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**GE Hitachi Nuclear Energy**

December 13, 2012  
MFN 12-128 R0

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

**Dale E. Porter**

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**Subject: Part 21 60-Day Interim Report Notification:  
Adequacy of Design Change in AM Magne-Blast Circuit Breakers**

This letter provides information concerning an evaluation being performed by GE Hitachi Nuclear Energy (GEH) regarding the adequacy of a Design Change in AM 4.16-350-2C and AM 4.16-350-2H Magne-Blast Circuit Breakers. As stated herein, GEH has not concluded that there is a reportable condition in accordance with the requirements of 10CFR 21.21(d). Testing and continued evaluation is required to determine whether this condition is a reportable condition and what impact and extent of this condition may exist.

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, 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 Potentially Affected
3. 60-Day Interim Report Notification Information per §21.21(a)(2)

MFN 12-128 R0

Page 2 of 2

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## Summary

GE Hitachi Nuclear Energy (GEH) is investigating the adequacy of a Design Change in AM 4.16-350-2C and AM 4.16-350-2H Magne-Blast Circuit Breakers as a result of a breaker failure at a BWR Licensee.

GEH has not completed the evaluation of this condition to determine reportability under 10 CFR Part 21 and is therefore issuing this 60-day Interim Notification. GEH will close or issue an update on this matter on or before June 14, 2013. Given the early status of the evaluation, GEH has no recommended actions at this time. This 60-day Interim Notification is issued in accordance with 10CFR Part 21.21(a)(2), and will be sent to all GE BWR/2-6 plants and all PWRs.

## Discussion

On October 30, 2012 GEH determined that a part of a Safety Related Breaker (Model AM 4.16-350-2H/2C 1200A, 2000A, 3000A) may be installed in such a manner that could cause the breaker to fail.

A customer reported a breaker failure which involved the booster piston impacting the bottom of the booster cylinder. GEH performed a causal evaluation for the licensee and the root cause was indeterminate. It was noted that there were multiple contributing maintenance factors associated with the breaker failure. The report concluded that no single issue could have caused the impact and subsequent failure.

GEH developed the design of this model breaker in the late 1960's and were sold to Licensee's as Safety Related, prior to the development of IEEE-323. However, that did not relinquish GEH from developing test reports according to existing industry standards. One industry standard established at that time was ANSI C37.06, which required successful demonstration of 10,000 cycles under no load. This standard is used today as part of the IEEE-323 Qualification.

GEH constructed, tested and supplied a specialized breaker for a licensee in 1971 to improve response time. Heavier springs were installed on a base model AM 4.16-350-2H. Modification testing revealed that the heavier springs provided extra momentum to the mechanism, causing the puffer piston and booster cylinder bottom to contact. Two additional design changes were performed to eliminate the contact. First, the opening and closing spring rates were decreased. Second, another design change lowered the booster cylinder in relation to the booster piston, providing additional impact margin (gap). Follow-up testing revealed no impact; however, the contribution of either design change is unknown. The heavier springs were utilized for the special breaker and the product line

returned to the standard springs for subsequent breaker manufacture. The modification to lower the booster cylinder was incorporated into the base product design on October 6, 1971 (with standard springs) and has carried forth until the present. This modification increased the clearance between the piston end stroke and booster cylinder bottom.

GEH has attempted to locate documentation of the No Load Cycle Test required per ANSI C37.06 for both the pre-modification and post modification designs relating to the booster cylinder change. GEH has documentation that demonstrates the post modification models successfully passed the ANSI C37.06/C37.09 testing in 1977, as part of the IEEE-323 Qualification. GEH has been unable to locate ANSI C37.06 No Load Cycle Testing for the design prior to the 1971 modification (with standard springs). Additionally, GEH is not aware of any further design changes which would invalidate the Qualification of the breakers prior to the IEEE-323 Qualification in 1977.

