
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.: 304-8361
SRP Section: 06.04 – Control Room Habitability System
Application Section: 06.04
Date of RAI Issue: 11/12/2015

Question No. 06.04-2

APR-1400 Design Control Document (DCD) Tier 2, Chapter 16, "Technical Specifications (TSs)," states that the APR-1400 TSs were developed using NUREG-1432, "Standard Technical Specifications (STS) — Combustion Engineering (CE) Plants: Specifications," Revision 4. CE STS 3.7.11, "Control Room Emergency Air Cleanup System (CREACS)," applies to the APR-1400 control room HVAC system (CRHS) design. The APR-1400 CRHS consists of two divisions of CREACS and control room supply and return system (CRSRS).

1. APR-1400 DCD Tier 2, Chapter 16 includes TS 3.7.11 which requires two CRHS divisions be operable. The Bases for the TS 3.7.11 limiting condition for operation (LCO) states that each CREACS division is considered operable when individual components, including fans are operable. Please define the operability of CREACS related to fans. For example, AU01A has two fans and each fan is rated to provide 100 percent of the required flow. When one of two fans in AU01A is not functioning, do we consider one CREACS division in-operable? The same question applies to AU01B in another CREACS division.
2. CE STS Surveillance Requirement (SR) 3.7.11.1 requires operation of each CREACS train for "[≥ 10 continuous hours with heaters operating or (for systems without heaters) ≥15 minutes]." Since the APR1400 CREACS air cleanup units (ACUs) contain heaters, SR 3.7.11.1 should be conducted for ≥ 10 continuous hours with heaters operating. APR-1400 TS Bases B 3.7.11, Background, is consistent with the CE STS by stating, "continuous operation of each ACU for at least 10 hours per month with the heaters on reduces moisture buildup on the HEPA filters and absorbers". However, APR-1400 SR 3.7.11.1 only requires operation of each CREACS division for ≥ 15 minutes with heaters operating. Please explain the mismatch between these two TS sections and the CE STS. In addition, the word "absorbers" in TS Bases B 3.7.11, Background, appears to be a typo for "adsorbers."

Response

1. Each control room emergency makeup air cleaning system (CREACS) division has two 100 percent capacity fans and two 100 percent capacity electric heating coils. Each CREACS division is considered operable when one of two fans and one of two electric heating coils are operable. TS Bases B 3.7.11 will be revised to state that each CREACS division is considered operable when one of two fans and one of two electric heating coils are operable.
2. APR1400 CREACS air cleaning units (ACUs) are designed and tested in accordance with RG 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants". RG 1.52, Section C.6.a states that each ESF atmosphere cleanup train should be operated continuously for at least 15 minutes each month, with the heaters on (if so equipped), to justify the operability of the system and all of its components." As a result, APR1400 SR 3.7.11.1 requires operation of each CREACS division for ≥ 15 minutes with heaters operating in accordance with RG 1.52 although CE STS SR 3.7.11.1 requires operation of each CREACS train for "[≥ 10 continuous hours with heaters operating or (for systems without heaters) ≥ 15 minutes]". TS Bases B 3.7.11 will be revised to modify the mismatched ACU operation time of "10 hours per month" to "15 minutes per month" and modify the typo, "absorbers" to "adsorbers".

Impact on DCD

DCD Tier 2, TS Bases B 3.7.11 will be revised, as shown in the attachment associated with this response.

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.

B 3.7 PLANT SYSTEMS

B 3.7.11 Control Room HVAC System (CRHS)

BASES

BACKGROUND

The CRHS consists of control room emergency makeup air cleaning system (CREACS) and control room supply and return system (CRSRS).

The CREACS provides a protected environment from which occupants can control the unit following an uncontrolled released of radioactivity, hazardous chemicals, or smoke. The CRSRS provides air temperature control for the control room.

The CREACS consists of two independent, redundant emergency outside air makeup ducts, isolation dampers, and two air cleaning units (ACUs) that recirculate and filter the air in the control room envelope (CRE). Each ACU consists of a moisture separator, two electric heating coils, a prefilter, a high efficiency particulate air (HEPA) filter, an activated carbon adsorber section for removal of gaseous activity (principally iodine), a postfilter, and two fans for filtering the CRE air. Ductwork, dampers, and instrumentation also form part of the system. The prefilters and moisture separator remove any large particles in the air, and any entrained water droplets present to prevent excessive loading of the HEPA filters and carbon adsorbers. Continuous operation of each ACU for at least 15 minutes per month with the heaters on reduces moisture buildup on the HEPA filters and adsorbers. Both the moisture separator and heater are important to the effectiveness of the carbon adsorbers. Postfilter follows the adsorber section to collect carbon fines and provides backup in case of failure of the main HEPA filter bank.

The CRSRS consists of dual outside air intakes, normal outside makeup duct, isolation dampers, and four air handling units (AHUs) that provides cooling and heating of recirculated CRE air. Each AHU consists of a heating coil, a cooling coil, a fan, and instrumentation and controls to provide for control room temperature control.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room and other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural events, and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRE.

BASES

LCO (continued)

b. One of two electric heating coils is OPERABLE.

ADD

One of two fans is

Each CREACS division is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A CREACS division is considered OPERABLE when the associated:

a. Fan is OPERABLE.

adsorber

b. HEPA filter and carbon adsorber are not excessively restricting flow and are capable of performing their filtration functions.

c.

c. Heater, moisture separator, ductwork, and dampers are OPERABLE and air circulation can be maintained.

d. Moisture

In order for the CREACS divisions to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequence analyses for DBAs, and that CRE occupants are protected from hazardous chemicals and smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE.

This individual will have to a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation indicated.

APPLICABILITY

In MODES 1, 2, 3, 4, 5, and 6 and during movement of irradiated fuel assemblies, the CRHS must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA and ensure that the control room temperature will not exceed equipment operational requirements following isolation of the control room.

During movement of irradiated fuel, the CRHS must be OPERABLE to cope with the release from a fuel handling accident.