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.:	**401-8402**
SRP Section:	**19.03 – Beyond Design Basis External Event (APR1400)**
Application Section:	**19.3**
Date of RAI Issue:	**02/08/2016**

Question No. 19.03-14

NEI 12-06 Section 3.2.1.5, "Reactor Coolant Inventory Loss," identifies that normal system leakage is a source of expected reactor coolant inventory loss. Technical Report APR1400-EP-NR-14005-P, Table 5-9, "Conformance with NEI 12-06, Rev 0," indicates conformance with NEI 12-06 Section 3.2.1.5. However, the Technical Report does not identify if normal reactor coolant inventory loss (Technical Specifications typically permit up to 11 gpm) is considered as contributing to the mass and energy input into the containment. Therefore, the staff requests that the applicant assess all potential sources into the containment to include normal system leakage and evaluate the impact on containment capabilities.

Response

The normal identified leakage consists of pressurizer pilot-operated safety relief valves, reactor coolant pump seals, valves, reactor vessel head flange leakage, leakage through steam generator tubes or tubesheet and leakage to auxiliary systems. These are totally allowed up to 10 gpm but have no impact on containment capabilities because all the identified leakages are collected to RDT or VCT. The unidentified leakage is allowed up to 1 gpm in Technical Specification. Those leakages are, however, accounted for by assuming large RCP seal leakage (i.e., 100 gpm from 4 RCPs) in the support analysis for APR1400 FLEX strategy.

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

Technical Report APR 1400-E-P-NR-14005-P/NP, Rev.0, table 5-9 will be revised as indicated on the attachment.

Table 5-9 Conformance with NEI 12-06, Rev. 0 (7 of 20)

NEI 12-06, Rev. 0			APR1400
Section		Summary	
3.2.1.5	Reactor Coolant Inventory Loss	Sources of expected PWR reactor coolant inventory loss include: (1) normal system leakage (2) losses from letdown unless automatically isolated or until isolation is procedurally directed (3) losses due to reactor coolant pump seal leakage (rate is dependent on the RCP seal design) [the controlled bleed-off] [Other normal system leakages, i.e., identified leakage of 10 gpm and unidentified leakage of 1 gpm, are allowed in APR1400 technical specification.]	The APR1400 FLEX strategy complies with the guidance. During normal operation, there is ~~no system leakage except normal leakage~~ of 12.11 L/min (3.2 gpm) through each RCP, which is compensated by charging flow. RCP seal leakage might progress from ~~the normal leakage~~ of 12.11 L/min (3.2 gpm) per RCP to around 75.71 L/min (20 gpm) per RCP at 158.19 kg/cm^{2}A (2,250 psia) after 30 minutes. Normal letdown flow is 302.83 L/min (80 gpm), but letdown isolation valve is designed to close at setpoint of PZR low pressure. The letdown isolation valve could be also closed by operator action within 30 minutes following the event. In the support analysis for the APR1400 FLEX strategy, the seal leakage from each RCP is assumed to be 94.64 L/min (25 gpm) from the beginning of the event. Therefore, the assumption of seal leakage is conservatively determined to include all of system leakages considered above.
3.2.1.6	SFP Conditions	Initial conditions: (1) All boundaries of the SFP are intact, including the liner, gates, transfer canals, etc. (2) Although sloshing may occur during a seismic event, the initial loss of SFP inventory does not preclude access to the refueling deck around the pool. (3) SFP cooling system is intact, including attached piping. (4) SFP heat load assumes the maximum design basis heat load for the site.	The APR1400 FLEX strategy complies with the guidance.
3.2.1.7	Event Response Actions	Event response actions follow the command and control of the existing procedures and guidance based on the underlying symptoms that result from the event.	The APR1400 FLEX strategy complies with the guidance.

