



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

November 30, 2020

MEMORANDUM TO: Raymond V. Furstenu, Director  
Office of Nuclear Regulatory Research

FROM: Ho K. Nieh, Director  
Office of Nuclear Reactor Regulation

SUBJECT: CLOSURE RECOMMENDATION FOR GENERIC ISSUE 199,  
"IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC  
HAZARD ESTIMATES IN CENTRAL AND EASTERN UNITED  
STATES ON EXISTING PLANTS"

The Office of Nuclear Reactor Regulation (NRR) recommends closure of Generic Issue 199 (GI-199), "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants." This recommendation is based on the completion of the risk-informed reevaluation of the seismic hazards for operating power reactor plants in response to the lessons-learned from the reactor accident at the Fukushima Dai-ichi site. In addition, staff from the Office of Nuclear Material Safety and Safeguards (NMSS) and NRR completed an analysis of the applicability of these lessons-learned to facilities other than operating power reactors. The associated facilities included decommissioning reactors with spent fuel stored in spent fuel pools (SFP), and Independent Spent Fuel Storage Installations (ISFSIs). This recommendation is aligned with the U.S. Nuclear Regulatory Commission's (NRC's) Principles of Good Regulation, particularly the principles of Openness, Efficiency, Clarity, and Reliability. The associated activities have resulted in voluntary safety enhancements which improved many site's capabilities to protect and mitigate the impacts of the reevaluated seismic hazards. Moreover, the associated activities have greatly increased the NRC's level of knowledge and risk insights in the area concerning present-day seismic hazards. As such, any additional use of NRC resources on GI-199 would only provide marginal benefits to safety.

In addition to the hazard reevaluation work completed as noted above, the NRC has implemented a process for the ongoing assessment of natural hazards information (POANHI). The process enhancements are described in SECY-16-0144, dated December 29, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16286A586). Guidance in NRR Office Instruction LIC-208, "Process for the Ongoing Assessment of Natural Hazards Information," institutionalizes a defined structure and procedures to implement this process. Using the enhanced process, the staff can proactively seek out new hazard information and assess its potential impacts on site safety by comparing updated information to existing hazard evaluations for the fleet or individual plants, as appropriate.

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The enclosure provides a reference to the ADAMS accession numbers for the applicable staff assessments completed by the NRC staff in response to the licensees' seismic hazard reevaluation activities.

### Background

This generic issue was opened to evaluate the potential safety implications from earthquakes. Newer data and models indicated that estimates of the potential for earthquake hazards for some nuclear power plants in the Central and Eastern United States (CEUS) could be larger than previous estimates. The newer seismic data and models warranted further study and analysis. The analysis allows the NRC to better understand margins at operating plants for earthquakes.

The issue was officially declared as GI-199 in June 2005. In accordance with Management Directive (MD) 6.4, "Generic Issues Program," the NRC staff completed the safety/risk assessment on September 2, 2010 (ADAMS Package Accession No. ML100270582). The safety/risk assessment did not identify any concerns regarding adequate protection. The assessment also noted that the seismic design of operating reactors provides margin to withstand potential earthquakes exceeding the original design basis.

The safety/risk assessment panel recommended that lead responsibility for subsequent GI-199 actions be transferred to NRR for regulatory office implementation and that further actions be taken to address GI-199 (i.e., obtain information and develop methods, as needed, to complete plant-specific value impact analyses of potential backfits to reduce seismic risk). The NRR staff issued two information notices (IN) to inform stakeholders of the GI-199 safety/risk assessment report and results. On September 2, 2010, the NRC issued IN 2010-18, "Generic Issue 199, 'Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants'" (ADAMS Accession No. ML101970221) to operating nuclear power plants and ISFSIs. On September 16, 2010, the NRC issued IN 2010-19, "Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States" (ADAMS Accession No. ML102160735) to fuel cycle facilities.