The GEH position, regarding the pre-1971 modified breakers, is that the breakers will perform all safety related functions involving the booster cylinder and piston. This is based on:

- The GEH Service center has performed maintenance on this style breaker for over 40 years. There have been no documented piston impacts on the booster cylinder bottom, except for the single licensee failure noted above.
- GEH has also performed an EPIX search for all functional failures regarding this product line. The only instance where this occurred was the above mentioned licensee failure.

GEH has taken a conservative approach to this issue and has committed to testing an AM 4.16-350 breaker per ANSI C37.06, for purposes of validating the pre-modification design. GEH advises Licensees to take no action at this point. However, if licensees wish to determine the extent, they may identify breaker models AM 4.16-350-2H/2C with a date of manufacture prior to October 6, 1971. Other AM breaker styles do not use the booster cylinder as designed in breaker model AM 4.16-350-2H/2C.

### **Extent of Condition**

GEH has documentation that the licensee who reported the failure, was shipped additional breakers that fall within the date of manufacture prior to October 6, 1971. GEH is unable at this time to identify other licensees who may have been shipped this series of breakers. This is not of concern because the current GEH position is that no defect exists. If testing identifies any anomaly with the pre-October 6, 1971 design, GEH will immediately begin determining the extent of condition, and initiate notification to the industry and regulatory authority.

**ABWR and ESBWR Design Certification Documentation Applicability**

The issue described above has been reviewed for applicability to documentation associated with 10 CFR 52, and determined to have no effect on the technical information contained in either the ABWR certified design or the ESBWR design in certification. This is true because the Technical Specifications submitted with the Design Certification Documentation do not include specific details associated with these components.

**Recommendation**

GEH advises licensees to take no action at this time. However, if licensees wish to determine if the extent of this issue is present at their respective plants, they may identify breaker models AM 4.16-350-2H/2C with a date of manufacture prior to October 6, 1971. Other AM breaker styles do not use the booster cylinder as designed in breaker model AM 4.16-350-2H/2C and are not included in this concern. Therefore the extent is limited to the AM 4.16-350-2H/2C models manufactured prior to October 6, 1971.

**Corrective/Preventive Actions**

GEH will complete the testing and post-test evaluation and issue either a closure of this 10CFR Part 21 concern or issue an update, based on the results of these tests, by June 14, 2013.

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

**Attachment 2**  
**US Plants Potentially Affected**

*US BWR Plants and Associated Facilities*

	<b><u>Utility</u></b>	<b><u>Plant</u></b>
<u>X</u>	Constellation Energy	Nine Mile Point 1-2
<u>X</u>	Detroit Edison Co.	Fermi 2
<u>X</u>	Energy Northwest	Columbia
<u>X</u>	Entergy	Grand Gulf
<u>X</u>	Entergy	River Bend
<u>X</u>	Entergy	FitzPatrick
<u>X</u>	Entergy	Pilgrim
<u>X</u>	Entergy	Vermont Yankee
<u>X</u>	Exelon	Clinton
<u>X</u>	Exelon	Dresden 2-3
<u>X</u>	Exelon	LaSalle 1-2
<u>X</u>	Exelon	Limerick 1-2
<u>X</u>	Exelon	Oyster Creek
<u>X</u>	Exelon	Peach Bottom 2-3
<u>X</u>	Exelon	Quad Cities 1-2
<u>X</u>	FirstEnergy Nuclear Operating Co.	Perry 1
<u>X</u>	Florida Power & Light	Duane Arnold
<u>X</u>	Nebraska Public Power District	Cooper
<u>X</u>	PPL Susquehanna LLC	Susquehanna 1-2
<u>X</u>	Progress Energy	Brunswick 1-2
<u>X</u>	PSEG Nuclear, LLC	Hope Creek
<u>X</u>	Southern Nuclear Operating Co.	Hatch 1 - 2
<u>X</u>	Tennessee Valley Authority	Browns Ferry 1-3
<u>X</u>	Xcel Energy	Monticello

