# RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**APR1400 Design Certification**

**Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD**

**Docket No. 52-046**

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| **RAI No.:** | **354-8416** |
| **SRP Section:** | **19.03 – Fukushima** |
| **Application Section:** | **19.03 – Beyond Design Basis External Event** |
| **Date of RAI Issue:** | **11/09/2015** |

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## Question No. 19.03-10

NRC Order EA-12-049 requires equipment credited for FLEX mitigation strategies be protected from applicable external events. NEI 12-06, Section 3 provides guidelines for establishing baseline coping capability based on an assumption that installed equipment is robustly designed with respect to design basis external events and is fully available for mitigation strategies. Specifically, NEI 12-06, Section 3.2.1.3 addresses a set of initial conditions that should be taken into account in establishing plant-specific baseline coping capability including conditions pertaining to the storage and protection of installed plant equipment.

APR1400 DCD, Tier 2, Section 19.3.2.3 describes that APR1400 FLEX strategies ensure reasonable protection for the associated equipment from external events. The KHNP report, APR1400-E-P-NR-14005-P, Section 5.1.2 states that the guidance for developing, implementing, and maintaining mitigation strategies from JLD-ISG-2012-01 and the methodology to establish baseline coping capability from NEI 12-06 were considered in developing the APR1400 FLEX strategies and evaluating the resultant baseline coping capability after a beyond design basis external event (BDBEE). However, the staff finds that APR1400 DCD Tier 2, Section 19.3 and APR1400-E-P-NR-14005-P did not provide information with respect to the capability of the structures and tanks for providing protection and storage for mitigation equipment and cooling inventories. In order to complete an evaluation of APR1400 FLEX strategies with respect to credited structures and tanks, the applicant is requested to provide the following information:

(1) A description of the structures credited for protection of permanent plant equipment identified for APR1400 mitigation strategies. The description should include classifications, locations, and structural functions credited for protection. If a structure that houses such equipment is not classified as safety-related, the applicant should demonstrate that the design of the structure is robust enough to withstand the effect of an applicable external event including seismic events, floods, and high winds and associated missiles so that the permanent plant equipment credited for APR1400 mitigation strategies remains protected from the event.

(2) A description of the tanks credited for protection and storage of cooling and makeup water inventories or fuel for equipment identified for APR1400 mitigation strategies. The description should include classifications, locations, and functions credited for protection and storage. If such tanks are not safety-related, the applicant should demonstrate that the design of these tanks and the structure that houses tank(s) are robust enough to withstand the effect of an applicable external event including seismic events, floods, and high winds and associated missiles so that the tank(s) remain functional for protecting the cooling and makeup water inventories and fuel for equipment credited for APR1400 mitigation strategies.

## Response

(1) All permanent installed, safety related equipment (Pumps, Valves, etc.) that is utilized in the mitigation strategies for BDBEE, and as identified in response to RAI-B-002, Item (a), are housed inside the reactor containment building, auxiliary building, essential service water building, emergency diesel generator building and component cooling water heat exchanger building. All of these structures are safety related and are designed for seismic, flood, high wind and missile (10CFR50, Appendix A, GDC 2). The specific location, function and classification of these structures are described in DCD Tier 2, Table 3.2-1. Please note that APR1400 does not have installed equipment housed inside non safety structures.

(2) The specific tanks that are utilized in the mitigation strategies are listed below and also in Technical Report APR 1400-E-P-NR-14005-P and DCD Tier 2:

- AFWST (DCD Tier 2, Table 10.4.9-1)
- IRWST (DCD Tier 2, Table 6.8-1)
- SIT (DCD Tier 2, Table 3.2-1 )
- EDG Fuel Oil ST (DCD Tier 2, Chapter 9.5.4)
- EDG Fuel Oil DT (DCD Tier 2, Chapter 9.5.4)

All of these tanks are safety related, seismic category I, and Quality Group C. DCD Table 3.2-1 provides the location, function and safety classifications for these tanks.

Additionally, RWT is utilized for mitigating strategies and is designed to Seismic Category I and Quality Group D. It will remain functional for the mitigating strategies. The COL applicant will confirm that the RWT and flow path to the FLEX equipment (structures, piping, components, and connections) are designed to be robust with respect to seismic events, floods, high winds, and associated missiles. The COL items will be added in DCD Tier 2, Subsection 19.3.2.3.4 as below.

“COL 19.3(11) The COL applicant is to confirm that the raw water tank and flow path to the FLEX equipment (structures, piping, components, and connections) are designed to be robust with respect to seismic events, floods, high winds, and associated missiles.”

**Impact on DCD**

DCD Tier 2, Table 1.8-2 (29 of 29), Subsection 19.3.2.3.4 and 19.3.4 will be revised as indicated on the attached markup.

**Impact on PRA**

There is no impact on the PRA.

**Impact on Technical Specifications**

There is no impact on the Technical Specifications.

