



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

December 2, 2016

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2 – INTERIM STAFF RESPONSE TO REEVALUATED FLOOD HAZARDS SUBMITTED IN RESPONSE TO 10 CFR 50.54(f) INFORMATION REQUEST – FLOOD-CAUSING MECHANISM REEVALUATION (CAC NOS. MF8379 AND MF8380)

Dear Sir or Madam:

The purpose of this letter is to provide a summary of the U.S. Nuclear Regulatory Commission (NRC) staff's assessment of the reevaluated flood-causing mechanisms described in the September 14, 2016, flood hazard reevaluation report (FHRR) submitted by Entergy Operations, Inc. (Entergy, the licensee) for Arkansas Nuclear One, Units 1 and 2 (ANO) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16260A060).

By letter dated March 12, 2012, the NRC issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter) (ADAMS Accession No. ML12053A340). The request was issued as part of implementing lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood-causing mechanisms using present-day methodologies and guidance. Concurrent with the reevaluation of flooding hazards, licensees were required to develop and implement mitigating strategies in accordance with NRC Order EA-12-049, "Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). On March 30, 2015, the Commission provided staff requirements memorandum (SRM) (ADAMS Accession No. ML15089A236) to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256), affirming that licensees need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events.

Enclosure 2 transmitted herewith contains Security-Related Information. When separated from the Enclosure, this document is decontrolled.

The NRC staff has reviewed the information submitted by the licensee and has summarized the results of the review in the tables provided as an enclosure to this letter. Table 1 provides the current design-basis flood hazard mechanisms. Table 2 provides the reevaluated flood hazard mechanisms; however, the reevaluated flood hazard mechanisms bounded by the current design-basis (Table 1) are not included. Because Table 1 includes security-related information, Enclosure 1 contains the redacted version of Table 1. Enclosure 2 is withheld from public disclosure and restores the security-related information to Table 1.

The NRC staff has concluded that the licensee's reevaluated flood hazard information, as summarized in the enclosure, is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide") for ANO. Further, the NRC staff has concluded that the licensee's reevaluated flood hazard information is a suitable input for other assessments associated with Near-Term Task Force Recommendation 2.1, "Flooding." The NRC staff plans to issue a staff assessment documenting the basis for these conclusions at a later time.

Revision 2 of NEI 12-06 includes a methodology to perform a mitigating strategies assessment (MSA) with respect to the reevaluated flood hazards. On February 29, 2016, the NRC staff published Japan Lessons-Learned Division (JLD) Interim Staff Guidance (ISG) JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A142) in the *Federal Register* (81 FR 10283). This ISG endorses Revision 2 of NEI 12-06 (ADAMS Accession No. ML16005A625), dated December 2015. Based on the guidance provided in Revision 2 of NEI 12-06, flood event duration parameters and applicable flood associated effects should be considered as part of the ANO MSA. The NRC staff will evaluate the flood event duration parameters (including warning time and period of inundation) and flood-related associated effects developed by the licensee during the NRC staff's review of the MSA.

As stated above, Table 2 of the enclosure to this letter describes the reevaluated flood hazards that exceed the current design basis. In order to complete its response to the information requested by Enclosure 2 to the 50.54(f) letter, the licensee is expected to submit an integrated assessment or a focused evaluation, as appropriate, to address these reevaluated flood hazards, as described in the NRC letter, "Coordination of Request for Information Regarding Flooding Hazard Reevaluation and Mitigating Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15174A257). This letter describes the changes in the NRC's approach to the flood hazard reevaluations that were approved by the Commission in its SRM to COMSECY-15-0019, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants" (ADAMS Accession No. ML15209A682).

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If you have any questions, please contact me at (301) 415-22621 or e-mail at Robert.Bernardo@nrc.gov.

Sincerely,



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

Docket Nos. 50-313 and 50-368

Enclosures:

- 1) Summary of Results of Flooding
Hazard Re-Evaluation Report (Redacted Version)
- 2) Summary of Results of Flooding
Hazard Re-Evaluation Report (Non-Public Version)

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ENCLOSURE 1:
SUMMARY TABLES OF
REEVALUATED FLOOD HAZARD LEVELS-REDACTED VERSION

Table 1. Current Design Basis Flood Hazards for Use in the MSA

| Mechanism | Stillwater Elevation | Waves/Runup | Design Basis Hazard Elevation | Reference |
|--|-----------------------------|--------------------|--------------------------------------|------------------|
| Local Intense Precipitation | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |
| Streams and Rivers | | | | |
| PMF on Arkansas River | 358.0 ft, NGVD29 | 10.0 ft | 368.0 ft, NGVD29 | FHRR Table 4-1 |
| [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| Failure of Dams and Onsite Water Control/Storage Structures | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |
| Storm Surge | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |
| Seiche | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |
| Tsunami | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |
| Ice-Induced Flooding | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |

Table 1. Current Design Basis Flood Hazards for Use in the MSA

| Mechanism | Stillwater Elevation | Waves/Runup | Design Basis Hazard Elevation | Reference |
|--------------------------------------|-----------------------------|--------------------|--------------------------------------|------------------|
| Channel Migrations/Diversions | Not included in DB | Not included in DB | Not included in DB | FHRR Table 4-1 |

Note 1: Reported values are rounded to the nearest one-tenth of a foot.

Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms for Use in the MSA

| Mechanism | Stillwater Elevation | Waves/ Runup | Reevaluated Hazard Elevation | Reference |
|---|-----------------------------|---------------------|-------------------------------------|------------------|
| Local Intense Precipitation | | | | |
| North Train Bay Door | 354.4 ft, NGVD29 | Minimal | 354.4 ft, NGVD29 | FHRR Table 4-2 |
| South Train Bay Door | 354.4 ft, NGVD29 | Minimal | 354.4 ft, NGVD29 | FHRR Table 4-2 |
| Between Warehouse and Reactor Building Unit 2 | 355.0 ft, NGVD29 | Minimal | 355.0 ft, NGVD29 | FHRR Table 4-2 |
| West of Maintenance Building | 353.7 ft, NGVD29 | Minimal | 353.7 ft, NGVD29 | FHRR Table 4-2 |
| North of Turbine Building Unit 2 | 353.7 ft, NGVD29 | Minimal | 353.7 ft, NGVD29 | FHRR Table 4-2 |
| South of Turbine Building Unit 2 | 355.1 ft, NGVD29 | Minimal | 355.1 ft, NGVD29 | FHRR Table 4-2 |
| South of Central Support Building | 354.0 ft, NGVD29 | Minimal | 354.0 ft, NGVD29 | FHRR Table 4-2 |
| North of Central Support Building | 357.7 ft, NGVD29 | Minimal | 357.7 ft, NGVD29 | FHRR Table 4-2 |
| Northeast of Turbine Building Unit 2 | 354.4 ft, NGVD29 | Minimal | 354.4 ft, NGVD29 | FHRR Table 4-2 |
| Transformer Yard | 354.4 ft, NGVD29 | Minimal | 354.4 ft, NGVD29 | FHRR Table 4-2 |
| East of Turbine Building Unit 1 | 354.3 ft, NGVD29 | Minimal | 354.3 ft, NGVD29 | FHRR Table 4-2 |

Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms for Use in the MSA

| Mechanism | Stillwater Elevation | Waves/Runup | Reevaluated Hazard Elevation | Reference |
|--|-----------------------------|--------------------|-------------------------------------|------------------|
| Northwest of Intake Structure | 354.1 ft, NGVD29 | Minimal | 354.1 ft, NGVD29 | FHRR Table 4-2 |
| North of Intake Structure | 354.2 ft, NGVD29 | Minimal | 354.2 ft, NGVD29 | FHRR Table 4-2 |
| North of ISFSI | 356.3 ft, NGVD29 | Minimal | 356.3 ft, NGVD29 | FHRR Table 4-2 |
| South of ISFSI | 355.6 ft, NGVD29 | Minimal | 355.6 ft, NGVD29 | FHRR Table 4-2 |
| East of Cooling Tower | 351.4 ft, NGVD29 | Minimal | 351.4 ft, NGVD29 | FHRR Table 4-2 |
| West of Warehouse | 351.2 ft, NGVD29 | Minimal | 351.2 ft, NGVD29 | FHRR Table 4-2 |
| South of Warehouse | 351.4 ft, NGVD29 | Minimal | 351.4 ft, NGVD29 | FHRR Table 4-2 |
| West of Diesel Oil Storage Tank | 354.5 ft, NGVD29 | Minimal | 354.5 ft, NGVD29 | FHRR Table 4-2 |
| West of Engineering/Modification Building | 352.2 ft, NGVD29 | Minimal | 352.2 ft, NGVD29 | FHRR Table 4-2 |
| Between Engineering/Modification Building and Reactor Building 1 | 352.7 ft, NGVD29 | Minimal | 352.7 ft, NGVD29 | FHRR Table 4-2 |
| East of Diesel Fuel Storage Vault | 353.7 ft, NGVD29 | Minimal | 353.7 ft, NGVD29 | FHRR Table 4-2 |

Note 1: Reevaluated hazard mechanisms bounded by the current design basis (see Table 1) are not included in this table

Note 2: Reported values are rounded to the nearest one-tenth of a foot.

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If you have any questions, please contact me at (301) 415-22621 or e-mail at Robert.Bernardo@nrc.gov.

Sincerely,

/RA/

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

Docket Nos. 50-313 and 50-368

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ADAMS Accession Nos.: PKG ML16327A482 LTR: ML16327A494 ENCL 1: ML16327A530 (PUBLIC)

ENCL 2 ML16327A503 (NON-PUBLIC)

***via email**

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| NAME | RBernardo | SLent | KSee* |
| DATE | 11/22/2016 | 11/28/2016 | 11/15/2016 |
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