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RAI No.:	**401-8402**
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Application Section:	**19.3**
Date of RAI Issue:	**02/08/2016**

Question No. 19.03-15

The staff conducted an Audit of Calculation 1-310-N380-008 Revision 0, "Containment Integrity Analysis Following RCP Seal Failure and Loss of RHR." This calculation discusses a single heat source, corresponding to a mass source, into containment from reactor coolant leakage flow (from reactor coolant pump seals). The staff requests that the applicant describe how sensible heat transfer from the reactor coolant system was evaluated. As part of the response, provide the value selected for sensible heat and any assumptions.

Response

As summarized in Table 5-1 of Technical Report APR1400-E-P-NR-14005-P, the plant is maintained at hot standby condition (i.e., 530°F with 2250 psia) after the reactor trip. After 8 hours from event initiation, MSADVs can be supplied with power from the 480 V mobile GTG and the operator starts to cooldown the RCS using MSADV. Approximately 4 hours after RCS cooldown, the SCS entry condition (i.e., 350°F with 450 psia) is reached and the plant remains at the same hot shutdown condition. Containment pressure and temperature analyses for Full-Power Operation are performed using mass and enthalpy data released from the RCS which includes the RCP seal leakage and normal system leakage. From the event initiation to 12 hours, mass release from the RCS is assumed to be 100 gpm and the enthalpy is conservatively determined under the assumption that the RCS remains at hot standby condition. After 12 hours, mass release from the RCS is assumed to critical flow at the SCS entry condition and enthalpy is conservatively determined under the assumption that the RCS is remained at the same SCS entry condition. Therefore the analyses results of containment pressure and temperature described in section 5.1.2.5.2 of Technical Report APR1400-E-P-NR-14005-P are sufficiently conservative.

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 Environment Report.

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.:	**401-8402**
SRP Section:	**19.03 – Beyond Design Basis External Event**
Application Section:	**19.3**
Date of RAI Issue:	**02/08/2016**

Question No. 19.03-18

NRC Commission paper SECY-12-0025 (February 17, 2012), "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," stated that the NRC staff expected new reactor design certification or license applications (e.g., construction permit, operating license, and combined license) not yet then-submitted to address the Commission-approved Fukushima actions in their applications, prior to submittal, to the fullest extent practicable. In SECY-12-0025, the NRC staff outlined a three-phase approach regarding mitigation strategies to respond to beyond-design basis external events (BDBEEs). The initial phase involved the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling without alternating current power. The transition phase involved providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involved obtaining sufficient offsite resources to sustain those functions indefinitely.

The NRC staff provided guidance for satisfying the Commission directives regarding BDBEE mitigation strategies in Japan Lesson-Learned Project Directorate (JLD)-ISG-2012-01, Revision 0, "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. ML12229A174). JLD-ISG-2012-01 endorsed with clarification the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 12–06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ADAMS Accession No. ML12242A378). The guidance in JLD-ISG-2012-01 describes one acceptable approach for satisfying the Commission directives regarding BDBEE mitigation strategies.

Technical Report APR1400-E-P-NR-14005-P does not contain simplified drawings to show how the FLEX strategy, using the emergency containment spray backup system (ECSBS), is used to maintain containment capabilities. The staff requests that the applicant provide a simplified drawing(s) that identifies the flow path to deliver water to containment. For example the drawing should depict plant piping, valves, pumps, water sources, power needs (as applicable), and any

associated connections (FLEX pump suction, FLEX pump discharge, and fuel supply) and support systems. The staff also requests that the applicant provide the quality classification of installed structures, systems, and components used to maintain containment capabilities. Additionally, the location for any connections should be identified.

Response

The ECSBS can use an external water source from the RWT using the ECSBS FLEX pump, which is connected to the ECSBS via a fire siamese connection located outside of the AB. The ECSBS FLEX pump is self-powered pump (diesel-driven). And the pump is connected to the RWT via a flexible hose on the suction side and is connected to the fire siamese connection via a flexible hose on the discharge side. Fuel is supplied from the diesel fuel oil day tank “A/B” as illustrated in Figure 6-6 of the Technical Report APR1400-E-P-NR-14005-P. A new schematic drawing (Figure 6-7) will be added to the next page of Figure 6-6 and Subsection 5.1.2.5.3 will be revised as indicated in the Attachment.

