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## 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.:** 127-8010  
**SRP Section:** 09.05.08 – Emergency Diesel Engine Combustion Air Intake and Exhaust System  
**Application Section:** 09.05.08  
**Date of RAI Issue:** 08/05/2015

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### **Question No. 09.05.08-2**

In accordance with NUREG-0800, SRP 9.5.8, the safety analysis report is reviewed to verify each emergency diesel generator (EDG) should have an independent and reliable combustion air intake and exhaust system sized and physically arranged for no degradation of engine function when the diesel generator set must operate continuously at the maximum rated power output. NUREG-0800, SRP 14.2 provides additional guidance on review of the acceptability of the pre-operational and startup tests.

DCD Section 9.5.8.4 indicates that “[i]nspection and functional testing are performed prior to initial operation as described in Section 14.2; thereafter, the system is periodically tested along with the complete EDG system in accordance with the Technical Specifications as described in Chapter 16. This testing demonstrates the performance of leaktightness, operability, and the capability of the system to function as intended under accident condition.”

The staff is unable to locate any emergency diesel engine combustion air intake and exhaust system (EDECAIES) leaktightness or operability testing in Section 14.2.

The applicant is requested to clarify the testing applied to the EDECAIES.

### **Response**

The testing for the operability and the capability of EDECAIES are performed during the initial operation test as described in Section 14.2

Since the capability of EDECAIES cannot be tested independently from the Emergency Diesel engine Generator (EDG), it is verified by the EDG endurance and load test at a load equivalent to the short time rating of the EDG for 2 hours. (As stated in DCD Tier 2, Subsection 14.2.12.1.87, item 3.7)

The operability of EDECAIES is tested and verified along with the complete EDG auxiliary systems in accordance with Subsection 14.2.12.1.88.

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**Impact on DCD**

DCD Tier 2, Subsection 9.5.8.4 and 14.2.12.1.88 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**

under accident conditions, assuming a single active component failure. The four trains of the EDG provide reasonable assurance that a single active failure in an EDECAIES does not lead to a loss of more than one EDG and therefore, independence and redundancy requirements of onsite ac power supplies are met. The duct for room ventilation air is separate from that for the EDECAIES. The system provides combustion air directly from the outside to the diesel engine. The combustion intake opening is located at a minimum of 6.10 m (20 ft) above grade level to minimize the intake of dust in the EDG room. The diesel exhaust gases are discharged to the atmosphere in a direction away from the outside air inlet with sufficient separation to minimize the effects of exhaust gas drift to the outside air inlet.

The safety-related portion of the EDECAIES provides an adequate quantity of combustion air and an exhaust path for the diesel engine during engine operation condition.

The quality and properties of the intake air are monitored to provide reasonable assurance that the engine will function in all ambient conditions.

The EDECAIES is initially tested prior to initial operation. Periodic inspection and functional testing are also performed along with the complete EDG system in accordance with the Technical Specifications.

Hydrogen and nitrogen gases are stored at a sufficient distance from the EDG room so that there is no threat to the proper operation of the diesel engines under an accidental release of hydrogen or nitrogen gases.

#### 9.5.8.4 Inspection and Testing Requirements

System components and piping are tested to pressures designated by ASME Section III Class 3 (Reference 49). Inspection and functional testing are performed prior to initial operation as described in Section 14.2; thereafter, the system is periodically tested along with the complete EDG system in accordance with the Technical Specifications as described in Chapter 16. This testing demonstrates the ~~performance of leaktightness, operability, and the capability~~ of the system to function as intended under accident condition.

operability and the capability

Piping is inservice inspected in accordance with the requirements of ASME Section XI (Reference 50).

**APR1400 DCD TIER 2**

4.3 Running data for the parameters monitored during each of the required testing sequences

4.4 Verification of field performance data versus shop data

**5.0 ACCEPTANCE CRITERIA**

5.1 The EDG electrical system performs as described in Subsection 8.3.1.1.3.

**14.2.12.1.88 Emergency Diesel Generator Auxiliary Systems Test****1.0 OBJECTIVE**

1.1 To demonstrate that the emergency diesel generator (EDG) fuel oil system provides a reliable and adequate supply to each EDG

1.2 To demonstrate the operation of the EDG engine cooling water system

1.3 To demonstrate that the EDG engine starting air system provides an adequate amount of air for 5 consecutive starts of its EDG without makeup air

1.4 To demonstrate the operation of the EDG engine lube oil system

**2.0 PREREQUISITES**

2.1 Construction activities on the EDG auxiliary systems have been completed.

2.2 EDG auxiliary systems instrumentation has been calibrated.

2.3 Support systems required for operation of the EDG auxiliary systems are complete and operational.

1.5 To demonstrate the operation of the EDG engine combustion air intake and exhaust system

**APR1400 DCD TIER 2**

- 3.11 Demonstrate the operation of EDG starting air compressors.
- 3.12 Demonstrate that each EDG starting air system has sufficient volume available to perform five consecutive starts of its EDGs.
- 3.13 Demonstrate the EDG starting air system operates the EDG pneumatic controls as designed.
- 3.14 Demonstrate the EDG starting air alarm interlocks and automatic operation.
- 3.15 Demonstrate the operation of the EDG lube oil prelube pump.
- 3.16 Demonstrate the operation of EDG lube oil heaters.
- 3.17 Demonstrate the operation of EDG lube oil alarms.
- 3.18 Demonstrate the operation of the EDG lube oil transfer pump.



4.0 DATA REQUIRED

- 4.1 EDG fuel oil consumption rate
- 4.2 Setpoints of alarms, interlocks, and controls
- 4.3 Operating data for pumps and compressors
- 4.4 Operating data for the heaters
- 4.5 EDG starting air volume parameters after consecutive starts


5.0 ACCEPTANCE CRITERIA

- 5.1 The EDG engine fuel oil system operates as described in Subsection 9.5.4.

3.20 Demonstrate the operation of the EDG engine combustion air intake and exhaust system.

**APR1400 DCD TIER 2**

- 5.2 The EDG engine cooling water system operates as described in Subsection 9.5.5.
- 5.3 The EDG engine starting air system operates as described in Subsection 9.5.6.
- 5.4 The EDG engine lubrication system operates as described in Subsection 9.5.7.

14.2.12.1.89  Alternate AC Source System Test

5.5 The EDG engine combustion air intake and exhaust system operates as described in Subsection 9.5.8.

- 1.1 To verify the proper operation of the alternate ac (AAC) source system

## 2.0 PREREQUISITES

- 2.1 Construction activities on the AAC source system have been completed.
- 2.2 Support systems, including the AAC support systems and the 4,160V distribution system required for the operation of the AAC source system, are complete and operational.
- 2.3 AAC source system instrumentation has been calibrated.
- 2.4 Test instrumentation is available and calibrated.

## 3.0 TEST METHOD

- 3.1 Verify the system alarms, instrumentation, interlocks, and controls.
- 3.2 Verify the AAC source system provides rated power at the proper voltage and frequency.
- 3.3 Verify operation of the AAC source system from all its control stations.