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.:	**420-8482**
SRP Section:	**19.03 – Beyond Design Basis External Event (APR1400)**
Application Section:	**19.3**
Date of RAI Issue:	**02/29/2016**

Question No. 19.03-34

NRC Commission paper SECY-12-0025 stated that the NRC staff expected new reactor design certification applications to address the Commission-approved Fukushima actions in their applications to the fullest extent practicable. In performing its review of the APR1400 design certification application, the NRC staff followed the guidance for satisfying the Commission directives regarding BDBEE mitigation strategies in Japan Lesson-Learned Project Directorate JLD-ISG-2012-01, Revision 0, which endorsed with clarifications the methodologies described in NEI 12–06, Revision 0. The guidance in JLD-ISG-2012-01 describes one acceptable approach for satisfying the Commission directives regarding BDBEE mitigation strategies (i.e., Order EA-12-049). TR APR1400-E-P-NR-14005-P, Rev. 0 provides details regarding mitigating strategies and design enhancements to meet Near-Term Task Force (NTTF) recommendations, NRC orders, and agency guidance related mitigation strategy during Beyond Design Basis External Events (BDBEE).

TR, APR1400-E-P-NR-14005-P, Revision 0, Section 5.1.2.3.1.2, “Phase 2: Coping with Installed Plant Equipment and Onsite Portable Resources (8 to 72 hours)," subsection 5.1.2.3.1.2.1 states that two 480 V, 1,000 kW, mobile GTGs are provided to meet N+1 requirements. One of the 480 V mobile gas turbine generators (GTGs) is connected to the 480 V Class 1E power system Train A or B, and supplies power to the 125 Vdc battery charger, the 480 V load center, and the motor control center (MCC). During this phase, additional cooling in MCR, electrical and I&C equipment rooms, turbine driven auxiliary feedwater pump (TDAFWP) rooms, and auxiliary control panel (ACP) room is not required based on heat-up calculations.

1. Please explain what type of environmental conditions, including temperature, are in the room housing the mobile GTGs, and whether there are any impacts to the functioning of the GTGs during Phase 2 and beyond.

2. Discuss how isolation between Class 1E and non-Class 1E equipment (mobile GTGs) is maintained, in accordance with NEI 12-06, Section 3.2.2, Guideline (13).

Response – (Rev. 1)

As stated in COL item 19.3(4), the details of the storage location for FLEX equipment, including mobile GTGs, are to be addressed by the COL applicant. The environmental conditions (e.g., temperature, humidity, etc.) of the specific storage room will also be addressed by COL applicant. The typical information on the environmental conditions of the storage room housing the 480 V mobile GTGs needs to be considered as follows (Response 1).

And also, a discussion on how isolation between the mobile GTGs (non-Class 1E) and the Class 1E buses will be maintained is provided as follows (Response 2).

1. The temperature conditions inside the onsite storage building(s), where the 480V, 1000kW mobile gas turbine generator(s) will be located, is expected to be in the range of 40 °F to 120 °F (typical). However, the final selection of this temperature range is site specific and therefore, is part of COL 19.3(4). Also, during extreme cold conditions, it is anticipated that the onsite storage building(s) will maintain a minimum temperature of 40 °F using thermostatically controlled heaters. Mechanical cooling may not be necessary since the storage building(s) is (are) designed to only store equipment. The mobile GTG equipment will be specified to withstand and operate under the site-specific extreme temperature conditions (e.g., between (-) 40 °F and 127 °F). Also, in case water cooled GTG is specified, there will be proper drainage provisions to preclude freezing of fluid and/or use of anti-freeze to ensure that the equipment remains functional during the lowest postulated temperature conditions. Regarding impact of high humidity, the gas turbine portion may not be affected by high humidity. However, the generator portion is expected to be protected by internal heaters as necessary to get rid of the moisture.

   In light of the above, the functionality (performance) of the proposed 480V, 1000kW mobile gas turbine generator(s) is not expected to be affected by temperature and humidity during BDBEE, since the GTGs procured from the manufacturer will meet or exceed the specification and will consider impact on the GTG rating at elevated temperature (say, above 90 °F). Additionally, periodic testing and proper maintenance of the GTGs will be conducted in accordance with manufacturer's recommendations to demonstrate GTG readiness when called upon to operate during FLEX Phases 2 and beyond. Please note that this subject is a COL item (COL 19.3(4) and 19.3(9)) as discussed in DCD Sections 19.3.2.3.4, and will be fully addressed by the COL applicant to comply with the requirements of NEI 12-06, Rev 0 and JLD-ISG-2012-01, Rev 0.

2. As described in DCD Tier 2, Subsection 8.3.1.1.2.3, the Class 1E safety buses of the APR1400 are designed with the physical and electrical independence from non-Class 1E equipment. The interface arrangement between the Class 1E safety buses and the non-Class 1E equipment is maintained by Class 1E circuit breakers, which serve as isolation devices in accordance with IEEE Std. 384 as endorsed by NRC RGs 1.75.

   Specifically, in order to connect the mobile GTGs, the connection boxes are provided and installed in the entry and exit of the auxiliary building as described in DCD Tier 2, Subsection 8.3.1.1. Power cables between the connection boxes and the incoming circuit breaker (isolation device) of Class 1E buses are designed in APR1400. The mobile GTGs will be connected with the connection boxes by temporary cabling to

support phase 2 of the FLEX strategy. The specific design, location, and connection configuration has been comprehensively addressed in the response to RAI 61-7984, Question 08.03.01-5 (Reference KHNP submittal MKD/NW-15-0131L, dated September 8, 2015, ML15251A244).

Additionally, the electrical isolations and interactions between the local equipment (e.g., connection boxes, Class 1E safety buses, electrical loads, etc.) and FLEX equipment (mobile GTGs) are accomplished according to the plant procedure(s) and/or FLEX support guidelines (FSGs), which will be prepared by the COL applicant (COL 19.3(9)) in accordance with the NEI 12-06, Section 3.2.2, Guideline(13).

These procedure and/or FSG will provide specific instructions to the operator for the transition from installed sources to the portable equipment to address the proposed FLEX strategy. This aspect of the interface is stated in COL item 19.3(9) and 19.3(13) of DCD Tier 2, Section 19.3.4.

Impact on DCD

There is no impact on the DCD.

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.