On March 11, 2011, the Great East Japan Earthquake occurred off the coast of Japan. The earthquake and subsequent tsunami caused wide-spread devastation across northeastern Japan. The tsunami inundated the Fukushima Dai-ichi Nuclear Power Plant, resulting in extensive damage and a complete loss of all alternating current power. In response to the accident, the NRC established a Near-Term Task Force (NTTF) to conduct a systematic and methodical review of NRC processes and regulations to determine if the NRC should make additional improvements to its regulatory system. The NTTF provided a set of 12 recommendations<sup>1</sup> to the Commission for its consideration. The NRC incorporated GI-199 into the work being done by the staff in response to the Fukushima Dai-ichi accident and the NTTF recommendations.

Specifically, the NTTF's work incorporated several insights from the GI-199 safety/risk assessment, which contributed to the NTTF's recommendations regarding seismic reevaluations. The NRC response to these recommendations addressed seismic issues broadly. As a result (and consistent with MD 6.4), it was determined that GI-199 would be addressed by the NRC's response to the NTTF's recommendations. The NTTF seismic

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<sup>1</sup> See "Near-Term Task Force (NTTF) Review of Insights from the Fukushima Dai-ichi Accident" (ADAMS Accession No. ML111861807).

recommendations expand the scope of the seismic activities to include operating power reactor sites in the Western United States.

The NTTF recommendations were applicable to operating power reactor sites. However, tasking Memorandum COMGBJ-11-0002 (ADAMS Accession No. ML110820875) also directed the staff to assess the applicability of the lessons-learned from the accident to non-operating reactors, non-power reactors, and non-reactor facilities. Staff actions in response to this tasking memorandum addressed seismic issues broadly for non-operating reactors and non-reactor facilities. The staff's assessment can be found in Enclosure 1 of SECY-15-0081, "Staff Evaluation of Applicability of Lessons Learned from the Fukushima Dai-Ichi Accident to Facilities Other Than Operating Power Reactors" (ADAMS Accession No. ML15050A066). Additional details are described below.

With the completion of these actions, the full scope of GI-199 has been addressed by the NRC's actions in response to the accident at Fukushima Dai-ichi.

#### NRC's Response to Recommendation 2.1, "Seismic" of the NTTF Report

By letter dated March 12, 2012 (ADAMS Accession No. ML12053A340), the NRC issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the "50.54(f) letter"). Enclosure 1 to the 50.54(f) letter requested that licensees reevaluate seismic hazards for their sites using "present-day" methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses.

A two-phase process was developed to respond to the seismic hazard reevaluations requested by the 50.54(f) letter. In Phase 1 (the information gathering phase), licensees were requested to complete a reevaluation of the seismic hazard that could affect their sites using updated seismic hazard information and present-day regulatory guidance and methodologies to develop a ground motion response spectrum (GMRS). Licensees were then asked to compare the new GMRS to the safe shutdown earthquake (SSE) ground motion and then report to the NRC in a seismic hazard screening report (SHSR). To provide a uniform and acceptable industry response, the Electric Power Research Institute (EPRI) developed a technical report, EPRI 1025287, "Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic" (ADAMS Accession No. ML12333A170). The NRC endorsed the SPID guidance in a letter dated February 15, 2013 (ADAMS Accession No. ML12319A074).

If the new GMRS was not bound by the SSE, Enclosure 1 of the 50.54(f) letter requested more detailed evaluations of the impact from the hazard. Those licensees were asked to evaluate whether interim protection measures were needed while the more detailed evaluations were completed. This evaluation was called the expedited seismic evaluation process (ESEP). The ESEP is a screening, evaluation, and equipment modification process performed by licensees to provide additional seismic margin and expedite plant safety enhancements for certain core cooling and containment components while the more detailed and comprehensive plant seismic risk evaluations are being performed. The licensees for 34 sites were screened in by this process and requested to submit an ESEP evaluation report to the NRC.

The NRC and nuclear industry provided the guidance documents listed in Table 1 for the performance of the reevaluated seismic hazard reviews.

