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**GE Hitachi Nuclear Energy**

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August 11, 2011
MFN 10-245 R3

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

**Subject: Part 21 60-Day Interim Report Notification: Failure to Include Seismic Input in Channel-Control Blade Interference Customer Guidance**

This letter provides information concerning the on-going evaluation being performed by GE Hitachi Nuclear Energy (GEH) regarding the failure to include seismic loads in the guidance provided in MFN 08-420 (Reference 1). This issue was initially reported on September 2, 2010 as GEH letter MFN 10-245 R0 (Reference 2); revised on September 27, 2010 as MFN 10-245 R1 (Reference 3). Additional information was provided on December 15, 2010 as GEH letter MFN 10-245 R2 (Reference 4).

GEH has not concluded that this is a reportable condition in accordance with the requirements of 10 CFR 21.21(d) and continued evaluation is required to determine the impact of a seismic event on the guidance contained in MFN 08-420.

To provide perspective to the continuing evaluation, it is important to note the limited range of conditions that remain under study. For normal operating pressure conditions, the guidance provided in MFN 08-420 remains adequate. The conditions that remain under study involve only startup and shutdown low pressure conditions. GEH has studied 17 US BWR plants from a probabilistic risk standpoint to predict the likelihood that a plant would experience a Safe Shutdown Earthquake (SSE) during a startup or shutdown. That study determined the median frequency of 1E-6/year and a highest frequency of 3E-6/year for this occurrence for the 17 plant study group. The overall probability that conditions exist where a blade would not insert is further reduced when considering the likelihood of the simultaneous occurrence of channel-control blade interference.

The information required for a 60-Day Interim Report Notification per §21.21(a)(2) is provided in Attachment 3. The commitment for follow-on actions is provided in Attachment 3, item (vii).

If you have any questions on this information, please call me at (910) 819-4491.

Sincerely,

Dale E. Porter
Safety Evaluation Program Manager
GE-Hitachi Nuclear Energy Americas LLC

Attachments:

1. Description of Evaluation
2. US Plants Previously Notified of Channel-Control Blade Interference Concerns
3. 60-Day Interim Report Notification Information per §21.21(a)(2)

References:

1. Letter from Dale E. Porter (GEH) to Document Control Desk (US NRC), Subject: Update to GEH Surveillance Program for Channel-Control Blade Interference Monitoring, December 19, 2008, MFN 08-420.
2. Letter from Dale E. Porter (GEH) to Document Control Desk (US NRC), Subject: Part 21 60-Day Interim Report Notification: Failure to Include Seismic Input in Channel-Control Blade Interference Customer Guidance, September 2, 2010, MFN 10-245.
3. Letter from Dale E. Porter (GEH) to Document Control Desk (US NRC), Subject: Part 21 60-Day Interim Report Notification: Failure to Include Seismic Input in Channel-Control Blade Interference Customer Guidance, September 27, 2010, MFN 10-245 R1.
4. Letter from Dale E. Porter (GEH) to Document Control Desk (US NRC), Subject: Part 21 60-Day Interim Report Notification: Failure to Include Seismic Input in Channel-Control Blade Interference Customer Guidance, December 15, 2010, MFN 10-245 R2.

cc: S. S. Philpott, USNRC
S. J. Pannier, USNRC
O. Tabatabai-Yazdi, USNRC
J. F. Harrison, GEH
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A. A. Lingenfelter, GNF
PRC File
DRF Section No. 0000-0137-3868

# Attachment 1 – Description of Evaluation

## Summary

GE Hitachi Nuclear Energy (GEH) identified, in July 2010, that engineering evaluations supporting the guidance provided in MFN 08-420 (Reference 1), did not address the potential impact of a seismic event on the ability to scram as it relates to the channel-control blade interference issue. GEH provided status of the on-going evaluation in MFN 10-245 R2 (Reference 4). GEH has not completed the evaluation of the impact of the seismic loads between the fuel channel and the control blade associated with a bounding Safe Shutdown Earthquake (SSE) on BWR/2-5 plants. The scram capability is expected to be affected due to the added seismic loads at low reactor pressures in the BWR/2-5 plants. Additional evaluations are required to determine to what extent the maximum allowable friction limits specified for the BWR/2-5 plants in MFN 08-420 are affected by the addition of SSE seismic loads at low reactor pressures.