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

Technical Report APR1400-E-P-NR-14005-P/NP, Subsection 5.1.2.5.3 will be revised and Figure 6-7 will be added as indicated in the Attachment.

a. Normally closed motor-operated valve (MOV) (fail as-is)

b. Air-operated valve (AOV) (fail closed)

c. Check valve inside containment (automatic isolation)

5.1.2.5.2 Containment Capability during Full-Power Operation

The containment design incorporates a prestressed concrete containment with a steel liner to house the nuclear steam supply system. The containment and associated systems are designed to safely withstand environmental conditions that may be expected to occur during the life of the plant, including both short-term and long-term effects following a design basis accident (DBA) and beyond DBA.

During a BDBEE, no major pipe break is postulated inside the containment, but RCP seal leakage is assumed to be at a leak rate of 94.64 L/min (25 gpm) per RCP, a total of 378.5 L/min (100 gpm) for four RCPs. The containment pressure and temperature analyses are performed using the GOTHIC (Version 8.0) computer program. The containment pressure reaches the design pressure of 5.25 kg/cm^2 A (74.7 psia) in about 63 days from the beginning of the event. The design temperature of 143 °C (290 °F) is not exceeded until 71 days following the event. Figure 5-3 provides the containment pressure and temperature responses with the assumed RCP seal leakage. Therefore, containment integrity is maintained following full-power events through all phases.

5.1.2.5.3 Containment Capability during Mode 5 Operation

Loss of residual heat removal (RHR) during mid-loop operation in mode 5 is additionally assumed for the evaluation of containment capability. In the RCS mid-loop operation, SG nozzle dams are installed on the steam generator plena and the pressurizer manway remains opened. In this event, steam is assumed to be released from the RCS to the containment through the pressurizer manway due to the boiling of reactor coolant following the loss of RHR.

Due to the mass and energy released from the RCS, containment pressure increases consistently from the beginning of the event, but it can be maintained below UPC by operating the ECSBS intermittently after reaching UPC at around 83 hours. The ECSBS is assumed to start spraying water into the containment atmosphere via a FLEX pump when the containment pressure reaches the UPC value of 12.9 kg/cm^2 A (184 psia). After the initial operation, the ECSBS is assumed to be intermittently operated for 2 hours whenever the containment pressure reaches the UPC value. The FLEX pump provides the flow rate of 2,839 L/min (750 gpm) and the differential pressure of at least 2.8 kg/cm^2 (40 psi) at the ECSBS nozzle. The external water source for ECSBS operation is the RWT.

GOTHIC analyses are performed for evaluation of the containment pressure and temperature responses following loss of RHR in mode 5. Figure 5-4 shows that the containment pressure reaches the UPC value in about 3.5 days without ECSBS operation, but with the intermittent operation of ECSBS, containment pressure can be maintained within the UPC limit. Figure 5-5 shows that the containment temperature is maintained well below 185 °C (365 °F), which is less than the upper limit temperature of 196 °C (385 °F) for ensuring the operability of RCS sensors.

5.1.2.6 Support Systems

A simplified drawing that identifies the flow path to deliver water to the ECSBS is schematically shown in Figure 6-7.

5.1.2.6.1 Electrical Systems

This subsection describes the electrical strategies to support the FLEX items described above for NTTF 4.1 and 4.2.

As stated earlier, the BDBEE causes the unit to lose all ac power. The initial condition is assumed to be