Guidance Document	ADAMS Accession No.
NRC guidance for performing a Seismic Margin Assessment - JLD-ISG-2012-04	ML12286A029
Industry Letter – Proposed path forward for NTTF Recommendation 2.1: Seismic	ML13101A345
Industry Guidance Document – ESEP - EPRI 3002000704	ML13102A142
NRC letter endorsing the ESEP approach	ML13106A331
Industry letter on relay chatter review	ML13281A308
NRC letter with guidance on the content of seismic reevaluation submittals (includes operability and reportability discussions)	ML14030A046
Industry letter on seismic risk evaluations for CEUS plants	ML14083A596
NRC background paper - Probabilistic seismic hazard analysis	ML14140A648

By letters dated May 9, 2014, and May 13, 2015 (ADAMS Accession Nos. ML14111A147 and ML15113B344, respectively), the NRC informed licensees of the initial screening and prioritization results based on a review of the licensees' SHSR. The NRC updated the screening and prioritization results in a letter dated October 3, 2014 (ADAMS Accession No. ML14258A043). The NRC provided the final determination of required seismic evaluations in a letter dated October 27, 2015<sup>2</sup> (ADAMS Accession No. ML15194A015). These evaluations could consist of a seismic probabilistic risk assessment (SPRA),<sup>3</sup> a high frequency evaluation, a low-frequency evaluation,<sup>4</sup> and/or an SFP evaluation. Table 2 is a listing of the guidance documents to perform the various additional assessments.

Guidance Document	ADAMS Accession No.
Industry High Frequency Application Guidance - EPRI 3002004396	ML15223A095
NRC letter endorsing High Frequency Application Guidance	ML15218A569
Industry SFP evaluation guidance – EPRI 3002007148	ML16055A017
NRC letter endorsing SFP evaluation guidance	ML15350A158
SPRA Guidance – Section 6.1.1 of SPID – EPRI 1025287	ML12333A170
NRC letter endorsing SPID	ML12319A074

If the reevaluated GMRS did not exceed the SSE (or the exceedance was considered “de minimis<sup>5</sup>”), a licensee was screened out from any further evaluations. Those not screened out were required to perform an SPRA and/or the limited scope evaluations (a high-frequency evaluation, a low-frequency evaluation, and/or a spent fuel pool evaluation). If a licensee was screened in to provide one or more of the limited scope evaluations without the need to complete an SPRA, the NRC staff reviewed the submittal and provided a staff assessment to document the staff's review. If the staff concluded that the limited scope evaluation met the

<sup>2</sup> The licensees for the four sites noted in Table 1b of the October 15, 2015, letter, all choose Option 2 and submitted a high frequency evaluation and SFP evaluation.

<sup>3</sup> Catawba Nuclear Station, Units 1 and 2, and McGuire Nuclear Station, Units 1 and 2, subsequently were screened out from the need to perform an SPRA (ADAMS Accession No. ML16344A313) and submitted high frequency and SFP evaluations.

<sup>4</sup> A low-frequency review was only required at Edwin I. Hatch Nuclear Plant, Units 1 and 2. The SPID provides guidance for the licensee to evaluate any low-frequency exceedances.

<sup>5</sup> Too trivial or minor to merit consideration.

applicable guidance and was an appropriate response to Enclosure 1 of the 50.54(f) letter, the site was screened out from any further regulatory actions and no further evaluations were required. Only those sites with a significant exceedance were screened in to perform an SPRA (with or without one or more of the limited scope evaluations). If a site was required to perform an SPRA, additional regulatory decisionmaking per Phase 2 of the process was needed. This Phase 2 decisionmaking is detailed in letters dated September 21, 2016 and March 2, 2020 (ADAMS Accession Nos. ML16237A103 and ML20043D958, respectively), and describes how the NRC will make any regulatory decisions using existing guidance for risk-informed decisionmaking and for evaluating plant-specific backfits.

