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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.: 100-8008  
SRP Section: 09.05.06 – Emergency Diesel Engine Starting System  
Application Section: 9.5.6  
Date of RAI Issue: 07/22/2015

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### **Question No. 09.05.06-1**

10 CFR 52.47(a)(2) requires that a standard design certification applicant provide a description and analysis of the structures, systems, and components (SSCs) of the facility, with emphasis upon performance requirements, the bases, with technical justification therefore, upon which these requirements have been established, and the evaluations required to show that safety functions will be accomplished.

DCD Tier 2, Section 9.5.6.2.1 for the emergency diesel engine starting system (EDESS) states that “[t]he EDESS consists of two redundant sets of equipment, each completely independent of the other for successful operation. A cross-connecting line with a normally closed valve is provided between the two redundant starting air systems.”

Figure 9.5.6-1 shows the cross-connecting line, but does not show any normally closed valve to isolate the redundant starting air systems.

The applicant is requested to provide the description and location of the normally closed valve and update figure accordingly.

### **Response**

The cross-connecting line with normally closed valves is located in the motor-driven compressor package. This cross-connecting line is marked on the attached markup, page 1 of 2.

DCD Tier 2, Subsection 9.5.6.2.1 will be revised as follows:

Current description : The EDESS consists of two redundant sets of equipment, each completely independent of the other for successful operation. A cross-connecting line with a normally closed valve is provided between the two redundant starting air systems. The set of equipment is a motor-

driven compressor package, an air receiver, valves, instrumentation and control system, piping, and devices to crank the engine.

Revised description : The EDESS consists of two redundant sets of equipment, each completely independent of the other for successful operation. The set of equipment consists of a motor-driven compressor package, an air receiver, valves, instrumentation and control system, piping, and devices to crank the engine. A cross-connecting line with a normally closed valve is provided between the two motor-driven compressor packages.

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#### **Impact on DCD**

DCD Tier 2, Subsection 9.5.6.2.1 will be revised as indicated on the attached markup, page 2 of 2.

#### **Impact on PRA**

There is no impact on the PRA.

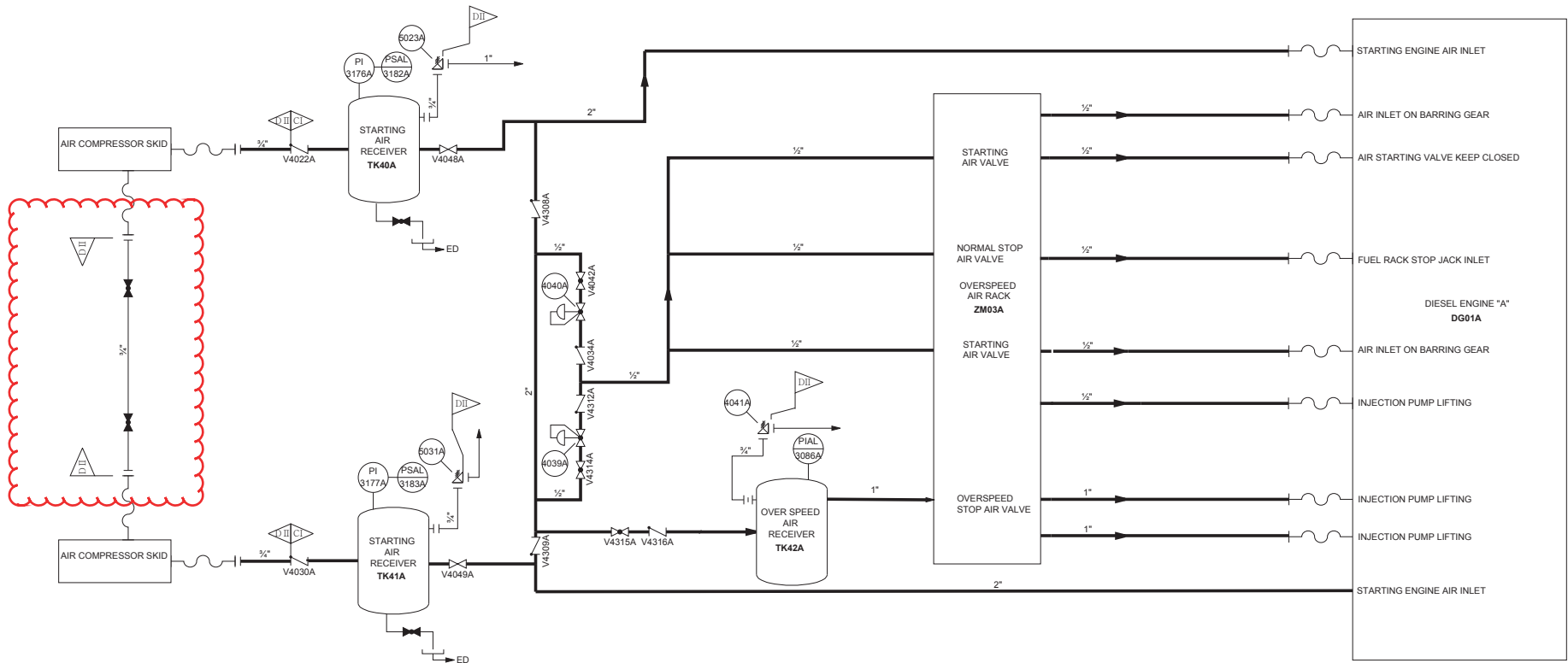
#### **Impact on Technical Specifications**

