
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.: 412-8525
SRP Section: 08.04 – Station Blackout
Application Section: 08.04
Date of RAI Issue: 02/22/2016

Question No. 08.04-15

In response to RAI 8192, Question 08.04-7.b, the applicant discussed conformance to NUREG-0800, Section 8.3.III.3 Criteria D – G, I, and K – M.

- a. The applicant did not discuss conformance with NUREG-0800, Section 8.3.III.3 in the DCD. Please revise Section 8.4 of the DCD Tier 2 to include conformance of the APR1400 design with NUREG-0800, Section 8.3.III.3, Criteria D – I, K – M.
- b. Regarding conformance with Criterion D, the applicant stated that voltage, current, frequency, volt-ampere reactive, watts, watt-hour, power factor, and circuit breaker position of the AAC power source are monitored from the control room. Please specify which control room is being referred to in this statement, and confirm that the performance monitoring of the AAC power source is available in both the main control room and the remote control room. If either the MCR and RSR does not have the above monitoring capabilities, please discuss how performance of the AAC GTG will be monitored in the specific control room during an SBO event.
- c. Criterion F recommends that the non-safety related AAC power source(s) and associated dedicated direct current (dc) system(s) meet the quality assurance (QA) guidance in Position 3.5, Appendix A, and Appendix B of RG 1.155. In the RAI response, the applicant discussed the QA program for the AAC GTG only. The applicant also provided the specifications of the AAC power source in accordance with RG 1.155, Appendix B.
 - i. Please clarify whether the support systems are included in the QA program for the AAC GTG. Also, please revise Section 8.4 of the DCD Tier 2 to include conformance of the AAC GTG with RG 1.155, Appendix B.
 - ii. Appendix A provides QA guidance for non-safety systems and equipment. Appendix B discusses specifications of system and station equipment such as

water source, instrument air, and water delivery system. Please state how the APR1400 design conforms to RG 1.155, Position 3.5, Appendix A, Appendix B in regards to non-safety related systems. Also, please revise Section 8.4 of the DCD Tier 2 to include conformance of the non-safety related systems with RG 1.155, Position 3.5, Appendix A, and Appendix B.

Response – (Rev.1)

Below are the responses to the items that the staff has requested above:

- a. Conformance to NUREG-0800, Section 8.4.III.3, Criteria D – G, I, and K – M will be added to DCD Tier 2 as a new Subsection, 8.4.2.3.
- b. KHNP confirms that all of the performance monitoring parameters listed in the response to RAI 8192, Question 08.04-7.b (ref. MKD/NW-15-0269L dated November 18, 2015; ML15322A404) for the AAC power source compliance to Criterion D are available in both the Main Control Room and The Remote Shutdown Room.
- c. The responses to each item are as follows:
 - i. The support systems such as fuel oil, lube oil, engine cooling water, starting air, and combustion air intake and exhaust are included in the QA program for the AAC GTG. The APR1400's design conformance to RG 1.155 Appendix B will be added to DCD Tier 2 Subsection 8.4.2.2 as a new paragraph "e."
 - ii. Design conformance to RG 1.155 Position 3.5 and Appendix A was provided in KHNP's response to RAI 8192, Question 08.04-7.b and in DCD Subsection 8.4.2.2, including the response to item c.i above. The AAC GTG is designed and installed to meet the station blackout rule and has its own independent support systems not subject to a water source, instrument air or water delivery system of any other safety related system described in RG 1.155, Appendix B. Thus, system and station equipment specifications for such functions as water source, instrument air, and water delivery system do not need to account for the AAC GTG. The provided response to RAI 8192, Question 08.04-7.b, Table 2 addresses the conformance of AAC sources in RG 1.155 Appendix B. DCD Tier 2 Subsection 8.4.2.2 will be revised to include conformance of the non-safety related systems with RG 1.155 Position 3.5, Appendix A and Appendix B.

Impact on DCD

The changes that were proposed in the original response to this RAI have been incorporated into Revision 2 of the DCD; therefore, only the pages containing proposed changes are included in the Attachment as a result of this response (revision 1).

DCD Tier 2, Subsection 8.4.2.2 will be revised and Table 8.4.2-1, 8.4.2-2 will be revised as shown in the Attachment.

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

procedures that address NRC RG 1.155 Positions C1.3, C.2 and C3.4 are included in the emergency operating procedures (EOPs), which are to be developed and implemented by the COL applicant as specified in COL 13.5(5).

The training per NRC RG 1.155 Position C.3.4 is included in the licensed plant staff training program, which is to be provided by the COL applicant as specified in COL 13.2(3).

- d. NRC RG 1.155 Position C.3.5 is related to the quality assurance (QA) activities and specification for a non-safety-related AAC that is installed to meet an SBO. The non-safety equipment installed to meet an SBO does not degrade the existing safety-related systems. The QA guidance for the AAC GTG is described in Chapter 17. Appendix B to RG 1.155 will be considered as a criteria to the technical specifications for the AAC GTG and its support systems.

The AAC GTG follows the quality requirements in accordance with regulatory position 3.5 and Appendix A in Regulatory Guide 1.155.

- e. The AAC GTG installed to meet the station blackout rule has its own independent system not subject to water source, instrument air and water delivery system of existing system is not accurate since none are built yet. Other safety-related systems described in RG 1.155 and therefore cannot degrade other safety-related systems. Conformance or justification of AAC Sources (AAC GTG) with RG 1.155 Appendix B is addressed as shown in Table 8.4.2-1.

