

## KHNPDCRAIsPEm Resource

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**Subject:** APR1400 Design Certification Application RAI 177-8166 (08.01 - Electric Power - Introduction)  
**Attachments:** APR1400 DC RAI 177 EEB 8166.pdf; image001.jpg

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, 60 days to respond to this RAI. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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# REQUEST FOR ADDITIONAL INFORMATION 177-8166

Issue Date: 08/31/2015  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 08.01 - Electric Power - Introduction  
Application Section: 8.01

## QUESTIONS

### 08.01-2

APR1400 DCD Section 8.2.1, System Description states the following “Electric power from the transmission network to the onsite electrical distribution system is supplied by two physically independent circuits. The COL applicant is to identify those independent circuits (COL 8.2(1)). The APR1400 is designed to meet the requirements in 10 CFR Part 50, Appendix A, and GDC 2, 4, 5, 17, and 18 (References 1 through 5, respectively).” Based on the statement above the APR1400 design is designed to meet the GDC 5 requirements, however, Table 8.1-2 indicates that GDC 5 is not applicable to the APR1400 design. Please clarify the inconsistency between the DCD Section 8.2.1 and Table 8.1-2.

### 08.01-3

APR1400 DCD Table 8.1-2, “Criteria and Guidelines for Electric Power Systems,” and Table 1.9-2, “APR1400 Conformance with the Standard Review Plan,” states that BTP 8-8, “Onsite (Emergency Diesel Generators) and Offsite Power Sources Allowed Outage Time Extensions,” February 2012 is not applicable.

DCD section 8.1.3.3, “General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards” lists BTP 8-8 and states that “The electric power system is designed to meet the following requirements of General Design Criteria (GDC), Regulatory Guides (RGs), Branch Technical Positions (BTPs), Generic Letters (GLs), and industry standards. Conformance with RGs and BTPs for electric power systems is addressed in Table 8.1-2 and Section 1.9.”

DCD section 8.3.1.1 states in part that the onsite ac power system includes standby power sources, distribution systems, and auxiliary supporting systems that are provided to supply power to safety-related equipment or equipment important to safety for all normal operating and accident conditions. There are four Class 1E emergency diesel generators (EDGs) and one non-Class 1E gas turbine generator (GTG).

Standard Review Plan, NUREG-0800 states that BTP 8-8 is applicable to sections 8.2 and 8.3.1. Please clarify whether BTP 8-8 is applicable to the APR1400 design for the Class 1E EDGs discussed in section 8.3.1.1.

If applicable provide a discussion in the appropriate DCD section describing applicability of BTP 8-8.

### 08.01-4

APR1400 DCD Table 8.1-2, indicated that the following Regulations are applicable to the APR1400 design: 10 CFR 50.55a, 10 CFR 52.47 (b)(1), 10 CFR 52.80(a), 10 CFR 50.34(f)(2)(v), and 10 CFR 50.34(f)(2)(xiii). However, the DCD for chapter 8 does not discuss how the design meets these requirements. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems. Please discuss how the APR1400 design conforms to the above requirements.

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### 08.01-5

10 CFR part 50, Appendix A Criterion 2 (GDC 2) —Design bases for protection against natural phenomena. Structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions.

DCD section 8.2.2.1 states in part that GDC 2 requires that structures, systems, and components (SSCs) of the offsite power system be capable of withstanding the effects of natural phenomena (excluding earthquakes, tornadoes, hurricanes, and floods) without the loss of the capability to perform their safety functions. The offsite power system is designed to withstand the effects of natural phenomena such as high and low atmospheric temperatures, high wind, rain, lightning discharges, ice and snow conditions, and weather events.

DCD Sections 8.3.1.2.1, Conformance with General Design Criteria, Criterion 2 – Design Bases for Protection Against Natural Phenomena states in part that GDC 2 requires that systems and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without the loss of their safety function capabilities. The Class 1E onsite ac power system and its components are located in seismic Category I structures that provide protection from the effects of natural phenomena. Class 1E equipment is seismically qualified, and its mounting and installation are seismically designed to worst-case design basis earthquake for the site.

DCD Sections 8.3.2.2.1, Conformance with General Design Criteria, Criterion 2 – Design Bases for Protection Against Natural Phenomena states in part that GDC 2 requires that systems and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without the loss of their safety function capabilities. The Class 1E 125 Vdc power system and its components are located in seismic Category I structures that provide protection from the effects of natural phenomena. Class 1E equipment is seismically qualified and the mounting and installations are seismically designed to the worst-case design basis earthquake for the site.

DCD section 3.7, “ Seismic Design,” states in part that the APR1400 structures, systems, and components (SSCs) important to safety are designed to withstand the effects of earthquakes without loss of capability to perform their safety functions, as required by 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 2.

DCD section 3.2.1, “Seismic Classification,” states in part that General Design Criterion (GDC) 2 (Reference 1) requires, in part, that nuclear power plant SSCs important to safety be designed to withstand the effects of earthquakes without loss of capability to perform their safety function.

DCD section 3.5, “Missile Protection,” states in part that In accordance with 10 CFR Part 50, Appendix A, GDC 2 and 4 (Reference 1), essential structures, systems, and components (SSCs) important to safety are required to be protected from internal and external missiles.