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



TRAIN A IS INDICATED AS REPRESENTATIVE OF TRAIN B, C, AND D.

Figure 9.5.6-1 Emergency Diesel Engine Starting Air System Flow Diagram

**APR1400 DCD TIER 2**

- k. The EDESS brings the EDG up to rated speed, ready for load sequencing, within 20 seconds after receipt of the start signal.

9.5.6.2 System Description9.5.6.2.1 General Description

The set of equipment consists of a motor-driven compressor package, an air receiver, valves, instrumentation and control system, piping, and devices to crank the engine. A cross-connecting line with a normally closed valve is provided between the two motor-driven compressor packages.

The EDESS is shown schematically in Figure 9.5.6-1.

The EDESS consists of two redundant sets of equipment, each completely independent of the other for successful operation. ~~A cross-connecting line with a normally closed valve is provided between the two redundant starting air systems. The set of equipment is a motor-driven compressor package, an air receiver, valves, instrumentation and control system, piping, and devices to crank the engine.~~ Controls for starting the EDG system are discussed in Section 8.3.

The EDESS has boundary divisions between a safety-related portion downstream of and including the check valve on the air compressor discharge, and the remaining non-safety-related portion. The check valve also provides reasonable assurance that a broken line from any of the compressors does not affect the air receiver.

A motor-driven air compressor is provided for each starting air receiver, respectively. An air compressor package consists of a compressor, a compressed air cooling fan, an air dryer, and filter. The air dryer dries starting air to a dew point of not more than 10 °C (50 °F) when installed in a normally-controlled 21 °C (70 °F) environment; otherwise, the starting air dew point is controlled to at least 5.5 °C (10 °F) less than the lowest expected ambient temperature.

The EDESS has two starting air receivers. The starting air receiver capacity for each redundant diesel engine is sufficient for a minimum of five successful engine starts without the use of the air compressor. Each air receiver is furnished with inlet/outlet shutoff valves, pressure gauge, drain valve with provisions for the periodic blowdown or automatic blowdown of accumulated moisture and foreign material in the air receivers, safety valve, and sensing element for low pressure alarm.

Relief valves in the compressor package, on the overspeed air receiver tank and the starting air receiver tank, protect the starting air system from over pressurization.

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### **Question No. 09.05.06-2**

10 CFR 52.47(b)(1) requires that a design certification (DC) application contain the proposed inspections, tests, analyses, and acceptance criteria (ITAAC) that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, a plant that incorporates the DC is built and will operate in accordance with the DC, the provisions of the Atomic Energy Act, and the NRC's regulations.

In DCD Tier 1 Table 2.6.2-3, ITAAC Item 1 requires verification of the as-built emergency diesel generator (EDG) functional arrangement (including support systems) and refers to Tables 2.6.2-1 and 2.6.2-2 for the corresponding design description. Table 2.6.2-1 and Table 2.6.2-2 contain piping list and component list, respectively.

The staff finds that Tier 1 information does not include any figures for the safety-related EDG support systems to accompany the ITAAC to verify as-built functional arrangement. Also, Tier 2 contains flow diagrams in Section 9.5 and these details are not consistent with these Tier 1 tables.

The applicant is requested to consider adding support system diagrams to Tier 1 information in order to properly address ITAAC, as well as making Tier 2 Section 9.5 information consistent with corresponding Tier 1 information. (This RAI also applies to other EDG support system Section 9.5.4, 9.5.5, 9.5.7, and 9.5.8)

### **Response**

The figure on the EDG mechanical system will be added to DCD Tier 1 as Figure 2.6.2-1.

