014, the staff requested clarification regarding use of the SAFER04A code with respect to the proposed amendment. Specifically, the staff requested the licensee to identify the NRC approved topical report pertaining to the use of SAFER04A. The licensee indicated that the topical report which approved SAFER04A is NEDE-23785P-A.

Please confirm that use of the SAFER04A code for the LGS STMO analyses is based on NEDE-23785P-A, in addition to NEDC-32170-P. Also, confirm that NEDE-23785P-A was evaluated to ensure that the LGS STMO analyses input parameters and assumptions are applicable and bounded. Also, confirm that there are no exceptions taken from the conditions and limitations identified in the NRC safety evaluation which approved NEDE-23785P-A.

**Response**

GEH has provided a response which is contained in Attachment 2.

**ATTACHMENT 2**

**License Amendment Request**

**Limerick Generating Station, Units 1 and 2**

**Docket Nos. 50-352 and 50-353**

**GEH 002N2662 R0 titled: Response to RAI #1 of the Limerick Main**

**Steam Line Flow-High Isolation Response Time Proposed Licensing Amendment.**



## GE HITACHI NUCLEAR ENERGY

**Larry Beese**  
Manager, Technical Services

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October 31, 2014

Exelon: A. Olson

Mr. Arun Varghese  
Exelon Generating Company, LLC

GEH: Region Manager  
Commercial Leader  
P&L Manager

**Site:** Limerick Generating Station  
**Project:** Exelon Contract 00000833 Release 00761  
**References:** GEH 002N2662 R0

Dear Mr. Varghese:

GE Hitachi Nuclear Energy LLC (GEH) is pleased to provide you with this RAI response.

This document this document is being provided as additional support under the terms and conditions of Exelon contract 00000833 release 00761.


GEH Document number: GEH 002N2662 R0 titled: Response to RAI #1 of the Limerick Main Steam Line Flow-High Isolation Response Time Proposed Licensing Amendment.

If you have any questions or wish to discuss this project in greater detail, please call me at your convenience.

Sincerely,

A handwritten signature in cursive script that reads 'Larry Beese'.

Larry Beese  
Manager, Technical Services  
GE Hitachi Nuclear Energy

|   |          |   |                         |
|---|----------|---|-------------------------|
|  <b>HITACHI</b>                  |          | GE Hitachi Nuclear Energy<br>002N2662-R0      | GEH Class I Information |
| Response to RAI #1 of the Limerick Main Steam Line Flow-High Isolation Response Time Proposed Licensing Amendment |          | Report Specification:<br>002N2662, Revision 0 | Date: 29 October 2014   |
| Final   | Verified | GEH External                                  | Sheet 1 of 2            |

**RAI #1 of Limerick Units 1 and 2 Main Steam Line Isolation Response Time (Docket Nos. 50-352 and 50-353)**

By application dated November 15, 2013, as supplemented by letters dated April 16, 2014, and September 11, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML13322A448, ML14106A642, and ML14255A088, respectively), Exelon Generation Company, LLC (Exelon, the licensee), submitted a license amendment request for Limerick Generating Station (LGS), Units 1 and 2. The proposed amendment would revise the Technical Specification (TS) requirements related to the response time for the main steam line flow-high isolation function.

The Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is needed to complete its review as indicated below.

1. In Attachment 4 to the application dated November 15, 2013 (General Electric Hitachi Nuclear Energy (GEH) report 0000-0158-9651-NP), GEH states that the SAFER04A code is approved for use in main steamline break outside of containment (STMO) analyses examining fuel integrity and mass release. The report also states that the analysis of record for the LGS STMO event is documented in GE Nuclear Energy Report NEDC-32170-P.

During a telephone conference between the NRC staff and Exelon on October 6, 2014, the staff requested clarification regarding use of the SAFER04A code with respect to the proposed amendment. Specifically, the staff requested the licensee to identify the NRC-approved topical report pertaining to the use of SAFER04A. The licensee indicated that the topical report which approved SAFER04A is NEDE-23785P-A.


Please confirm that use of the SAFER04A code for the LGS STMO analyses is based on NEDE-23785P-A, in addition to NEDC-32170-P. Also, confirm that NEDE-23785P-A was evaluated to ensure that the LGS STMO analyses input parameters and assumptions are applicable and bounded. Also, confirm that there are no exceptions taken from the conditions and limitations identified in the NRC safety evaluation which approved NEDE-23785P-A.

