NRR-PMDAPEm Resource

From: Jackson, Diane
Sent: Wednesday, August 12, 2015 8:40 AM
To: Shams, Mohamed
Cc: DiFrancesco, Nicholas; Wyman, Stephen; Spence, Jane; Devlin-Gill, Stephanie; Roche, Kevin; Yee, On; Andrukat, Dennis; Wang, George; Tseng, Ian; 50.54f_Seismic Resource; RidsNroDsea Resource; Rivera-Lugo, Richard; Schleicher, Lisa
Subject: DC COOK NUCLEAR STATION, UNITS 1 and 2 - Updated TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM ESEP SUPPORTING IMPLEMENTATION OF NTTF R2.1, SEISMIC (TAC NO. MF5236 AND MF5237)
Attachments: DCCook R2.1 Seismic ESEP NRC review update.docx

August 12, 2015
MEMORANDUM TO: Mohamed K. Shams, Chief
Hazards Management Branch (JHMB)
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation
FROM: Diane T. Jackson, Chief
Geosciences and Geotechnical Engineering Branch 2 (RGS2)
Division of Site Safety and Environmental Analysis
Office of New Reactors
SUBJECT: DC COOK NUCLEAR STATION, UNITS 1 AND 2 – UPDATED TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM EXPEDITED SEISMIC EVALUATION PROCESS SUPPORTING IMPLEMENTATION OF NTTF RECOMMENDATION 2.1, SEISMIC, RELATED TO THE FUKUSHIMA DAI-ICHI NUCLEAR POWER PLANT ACCIDENT (TAC NO. MF5236 AND MF5237)

The NRC technical staff working through the Geosciences and Geotechnical Engineering Branches 1 and 2 (RGS1 and RGS2) completed the Technical Review Checklist of the DC COOK NUCLEAR STATION, UNITS 1 and 2 response to Enclosure 1, Item (6) of the March 12, 2012, request for information letter issued per Title 10 of the Code of Federal Regulations, Subpart 50.54(f), to power reactor licensees and holders of construction permits requesting addressees to provide further information to support the NRC staff's evaluation of regulatory actions to be taken in response to Fukushima Near-Term Task Force (NTTF) Recommendation 2.1: Seismic which implements lessons learned from Japan's March 11, 2011, Great Tōhoku Earthquake and subsequent tsunami. This addresses the staff review of the interim Expedited Seismic Evaluation Process (ESEP) report in response to Requested Item (6) of Enclosure 1, "Recommendation 2.1: Seismic," of the 50.54(f) letter. Attached is a file containing the technical review checklist to prepare a response letter to the licensee.

This revised technical review checklist updates the original checklist sent on July 10, 2015, to reflect the licensee's letter of August 6, 2015 (ML15223A200), which provides an update of completed actions and a commitment to notify the NRC within 60 following the completion of all modification.

The NRC staff reviewed the information provided and, as documented in the enclosed staff checklist, determined that sufficient information was provided to be responsive to this portion of the Enclosure 1 of the 50.54(f) letter. The application of this staff review is limited to the interim ESEP as part of NTTF R2.1: Seismic activities.
This electronic memo constitutes the DSEA concurrence provided that only editorial changes are made to the staff assessment that would not affect the technical conclusions or technical context of the assessment.
This concludes the NRC's efforts associated with TAC NO. MF5236 and MF5237 for the review of the interim ESEP report for the DC COOK NUCLEAR STATION, UNITS 1 and 2.
Docket No: 50-315 and 50-316
CONTACT: Stephanie Devlin-Gill
Office of New Reactors

301-415-5301
Copy: Nicholas DiFrancesco, Steve Wyman, Jane Spence, Stephanie Devlin-Gill, Kevin Roche, On Yee, Richie Rivera-Lugo, Dennis Andrukat, George Wang, Ian Tseng, Lisa Schliecher, 50.54f_Seismic Resource, RidsNroDsea Resource

Hearing Identifier: NRR_PMDA
Email Number: 2308

Mail Envelope Properties (0a9a0e1a02104d01a324bb43dc3977a1)