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### **Impact on DCD**

DCD Tier 1, Figure 2.6.2-1 will be added as indicated on the attached markup.

**Impact on PRA**

There is no impact on the PRA.

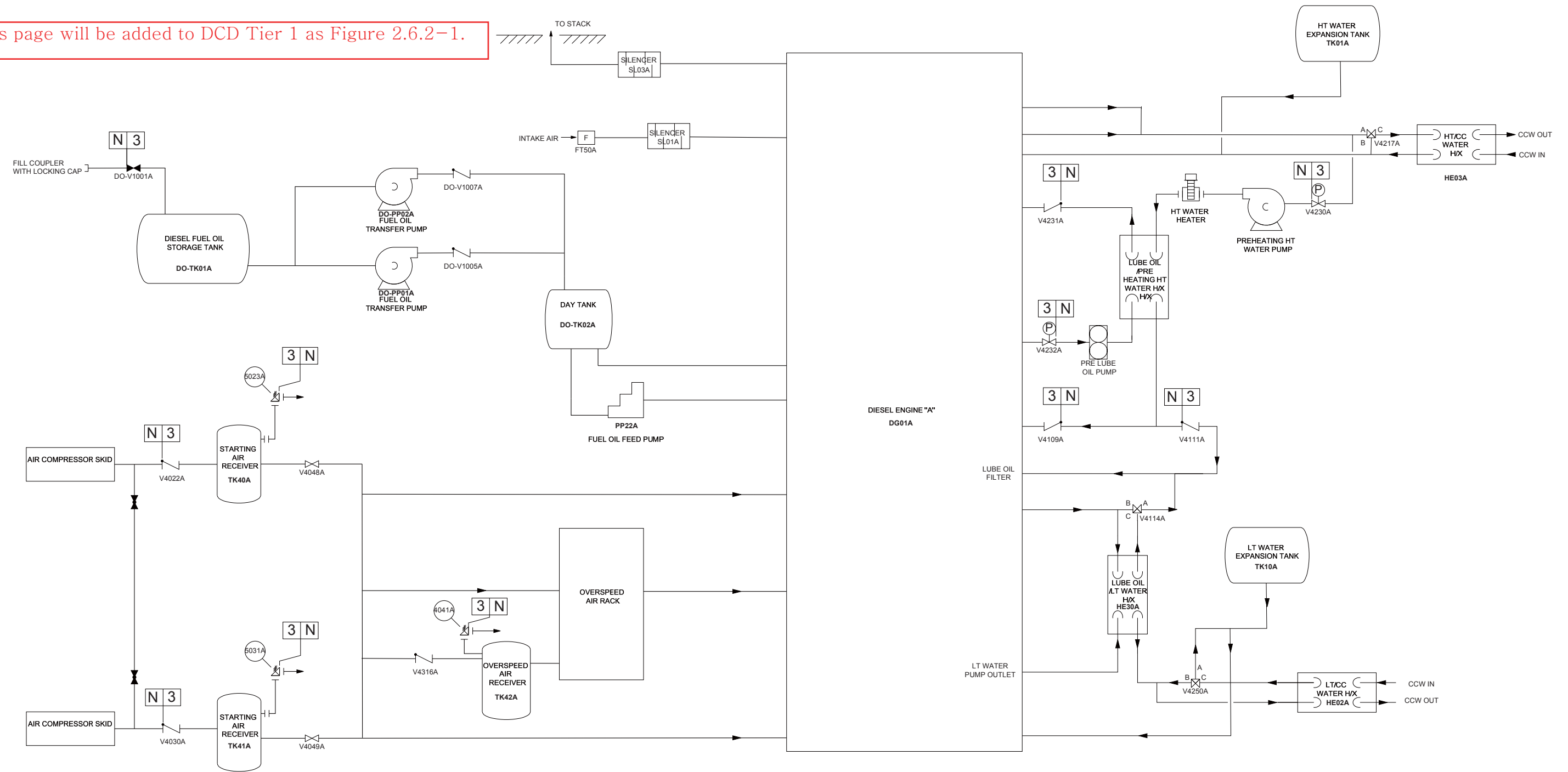
**Impact on Technical Specifications**

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.

This page will be added to DCD Tier 1 as Figure 2.6.2-1.



TRAIN A IS INDICATED AS REPRESENTATIVE OF TRAINS B, C, AND D.

Figure 2.6.2-1 Emergency Diesel Generator Mechanical System