These memoranda describe the formation of a Senior Management Review Panel (SMRP) consisting of three division directors from NRR. The SMRP is expected to reach a decision for each plant submitting an SPRA. The SMRP is supported by NRC technical staff who are responsible for consolidating relevant information and developing recommendations for the consideration of the panel. In presenting recommendations to the SMRP, the supporting technical staff recommended placement of each SPRA plant into one of three groups:

- Group 1 includes plants for which available information indicates that further regulatory action is not warranted. For seismic hazards, Group 1 will include plants for which the mean seismic core damage frequency and mean seismic early release frequency clearly demonstrate that a plant-specific backfit would not be warranted. For plants in Group 1, the SMRP will ensure that conclusions based primarily on numerical factors are supported by available qualitative risk insights before deciding that no further regulatory action is required.
- Group 2 includes plants for which further regulatory action should be considered under the NRC's backfit provisions. This group may include plants with relatively large seismic core damage frequency or seismic large early release frequency such that the event frequency in combination with other factors result in a risk to public health and safety for which a regulatory action is expected to provide a substantial safety enhancement.
- Group 3 includes plants for which further regulatory action may be needed, but for which more thorough consideration of both qualitative and quantitative risk insights is needed before determining whether a formal backfit analysis is warranted.

The basis for the staff's grouping recommendation to the SMRP for each site is described in the staff assessment issued for each SPRA. Fifteen<sup>6</sup> operating reactor sites met the criteria for the performance of an SPRA. Based on its evaluation, which included consideration of voluntary enhancements to improve the site's ability to cope with a seismic event, the staff recommended to the SMRP that no further regulatory action was warranted for any of the sites. As documented in the staff assessments, the SMRP approved the staff's recommendations for each site to be classified as Group 1, meaning that no further response or regulatory action is required.

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<sup>6</sup> Two additional operating power reactor sites which met the criteria for performance of an SPRA have approved deferrals to a date beyond the anticipated early shutdown date and are not expected to complete an SPRA.

### NRC's Response to Tasking Memorandum COMGBJ-11-0002

The NTTF recommendations were applicable to operating power reactor sites. As one of the longer-term activities, COMGBJ-11-0002 also directed the staff, in part, to assess the applicability of the lessons-learned from the accident to non-operating reactors, including those with spent fuel in the SFPs, and ISFSIs. Very shortly after the accident, NRC staff from NMSS and NRR performed limited assessments to ensure that no immediate safety concerns existed at these facilities.

In calendar year 2015, with insights gained from NRC activities related to operating power reactors and from the results of inspections at fuel cycle facilities, NRC staff more fully evaluated issues and possible actions related to non-operating reactors and other NRC-licensed materials, devices, and non-reactor facilities. The NRC staff's detailed evaluation can be found in Enclosure 1 of SECY-15-0081. The assessments specific to ISFSIs is included in Section 1 of the enclosure. The assessments specific to decommissioning reactors is included as Section 7 of the enclosure.

The types of events that NRC staff assessed for these facilities included postulated external events, seismic hazards, external flooding hazards, internal flooding hazards, wind and tornado loading, extended loss of alternating current or emergency power, and fires, to determine if existing regulatory requirements appropriately address such hazards. In addition to the evaluation of initiating events and external hazards, NRC staff assessed these licensees qualitatively in terms of (1) policy issues related to Fukushima, (2) the NTTF's findings and recommendations, and (3) other domestic and international studies and evaluations. The NRC staff's review was broad in scope and was not limited to specific recommendations and considerations provided by the NTTF, which tend to be discussed in the context of operating power reactors.

In each case, the NRC staff's analysis determined that no further study or regulatory action is recommended for decommissioning power reactor sites nor ISFSIs. Specifically concerning GI-199, the staff assessed the risk of external events for the decommissioned power reactors that have fuel stored in their SFPs, including five recently shutdown sites. Previous studies and analyses such as NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants" and NUREG-2161, "Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor" (ADAMS Accession Nos. ML010430066 and ML14255A365, respectively) have shown that the spent fuel pool structure is extremely robust and capable of withstanding the external events addressed in SECY-15-0081. In addition, based on the decay heat levels of recently permanently shutdown reactors and the time available to take mitigating actions, there are no identified safety concerns that need further analysis.

