



R. Michael Glover
H. B. Robinson Steam
Electric Plant Unit 2
Site Vice President

Duke Energy Progress
3581 West Entrance Road
Hartsville, SC 29550

O 843 857 1701
F 843 857 1319

Mike.Glover@duke-energy.com

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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

Spent Fuel Pool Evaluation Supplemental Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

References:

1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012 ADAMS Accession Number ML12053A340
2. NRC Letter, Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated October 27, 2015, ADAMS Accession Number ML15194A015
3. NEI Letter, transmits EPRI 3002007148 for NRC endorsement, dated February 23, 2016, ADAMS Accession Number ML16055A017
4. EPRI 3002007148, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, February 2016
5. NRC Letter, provides endorsement of EPRI 3002007148, dated March 17, 2016, ADAMS Accession Number ML15350A158
6. Submittal of Revision to Seismic Hazard Evaluation to Include New Ground Motion Response Spectra (GMRS Using New Geotechnical Data and Shear-Wave Testing for H.B. Robinson Steam Electric Plant, Unit No. 2., dated July 17, 2015, ADAMS Accession Number ML 15201A006

7. H.B. Robinson Steam Electric Plant Unit No 2 – Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (TAC No. MF3724), dated October 19, 2015, ADAMS Accession Number ML 15280A199
8. EPRI 1025287, Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details [SPID] for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic, February 2013
9. Addendum to Submittal of Revision to Seismic Hazard Evaluation to Include New Ground Motion Response Spectra (GMRS) Using New Geotechnical Data and Shear-Wave Testing for H.B. Robinson Steam Electric Plant Unit No. 2, dated August 29, 2015, ADAMS Accession Number ML 15243A061
10. G-190419, Rev. 7, Fuel Handling Building Piling – Plan and Details
11. G-190420, Rev. 13, Fuel Handling Building – Plan and Details at Elevation 226.00
12. G-190421, Rev. 9, Fuel Handling Building – Plan at Elevation 246.00
13. G-190422, Rev. 7, Fuel Handling Building – Plan at Elevation 275.00
14. G-190423, Rev. 8, Fuel Handling Building - Sections and Elevations
15. G-190424, Rev. 8, Fuel Handling Building – Sections and Elevations
16. G-190426, Rev. 2, Fuel Handling Building – Spent Fuel Pit Reinforcement, Sheet No 1
17. G-190427, Rev. 2, Fuel Handling Building – Spent Fuel Pit Reinforcement, Sheet No. 2
18. RNP-C/STRU-1226, "Spent Fuel Pool Structure Evaluation"
19. EGR-NGGC-0351, "Condition Monitoring of Structures", Rev. 22.
20. RNP-C/STRS-1142, "Stress Analysis for Lines 8AC-58, 8AC-58A, 4AC-59"
21. RNP-C/STRS-1141, "Stress Analysis for Line 8-AC-61"
22. RNP-C/STRS-1126, "VC Tail Piping"
23. RNP-C/SPPT-1659, "Pipe Support # AC-15-120/Spent Fuel System"
24. RNP-C/SPPT-1649, "AC-14-175 & AC-14-80 Spent Fuel Pit Cooling Piping, PM-1104 HBR-2"
25. RNP-C/SPPT-1650, "Spent Fuel Pit Cooling System AC-15-20, AC-14-125 Support Analysis"
26. RNP-C/SPPT-1651, "Pipe Support No. AC-15-60 and AC-14-155/ Spent Fuel Pit Cooling"
27. RNP-C/SPPT-1655, "Spent Fuel Pit Cooling System, AC-15-235 Support Analysis"
28. RNP-C/SPPT-1843, "SFPC System Seismic Integrity During M-1104 Modifications"

Ladies and Gentlemen:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a Request for Information per 10 CFR 50.54(f) (Reference 1) to all power reactor licensees. Enclosure 1, Item (9) of the 50.54(f) letter requested addressees to provide limited scope spent fuel pool (SFP) evaluations. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables which identified that H.B. Robinson Steam Electric Plant, Unit No. 2 is to conduct a limited scope SFP Evaluation. By Reference 3, Nuclear Energy Institute (NEI) submitted an Electric Power Research Institute (EPRI) report entitled, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation (EPRI 3002007148) (Reference 4) for NRC review and endorsement. NRC endorsement was provided by Reference 5.