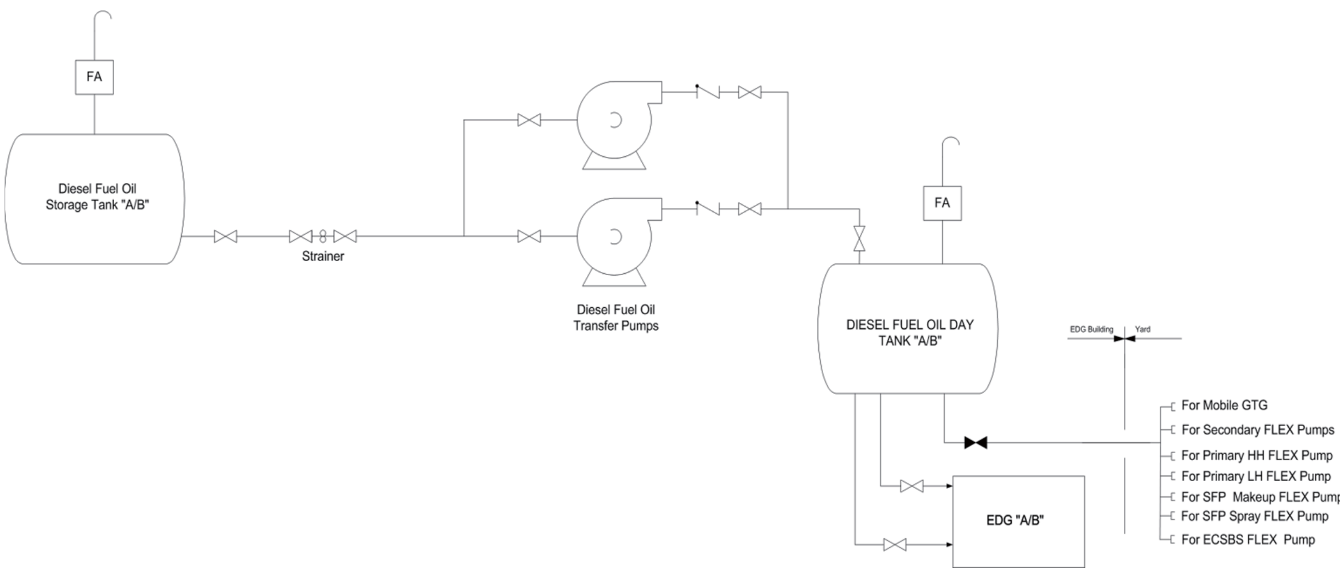

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Figure 6-6 Fuel Oil Supply System to FLEX Pumps

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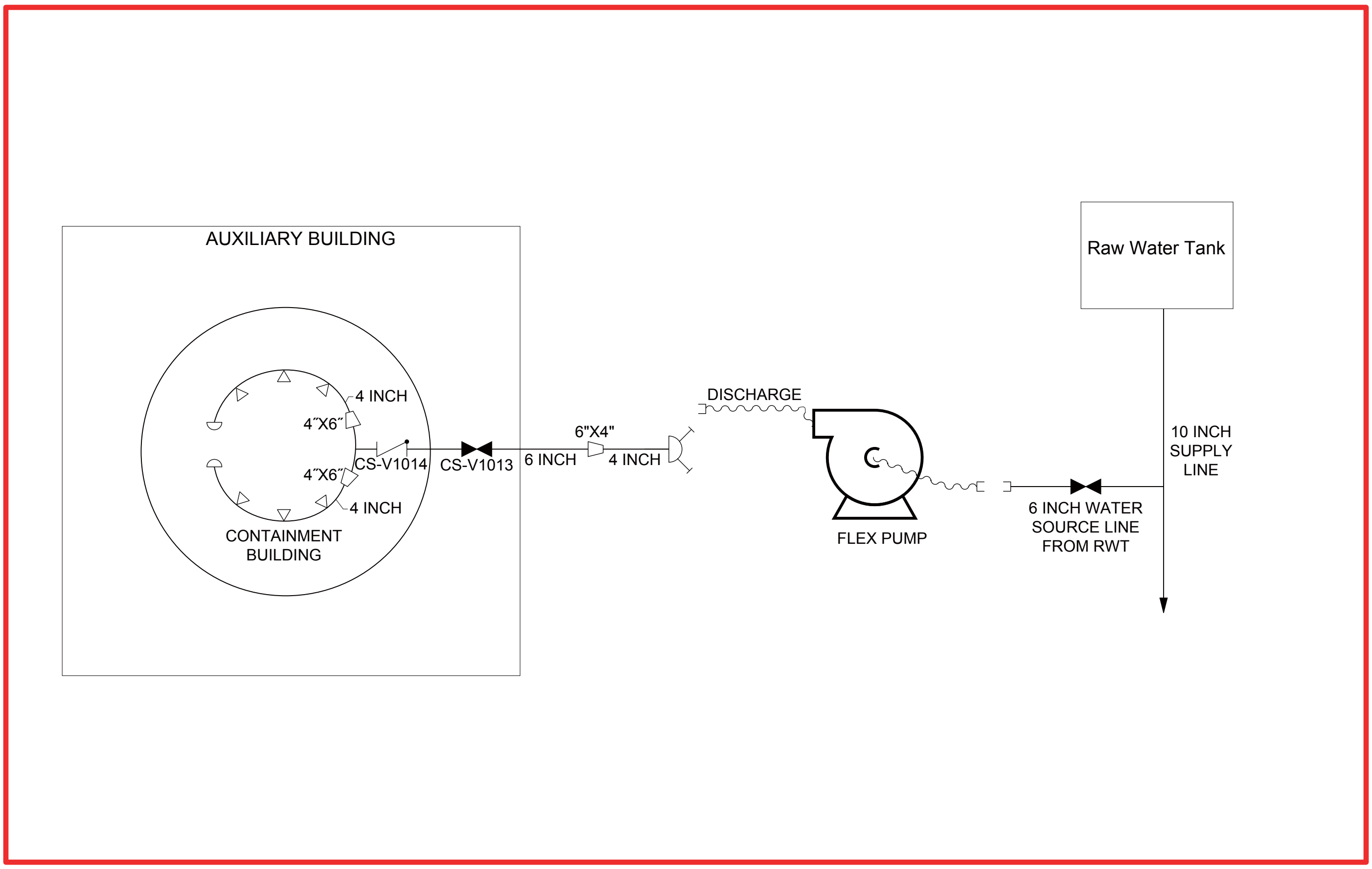