### Conclusions

Since March 2012, all operating power reactor licensees have reevaluated the seismic hazard applicable to their sites. These reevaluations used modern techniques and information to determine the seismic hazard applicable to each site. The NRC staff reviewed each licensees' submittals and evaluations. Using a graded, risk-informed approach, the NRC staff used that information to determine if any further regulatory actions would be warranted under the NRC's backfit rule. Based on the completion of seismic reevaluation activities related to the lessons-learned from the Fukushima Dai-ichi accident, the staff has determined that there are no

additional regulatory actions that are needed to address seismic hazards at operating power reactor sites.

In addition to seismic hazards applicable to operating power reactor sites, the NRC staff performed a detailed evaluation of the need to apply any of the NTTF recommendations to non-operating power reactors, non-power reactors, and non-reactor facilities. The NRC staff concluded that, except for some additional follow-up activities for fuel cycle facilities and higher-power research reactors, further assessments are not needed based on Fukushima lessons-learned and that the existing regulatory requirements and processes ensure adequate protection of public health and safety. The limited follow-up actions have been completed. Therefore, no additional regulatory actions were needed to address non-operating power reactors (i.e., decommissioning facilities and ISFSIs).

Although not directly related to the resolution of GI-199, POANHI has enhanced the existing NRC processes such that the staff proactively and systematically reviews new natural hazard information and assesses its impact on site safety by comparing updated information to existing hazard evaluations for the fleet or individual plants, as appropriate. Any future issues that may be similar in nature to GI-199 would be assessed by this improved and enhanced process.

The full scope of GI-199 has been addressed through the NRC response to the Fukushima lessons-learned. All agency actions associated with GI-199 are complete, including implementation and verification activities by the regulatory office. No additional evaluations or regulatory activities are necessary. Therefore, NRR recommends that GI-199 be closed.

Enclosure:  
Seismic Reevaluation Activities –  
List of NRC Staff Assessments

SUBJECT: CLOSURE RECOMMENDATION MEMORANDUM FOR GENERIC ISSUE 199,  
 "IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC HAZARD  
 ESTIMATES IN CENTRAL AND EASTERN UNITED STATES ON EXISTING  
 PLANTS" DATED: NOVEMBER 30, 2020

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**ADAMS Accession No.: ML20290A626** **\*via email** **NRR-106**

OFFICE	NRR/DORL/PBMB/PM*	NRR/DRA/APLC/PM*	NRR/DANU/UARL/LA*
NAME	RBernardo	MValentin	SLent
DATE	10/16/2020	10/19/2020	10/19/2020
OFFICE	NRR/DORL/PBMB/BC(A)*	NRR/DORL/D*	NRR/D*
NAME	KMorgan-Butler	CErlanger (DWrona for)	HNieh
DATE	10/21/2020	10/29/2020	11/30/2020

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## Seismic Reevaluation Activities – List of NRC Staff Assessments