EPRI 3002007148 provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. This report supplements the guidance in the Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) (Reference 8), for plants where the GMRS peak spectral acceleration is less than or equal to 0.8g. Section 3.3 of EPRI 3002007148 lists the parameters to be verified to confirm that the results of the report are applicable to H.B. Robinson Steam Electric Plant, Unit No. 2, and that the H.B. Robinson Steam Electric Plant, Unit No. 2, SFP is seismically adequate in accordance with NTF 2.1 Seismic evaluation criteria.

The attachment to this letter provides the data for H.B. Robinson Steam Electric Plant, Unit No. 2 that confirms applicability of the EPRI 3002007148 criteria, confirms that the SFP is seismically adequate, and provides the requested information in response to Item (9) of the 50.54 (f) letter associated with NTF Recommendation 2.1 Seismic evaluation criteria.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

If you have any questions regarding this submittal, please contact Mr. Tony Pilo, Manager (Acting) – Nuclear Regulatory Affairs at (843) 857-1409.

I declare under penalty of perjury that the foregoing is true and correct.

Executed On: August 1, 2016

Sincerely,



R. Michael Glover
Site Vice President

RMG/am

Attachment: Site-Specific Spent Fuel Pool Criteria for H.B. Robinson Steam Electric Plant, Unit No. 2

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cc: NRC Resident Inspector, HBRSEP Unit No. 2
NRC Regional Administrator, NRC, Region II
Dennis Gavin, NRC Project Manager, NRR
Joseph Sebrosky, NRC Senior Project Manager, JLD-NRR

ATTACHMENT

Duke Energy

H.B. Robinson Steam Electric Plant, Unit No. 2

Docket Number 50-261

Renewed License No DPR-23

Site-Specific Spent Fuel Pool Criteria for H.B. Robinson Steam Electric Plant, Unit No. 2

The 50.54(f) letter requested that, in conjunction with the response to NTTF Recommendation 2.1, a seismic evaluation be made of the SFP. More specifically, plants were asked to consider "all seismically induced failures that can lead to draining of the SFP." Such an evaluation would be needed for any plant in which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. The staff confirmed through References 2 and 7 that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for the H.B. Robinson Steam Electric Plant, Unit No 2. By letter dated [Reference 5] the staff determined that EPRI 3002007148 was an acceptable approach for performing SFP evaluations for plants where the peak spectral acceleration is less than or equal to 0.8g.

The table below lists the criteria from Section 3.3 of EPRI 3002007148 along with data for H.B. Robinson Steam Electric Plant, Unit No. 2, that confirms applicability of the EPRI 3002007148 criteria and confirms that the SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTTF 2.1 Seismic evaluation criteria.

SFP Criteria from EPRI 3002007148	Site-Specific Data
Site Parameters	
1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.	The GMRS peak spectral acceleration in References 6 and 9 as accepted by the NRC in Reference 7 is 0.659g, which is $\leq 0.8g$, therefore, this criterion is met.
Structural Parameters	
2. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.	The SFP is housed in the spent fuel building, which is seismically designed to the site SSE with a PGA of 0.2g (Reference 6). The H.B. Robinson Steam Electric Plant, Unit No. 2, PGA is greater than 0.1g, therefore, this criterion is met.
3. The structural load path to the SFP should consist of some combination of reinforced concrete shear wall elements, reinforced concrete frame elements, post-tensioned concrete elements and/or structural steel frame elements.	As shown in References 10 through 18, the spent fuel pool building is a reinforced concrete structure and consists of four exterior shear walls which are 6 ft. thick. The interior divider runs in the North-South direction and it is a 4 ft. thick reinforced concrete wall. The floor of the fuel pool is a 4.5 ft. thick reinforced concrete slab with clear area of 31ft. x 33.5ft. The SFP structure is supported on a 4ft. thick pile cap which transfers the load to 169 cast-in-place reinforced concrete pile foundations. Therefore, this criterion is met for H.B. Robinson Steam Electric Plant, Unit No. 2.