Figure 6-7 Flow Path for FLEX Connection to Deliver Water to Containment for ECSBS

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.:	**401-8402**
SRP Section:	**19.03 – Fukushima**
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Question No. 19.03-21

NRC Commission paper SECY-12-0025 (February 17, 2012), “Proposed Orders and Requests for Information in Response to Lessons Learned from Japan’s March 11, 2011, Great Tohoku Earthquake and Tsunami,” stated that the NRC staff expected new reactor design certification or license applications (e.g., construction permit, operating license, and combined license) not yet then-submitted to address the Commission-approved Fukushima actions in their applications, prior to submittal, to the fullest extent practicable. In SECY-12-0025, the NRC staff outlined a three-phase approach regarding mitigation strategies to respond to beyond-design basis external events (BDBEEs). The initial phase involved the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling without alternating current power. The transition phase involved providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involved obtaining sufficient offsite resources to sustain those functions indefinitely.

The NRC staff provided guidance for satisfying the Commission directives regarding BDBEE mitigation strategies in Japan Lesson-Learned Project Directorate (JLD)-ISG-2012-01, Revision 0, “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. ML12229A174). JLD-ISG-2012-01 endorsed with clarification the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 12–06, Revision 0, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” (ADAMS Accession No. ML12242A378). The guidance in JLD-ISG-2012-01 describes one acceptable approach for satisfying the Commission directives regarding BDBEE mitigation strategies.

Technical Report, APR1400-E-P-NR-14005-P, Table 6-1, “External Connection Components for BDBEE,” lists diesel fuel oil supply line isolation valves that are not consistent with DCD, Tier 2, Figure 9.5.4-1, “Diesel Fuel Oil Transfer System Flow Diagram.” For example, Technical Report Table 6-1 is missing V2208. The staff requests that the applicant address any inconsistencies between Technical Report Table 6-1 and DCD, Tier 2, Figure 9.5.4-1.