SUMMARY OF NRC RESPONSES FOR EACH SITE								
Agencywide Documents Access and Management System (ADAMS) Accession Numbers								
Site	Seismic Hazard Screening Report (SHSR) Staff Assessment	Expedited Seismic Evaluation Process (ESEP) Response	Bounded - No further assessment needed	Spent Fuel Pool Evaluation Staff Assessment	High Frequency Confirmation Staff Assessment	Seismic Probabilistic Risk Assessment (SPRA) Report Staff Assessment	Deferred or not completed	Remarks
ANO	ML15344A109			ML17093A859	ML17257A042			ESEP no longer needed (December 15, 2014, ML14310A033).
Beaver Valley	ML15274A307	ML15233A120		ML16349A042	In SPRA	ML18092A837		
Braidwood	ML16014A188				ML17023A179			
Browns Ferry	ML15090A745	ML15203A875		ML17024A164	In SPRA	In progress		
Brunswick	ML16041A435	ML15313A245		ML17031A001	ML17107A277			Relay chatter IPEEE review (ML16365A023) documented in HF confirmation SA.
Byron	ML16027A045 ML16070A116			ML16274A445	ML17023A137			ESEP no longer needed (December 15, 2014, ML14310A033).
Callaway	ML15063A517	ML15282A044		ML18003B419	In SPRA	In progress		
Calvert Cliffs	ML15153A073	ML15238A429		ML16281A491	ML15364A544			
Catawba	ML15096A513	ML16072A037		ML16222A368	ML18003B420			Catawba screened out from need for SPRA (ML16344A313).
Clinton	ML15281A226				ML15364A544			
Columbia	ML16285A410	ML16154A016		ML18106B119	In SPRA	ML20076A547		
Comanche Peak	ML16014A125		ML16014A125					
Cooper	ML15240A030	ML15238A626		ML16313A282	ML18171A237			
Davis-Besse	ML15230A289	ML15273A237		ML16355A166	ML17230A289			
DC Cook	ML15097A196	ML15232A411		ML16308A086	In SPRA	In progress		
Diablo Canyon	ML16341C057			ML18211A322	In SPRA	ML18254A040		
Dresden	ML15097A519	ML15173A244		ML16291A021	In SPRA	ML20105A507		
Duane Arnold	ML15324A176				ML15364A544			
Farley	ML15287A092		ML15194A015					
Fermi	ML15077A028	ML15310A197		ML16350A195	ML17261B197			
FitzPatrick	ML16043A411	ML15238A810		ML17072A342	ML17263B143			
Fort Calhoun	ML15329A181			ML16182A361			ML16326A046	ESEP no longer needed (December 15, 2014, ML14310A033). IPEEE review due 12/31/2016 not completed (No additional seismic evaluations were required after permanent plant shutdown (ML16326A046).
Ginna	ML15153A026				ML15364A544			
Grand Gulf	ML15348A379		ML15348A379					
Hatch	ML15097A424	ML15201A474		ML17019A216	ML17271A033			Hatch completed a low frequency evaluation, the staff's assessment is dated October 20, 2016 (ML16285A421).
Hope Creek	ML16049A609				ML15364A544			
Indian Point	ML15096A340	ML15232A667		See Remarks	See Remarks	See Remarks	ML17222A239 ML20182A125	Indian Point has an approved deferral of the seismic evaluations until after the final unit shutdown in April 2021.
LaSalle	ML15013A132	ML15160A168		ML16252A314	ML17031A425			
Limerick	ML15296A492				ML17031A415			
McGuire	ML15182A067	ML16072A038		ML16237A354	ML17320A770			McGuire screened out from need for SPRA (ML16344A313).
Millstone	ML15328A268 ML16057A785			ML17046A474	ML17038A035			ESEP no longer needed (December 15, 2014, ML14310A033).
Monticello	ML15175A336	ML15281A029		ML16335A176	ML17180A031			
Nine Mile Point	ML15153A660				ML17031A156 ML15364A544			
North Anna	ML15057A249	ML15182A392		ML18165A412	In SPRA	ML19052A522		
Oconee	ML15201A008	ML16072A039		ML18197A021	In SPRA	ML19267A022		
Oyster Creek	ML15350A353	ML15240A049	ML15350A353 See Remarks		ML15364A544 ML15350A353 See Remarks			HF Confirmation provided on December 4, 2015 (ML15338A005), which was found acceptable by NRC in a letter dated February 18, 2016 (ML15364A544). SHSR staff assessment (February 17, 2016) notes that Oyster Creek is bound by current design/licensing basis and no further evaluations are needed.
Palisades	ML15098A032	ML15233A101		ML16342C530	See Remarks	See Remarks	ML19115A413	Palisades has an approved deferral of the SPRA due date until after the final shutdown in May 2022.
Palo Verde	ML16221A604		ML16221A604					

**SUMMARY OF NRC RESPONSES FOR EACH SITE**  
**Agencywide Documents Access and Management System (ADAMS) Accession Numbers**

