



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 18, 2016

To the Power Reactor Licensees  
on the Enclosed List

SUBJECT: STAFF REVIEW OF HIGH FREQUENCY CONFIRMATION ASSOCIATED WITH  
REEVALUATED SEISMIC HAZARD IN RESPONSE TO MARCH 12, 2012  
50.54(f) REQUEST FOR INFORMATION

The U.S. Nuclear Regulatory Commission (NRC) is issuing this letter to inform the power reactor licensees included in Enclosure 2, of the NRC staff's review of the high frequency confirmation letters and concludes that the licensees' assessment was performed consistent with the guidance. This letter also identifies specific licensees that have provided sufficient information to complete the response to the 50.54(f) request for information and that the staff has also found that no additional regulatory actions associated with Phase 2 of R2.1 "Seismic" are required.

BACKGROUND

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations* Part 50, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The request was issued as part of implementing lessons-learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 1 to the 50.54(f) letter requested that licensees reevaluate seismic hazards at their sites using present-day methodologies and guidance. Enclosure 1, Item 4, of the 50.54(f) letter requested that licensees perform a comparison of the ground motion response spectrum (GMRS) and safe shutdown earthquake (SSE); and if the GMRS exceeds the SSE only at higher frequencies information related to the functionality of high frequency sensitive structures, systems and components (SSCs) is requested. Attachment 1, Step 3 of the March 12, 2012, letter further clarified that licensees with high frequency exceedance should provide a confirmation that SSCs, which may be affected by high-frequency ground motion, will maintain their functions important to safety.

By letter dated July 30, 2015 (ADAMS Accession No. ML15223A100), the Nuclear Energy Institute submitted an Electric Power Research Institute (EPRI) report entitled, High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation (EPRI 3002004396) for NRC review and endorsement. The NRC endorsed the guidance by letter dated September 17, 2015 (ADAMS Accession No. ML15218A569), as an acceptable method for licensees to use, in addition to the SPID guidance, when responding to NRC Requested Information Item (4) in Enclosure 1 of the 50.54(f) letter. Furthermore, the letter dated October 27, 2015 (ADAMS Accession No. ML15194A015), to licensees established that for facilities with limited exceedance in the high frequency range above plant design bases, submittals are expected by December 31, 2015.

## REVIEW OF LICENSEE HIGH FREQUENCY CAPACITY CONFIRMATION

By letters dated November and December 2015<sup>1</sup>, to the NRC, licensees submitted for NRC review the limited exceedance high frequency confirmations. The NRC staff review confirmed that licensee-reevaluated seismic hazards meet one of two screening criteria:

1. Peak spectral accelerations  $\leq 0.2g$  or
2. The GMRS exceedance above the current design-basis is on the order of 10 percent or less of the area under the SSE or Individual Plant Examination of External Events High Confidence of Low Probability of Failure Spectrum (IHS) over the frequency range of exceedance.

The NRC staff confirmed that the following plants met the 3.1.1. "Low Spectral Acceleration Screening" criterion described in EPRI Report 3002004396:

Calvert Cliffs Nuclear Power Plant, Units 1 and 2  
Duane Arnold Energy Center  
River Bend Station, Unit 1  
Waterford Steam Electric Station, Unit 3

The basis for this criterion is the lack of damage observed in actual earthquakes with observed spectral accelerations less than 0.2g. Additionally, the EPRI High Frequency Program has shown that shake table testing in the high frequency range of 20 to 40 Hertz (Hz), in general, yields a higher test capacity than testing in the 4 to 16 Hz range for tests of the same control component. Therefore, the NRC staff concludes that sites with a horizontal GMRS high frequency peak spectral acceleration less than 0.2g do not warrant additional evaluations to confirm the functionality of control devices in the high frequency range.

The NRC staff confirmed that the following plants met the 3.1.2 "Limited High Frequency Exceedance Screening" criterion described in EPRI Report 3002004396:

Clinton Power Station, Unit No. 1  
Hope Creek Generating Station  
Nine Mile Point Nuclear Station, Unit 2  
Oyster Creek Nuclear Generating Station  
R.E. Ginna Nuclear Power Plant  
Salem Nuclear Generating Station, Units 1 and 2  
Shearon Harris Nuclear Generating Station, Unit 1  
Susquehanna Steam Electric Station, Units 1 and 2

For the high frequency confirmation, this range of exceedance over limited frequency ranges, evaluated using the exceedance area criteria, does not represent a concern and thus does not warrant additional evaluations to confirm the functionality of control devices in the high frequency range.

Based on the NRC staff review of licensee letters, the staff concludes that licensee screening meets the criteria outlined in EPRI Report 3002004396, and thus is acceptable to the staff.

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<sup>1</sup> Licensee November and December 2015 submittal letters can be found in Enclosure 1.