**Impact on Technical/Topical/Environmental Reports**

ARP1400-E-P-NR-14005-NP, Subsection 6.10 will be added as indicated on the Attachment.

Table 1.8-2 (29 of 29)

| Item No. | Description |
|---|---|
| COL 19.3(1) | The COL applicant is to perform site-specific seismic hazard evaluation and seismic risk evaluation as applicable in accordance with NTTF Recommendation 2.1 as outlined in the NRC RFI. |
| COL 19.3(2) | The COL applicant is to address the flood requirements for wet sites |
| COL 19.3(3) | The COL applicant is to develop the details for offsite resources. |
| COL 19.3(4) | The COL applicant is to address the details of storage location for FLEX equipment. |
| COL 19.3(5) | The COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in the NRC Order EA-12-049. |
| COL 19.3(6) | The COL applicant is to address SFP level instrumentation maintenance procedure development and perform training as specified in NRC Order EA-12 |
| COL 19.3(7) | The COL applicant is to address development of EOPs, SAMGs, and EDMGs that incorporate lessons learned from TEPCO's Fukushima Dai-Ichi nuclear power plant accident as addressed in SECY-12-0025. |
| COL 19.3(8) | The COL applicant is to address enhancement of the offsite communication system as specified in the NRC Request for Information pertaining to NTTF Recommendation 9.3. |
| COL 19.3(9) | The COL applicant is to address staffing for large-scale natural events as specified in the NRC RFI pertaining to NTTF Recommendation 9.3. |
| COL 19.3(11) | The COL applicant is to confirm that the raw water tank and flow path to the FLEX equipment (structures, piping, components, and connections) are designed to be robust with respect to seismic events, floods, high winds, and associated missiles. |

COL applicant is to address details of the storage location for FLEX equipment (COL 19.3(4)).

Also, the COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in NRC Order EA-12-049 (COL 19.3(5)), including but not limited to the following:

a. Evaluation of site-specific external hazards

b. Determination and protection of portable equipment

c. Providing means for acquisition, staging, and installation of equipment

d. Establishing means for maintaining and testing of portable equipment

e. Establishing procedures and guidance on mitigation of BDBEEs

f. Establishing training of personnel to the developed strategies and procedures

19.3.2.4 Recommendation 7.1 – Reliable Spent Fuel Pool Instrumentation

The APR1400 employs reliable indication of the water level in the SFP capable of supporting identification of the following pool water level conditions:

a. Level that is adequate to support operation of the normal fuel pool cooling system

b. Level that is adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck

c. Level at which fuel remains covered and actions to implement makeup water addition should no longer be deferred

The APR1400 SFP water level instrumentation is consistent with the guidelines addressed in NRC EA-12-051, NEI 12-02 (Reference 8), and JLD-ISG-2012-03 (Reference 9).

The primary instrument channel provides level indication through the use of guided wave radar (GWR) technology using the principle of time domain reflectometry (TDR).

The COL applicant is to confirm that raw water tank and flow path to the FLEX equipment (structures, piping, components, and connections) are designed to be robust with respect to seismic events, floods, high winds, and associated missiles (COL 19.3(11)).

COL 19.3(3) The COL applicant is to develop the details for offsite resources.

COL 19.3(4) The COL applicant is to address the details of storage location for FLEX equipment.

COL 19.3(5) The COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in the NRC Order EA-12-049.

COL 19.3(6) The COL applicant is to address SFP level instrumentation maintenance procedure development and perform training as specified in NRC Order EA-12-051.

COL 19.3(7) The COL applicant is to address development of EOPs, SAMGs, and EDMGs that incorporate lessons learned from TEPCO's Fukushima Dai-Ichi nuclear power plant accident as addressed in SECY-12-0025.

COL 19.3(8) The COL applicant is to address enhancement of the offsite communication system as specified in the NRC Request for Information pertaining to NTTF Recommendation 9.3.

COL 19.3(9) The COL applicant is to address staffing for large-scale natural events as specified in the NRC RFI pertaining to NTTF Recommendation 9.3.

## 19.3.5 References

1. SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," U.S. Nuclear Regulatory Commission, February 2012.

2. Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," U.S. Nuclear Regulatory Commission, March 12, 2012.

3. Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," U.S. Nuclear Regulatory Commission, March 12, 2012.

COL 19.3(11) The COL applicant is to confirm that the raw water tank and flow path to the FLEX equipment (structures, piping, components, and connections) are designed to be robust with respect to seismic events, floods, high winds, and associated missiles.

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### 6.2.8 Emergency Procedures

The emergency communication system/enhancement, staffing large-scale natural events, and revisions to EP for ELAP are COL items.

### 6.2.9 Storage of FLEX Equipment

In accordance with NEI 12-06 (Reference 8), the FLEX equipment is stored in dedicated building/structure that will withstand the BDBEEs and meet the requirements of 10 CFR 50, Appendix A, GDC 2. The N+1 equipment is stored in separate buidlings.

