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OCAN121601

December 20, 2016

U.S. Nuclear Regulatory Commission  
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**SUBJECT:** 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  
Arkansas Nuclear One – Units 1 and 2  
Docket Nos. 50-313 and 50-368  
License Nos. DPR-51 and NPF-6

- REFERENCES:**
1. NRC Letter to Entergy, *Request for Information Pursuant to 10CFR 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 (OCNA031208) (ML12053A340)
  2. NRC Letter to Entergy, *Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to 10CFR 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 (OCNA101505) (ML15194A015)
  3. NEI Letter to NRC, transmits EPRI Report 3002007148 for NRC endorsement, dated February 23, 2016 (ML16055A017)
  4. EPRI Report 3002007148, *Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation*, February 2016
  5. NRC Letter to NEI, provides endorsement of EPRI Report 3002007148, dated March 17, 2016 (ML15350A158)
  6. EPRI Report 1025287, *Seismic Evaluation Guidance, Screening, Prioritization, and Implementation Details for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, February 2013

Dear Sir or Madam:

On March 12, 2012, the NRC issued a Request for Information per 10 CFR 50.54(f) (Reference 1) to all power reactor licensees. Enclosure 1, Item 9 requested addressees to provide limited scope spent fuel pool (SFP) evaluations. By Reference 2, the NRC transmitted the final seismic information request tables which identified that Arkansas Nuclear One (ANO) is to conduct a limited scope SFP evaluation. By Reference 3, the Nuclear Energy Institute (NEI) submitted the Electric Power Research Institute (EPRI) Report 3002007148 entitled, Seismic Evaluation Guidance SFP Integrity Evaluation (Reference 4) for NRC review and endorsement. NRC endorsement was provided by Reference 5.

Reference 4 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 (Reference 6), for plants where the GMRS peak spectral acceleration is less than or equal to 0.8g. Section 3.3 of Reference 4 lists the parameters to be verified to confirm that the results of the report are applicable to ANO, and that the SFPs are seismically adequate in accordance with Near-Term Task Force (NTTF) 2.1 seismic evaluation criteria.

The attachment to this letter provides the data for ANO-1 and ANO-2 that confirms applicability of the EPRI Report 3002007148 criteria, confirms that the SFPs are seismically adequate, and provides the requested information in response to Item 9 of the 10 CFR 50.54(f) letter associated with NTTF Recommendation 2.1 seismic evaluation criteria.

This letter contains no new regulatory commitments. Should you have any questions regarding this submittal, please contact Stephenie Pyle at 479.858.4704.

I declare under penalty of perjury that the foregoing is true and correct; executed on December 20, 2016.

Sincerely,

**ORIGINAL SIGNED BY RICHARD L. ANDERSON**

RLA/nbm

Attachment: Site-Specific Spent Fuel Pool Criteria for Arkansas Nuclear One

cc: Mr. Kriss Kennedy  
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**Attachment to**

**0CAN121601**

**Site-Specific Spent Fuel Pool Criteria for Arkansas Nuclear One**

### Site-Specific Spent Fuel Pool Criteria for Arkansas Nuclear One

The 10 CFR 50.54(f) letter requested that, in conjunction with the response to Near-Term Task Force (NTTF) Recommendation 2.1, a seismic evaluation be completed for the spent fuel pool (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 one-to-ten Hz frequency range. The staff confirmed through References 1 and 2 that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for the Arkansas Nuclear One (ANO). By Reference 3 the staff determined that EPRI Report 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 Report 3002007148 along with data for ANO, Unit 1 (ANO-1) that confirms applicability of the EPRI 3002007148 criteria and confirms that the ANO-1 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 (ANO-1)   |
|--|--|
| <b>Site Parameters</b>   |  |
| 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 Reference 4, as accepted by the NRC in Reference 2, is 0.51g which is $\leq 0.8g$ ; therefore, this criterion is met for ANO-1.   |
| <b>Structural Parameters</b>   |  |
| 2. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.   | The ANO-1 SFP is housed in the Auxiliary Building which is seismically designed to the site SSE with a PGA of 0.2g. The ANO-1 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. | The structural load path from the foundation to the ANO-1 SFP consists of reinforced concrete slabs and walls within the Auxiliary Building. The Seismic Class 1 portions of the Auxiliary Building are founded on rock (ANO-1 Safety Analysis Report (SAR) Section 5.3.2); therefore, this criterion is met.  |
| 4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.   | The SFP structure is included in the ANO-1 Civil Inspection Program (reference Entergy procedure EN-DC-150) in accordance with 10 CFR 50.65 which monitors the performance or conditions 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. |