**Attachment 2**  
**US Plants Potentially Affected**

*US PWR Plants and Associated Facilities*

<b><u>Utility</u></b>	<b><u>Plant</u></b>	
<u>X</u>	AmerenUE	Callaway
<u>X</u>	Arizona Public Service	Palo Verde 1-3
<u>X</u>	Constellation Energy	Calvert Cliffs 1-2
<u>X</u>	Constellation Energy	GINNA
<u>X</u>	Entergy	Arkansas Nuclear One 1-2
<u>X</u>	Entergy	Indian Point 2-3
<u>X</u>	Dominion	Kewaunee
<u>X</u>	Dominion	Millstone 2
<u>X</u>	Dominion	Millstone 3
<u>X</u>	Dominion	North Anna 1-2
<u>X</u>	Dominion	Palisades
<u>X</u>	Dominion	Surry 1-2
<u>X</u>	Dominion	Waterford 3
<u>X</u>	Duke Energy Corporation	Catawba 1-2
<u>X</u>	Duke Energy Corporation	Oconee 1-3
<u>X</u>	Duke Energy Corporation	McGuire 1-2
<u>X</u>	Exelon	Braidwood 1-2
<u>X</u>	Exelon	Byron 1-2
<u>X</u>	Exelon	Three Mile Island 1
<u>X</u>	FirstEnergy Nuclear Operations Co.	Beaver Valley 1-2
<u>X</u>	FirstEnergy Nuclear Operating Co.	Davis-Besse
<u>X</u>	Florida Power & Light	Seabrook
<u>X</u>	Florida Power & Light	St. Lucie 1-2
<u>X</u>	Florida Power & Light	Turkey Point 3-4
<u>X</u>	Florida Power & Light	Point Beach 1-2
<u>X</u>	Indiana Michigan Power Corp	D C Cook 1-2
<u>X</u>	Northern States Power	Prairie Island 1-2
<u>X</u>	Omaha Public Power District	Fort Calhoun
<u>X</u>	Pacific Gas & Electric Co.	Diablo Canyon 1-2
<u>X</u>	Progress Energy	Crystal River 3
<u>X</u>	Progress Energy	Robinson
<u>X</u>	Progress Energy	Shearon Harris
<u>X</u>	PSEG Nuclear LLC	Salem 1
<u>X</u>	PSEG Nuclear LLC	Salem 2
<u>X</u>	South Carolina Electric & Gas Co.	Summer
<u>X</u>	South Texas Project Nuclear Operating Co.	South Texas Project 1-2
<u>X</u>	Southern California Edison Co.	San Onofre 2-3
<u>X</u>	Southern Nuclear Operating Co.	Farley 1-2
<u>X</u>	Southern Nuclear Operating Co.	Vogtle 1-2
<u>X</u>	Tennessee Valley Authority	Sequoyah 1-2

X  
X  
X

Tennessee Valley Authority  
TXU Electric Generation Co.  
Wolf Creek Nuclear Operating Corp.

Watts Bar 1  
Comanche Peak 1-2  
Wolf Creek



**Attachment 3****60-Day Interim Report Notification Information per §21.21(a)(2)**

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

Dale E. Porter  
GE Hitachi Nuclear Energy  
Safety Evaluation Program Manager  
3901 Castle Hayne Road, Wilmington, NC 28401

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

AM 4.16-350-2C and AM 4.16-350-2H Magne-Blast Circuit Breakers

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

GE Hitachi Nuclear Energy

- (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.

Failure of a Safety Related AM 4.16-350-2H/2C breaker to close or open. Failure to prevent arching between phases during opening.

- (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 October 30, 2012.

- (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.

As a conservative measure this Transfer of Information is being supplied to all BWR and PWR plants as the AM 4.16-350-2H/2C breaker is widely used.

- (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 testing and post-test evaluation and issue either a closure of this 10CFR Part 21 concern or issue an update, based on the results of these tests, by June 14, 2013.

**Attachment 3**

**60-Day Interim Report Notification Information per §21.21(a)(2)**

- (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.

GEH advises Licensees to take no action at this time.

- (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.