**GEH Proposed Response to RAI #1:**

The LGS main steam isolation valve response time testing analysis documented in GEH report 0000-0158-9651-NP (Reference 1) utilizes the SAFER04A code for STMO analyses in a manner fully consistent with the analysis of record for the LGS STMO event documented in report NEDC-32170P, (Reference 2). The name SAFER04A refers to the current executable version of the Engineering Computer Code compliant with the GEH Quality Assurance Program as approved by NRC and described in the GEH quality assurance topical report NEDO-11209-A (Reference 3). SAFER04A implements and maintains the NRC-approved SAFER/GESTR-LOCA evaluation methodology (generally referred to as "SAFER") recorded in Reference 4. The specific application of the Reference 4 methodology to LGS is documented in Reference 2, including the STMO analysis basis.

GEH confirms the use of SAFER04A in the Reference 1 analysis is based upon the SAFER evaluation methodology of NEDE-23785-1-PA (Reference 4), which also serves as the basis of the SAFER evaluations reported in NEDC-31270-P (Reference 2). The statement provided in Section 3 of the Reference 1 report indicating that "... SAFER04A ... is approved for STMO analyses" and referring to NEDC-31270-P (Reference 2) may more appropriately be stated as "SAFER04A is used for STMO analysis as reported in [NEDC-31270-P], consistent with application of the SAFER methodology documented in [NEDE-23785-1-PA]."



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|---|-----------------|--|--------------------------------|
|  <b>HITACHI</b>                        |                 | <b>GE Hitachi Nuclear Energy</b><br><b>002N2662-R0</b> | <b>GEH Class I Information</b> |
| Response to RAI #1 of the Limerick Main<br>Steam Line Flow-High Isolation Response<br>Time Proposed Licensing Amendment |                 | Report Specification:<br>002N2662, Revision 0          | Date: 29 October 2014          |
| <b>Final</b>  | <b>Verified</b> | GEH External   | Sheet 2 of 2                   |

Furthermore, GEH confirms that NEDC-23785-1-PA (Reference 4) was evaluated to ensure the STMO analysis results presented in Reference 1 were obtained using applicable and bounding input parameters and assumptions. The Reference 1 analysis input parameters and assumptions were established from the analysis of record conditions given in NEDC-32170-P (Reference 2), thereby invoking the evaluation methodology conditions of NEDE-23785-1-PA (Reference 4). Additional or alternative input parameters or assumptions specifically applied in order to bound the STMO mass release are described in Reference 1. These analysis conditions are applied without altering the requirements of NRC Topical Report Evaluation accompanying NEDE-23785-1-PA (Reference 4). For example, use of the Moody Slip Flow Model for break flow rate provides a conservative assumption consistent with the Appendix K Model Specifications shown in Table 1 of NRC Topical Report Evaluation accompanying NEDE-23785-1-PA (Reference 4). Additionally, the hot-standby power and flow condition is assessed in Reference 1 for conservatively maximizing the quantity of reactor coolant released in the postulated steam line break outside containment during the timeframe prior to vessel isolation with closure of the main steam line isolation valves. Rated power and flow conditions yield a lower total coolant release as documented in the Reference 1 report, but result in a larger calculated temperature increase of the fuel and cladding and thus are the conservative conditions applied in the Reference 2 analysis. The analysis objectives of these scenarios requires differing input, but in no case of the Reference 1 analyses are exceptions taken to the evaluation methodology or the applicable limitations and conditions in the NRC safety evaluation approving NEDE-23785-1-PA (Reference 4).

**References:**

1. GE Hitachi Nuclear Energy, "Limerick Generating Station Main Steam Isolation Valve Response Time Testing Analysis," 0000-0158-9651-NP, October 2013.
2. GE Nuclear Energy, "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Limerick Generating Station Units 1 and 2," NEDC-32170P, Revision 2, May 1995.
3. GE Hitachi Nuclear Energy, "Quality Assurance Program Description," NEDO-11209-A, Revision 9, August 2011.
4. General Electric Company, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology," NEDE-23785-1-PA, Revision 1, October 1984.