DCD section 3.5.1.4, “Missiles Generated by Tornadoes and Extreme Winds,” states in part that related SSCs of the APR1400 are protected against the impact generated by tornado or hurricane missiles. The protection measures consist of seismic Category I structures, shields, and barriers to withstand the effects of missile impact generated by a tornado or hurricane. The protection provides reasonable assurance of conformance with 10 CFR Part 50, Appendix A, GDC 2 and 4 and 10 CFR 52.47(b)(1).

Please indicate whether the APR1400 offsite power system is important to safety and whether it is in compliance with the requirements of GDC 2. Clarify the difference in language between the DCD sections as it relates to conformance with GDC 2. NUREG-0800, Standard Review Plan (SRP) 8.2 states that GDC 2 requires that capability for the offsite power system to perform its functions be retained during the most severe natural phenomena that have been historically reported for the site and surrounding area. Please discuss how equipment and structures in the offsite power system, including the switchyard, are designed to withstand the effects associated with the aforementioned natural phenomena.

DCD Section 8.3.1.2.1, Conformance with General Design Criteria states in part that GDC 2 is addressed in Subsection 8.3.1.1.2. However, staff finds that additional detail in Subsection 8.3.1.1.2 is needed regarding the conformance of GDC 2. Please provide a discussion how the AC onsite power system conforms to GDC 2.

DCD Section 8.3.2.2.1 Conformance with General Design Criteria states in part that GDC 2 is addressed in Subsection 8.3.2.1.2. However, review of Subsection 8.3.2.1.2 does not provide sufficient detail as to the conformance of GDC 2. Please provide a discussion how the Class 1E DC power system conforms to GDC 2.

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### 08.01-6

The Commission Papers (SECY)-90-016 is listed in Table 8.1-2, but not discussed in other parts of DCD chapter 8. DCD chapter 8, Table 8.1-2 states that SECY-90-016 is applicable to DCD sections 8.2, 8.3.1, and 8.4, but applicability is not discussed in other parts of DCD chapter 8 or chapter 1.

SECY-91-078 is listed in Table 8.1-2, but not discussed in other parts of DCD chapter 8. DCD chapter 8, Table 8.1-2 states that SECY-91-078 is applicable to DCD sections 8.2, but the applicability is not discussed in other parts of DCD chapter 8 or chapter 1. SECY-91-078, DCD chapter 1, Table 1.9-7 states that APR1400 conforms to the requirements of SECY 91-078.

The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

Please provide a discussion on how the APR1400 design meets the guidance in SECY 90-016 and SECY 91-078.

### 08.01-7

APR1400 DCD Table 8.1-2, "Criteria and Guidelines for Electric Power Systems," states in part that BTP 8-1, "Requirements on Motor-Operated Valves in the ECCS Accumulator Lines," is applicable to DCD section 8.3.1 and DCD section 8.1.3.3, "General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards," and Table 1.9-2, "APR1400 Conformance with the Standard Review Plan," states that the APR1400 conforms with BTP 8-1. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

Provide a discussion how BTP 8-1 applies to the APR1400 design, since this information is not in DCD chapter 8.

### 08.01-8

APR1400 DCD Table 8.1-2, "Criteria and Guidelines for Electric Power Systems," states in part that BTP 8-2, "Use of Diesel Generator Sets for Peaking," is applicable to DCD section 8.3.1. DCD section 8.1.3.3, "General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards," and Table 1.9-2, "APR1400 Conformance with the Standard Review Plan," states that APR1400 conforms with BTP 8-2 and that the emergency diesel generator is not used for peaking service for offsite power system. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

Provide a discussion how BTP 8-2 applies to the APR1400 design, since this information is not in DCD chapter 8.

### 08.01-9

APR1400 DCD Table 8.1-2, "Criteria and Guidelines for Electric Power Systems," states in part that BTP 8-4, "Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves," is applicable to DCD section 8.3.1. DCD section 8.1.3.3, "General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards," and Table 1.9-2, "APR1400 Conformance with the Standard Review Plan," states that APR1400 conforms with BTP 8-4. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

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Provide a discussion how BTP 8-4 applies to the APR1400 design, since this information is not in DCD chapter 8.

### 08.01-10

APR1400 DCD Table 8.1-2, "Criteria and Guidelines for Electric Power Systems," states in part that BTP 8-5, "Supplemental Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems," is applicable to DCD section 8.3.1 and 8.3.2. DCD section 8.1.3.3, "General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards," and Table 1.9-2, "APR1400 Conformance with the Standard Review Plan," states that APR1400 conforms with BTP 8-5. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

Provide a discussion how BTP 8-5 applies to the APR1400 design, since this information is not in DCD chapter 8.

### 08.01-11

APR1400 DCD Table 8.1-2, "Criteria and Guidelines for Electric Power Systems," states in part that BTP 8-7, "Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status," is applicable to DCD section 8.3.1. DCD section 8.1.3.3, "General Design Criteria, NRC Regulatory Guides, Branch Technical Positions, Generic Letters, and Industry Standards," and Table 1.9-2, "APR1400 Conformance with the Standard Review Plan," states that APR1400 conforms with BTP 8-7. The guidance in Standard Review Plan (SRP) section 8.1 states in part that the DCD should discuss the applicability of the criteria and guidelines listed and include a statement to the effect that they will be implemented or are implemented in the design of the electrical power systems.

Provide a discussion how BTP 8-7 applies to the APR1400 design, since this information is not in DCD chapter 8.