CLOSURE OF PHASE TWO EVALUATION FOR SPECIFIC LICENSEES

Based on the justification provided above, the NRC staff concludes that no further response or regulatory actions associated with the 50.54(f) letter review of Phase 2 of the Near-term Task Force (NTTF) Recommendation 2.1 "Seismic" are required for the following plants:

Clinton Power Station, Unit No. 1  
Duane Arnold Energy Center  
Nine Mile Point Nuclear Station, Unit 2  
R.E. Ginna Nuclear Power Plant  
River Bend Station, Unit 1  
Shearon Harris Nuclear Generating Station, Unit 1  
Waterford Steam Electric Station, Unit 3

For the above plants, this letter closes out the NRC efforts associated with Phase 1 and Phase 2 of NTTF Recommendation 2.1 "Seismic". If you have any questions, please contact Steve Wyman at (301) 415-3041 or via e-mail at Stephen.Wyman@nrc.gov.

Sincerely,



Stephen Wyman, Project Manager  
Hazards Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Enclosures:

1. Correspondence Associated with  
Seismic Hazard Reviews and  
High Frequency Confirmation
2. List of Addressees

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Correspondence Associated with Seismic Hazard Reviews and  
High Frequency Confirmation

Plant Name	Seismic Hazard and Screening Report and Supplements (ADAMS Accession Nos.)	NRC Screening and Determination Letters (ADAMS Accession Nos.)	Seismic Hazard Staff Assessment Letter (ADAMS Accession Nos.)	High Frequency Confirmation Letter (ADAMS Accession Nos.)
Calvert Cliffs Nuclear Power Plant, Units 1 and 2	March 31, 2014 (ML14099A196)	May 9, 2014 (ML14111A147)	July 8, 2015 (ML15153A073)	December 4, 2015 (ML15338A002)
Clinton Power Station, Unit No. 1	March 31, 2014 (ML14091A011), and August 21, 2014 (ML14234A124)	May 9, 2014 (ML14111A147), and October 3, 2014 (ML14258A043)	October 19, 2015 (ML15281A226)	November 30, 2015 (ML15335A389)
Duane Arnold Energy Center	March 28, 2014 (ML14092A331) and	May 9, 2014 (ML14111A147) and August 21, 2014 (ML14198A070)	December 15, 2015 (ML15324A176)	December 15, 2015 (ML15352A114)
Hope Creek Generating Station	March 28, 2014 (ML14087A436)	May 9, 2014 (ML14111A147)	Remains under review	December 23, 2015 (ML15358A138)
Nine Mile Point Nuclear Station, Unit 2	March 31, 2014 (ML14099A196)	May 9, 2014 (ML14111A147)	June 16, 2015 (ML15153A660)	December 4, 2015 (ML15338A004)
Oyster Creek Nuclear Generating Station	March 31, 2014 (ML14090A241) and August 21, 2014 (ML14234A124)	May 9, 2014 (ML14111A147) and November 28, 2014 (ML14307A638)	February 17, 2016 (ML15350A353)	December 4, 2015 (ML15338A005)
R.E. Ginna Nuclear Power Plant	March 31, 2014 (ML14099A196)	May 9, 2014 (ML14111A147)	June 11, 2015 (ML15153A026)	December 4, 2015 (ML15338A003)
River Bend Station, Unit 1	March 26, 2014 (ML14091A426)	May 9, 2014 (ML14111A147)	November 3, 2015 (ML15295A186)	December 8, 2015 (ML16005A088)

Plant Name	Seismic Hazard and Screening Report and Supplements (ADAMS Accession Nos.)	NRC Screening and Determination Letters (ADAMS Accession Nos.)	Seismic Hazard Staff Assessment Letter (ADAMS Accession Nos.)	High Frequency Confirmation Letter (ADAMS Accession Nos.)
Salem Nuclear Generating Station, Units 1 and 2	March 28, 2014 (ML14090A043)	May 9, 2014 (ML14111A147) October 3, 2014 (ML14258A043) October 27, 2015 (ML15194A015)	Remains under review	December 23, 2015 (ML15358A139)
Shearon Harris Nuclear Power Plant, Unit 1	March 27, 2014 (ML14090A441)	May 9, 2014 (ML14111A147)	December 18, 2015 (ML15349A149)	December 17, 2015 (ML15351A170)
Susquehanna Steam Electric Station, Units 1 and 2	March 26, 2014 (ML14085A398)	May 9, 2014 (ML14111A147)	January 20, 2016 (ML15356A247)	December 23, 2015 (ML15362A529)
Waterford Steam Electric Station, Unit 3	March 27, 2014 (ML14086A427)	May 9, 2014 (ML14111A147)	December 15, 2015 (ML15335A050)	December 16, 2015 (ML15350A389)

**List of Addressees**

Calvert Cliffs Nuclear Power Plant  
Calvert Cliffs Nuclear Power Plant, LLC  
Docket Nos. 50-317 and 50-318  
License Nos. DPR-53 and DPR-69