Subject: DC COOK NUCLEAR STATION, UNITS 1 and 2 - Updated TECHNICAL REVIEW CHECKLIST RELATED TO INTERIM ESEP SUPPORTING IMPLEMENTATION OF NTTF R2.1, SEISMIC (TAC NO. MF5236 AND MF5237)
Sent Date: 8/12/2015 8:39:45 AM
Received Date: 8/12/2015 8:39:47 AM
From: Jackson, Diane

Created By: Diane.Jackson@nrc.gov

Recipients:
"DiFrancesco, Nicholas" <Nicholas.DiFrancesco@nrc.gov>
Tracking Status: None
"Wyman, Stephen" <Stephen.Wyman@nrc.gov>
Tracking Status: None
"Spence, Jane" <Jane.Spence@nrc.gov>
Tracking Status: None
"Devlin-Gill, Stephanie" <Stephanie.Devlin-Gill@nrc.gov>
Tracking Status: None
"Roche, Kevin" <Kevin.Roche@nrc.gov>
Tracking Status: None
"Yee, On" <On.Yee@nrc.gov>
Tracking Status: None
"Andrukat, Dennis" <Dennis.Andrukat@nrc.gov>
Tracking Status: None
"Wang, George" <George.Wang@nrc.gov>
Tracking Status: None
"Tseng, Ian" <Ian.Tseng@nrc.gov>
Tracking Status: None
"50.54f_Seismic Resource" <50.54f_Seismic.Resource@nrc.gov>
Tracking Status: None
"RidsNroDsea Resource" <RidsNroDsea.Resource@nrc.gov>
Tracking Status: None
"Rivera-Lugo, Richard" <Richard.Rivera-Lugo@nrc.gov>
Tracking Status: None
"Schleicher, Lisa" <Lisa.Schleicher@nrc.gov>
Tracking Status: None
"Shams, Mohamed" <Mohamed.Shams@nrc.gov>
Tracking Status: None

Post Office: HQPWMSMRS07.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	3404	8/12/2015 8:39:47 AM
DCCook R2.1 Seismic ESEP NRC review update.docx	49010	

Options
Priority: Standard
Return Notification: No
Reply Requested: No

Sensitivity: Normal
Expiration Date:
Recipients Received:

TECHNICAL REVIEW CHECKLIST

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO EXPEDITED SEISMIC EVALUATION PROCESS INTERIM EVALUATION

IMPLEMENTING NTTF RECOMMENDATION 2.1 SEISMIC

DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-315 AND 316

By letter dated March 12, 2012 (USNRC, 2012a), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) "Conditions of License" (hereafter referred to as the "50.54(f) letter"). Enclosure 1 of the 50.54(f) letter requests addressees to reevaluate the seismic hazard at their site using present-day methods and guidance for licensing new nuclear power plants, and identify actions to address or modify, as necessary, plant components affected with the reevaluated seismic hazards. Requested Information Item (6) in Enclosure 1 to the 50.54(f) letter requests addressees to provide an interim evaluation and actions taken or planned to address a higher seismic hazard relative to the design basis, as appropriate, prior to completion and submission of the seismic risk evaluation.

Additionally, by letter dated April 12, 2013[1], the Electric Power Research Institute (EPRI) staff submitted EPRI TR 3002000704 "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force (NTTF) Recommendation 2.1: Seismic" (hereafter referred to as the guidance). The Augmented Approach proposed that licensees would use an Expedited Seismic Evaluation Process (ESEP) to address the interim actions as requested by Information Item (6) in the 50.54(f) letter. The ESEP is a simplified seismic capacity evaluation with a focused scope of certain key installed Mitigating Strategies equipment that is used for core cooling and containment functions to cope with scenarios that involve a loss of all AC power and loss of access to the ultimate heat sink to withstand the Review Level Ground Motion, which is up to two times the safe shutdown earthquake (SSE). Due to the expedited and interim nature of the ESEP, the assessment does not include many considerations that are part of a normal risk evaluation. These deferred items, include but are not limited to, structures, piping, non-seismic failures, and operator actions, as well scenarios such as addressing loss of coolant accidents. By letter dated May 7, 2013[2], the NRC staff endorsed the guidance. Central and eastern United States licensees with a reevaluated seismic hazard exceeding the SSE submitted an ESEP interim evaluation in December 2014