| SFP Criteria from EPRI 3002007148  | Site-Specific Data (ANO-1)  |
|--|---|
| Non-Structural Parameters  |   |
| <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>The piping attached to the ANO-1 SFP that is susceptible to draining the SFP is class HCC line class (or better) as shown on drawing M-235, sheet 1. HCC line class is Seismic Class 1 and evaluated to SSE loads; therefore, this criterion is met for ANO-1.</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 two-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p> | <p>The ANO-1 SFP supply/discharge piping lines have siphon breaker holes below water level. This prevents inadvertent emptying of the ANO-1 SFP (reference drawing M-235, Sheet 1). Anti-siphoning devices are installed on the ANO-1 SFP supply/discharge piping that could lead to siphoning; therefore, this criterion is met.</p> <p>The ANO-1 SFP suction piping does not have anti-siphon devices. The suction nozzles are located three feet below the normal water level to prevent inadvertent drainage (ULD-0-SYS-03).</p> <p>There are no cases where anti-siphoning devices are attached to two-inch or smaller piping with extremely large extended operators; therefore, this criterion is met for ANO-1.</p> |
| <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 spectral acceleration should be &lt; 0.1g at frequencies equal to or less than 0.3 Hz.</p>         | <p>The ANO-1 SFP has a length of 44 ft, a width of 23 ft, and a depth of 42 ft based on ANO-1 drawing C-206; therefore, this criterion is met.</p> <p>The ANO-1 GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.06g (Reference 2), 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 ft<sup>2</sup>, and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>   | <p>The surface area of the ANO-1 SFP is 1012 ft<sup>2</sup>, which is greater than 500 ft<sup>2</sup>, and the licensed reactor thermal power for ANO-1 is 2,568 MWt, which is less than 4,000 MWt; therefore, this criterion is met.</p>   |

The table below lists the criteria from Section 3.3 of EPRI Report 3002007148 along with data for ANO, Unit 2 (ANO-2), that confirms applicability of the EPRI Report 3002007148 criteria and confirms that the ANO-2 SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTF 2.1 seismic evaluation criteria.

| <b>SFP Criteria from EPRI 3002007148</b>   | <b>Site-Specific Data (ANO-2)</b>  |
|--|--|
| <b>Site Parameters</b>   |  |
| 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 Reference 4, as accepted by the NRC in Reference 2, is 0.51g which is $\leq 0.8g$ ; therefore, this criterion is met for ANO-2.   |
| <b>Structural Parameters</b>   |  |
| 2. The structure housing the SFP should be designed using an SSE with a PGA of at least 0.1g.  | The ANO-2 SFP is housed in the Auxiliary Building, which is seismically designed to the site SSE with a PGA of 0.2g. The ANO-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. | The structural load path from the foundation to the SFP consists of reinforced concrete slab and fixed connections with walls and columns. The Auxiliary Building is founded on rock (ANO-2 SAR Sections 3.8.4.1.1, 3.8.5.1.3.1, and 1.2.2.6); therefore, this criterion is met.   |
| 4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.   | The SFP structure is included in the ANO-2 Civil Inspection Program (reference Entergy procedure EN-DC-150) in accordance with 10 CFR 50.65, which monitors the performance or conditions of SSCs in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions; therefore, this criterion is met. |

| SFP Criteria from EPRI 3002007148  | Site-Specific Data (ANO-2)  |
|--|---|
| Non-Structural Parameters  |   |
| <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>Piping attached to the ANO-2 SFP is evaluated to the SSE as discussed in ULD-0-SYS-03, Sections 4.7 and 4.8; therefore, this criterion is met.</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 two-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p> | <p>Siphon breaker holes are installed in ANO-2 SFP pipe lines. The fuel tilt pit suction and discharge lines also have siphon breaker holes installed. The cask loading pit discharge line has a siphon breaker hole installed. The cask loading pit suction line has an anti-siphon valve installed which does not have a large extended operator. Anti-siphoning devices are installed on the ANO-2 SFP piping that could lead to siphoning; therefore, this criterion is met.</p> <p>There are no cases where anti-siphoning devices are attached to two-inch or smaller piping with extremely large extended operators; therefore, this criterion is met for ANO-2.</p> |
| <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 spectral acceleration should be &lt; 0.1g at frequencies equal to or less than 0.3 Hz.</p>         | <p>The ANO-2 SFP has a length of 32.75 ft, a width of 23 ft, and a depth of 42 ft based on ANO-2 drawing C-2203; therefore, this criterion is met.</p> <p>The ANO-2 GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.06 g from Reference 2, 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 ft<sup>2</sup> and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>  | <p>The surface area of the ANO-2 SFP is 753 ft<sup>2</sup>, which is greater than 500 ft<sup>2</sup>, and licensed reactor thermal power for ANO-2 is 3,026 MWt, which is less than 4,000 MWt; therefore, this criterion is met.</p>  |



References:

1. NRC Letter to Entergy, *Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to 10CFR 50.54(f) Regarding Recommendation 2.1 "Seismic" of the NTTF Review of Insights from the Fukushima Dai-ichi Accident*, dated October 27, 2015 (0CNA101505) (ML15194A015)
2. NRC Letter to Entergy, *Arkansas Nuclear One, Units 1 and 2 Staff Assessment of Information provided Pursuant to 10 CFR 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the NTTF Review of Insights from the Fukushima Dai-ichi Accident*, dated December 15, 2015 (0CNA121502) (ML15344A109)
3. NRC Letter to NEI, provides endorsement of EPRI 3002007148, dated March 17, 2016, (ML15350A158)
4. Entergy Letter to NRC, *Seismic Hazard and Screening Report (Central Eastern United States Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the NTTF Review of Insights from the Fukushima Dai-ichi Accident*, dated March 28, 2014 (0CAN031404) (ML14092A021)