8.4.2.3 Conformance with 10 CFR 52.47(b)(1) and 10 CFR 52.80(a)

See Subsection 8.2.2.4.

8.4.2.4 Conformance with NUREG-0800

Standard Review Plan, Section 8.4.III.3, Criteria D to I and K to M

Conformance of APR1400 design with the NUREG-0800, Section 8.4.III.3, Criteria D to I and K to M is addressed as shown in Table 8.4.2-2.

8.4.3 Combined License Information

COL 8.4(1) The COL applicant is to validate the SBO coping duration according to the method specified in RG 1.155.

Table 8.4.2-1 (1 of 2)

Conformance to RG 1.155 Appendix B, Alternate AC Sources

RG 1.155, Appendix B, Alternate AC Sources		Conformance or Justification
Safety-Related Equipment (Compliance with IEEE-279)	Not required, but the existing Class 1E electrical systems must continue to meet all applicable safety-related criteria.	The AAC is non-safety-related, but the existing onsite emergency power sources, buses and loads will continue to meet all applicable safety-related criteria since the AAC source is independent of the Class 1E electrical systems as noted in Table 1 Items E, G, I, and K.
Diversity from Existing EDGs	See Regulatory Position 3.3.5 of this guide.	The APR1400 design will utilize an AAC power source that is diverse from that of the EDGs. A qualified gas turbine generator will be used as the AAC source.
Independence from Existing Safety-Related Systems	Required if connected to Class 1E buses. Separation to be provided by 2 circuit breakers in series (1 Class 1 E at the Class 1E bus and 1 non-Class 1E).	The two breakers in series, which are normally open, are provided between the Class 1E SWGR buses and AAC SWGR bus (one Class 1E at the Class 1E buses and another non-Class 1E at the AAC SWGR bus).
Environmental Consideration	If normal cooling is lost, needed for station blackout event only and not for design basis accident (DBA) conditions. Procedures should be in place to effect the actions necessary to maintain acceptable environmental conditions for the required equipment. See Regulatory Position 3.2.4.	Equipment and environment cooling loss will be limited to 10 minutes (SBO duration). Normal plant cooling loads will be restored after shutdown loads are reestablished. Temperature rise conditions will be on the order of minutes rather than hours and no additional equipment or measures are necessary to supply interim cooling. Therefore, associated procedures are also not required.
Capacity	Specified in § 50.63 and Regulatory Position 3.3.5.	The AAC GTG has the sufficient capacity to supply required shutdown loads to bring and maintain the plant in a safe shutdown condition.
Quality Assurance	Indicated in Regulatory Position 3.5.	Quality assurance (QA) of the AAC GTG follows the QA program for the APR1400 design certification described in DCD Tier 2, Section 17.5, which applies the requirements of 10 CFR 50, Appendix B.

The AAC GTG follows the quality requirements in accordance with regulatory position 3.5 and Appendix A in Regulatory Guide 1.155.

Table 8.4.2-2 (1 of 3)

Conformance to NUREG-0800, Section 8.4.III.3 Criteria D to I and K to M

NUREG-0800, Section 8.4.III.3 Criteria	Conformance or Justification
<p>D. Plant staff in the control room monitor the performance of the AAC power source. As a minimum, monitoring should include the voltage, current, frequency, and circuit breaker position.</p>	<p>The performance monitoring parameters of the AAC power source from the control room consist of the voltage, current, frequency, VARs, watts, watt-hour, and power factor. Also, the status of the circuit breaker position is monitored from the main control room and remote shutdown room.</p>
<p>E. The AAC source components are enclosed within structures that conform to the Uniform Building Code. Electrical cables connecting the AAC power source to the shutdown buses are protected against the events that affect the preferred ac power system. Buried cables or other appropriate methods can be used to accomplish this.</p>	<p>The structure of AAC GTG building, in which the AAC source components are located, will be designed to conform to the Uniform Building Code.</p> <p>The AAC power source components are located in the AAC GTG building and the Class 1E (shutdown buses) are located in the auxiliary building. The non-Class 1E AAC power source SWGR (3N) has connection provisions each to the Class 1E SWGRs 1A and 1B.</p> <p>The connections between the AAC power source and Class 1E SWGR 1A and 1B are made by cables, which run through an underground common tunnel (UCT) installed between the AAC GTG building and the auxiliary building. The connections, between the AAC power source and each Class 1E SWGR 1A and 1B, are appropriately separated from the cables connecting the Class 1E SWGR 1A and 1B to the preferred ac power system (PPS) as practicable such that impact on the connections of the AAC power source is minimized for the events that affect the PPS.</p>
<p>F. Non safety-related AAC power source(s) and associated dedicated dc system(s) should meet the QA guidance in Section 3.5, Appendix A, and Appendix B to RG 1.155.</p>	<p>As mentioned in DCD Tier 2, Subsection 8.4.2.2, the AAC GTG follows the Quality Assurance Program Description described in DCD Tier 2, Section 17.5, which applies the requirements of 10 CFR 50, Appendix B. Compliance with Appendix B to RG 1.155 is provided as following Table “Conformance to RG 1.155, Appendix B, Alternate AC Sources.”</p>

The AAC GTG follows the quality requirements in accordance with regulatory position 3.5 and Appendix A in Regulatory Guide 1.155.