Response

During Phase 2, the fuel for the FLEX equipment is supplied by gravity flow from the emergency diesel generator (EDG) fuel oil day tank (Train A or B). Once the 480 V mobile GTG is running, the existing diesel fuel oil transfer pump (Train A or B) is used to make up day tank from the EDG fuel oil storage tank. During Phase 2, the day tank of train A or B supplies the fuel to following FLEX equipment at Full Power or Low Mode.

- 480 V Mobile GTG
- Primary high-head FLEX pump
- Primary low-head FLEX pump
- SFP makeup pump
- SFP spray pump
- AF FLEX pump
- ECSBS FLEX pump

Therefore, Technical Report, APR1400-E-P-NR-14005-P, Table 6-1 will be revised to correct any inconsistency with the above information and the DCD.

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

ARP1400-E-P-NR-14005-P/NP, Table 6-1 will be revised as shown in the Attachment.

Table 6-1 External Connection Components for BDBEE (1 of 2)

Component	DCD Chapter and/or Section	Function
V2601	Figure 6.3.1-2	SFP external makeup line check valve
V2602	Figure 6.3.1-2	SFP external makeup line isolation valve
V2605	Figure 6.3.1-2	SFP external spray line check valve
V2606	Figure 6.3.1-2	SFP external spray line isolation valve
V2611	Figure 6.3.1-2	SFP external makeup line check valve
V2612	Figure 6.3.1-2	SFP external makeup line isolation valve
V2615	Figure 6.3.1-2	SFP external spray line check valve
V2616	Figure 6.3.1-2	SFP external spray line isolation valve
SI-801	Table 3.9-4, Table 3.9-13, Figure 6.3.2-1 (4 of 4)	External emergency injection line check valve
SI-803	Table 3.9-4, Table 3.9-13, Figure 6.3.2-1 (4 of 4)	External emergency injection line isolation valve
SI-805	Figure 6.3.2-1 (4 of 4)	External emergency injection line fill isolation valve
SI-807	Figure 6.3.2-1 (4 of 4)	External emergency injection line isolation valve
CH-784	Figure 9.3.4-1 (4 of 7)	Primary side high-head FLEX pump suction isolation
V2678A	Figure 10.4.9-1	AF FLEX pump suction line backflow prevention
V2678B	Figure 10.4.9-1	AF FLEX pump suction line backflow prevention
V2679A	Figure 10.4.9-1	AF FLEX pump suction line isolation
V2679B	Figure 10.4.9-1	AF FLEX pump suction line isolation
V2098A	Figure 10.4.9-1	AF FLEX pump discharge line backflow prevention
V2098B	Figure 10.4.9-1	AF FLEX pump discharge line backflow prevention
V2102A	Figure 10.4.9-1	AF FLEX pump discharge line isolation
V2102B	Figure 10.4.9-1	AF FLEX pump discharge line isolation
V2001A	Figure 9.5.4-1	Diesel fuel oil day tank discharge line to mobile equipment ~~isolation~~ header isolation
V2001B	Figure 9.5.4-1	Diesel fuel oil day tank discharge line to mobile equipment header isolation
~~V2001C~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil day tank discharge line to mobile equipment header isolation~~
~~V2001D~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil day tank discharge line to mobile equipment header isolation~~
V2202A	Figure 9.5.4-1	Diesel fuel oil supply line to mobile GTG isolation
V2202B	Figure 9.5.4-1	Diesel fuel oil supply line to mobile GTG isolation
~~V2202C~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to mobile GTG isolation~~
~~V2202D~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to mobile GTG isolation~~
V2203A	Figure 9.5.4-1	Diesel fuel oil supply line to AF FLEX pump isolation
V2203B	Figure 9.5.4-1	Diesel fuel oil supply line to AF FLEX pump isolation
V2204A	Figure 9.5.4-1	Diesel fuel oil supply line to primary high-head pump isolation
V2204B	Figure 9.5.4-1	Diesel fuel oil supply line to primary high-head pump isolation
~~V2204C~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to primary high-head pump isolation~~

Table 6-1 External Connection Components for BDBEE (2 of 2)