### 6.2.10 Installed equipment and tanks utilized in the mitigation strategies

All permanent installed, safety related equipment (pumps, valves, etc.) that is utilized in the mitigation strategies for BDBEE are housed inside the reactor containment building, auxiliary building, essential service water/component cooling water heat exchanger building, emergency diesel generator building. All of these structures are safety related and are designed for seismic, flood, high wind and missile. The specific location, function, and classification of these structures are described in DCD Tier 2, Table 3.2-1.

The specific tanks (AFWST, IRWST, SIT, EDG fuel oil storage tank, EDG fuel oil day tank) are utilized in the mitigation strategies. All of these tanks are safety related, seismic Category I, and Quality Group C. DCD Tier 2, Table 3.2-1 provides the location, function, and safety classifications for these tanks. Additionally, RWT is utilized for mitigating strategies and is designed to seismic Category I and Quality Group D. It will remain functional for the mitigating strategies. The COL applicant will confirm that the RWT and flow path to the FLEX equipment(structures, piping, components, and connections) are designed as seismic Category I to be robust with respect to seismic events.

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| **Application Section:** | **19.03** |
| **Date of RAI Issue:** | **11/09/2015** |

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## Question No. 19.03-12

NEI 12-06 provides detailed guidelines for selecting suitable storage locations that would provide reasonable protection for FLEX equipment from applicable external events. In APR1400 DCD, Tier 2, Section 19.3.4, the applicant provided Combined License Information pertaining to the Near Term Task Force (NTTF) recommendations. Specifically, the COL Information Item, COL 19.3(4), specifies that "The COL applicant is to address the details of storage location for FLEX equipment." Because reasonable protection of FLEX equipment during an applicable external event is a key consideration in selecting storage locations, the applicant is requested to expand the COL Information Item, COL 19.3(4), in such a way that it highlights reasonable protection of FLEX equipment in selecting storage locations.

## Response

COL 19.3(4) is expanded to address reasonable protection of FLEX equipment in selecting storage locations, as follows:

"COL 19.3(4) – The COL Applicant is to address the details of selecting suitable storage locations for FLEX equipment that provide reasonable protection during specific external events as provided in NEI 12-06 guidance Sections 5 through 9".

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**Impact on DCD**

DCD Tier 2 Table 1.8-2, Section 19.3.2.3.4 and 19.3.4 will be revised as indicated in the Attachment associated with this response.

**Impact on PRA**

There is no impact on the PRA.

**Impact on Technical Specifications**

There is no impact on the Technical Specifications.

**Impact on Technical/Topical/Environmental Reports**

There is no impact on the Technical Report.

Table 1.8-2 (29 of 29)

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| COL 19.3(3) | The COL applicant is to develop the details for offsite resources. |
| COL 19.3(4) | The COL applicant is to address the details of ~~storage location for FLEX equipment~~. |
| COL 19.3(5) | The COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in the NRC Order EA-12-049. |
| COL 19.3(6) | The COL applicant is to address SFP level instrumentation maintenance procedure development and perform training as specified in NRC Order EA-12 |
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selecting suitable storage locations for FLEX equipment that provide reasonable protection during specific external events as provided in NEI 12-06 guidance Sections 5 through 9.

COL applicant is to address details of ~~the storage location for FLEX equipment~~ (COL 19.3(4)). selecting suitable storage locations for FLEX equipment that provide reasonable protection during specific external events as provided in NEI 12-06 guidance Sections 5 through 9.

Also, the COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in NRC Order EA-12-049 (COL 19.3(5)), including but not limited to the following:

a. Evaluation of site-specific external hazards

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The primary instrument channel provides level indication through the use of guided wave radar (GWR) technology using the principle of time domain reflectometry (TDR).

selecting suitable storage locations for FLEX equipment that provide reasonable protection during specific external events as provided in NEI 12-06 guidance Sections 5 through 9.

COL 19.3(3) The COL applicant is to develop the details for offsite resources.

COL 19.3(4) The COL applicant is to address the details of ~~storage location for FLEX equipment.~~

COL 19.3(5) The COL applicant is to address site-specific strategies to mitigate BDBEEs as specified in the NRC Order EA-12-049.

COL 19.3(6) The COL applicant is to address SFP level instrumentation maintenance procedure development and perform training as specified in NRC Order EA-12-051.

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COL 19.3(8) The COL applicant is to address enhancement of the offsite communication system as specified in the NRC Request for Information pertaining to NTTF Recommendation 9.3.

COL 19.3(9) The COL applicant is to address staffing for large-scale natural events as specified in the NRC RFI pertaining to NTTF Recommendation 9.3.

## 19.3.5 References

1. SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," U.S. Nuclear Regulatory Commission, February 2012.

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