GEH issues this 60-Day Interim Report in accordance with the requirements set forth in 10CFR 21.21(a)(2) to allow additional time for this evaluation to be completed.

## Background

In 2010, GEH identified that the engineering evaluations supporting the guidance provided in MFN 08-420, did not address the potential impact of a seismic event on the ability of control rods to fully insert during a scram for locations with substantial channel – control blade interference. GEH issued three 60-Day Interim Reports in accordance with the requirements set forth in 10CFR 21.21(a)(2) to allow additional time for the evaluation to be completed.

In September 2010, GEH issued MFN 10-245 and MFN 10-245 R1 (References 2 and 3, respectively) to communicate the following results from the evaluation completed as of that date:

1. The required scram performance for the BWR/6 plant is not adversely impacted by the seismic events. The guidance specified in MFN 08-420 continues to ensure that the BWR/6 control rods will fully insert during a seismic event (OBE or SSE) at all normal operating conditions.
2. For BWR/2-5 plants, at reactor pressures of 1000 psig and above, the required scram capability is not adversely impacted by the inclusion of seismic events (OBE or SSE). The guidance specified in MFN 08-420 will continue to ensure that the BWR/2-5 control blades will fully insert during a seismic event (OBE or SSE).

3. For the BWR/2-5 plants, the potential exists that, during a seismic event, control blades with scram friction near the limits specified in MFN 08-420 may not fully insert at the main steam isolation valve (MSIV) isolation pressure condition, or at a 550 psig pressure condition.

In December 2010, GEH issued MFN 10-245 R2 to communicate the status of the on-going evaluation. Additional time was needed to modify and verify the model used for establishing the maximum allowable friction limits in MFN 08-420; adding the capability to evaluate the effects of friction caused by a seismic event. The scope of the modification also included other changes needed to account for the depletion of the Hydraulic Control Unit (HCU) scram accumulator and pressurization of the Scram Discharge Volume (SDV).

**Evaluation Status**

As of this date, the modification of the model is complete. GEH has performed preliminary evaluations using the model to determine the impact of the seismic event on the ability of the control rod to scram when channel-control blade interference is present. Once the evaluations are complete, GEH will be providing an update to MFN 08-420 – specifically providing guidance for startup and shutdown. This communication provides updated recommendations for BWR/2-5 plants until the evaluations are complete.

**ABWR and ESBWR Design Certification Documentation Applicability**

The issues described above have been reviewed for applicability to documentation associated with 10 CFR 52 and it has been determined that there is no effect on the technical information contained in either the ABWR certified design or the ESBWR design in certification.

**Recommendation**

To assist in a control blade insertion under the low-pressure condition, control rods that have exhibited signs of channel-control blade interference (i.e. either no-settle (>30 seconds) or slow-to-settle (>7 seconds)) should be fully inserted prior to operating at a reactor pressure less than 950 psig. Because of this increased sensitivity to channel-control blade interference, settle time testing or other appropriate alternate testing to identify control rods affected by interference should be performed prior to operating at a reactor pressure less than 950 psig. Additionally, during startup or shutdown with reactor pressure <950 psig, all control rods should have the associated accumulator pressure charged to ≥ 1100 psig until reactor pressure is ≥ 950 psig.

**Corrective/Preventive Actions**

GEH will complete the ongoing evaluations by September 26, 2011.

Refer to Attachment 3, Item (vii) for corrective actions.