Component	DCD Chapter and/or Section	Function
~~V2204D~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to primary high-head pump isolation~~
V2205A	Figure 9.5.4-1	Diesel fuel oil supply line to primary low-head pump isolation
V2205B	Figure 9.5.4-1	Diesel fuel oil supply line to primary low-head pump isolation
~~V2205C~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to primary low-head pump isolation~~
~~V2205D~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to primary low-head pump isolation~~
~~V2203C~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to AF FLEX pump isolation~~
~~V2203D~~	~~Figure 9.5.4-1~~	~~Diesel fuel oil supply line to AF FLEX pump isolation~~
V2206A	Figure 9.5.4-1	Diesel fuel oil supply line to SFP pump isolation
V2206B	Figure 9.5.4-1	Diesel fuel oil supply line to SFP pump isolation
V2207A	Figure 9.5.4-1	Diesel fuel oil supply line to SFP spray pump isolation
V2207B	Figure 9.5.4-1	Diesel fuel oil supply line to SFP spray pump isolation
Circuit Breaker of Class 1E 4.16 kV Switchgear 01A (1-823-E-SW01A)	Figure 8.1-1 (1 of 2)	Provision for connecting to 4.16 kV mobile generator
Circuit Breaker of Class 1E 4.16 kV Switchgear 01B (1-823-E-SW01B)	Figure 8.1-1 (2 of 2)	Provision for connecting to 4.16 kV mobile generator
Circuit Breaker of Class 1E 480 V Load Center 01A (1-825-E-LC01A)	Figure 8.1-1 (1 of 2)	Provision for connecting to 480V mobile generator
Circuit Breaker of Class 1E 480 V Load Center 01B (1-825-E-LC01B)	Figure 8.1-1 (2 of 2)	Provision for connecting to 480V mobile generator
Battery	9.5.2.1	The communication systems are powered from one of the two dedicated 16-hour-rated non-safety-related batteries (normal and standby) in case of either AAC GTG failure during a LOOP or SBO condition.

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

Docket No. 52-046

RAI No.:	**401-8402**
SRP Section:	**19.03 – Beyond Design Basis External Event**
Application Section:	**19.3**
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Question No. 19.03-23

NRC Commission paper SECY-12-0025 (February 17, 2012), "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," stated that the NRC staff expected new reactor design certification or license applications (e.g., construction permit, operating license, and combined license) not yet then-submitted to address the Commission-approved Fukushima actions in their applications, prior to submittal, to the fullest extent practicable. In SECY-12-0025, the NRC staff outlined a three-phase approach regarding mitigation strategies to respond to beyond-design basis external events (BDBEEs). The initial phase involved the use of installed equipment and resources to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling without alternating current power. The transition phase involved providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from offsite. The final phase involved obtaining sufficient offsite resources to sustain those functions indefinitely.

The NRC staff provided guidance for satisfying the Commission directives regarding BDBEE mitigation strategies in Japan Lesson-Learned Project Directorate (JLD)-ISG-2012-01, Revision 0, "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. ML12229A174). JLD-ISG-2012-01 endorsed with clarification the methodologies described in the industry guidance document Nuclear Energy Institute (NEI) 12–06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ADAMS Accession No. ML12242A378). The guidance in JLD-ISG-2012-01 describes one acceptable approach for satisfying the Commission directives regarding BDBEE mitigation strategies.

Technical Report, APR1400-E-P-NR-14005-P, Table 5-8, "Conformance with JLD-ISG-2012-01, Rev. 0," Section 5.0, "Containment Function Strategies," states that for those penetrations needed to be opened for FLEX strategies, that the isolation valves can be opened from the MCR [Main Control Room]. The staff requests that the applicant identify the valves that are to be opened, what support systems are needed to open the valves from the control room (e.g.,

electrical power, air, etc.), and why these supporting systems are available during the event (extended loss of ac power concurrent with a loss of the ultimate heat sink). In addition, for the containment penetration that is used to provide IRWST water to support the FLEX strategies (opening of motor operated valve 005 and 006 depicted in DCD Tier 2, Figure 6.8-3) the staff requests setpoint information on the penetration relief valve 1003, and the basis for the setpoint (assess the pressure seen by the relief valve during mitigating strategies and the relief valve setpoint).