Consistent with the interim nature of this activity, the staff performed the review of the licensee's submittal to assess whether the intent of the guidance was implemented. A multi-disciplined team checked whether the identified methods were consistent with the guidance. A senior expert panel reviewed the team's questions, if any, and checklist for consistency and scope. New or updated parameters (e.g., In-Structure Response Spectra, High Confidence of Low Probability of Failure calculations) presented by the licensees were assessed only based on licensee statements for acceptability for the Item (6) response. The application of this staff review is limited to the ESEP interim evaluation as part of NTTF R2.1: Seismic activities.

---

1 ADAMS Accession No. ML13102A142

2 ADAMS Accession No. ML13106A331

Technical Review Checklist for Donald C. Cook Nuclear Plant, Units 1 and 2

By letter dated December 18, 2014[3], Indiana Michigan Power Company (the licensee), provided an Expedited Seismic Evaluation Process (ESEP) report in a response to Enclosure 1, Requested Information Item (6) of the 50.54(f) letter for the Donlad C. Cook Nuclear Plant, Units 1 and 2 (D.C. Cook).

I. Review Level Ground Motion

The licensee: • described the determination of the review level ground motion (RLGM) using one of the means acceptable by the guidance • identified location of the control point and is consistent with March submittal • compared the site ground motion response spectra used to select the ESEP RLGM to the SSE.	Yes Yes Yes
D.C. Cook used a scaled SSE at a ratio of 1.93	
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified.	
The NRC staff concludes: • the licensee's RLGM meets the intent of the guidance • the RLGM is reasonable for use in the interim evaluation	 Yes Yes

II. Selection of the Success Path

The licensee: • described the success path • described normal and desired state of the equipment for the success path • ensured that the success path is consistent with the plant's overall mitigating strategies approach or provided a justification for an alternate path • stated that the selection process was in accordance with the guidance or meets the intent of the guidance • used installed FLEX Phase 1 equipment as part of the success path • included FLEX Phase 2 and/or 3 connections • considered installed FLEX Phase 2 and/or 3 equipment	 Yes Yes Yes Yes Yes Yes Yes
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The NRC staff concludes that: • the selected success path is reasonable for use in the interim evaluation • the licensee considered installed Phase 2 and 3 connections or equipment in the interim evaluation.	 Yes Yes

III. Selection of the Equipment List

3 ADAMS Accession No. ML14357A053

The licensee:
• developed and provided the ESEL by applying the ESEP
• identified equipment considering the following functions:
  o Core cooling (with focus on Mode 1) function
  o Available, sustainable water source
  o Containment function and integrity
	Yes
	
	Yes
	Yes
	Yes

Notes from the Reviewer: • The staff noted that the Unit 1 ESEL contains three extra items, that Unit 2 ESEL does not: Middle Boric Acid Tank and related level and temperature transmitters. The staff requested the licensee to clarify if similar items should be included in the Unit 2 ESEL, and if not, to provide an explanation. The licensee's response (ML15173A217) clarified that the tank is common [spare] and can be aligned to serve either unit. As such, it is only listed once (on Unit 1 ESEL and not on both Unit's ESEL) to prevent duplication and confusion. The staff finds the response acceptable for this evaluation. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
For PWR Plants ONLY The licensee included indicators / instrumentation for the following functions: level, pressure, temperature, that would be indicative of (but not explicitly identified to specific instruments): water level of the steam generator (SG), pressure of SG, containment, and reactor coolant system (RCS); and temperature of the RCS.	Yes
For BWR Plants ONLY The licenseeconsidered indicators for the following functions: level, pressure, temperature that would be indicative of (but not explicitly identified to specific instruments): Temperature of suppression pool, RCS, containment); Pressure of suppression pool, RCS, and drywell; water level of the suppression pool.	N/A
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
Through a sampling of the ESEP key components, the NRC staff concludes that: • the licensee's process to develop the ESEL meets the intent of the guidance for the interim evaluation • the desired equipment state for the success path were identified • the licensee considered the support equipment for the ESEL • both front-line and support systems appeared to be included in the ESEL as evidenced by inclusion of SSCs on the success path and of support systems (e.g., batteries, motor control center, inverters).	Yes Yes Yes Yes