Mr. Bryan C. Hanson  
President and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Clinton Power Station  
Exelon Generation Company  
Docket No. 50-461  
License No. NPF-62

Mr. Bryan C. Hanson  
Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

Duane Arnold Energy Center  
NextEra Duane Arnold, LLC  
Docket No. 50-331  
License No. DPR-49

Mr. Thomas A. Vehec  
Site Vice President  
Next Era Energy  
Duane Arnold Energy Center  
3277 DAEC Road  
Palo, IA 52324-9785

Hope Creek Generating Station  
PSEG Nuclear LLC  
Docket No. 50-354  
License No. NPF-57

Mr. Robert Braun  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P. O. Box 236,  
Hancocks Bridge, NJ 08038

Nine Mile Point Nuclear Station  
Nine Mile Point Nuclear Station, LLC  
Docket No. 50-410  
License No. NPF-69

Mr. Bryan C. Hanson  
President and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

Oyster Creek Nuclear Generating Station  
Exelon Generation Company LLC  
Docket No. 50-219  
License No. DPR-16

Mr. Bryan C. Hanson  
President and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

R. E. Ginna Nuclear Power Plant  
R. E. Ginna Nuclear Power Plant, LLC  
Docket No. 50-244  
License No. DPR-18

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President and Chief Nuclear Officer  
Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

River Bend Station

Entergy Operations, Inc.  
Docket No. 50-458  
License No. NFP-47

Vice President, Operations  
Entergy Operations, Inc.  
River Bend Station  
5485 U.S. Highway 61N  
St. Francisville, LA 70775

Salem Nuclear Generating Station

PSEG Nuclear LLC  
Docket Nos. 50-272 and 50-311  
License No. DPR-70 and DPR-75

Mr. Robert Braun  
President and CNO  
PSEG Nuclear LLC-N09  
P. O. Box 236  
Hancocks Bridge, NJ 08038

Shearon Harris Nuclear Power Plant

Duke Energy Progress, Inc.  
Docket No. 50-400  
License No. NPF-63

Mr. Benjamin C. Waldrep  
Site Vice President  
Shearon Harris Nuclear Power Plant  
5413 Shearon Harris Rd.  
M/C HNP01  
New Hill, NC 27562-0165

Susquehanna Steam Electric Station

Susquehanna Nuclear, LLC  
Docket Nos. 50-387 and 50-388  
License No. NPF-14 and NPF-22

Mr. Jon A. Franke  
Site Vice President  
Susquehanna Nuclear, LLC  
769 Salem Boulevard  
NUCSB3  
Berwick, PA 18603-0467

Waterford Steam Electric Station

Entergy Operations, Inc.  
Docket No. 50-382  
License No. NPF-38

Site Vice President  
Entergy Operations, Inc.  
Waterford Steam Electric Station, Unit 3  
17265 River Road  
Killona, LA 70057-075

CLOSURE OF PHASE TWO EVALUATION FOR SPECIFIC LICENSEES

Based on the justification provided above, the NRC staff concludes that no further response or regulatory actions associated with the 50.54(f) letter review of Phase 2 of the Near-term Task Force (NTTF) Recommendation 2.1 "Seismic" are required for the following plants:

- Clinton Power Station, Unit No. 1
- Duane Arnold Energy Center
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- Shearon Harris Nuclear Generating Station, Unit 1
- Waterford Steam Electric Station, Unit 3

For the above plants, this letter closes out the NRC efforts associated with Phase 1 and Phase 2 of NTTF Recommendation 2.1 "Seismic". If you have any questions, please contact Steve Wyman at (301) 415-3041 or via e-mail at Stephen.Wyman@nrc.gov.

Sincerely,

***/RA Nicholas DiFrancesco Acting for/***

Stephen Wyman, Project Manager  
Hazards Management Branch  
Japan Lessons-Learned Division  
Office of Nuclear Reactor Regulation

Enclosures:

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ADAMS Accession Number: ML15364A544

\* via e-mail

OFFICE	NRR/JLD/JHMB/PM	NRR/JLD/LA	NRO/DSEA/RGS2/BC
NAME	SWyman	SLent	MMcCoppin
DATE	1/2/2016	1/15/16	2/3/16
OFFICE	OGC (NLO)	NRR/JLD/JHMB/BC	NRR/JLD/JHMB/PM
NAME	BHarris	MShams	SWyman (NDiFrancesco for)
DATE	1/28/16	2/18/16	2/18/16

OFFICIAL RECORD COPY



Letter to the Power Reactor Licensees on the Enclosed List from S.Wyman dated February 18, 2016

SUBJECT: STAFF REVIEW OF HIGH FREQUENCY CONFIRMATION ASSOCIATED WITH REEVALUATED SEISMIC HAZARD IMPLEMENTING NEAR-TERM TASK FORCE RECOMMENDATION 2.1 AND PHASE 2 CLOSURE OF RECOMMENDATION 2.1, "SEISMIC" FOR SPECIFIC LICENSEES

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