Response

During the BDBEE with loss of all ac power, following containment isolation valves can be opened for FLEX strategies to provide makeup water from water source of boric acid storage tank (BAST) or IRWST to RCS through a DVI line, or to depressurize the containment pressure below ultimate pressure capacity (UPC) of the containment using the emergency containment spray backup system (ECSBS) with water source from raw water tank (RWT).

- Safety Injection System: V601 (MOV)
- In-containment Water Storage System: V005 (MOV), V006 (MOV)
- ECSBS: V1013 (Manual)

The above MOVs are normally closed valves, and will be opened by manual operation with hand wheel on each valve during the BDBEE. Therefore, all containment isolation valves which are needed to be opened for FLEX strategies are opened manually, and the Technical Report, Table 5-8, Section 5.0 will be corrected to reflect the above information.

Pertaining to the relief valve (V1003) on the suction line of the boric acid makeup pump (BAMP), the setpoint for the relief valve is at 80 psig, and is based on the design pressure for the containment (74.7 psia) during a design basis accident, and the static head of water inside the IRWST (11.2 psi). The maximum operating pressure for the containment during the DBA is therefore 73 psig (rounding up). This line could be used during a BDBEE that occurs at full-power operation, and following the onset of the BDBEE, during which the containment pressure increases by RCP seal leakage, it would take approximately 70 more days for the pressure to increase by 68.8 psi (80 psig – 11.2 psig), in accordance with the containment pressure buildup in Figure 5-3 of the Technical Report, to the setpoint of 80 psig. At that point, the relief valve will open if there is no other counter measures or intervention. However the APR1400 design has incorporated mitigation strategies to offset containment pressure buildup, approximately 3 days, before the relief valve is impacted.

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

Technical Report APR1400-E-P-NR-14005-P/NP, Table 5-8, Section 5.0 will be revised as indicated in the Attachment.

Table 5-8 (4 of 5)

JLD-ISG-2012-01 Rev. 0			APR1400
Section		Summary	
5.0	Containment Function Strategies	The third group of strategies and guidance necessary to meet the requirements of Order EA-12- 049 addresses challenges to the containment functions. Containment functions must be accomplished in all three phases described in the Order.	Upon loss of all ac power, all containment penetrations are isolated by either using dc power or mobile ac power. Also, for those penetrations needed to be opened for FLEX strategies, ~~the isolation valves can be opened from the MCR.~~ the isolation valves (SI-601, IW-005, IW-006, and CS-1013) can be opened by manual operation.
5.1	Removal of Heat from Containment (Pressure Control)	Beyond-design-basis external events such as a prolonged SBO or loss of normal access to the ultimate heat sink could result in a long-term loss of containment heat removal. The goal of this strategy is to relieve pressure from the containment in such an event.	The APR1400 FLEX strategy complies with this guidance. The containment pressure and temperature can be maintained below the design basis value since the only source of energy imparted onto the containment building is the RCP seal leakage, which is 94.64 L/min (25 gpm) / RCP (a total of 378.54 L/min [100 gpm]). This is well below the mass and energy of the design basis accident, and the containment integrity can be maintained for the BDBEE conditions. When the BDBEE occurs during the mid-loop operation, the containment pressure increases consistently due to the mass and energy released from the pressurizer manway, but it can be maintained below UPC by operating the ECSBS.
6.0	Programmatic Controls		
6.1	Equipment Protection, Storage, and Deployment	Storage locations chosen for the equipment must provide protection from external events as necessary to allow the equipment to perform its function without loss of capability. In addition, the licensee must provide a means to bring the equipment to the connection point under those conditions in time to initiate the strategy prior to expiration of the estimated capability to maintain core and spent fuel pool cooling and containment functions in the initial response phase. Staff Position: NEI 12-06 provides an acceptable method to provide reasonable protection, storage, and deployment of the equipment associated with Order EA-12-049.	COL applicant is responsible for the FLEX equipment protection, storage, and deployment.