IV. Walkdown Approach

The licensee: • described the walkdown screening approach, including walkbys and walkdowns performed exclusively for the ESEP, in accordance with the guidance • credited previous walkdown results, including a description of current action(s) to verify the present equipment condition and/or configuration (e.g., walk-bys), in accordance with the guidance • stated that the walkdown was performed by seismically trained personnel	Yes Yes[1] Yes
Notes from the Reviewer: 1. Section 6.3.2 of the ESEP report, Application of Previous Walkdown Information, states that inaccessible items were screened using information from recent walkdowns and based on documentation and similarity to items that were included in the walkdowns. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The licensee: • Described, as needed, adverse material condition of the equipment (e.g. material degradation) • credited previous walkdown results, included a description of current action(s) to verify the present equipment condition (e.g., walk-bys), meeting the intent of the guidance	Yes Yes
The licensee: • described the conditions of structural items considered for the interim evaluation, including: o spatial interactions (i.e. interaction between block walls and other items/components) o anchorage o piping connected to tanks (i.e. differential movement between pipes and tanks at connections)	 Yes Yes Yes
Notes from the Reviewer: None **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The licensee reported deviations for DC Cook. If deviations were identified, there is a discussion of how the deficiencies were or will be addressed in the ESEP submittal report.	No N/A
The NRC staff concludes that: the licensee described the performed walkdown approach, including any credited previous efforts (e.g.,Individual Plant Examination of External Events(IPEEE)) consistent with the guidance • the licensee addressed identified deviations consistent with the guidance, if any	Yes N/A

V. Capacity Screening Approach and HCLPF Calculation Results

The licensee:	

• described the capacity screening process for the ESEL items, consistent with the guidance (e.g., use of EPRI NP-6041 screening table).
• presented the results of the screened-out ESEL items in the ESEP report
• described the development of in-structure response spectra (ISRS)
• based on scaling
• described the development of ISRS based on new analysis consistent with the guidance
• described the method for estimating HCLPF capacity of screened-in ESEL items, including both structural and functional failure modes consistent with the guidance:
  o use of Conservative Deterministic Failure Margin (CDFM)
  o use of fragility analysis (FA)
  o use of experience data or generic information
• credited IPEEE spectral shape for HCLPF capacity estimates is similar to or envelopes the RLGM, and anchored at the same control point
• presented the results of HCLPF capacities including associated failure modes for screened-in ESEL items
• reviewed the ESEL items with the lowest HCLPF values to ensure that their capacities are equal or greater than the RLGM
	Yes
	Yes
	Yes
	N/A
	Yes
	Yes
	N/A
	N/A
	N/A
	Yes
	Yes

Notes from the Reviewer: 1. The staff requested clarification of the licensee's evalatuion of equipment above 40 feet. The licensee's response (ML15173A217)clarified the elevation of those components that exceed 40ft and the procedure followed to analyze them was provided by the licensee. The staff find this acceptable for this evaluation. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The NRC staff concludes that: • the licensee described the implementation of the capacity screening process consistent with the intent of the guidance • the licensee presented capacity screening and calculation results, as appropriate, in the ESEP report • the method used to develop the ISRS is consistent with guidance for use in the ESEP • for HCLPF calculations, the licensee used HCLPF calculation methods as endorsed in the guidance • no anomalies were noted in the reported HCLPF	Yes Yes Yes Yes Yes