Site	Seismic Hazard Screening Report (SHSR) Staff Assessment	Expedited Seismic Evaluation Process (ESEP) Response	Bounded - No further assessment needed	Spent Fuel Pool Evaluation Staff Assessment	High Frequency Confirmation Staff Assessment	Seismic Probabilistic Risk Assessment (SPRA) Report Staff Assessment	Deferred or not completed	Remarks
Peach Bottom	ML15051A262	ML15173A385		ML18187A403	In SPRA	ML19053A469 ML19248C756		
Perry	ML15208A034	ML15240A032		ML16337A361	ML17234A646			
Pilgrim	ML15051A336	ML15154A975		See Remarks	See Remarks	See Remarks	ML16278A313 ML19168A231	Pilgrim did not complete seismic evaluation activities prior to final shutdown.
Point Beach	ML15211A593	ML15209A657		ML16349A572	ML17229B187			
Prairie Island	ML15341A162		ML15341A162					
Quad Cities	ML15309A493				ML16060A043			
River Bend	ML15295A186				ML15364A544			
Robinson	ML15280A199	ML15201A602		ML16230A535	In SPRA	In progress		
Salem	ML16041A033			ML16351A231	ML15364A544			ESEP no longer needed (December 15, 2014, ML14310A033).
Seabrook	ML15208A049	ML15282A019		ML18115A509	ML18138A451			
Sequoyah	ML15098A641	ML15278A052		ML17041A387	In SPRA	ML20143A175		
Shearon Harris	ML15349A149				ML15364A544			
St. Lucie	ML15352A053		ML15352A053					
STP	ML15287A077		ML15287A077					
Surry	ML15335A093		ML15335A093					
Susquehanna	ML15356A247			ML16210A313	ML15364A544			ESEP no longer needed (December 15, 2014, ML14310A033).
TMI	ML15223A215	ML15272A213		ML16293A873	ML16354B587			
Turkey Point	ML16013A472		ML16013A472					
VC Summer	ML15194A055	ML15280A216		ML17128A355	In SPRA	ML19199A696		
Vogtle 1 & 2	ML15054A296	ML15215A521		ML18066A913	In SPRA	ML18058A929		
Waterford	ML15335A050				ML15364A544			
Watts Bar	ML15055A543 (U1) ML15111A377 (U2)	ML15275A383		ML17062A681	In SPRA	ML18115A138 ML19248C797		
Wolf Creek	ML15216A320	ML15350A220		ML16335A371	ML18012A506			
61 sites total <sup>1,2</sup>	Totals for each	34	10	38	34	15	4	

For additional information, please see the plant specific pages under the "Safety Enhancements After Fukushima" public web page (<https://www.nrc.gov/reactors/operating/ops-experience/post-fukushima-safety-enhancements.html>)

**1 Previously Operating Power Reactor Units Subject to the March 12, 2012 50.54(f) letter that Shutdown without completing any seismic reevaluation activities**

Crystal River 3	Crystal River Unit 3 shutdown prior to completing any seismic reevaluation activities. In a letter dated January 22, 2014 (ML13325A847), the NRC agreed that no further responses or actions associated with the 50.54(f) letter are necessary.
Kewaunee	Kewaunee shutdown prior to completing any seismic reevaluation activities. In a letter dated January 22, 2014 (ML13322B255), the NRC agreed that no further responses or actions associated with the 50.54(f) letter are necessary.
San Onofre 2 and 3	San Onofre Units 2 and 3 shutdown prior to completing any seismic reevaluation activities. In a letter dated January 22, 2014 (ML13329A826), the NRC agreed that no further responses or actions associated with the 50.54(f) letter are necessary.
Vermont Yankee	Vermont Yankee shutdown prior to completing any seismic reevaluation activities. In a letter dated May 27, 2015 (ML15135A046), the NRC agreed that no further responses or actions associated with the 50.54(f) letter are necessary.

**2 Sites Under Active Construction or Deferred Policy Subject to the March 12, 2012 50.54(f) letter**

Bellefonte 1 and 2	TVA will submit a schedule under Section III.A.6 of the Commission Policy Statement on Deferred Plants, by the respective date that TVA submits the letters to reactivate construction at Bellefonte Units 1 and 2. NRC approved the proposed schedule changes in a letter dated February 26, 2015 (ML15023A259)
Vogtle 3 and 4	For combined license (COL) holders under 10 CFR Part 52, the issues in NTFTR Recommendation 2.1 regarding seismic reevaluations are resolved. Therefore, COL holders are not required to respond to Enclosures 1 through 4 of this letter.