SFP Criteria from EPRI 3002007148	Site-Specific Data
<p>4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.</p>	<p>The SFP structure is included in the H. B. Robinson Steam Electric Plant, Unit No 2, Civil Inspection Program in accordance with 10 CFR 50.65 (Reference 19), which monitors the performance and condition of structures, systems, or components (SSCs) in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. Therefore, this criterion is met for H.B. Robinson Steam Electric Plant, Unit No 2.</p>
<p>Non-Structural Parameters</p>	
<p>5. To confirm applicability of the piping evaluation in Section 3.2 of EPRI 3002007148, piping attached to the SFP up to the first valve should have been evaluated for the SSE.</p>	<p>Based on References 20 through 28, piping and valves attached to the SFP are seismic, safety-related and evaluated for the SSE. Evaluation of the piping satisfies allowable limits in American National Standards Institute (ANSI) code for Pressure Piping ANSI B31.1, Power Piping (1967). Therefore, this criterion is met for H.B. Robinson Steam Electric Plant, Unit No. 2.</p>
<p>6. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p>	<p>There are two items that can potentially provide hydraulic pathway for rapid drain-down of the spent fuel pool to a level approximately 10 ft. above the spent fuel stored in the pool within 72 hours of an earthquake occurrence: (1) The return piping from the spent fuel pool cooling heat exchanger has a 1 in. branch line near the fuel pool normal water level. A 0.5 in. diameter hole exists that acts as a vacuum breaker to prevent siphoning effect on the pool. The return piping is covered under the ISI program; and (2) The other item is the spent fuel pool drain line which is within 3 in. of the bottom of the pool. The drain line is prevented from draining by two closed and locked valves (one is inside the pool and the other is outside of the pool) and a blind spectacle flange upstream of the outside valve.</p> <p>As described, anti-siphoning devices are installed on all SFP piping that could lead to siphoning and no active anti-siphoning devices are attached to 2-inch or smaller piping with extremely large extended operators; therefore, this criterion is met for H.B. Robinson Steam Electric Plant, Unit No. 2.</p>

SFP Criteria from EPRI 3002007148	Site-Specific Data
<p>7. To confirm applicability of the sloshing evaluation in Section 3.2 of EPRI 3002007148, the maximum SFP horizontal dimension (length or width) should be less than 125 ft, the SFP depth should be greater than 36 ft, and the GMRS peak Sa should be <0.1g at frequencies equal to or less than 0.3 Hz.</p>	<p>The H.B. Robinson Steam Electric Plant, Unit No. 2, SFP has a length of 33.5 ft, a width of 31 ft and a depth of 38.25 ft based on Reference 18; therefore, this criterion is met.</p> <p>The H.B. Robinson Steam Electric Plant, Unit No. 2 GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.07g from Reference 6 (H.B. Robinson Steam Electric Plant Unit No. 2, GMRS submittal) which is less than 0.1g, therefore, this criterion is met.</p>
<p>8. To confirm applicability of the evaporation loss evaluation in Section 3.2 of EPRI 3002007148, the SFP surface area should be greater than 500 ft² and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>	<p>The surface area of the H.B. Robinson Steam Electric Plant, Unit No. 2 SFP is 1,038.5 ft², which is greater than 500 ft²; and licensed reactor thermal power for H.B. Robinson Steam Electric Plant, Unit No. 2, is 2,339 MWt per unit which is less than 4,000 MWt per unit, therefore, these criteria are met.</p>