**Attachment 2**

**US Plants Notified of Channel-Control Blade Concerns**

(1) = Surveillance program recommended
(2) = Provided for information

| (1) | (2) | Utility | Plant |
|---|---|---|---|
| X | | Constellation Nuclear | Nine Mile Point 1 |
| X | | Constellation Nuclear. | Nine Mile Point 2 |
| X | | Detroit Edison Co. | Fermi 2 |
| X | | Energy Northwest | Columbia |
| X | | Entergy Nuclear Northeast | FitzPatrick |
| X | | Entergy Nuclear Northeast | Pilgrim |
| X | | Entergy Nuclear Northeast | Vermont Yankee |
| | X | Entergy Operations, Inc. | Grand Gulf |
| | X | Entergy Operations, Inc. | River Bend |
| | X | Exelon Generation Co. | Clinton |
| X | | Exelon Generation Co. | Oyster Creek |
| X | | Exelon Generation Co. | Dresden 2 |
| X | | Exelon Generation Co. | Dresden 3 |
| X | | Exelon Generation Co. | LaSalle 1 |
| X | | Exelon Generation Co. | LaSalle 2 |
| X | | Exelon Generation Co. | Limerick 1 |
| X | | Exelon Generation Co. | Limerick 2 |
| X | | Exelon Generation Co. | Peach Bottom 2 |
| X | | Exelon Generation Co. | Peach Bottom 3 |
| X | | Exelon Generation Co. | Quad Cities 1 |
| X | | Exelon Generation Co. | Quad Cities 2 |
| | X | First Energy Nuclear Operating Co. | Perry 1 |
| X | | FPL Energy | Duane Arnold |
| X | | Nebraska Public Power District | Cooper |
| X | | Xcel Energy | Monticello |
| X | | PPL Susquehanna LLC. | Susquehanna 1 |
| X | | PPL Susquehanna LLC | Susquehanna 2 |
| X | | Progress Energy | Brunswick 1 |
| X | | Progress Energy | Brunswick 2 |
| X | | PSEG Nuclear. | Hope Creek |
| X | | Southern Nuclear Operating Co. | Hatch 1 |
| X | | Southern Nuclear Operating Co. | Hatch 2 |
| X | | Tennessee Valley Authority | Browns Ferry 1 |
| X | | Tennessee Valley Authority | Browns Ferry 2 |
| X | | Tennessee Valley Authority | Browns Ferry 3 |

**<u>Attachment 3</u> – 60-Day Interim Report Notification Information per §21.21(a)(2)**

(i) Name and address of the individual or individuals informing the Project.

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(ii) Identification of the facility, the activity, or the basic component supplied for such facility which fails to comply or contains a defect.

See Attachment 2 for a list of potentially affected plants

(iii) Identification of the firm constructing the facility or supplying the basic component which fails to comply or contains a defect.

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(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.

GE Hitachi Nuclear Energy (GEH) has identified that engineering evaluations that support the guidance provided in MFN 08-420, do not address the potential impact of a seismic event on scram performance as it relates to the channel-control blade interference issue. GEH continues evaluating the impact of the seismic loads between the fuel channel and the control blade associated with a bounding Safe Shutdown Earthquake (SSE) on BWR/2-5 plants. The scram capability is expected to be affected due to the added seismic loads at low reactor pressures in the BWR/2-5 plants. The scram capability for the BWR/6 plants is not adversely affected by a concurrent seismic event. Additional evaluations are required to determine to what extent the maximum allowable friction limits specified for the BWR/2-5 plants in MFN 08-420 are affected by the addition of seismic loads at low reactor pressures.

(v) The date on which the information of such defect or failure to comply was obtained.

A Potential Reportable Condition Evaluation in accordance with 10 CFR Part 21 was initiated on July 7, 2010.

(vi) In the case of a basic component which contains a defect or fails to comply, the number and location of these components in use at, supplied for, being supplied for, or may be supplied for, manufactured, or being manufactured for one or more facilities or activities subject to the regulations in this part.

See Attachment 2 for a list of potentially affected plants.

(vii) The corrective action, which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.

GEH will complete the evaluation by September 26, 2011.

(viii) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.

To assist in a control blade insertion under the low-pressure condition, control rods that have exhibited signs of channel-control blade interference (i.e. either no-settle (>30 seconds) or slow-to-settle (>7 seconds)) should be fully inserted prior to operating at a reactor pressure less than 950 psig. Because of this increased sensitivity to channel-control blade interference, settle time testing or other appropriate alternate testing to identify control rods affected by interference should be performed prior to operating at a reactor pressure less than 950 psig. Additionally, during startup or shutdown with reactor pressure <950 psig, all control rods should have the associated accumulator pressure charged to ≥ 1100 psig until reactor pressure is ≥ 950 psig.

(ix) In the case of an early site permit, the entities to whom an early site permit was transferred.

This is not an early site permit concern.