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## REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

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

Docket No. 52-046

RAI No.: 135-8001  
SRP Section: 09.02.06 – Condensate Storage Facilities  
Application Section: 9.2.6  
Date of RAI Issue: 08/07/2015

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### **Question No. 09.02.06-1**

GDC 2 establishes requirements with respect to the condensate storage facilities (CSF) design regarding protection against the effects of natural phenomena such as earthquakes, tornados, hurricanes and floods.

DCD Tier 2, Section 9.2.6.2, contains a description of the condensate storage and transfer system. The system includes three large storage tanks (one 300,000 gallon demineralized water storage tank and two 255,000 gallon condensate storage tanks). These tanks are classified as seismic category III (non-seismic). As indicated in Section I of SRP 9.2.6, the staff's review of the condensate storage facilities includes the review of provisions for mitigating the environmental effects of system leakage or storage tank failure. Details on the provisions made to mitigate environmental effects from system leakage and storage tank failures are not included in the DCD.

The applicant is requested to provide a discussion of the provisions and CSF design features to ensure adequate protection against the effects of natural phenomena and adherence to Position C.2 of Regulatory Guide 1.29, "Seismic Design Classification." This information must be included in the DCD. The applicant is to provide a DCD markup of this response.

### **Response - (Rev. 1)**

GDC 2 states that "Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornados, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions."

DCD Tier 2, Section 9.2.6.2.2 states that "All condensate storage and transfer system components including the CST and piping are non-safety-related and designed in accordance with NRC RG 1.26, Quality Group D."

DCD Tier 2, Section 9.2.6.2.1 states that “All demineralized water system components are non-safety-related except for the containment isolation valves and associated piping, and designed in accordance with NRC RG 1.26 (Reference 11), Quality Group D. Containment isolation valves and associated piping are Seismic Category I.

The failure of non-safety-related onsite tanks such as condensate storage facilities (CSF) could result in a potential flood source. The auxiliary building is the closest safety-related SSC, and it is approximately 90 meters away from the CSF, which is located in the tank yard as shown in DCD Tier 2, Figure 1.2-1. For conservatism, all of the water storage tanks are assumed to fail at the same time and 100% net-volumes are overflowed at the site. The flood level at the entrance doors to the auxiliary building is expected to be 16.7 cm, which is lower than the maximum allowable flood height (40.6 cm) between the bottom elevation of the door (100'-0”) and the ground level elevation (98'-8”). Also, watertight doors are installed at the exterior entrances to the safety-related structures. DCD Tier 2, Subsection 3.4.1.4 and 9.2.6.2.2 will be revised to clarify a CSF tank failure will not adversely affect safety-related SSCs.

The condensate storage tanks are not treated as potentially containing radioactive material due to the APR1400 design features that are described below. The condensate and demineralized water is filtered water to remove dissolved and suspended impurities. There are no supply lines to the condensate storage tanks (CSTs) except the nitrogen and demineralized water lines. The CSTs can only add condensate to the hotwell. There is not a return line to the CST for the control of condensate overflow, DCD Tier 2, Figure 10.4.7-1 shows that there is a line to the condensate overflow storage sump to control the condenser hotwell level at a hotwell level high condition. Also, the CSTs are located at the ground level elevation (98'-8”) and the condenser hotwells are located at the condenser pit (elevation 55'-0”) as shown in DCD Tier 2 Figure 1.2-32. According to HEI-Standards for Steam Surface condensers, hotwell makeup water lines from the CSTs are connected above the top tube or in the transition section of condenser; this assures that there is no contact between the CST supply lines and the condensate. The location of the connection from the CST supply line to the hotwell, along with the approximate 40' elevation difference would not allow back leakage from condenser hotwells to CSTs. Therefore, the CSTs do not contain radioactive fluids as provided in the response to Question No. 09.02.06-2.

In conclusion, a CSF tank leakage or failure would not cause adverse effects on the environment.

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### **Impact on DCD**

DCD Tier 2, Subsection 3.4.1.4 and 9.2.6.2.2 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**

There is no impact on any Technical, Topical, or Environmental Report.

**APR1400 DCD TIER 2**

The systems in the emergency diesel generator building to be protected from flooding are Class 1E emergency diesel generator system, and the emergency diesel generator fuel oil storage and transfer system. The components to be protected from flooding are diesel generator, diesel fuel oil transfer pump, and exhaust fan.

d. Site-specific safety structures

The COL applicant is to provide flooding analysis with flood protection and mitigation features from internal flooding for the CCW Heat Exchanger Building and ESW Building (COL 3.4(2)).

Tables 3.4-1 and 3.4-2 provide the locations of safety-related SSCs and a comparison of the maximum internal flood elevation in the vicinity of the components. Figures 3.4-1 through 3.4-7 provide the locations of watertight doors and flood barriers in the auxiliary building.

3.4.1.4 Evaluation of External Flooding

External flooding is evaluated based on flooding sources such as natural phenomena and the failure of onsite tanks or large buried pipes. The maximum water level and flow velocity of an individual flood event are determined to estimate flood loads on seismic Category I structures and the watertightness of the structures during an external flood event. Seismic Category I structures are designed for the design basis flood level and the maximum groundwater level defined in Table 2.0-1.

The COL applicant is to confirm that the potential site-specific external flooding events are bounded by design basis flood values or otherwise demonstrate that the design is acceptable (COL 3.4(3)).

No permanent dewatering systems are necessary to maintain safe and acceptable groundwater levels.

The failure of non-safety related onsite tanks such as condensate storage facilities (CSF) could result in a potential flood source. However, onsite tanks are located in the tank yard that is an adequate distance from safety-related structures, and watertight doors are installed at the exterior entrances located on the ground level of safety-related structures to prevent inflow of external flooding. Therefore, a non-safety related tank failure does not result in adverse effects to safety-related SSCs.

**APR1400 DCD TIER 2**

All system components meet design code requirements consistent with the component quality group and seismic design classification, as described in Section 3.2. All demineralized water system components are non-safety related except for the containment isolation valves and associated piping, and designed in accordance with NRC RG 1.26 (Reference 11), Quality Group D. Containment isolation valves and associated piping are seismic Category I. Non-safety-related components and piping located in safety-related areas are seismic Category II. The others including the DWST are seismic Category III. Design parameters of the DWST and demineralized water transfer pumps are shown in Table 9.2.6-1.

**9.2.6.2.2 Condensate Storage and Transfer System**

The condensate storage and transfer system (see Figure 9.2.6-2) provides a readily available source of deaerated condensate for makeup to the condenser. The condensate storage and transfer system provides condensate by means of gravity to the following equipment:

- a. Condenser hotwell
- b. Auxiliary feedwater pump suction as alternate non-safety backup supply
- c. Miscellaneous condensate makeup demands

All system components meet design code requirements consistent with the component quality group and seismic design classification, as described in Section 3.2. All condensate storage and transfer system components including the CST and piping are non-safety-related and designed in accordance with NRC RG 1.26, Quality Group D. System components including the CST are normally designed as seismic Category III but piping for within safety-related structures containing safety-related components is designed in accordance with seismic Category II requirements. The CSTs are pressurized by the nitrogen system to minimize air ingress. Design parameters of the CST are shown in Table 9.2.6-1.

The condensate storage facilities are located in the tank yard that is an adequate distance from safety-related structures and equipment such that a failure of the tanks does not result in adverse effects as described in Section 3.4.1.4.