VI. Inaccessible Items

The licensee: • provided a list of inaccessible items • provided a schedule of the planned walkdown and evaluation for all inaccessible items • provided Regulatory Commitment to complete walkdowns.	Yes Yes Yes
DC Cook will complete thewalkdowns, and screening and evaluations:	

within 90 days following the conclusion of the scheduled Unit 2(U2C22) refueling outage.	
Notes from the Reviewer: 1. Section 6.3.2 lists inaccessible items (9 components for Unit 1, and 34 components fro Unit 2) that were screened based on several methods, such as walkdowns performed under NTTF 2.3, USI A-46, or the similarity of the components to others that were accessible. An evaluation of each component listed was provided to explain the method used to screen them. 2. Section 7.1 lists the remaining inaccessible components for each Unit (6 components for each Unit). The licensee committed to complete the walkdown of these items prior to restart of Unit 2 at the completion of its spring 2015 refueling outage. The screening and evaluation will be completed within 90 days following the conclusion of the U2C22 refueling outage. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The NRC staff concludes that the licensee: • listed inaccessible items • committed to provide the results (e.g. walkdowns, walkbys, etc) of the remaining inaccessible items consistent with the guidance • substitutions, if needed, were appropriately justified	Yes Yes Yes

VII. Modifications to Plant Equipment

The licensee: • identified modifications for ESEL items necessary to achieve HCLPF values that bound the RLGM (excluding mitigative strategies equipment (FLEX)), as specified in the guidance • provided a schedule to implement such modifications (if any), consistent with the intent of the guidance • provided Regulatory Commitment to complete modifications • provided Regulatory Commitment to report completion of modifications	Yes Yes Yes Yes
DC Cook will: • complete modifications by December 31, 2016, for those modifications that do no require a refueling outage, and within two planned refueling outages after December 31, 2014, (i.e., U1C28 (Fall 2017) and U2C23 (Fall 2016)), for those modifications that require a refueling outage to be completed. • report completion of remaining evaluations and modificationswithin 60 days following the completion of all modifications. Commitment made by letter dated August 6, 2015 (ML15223A200).	

Notes from the Reviewer: • At the time of the ESEP report, the licensee stated that "the modification of the three Boric Acid Storage Tanks, has not yet proceeded to a level of development to determine if a refueling outage is required to implement the modifications." As such, if a refueling outage is required to perform these modifications, they will be completed in accordance with the schedule identified by NEI (letter dated April 9, 2013), with the 2nd planned refueling outage (U1C28) of Unit 1 being scheduled for the 4th quarter of 2017 and the second Unit 2 (U2C23) being scheduled in the 4thquarter of 2016. **Deviation(s) or Deficiency(ies), and Resolution:** • No deviations or deficiencies were identified	
The NRC staff concludes that the licensee: • identified plant modifications necessary to achieve the target seismic capacity • provided a schedule to implement the modifications (if any) consistent with the guidance	Yes Yes

VIII. Conclusions:

The NRC staff assessed the licensee's implementation of the ESEP guidance. Due to the interim applicability of the ESEP evaluations, use of the information for another application would require a separate NRC review and approval. Based on its review, the NRC staff concludes that the licensee's implementation of the interim evaluation meets the intent of the guidance. The staff concludes that, through the implementation of the ESEP guidance, the licensee identified and evaluated the seismic capacity of certain key installed Mitigating Strategies equipment that is used for core cooling and containment functions to cope with scenarios that involve a loss of all AC power and loss of access to the ultimate heat sink to withstand a seismic event up to the Review Level Ground Motion (RLGM). In the case of D.C. Cook, the RLGM was set at the ratio of 1.93 times the SSE in accordance with the guidance. The staff did not identified deviations or exceptions taken from the guidance. The application of this staff review is limited to the ESEP interim evaluation as part of NTTF Recommendation 2.1: Seismic activities.

The licensee identified safety enhancing modifications based on the evaluation and committed to complete modifications by December 31, 2016, for those modifications that do no require a refueling outage, and within two planned refueling outages after December 31, 2014, for those modifications that require a refueling outage to be completed, and report the completion of modifications within 60 days following the completion of all modifications.

In summary, the licensee, by implementing the ESEP interim evaluation, has demonstrated additional assurance which supports continued plant safety while the longer-term seismicevaluation is completed to support regulatory decision making. The NRC staff concludes that the licensee responded appropriately to Enclosure 1, Item (6) of the 50.54(f) letter, dated March 12, 2012, for Donald C. Cook Nuclear Plant, Units 1 & 2.

Principle Contributors: Dennis Andrukat, George Wang, Ian Tseng, Lisa Walsh, On Yee, Richard Rivera-Lugo, Nikolaos Simos (NRC Consultant)