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.: **154-8064**

SRP Section: **16 - Technical Specification**

Application Section: **16 - Technical Specification**

Date of RAI Issue: **08/17/2015**

Question No. 16-43

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 state that a design certification (DC) applicant and a combined license (COL) applicant, respectively, are to propose TS prepared in accordance with 10 CFR 50.36 and 50.36a. 10 CFR 50.36 sets forth requirements for technical specifications to be included as part of the operating license for a nuclear power facility. NUREG-1432, “Standard Technical Specifications-Combustion Engineering Plants,” Rev. 4, provides NRC guidance on format and content of technical specifications as one acceptable means to meet 10 CFR 50.36 requirements. SRP Section 16.0, Part III.2.A states, in part, “when reviewing a difference between the proposed TS provision and the reference TS provision, verify that the applicant’s written technical or administrative reasoning in support of the difference is logical, complete, and clearly written." Staff needs to evaluate all technical differences from STS and the docketed rationale for each difference because conformance to STS provisions is used in the safety review as the initial point of guidance for evaluating the adequacy of the generic TS to ensure adequate protection of public health and safety, and the completeness and accuracy of the generic TS Bases.

The applicant is requested to place Technical Report APR1400-K-O-NR-14001-NP, “Deviation Report between NUREG-1432, [Standard TS (STS) Combustion Engineering (CE) Plants,] Rev. 4.0 and APR1400 Technical Specifications,” on the Docket after updating the report with more informative justifications for technical deviations. An informative justification would describe why the deviation is needed and how it contributes to safety, providing pointers to related design or analyses information in the DCD, including any technical or topical reports submitted with the DC application. Unless the design feature addressed by a deviation is obvious, the justification “This is an intrinsic design characteristic of APR1400” provides insufficient information for the staff to evaluate the deviation’s merits.

The applicant is also requested to provide the following information (possibly as a supplement to the referenced deviation technical report, if the report is upgraded and docketed as described above):

(1) All changes associated with applicable approved technical specifications task force (TSTF) travelers that are included in NUREG-1432 Rev. 4, but are not included in the proposed generic TS and Bases; also provide rationale for not including each such change; and

(2) All changes associated with applicable TSTF travelers that have been approved since NUREG-1432 Rev. 4, and that
   (a) are proposed for inclusion in the proposed generic TS and Bases; or
   (b) are not proposed for inclusion in the proposed generic TS and Bases; also provide rationale for not including each such change.

Response

To clarify the technical difference between APR1400 and NUREG-1432, KHNP updated and submitted the Technical Report APR1400-K-O-NR-14001-NP, “Deviation Report between NUREG-1432, [Standard TS (STS) Combustion Engineering (CE) Plants], Rev. 4.0 and APR1400 Technical Specifications, Rev.01.

Related to the TSTFs, KHNP has attached a summary list of the TSTF reports that are included or not included in generic TS.

Impact on DCD

There is no impact on the DCD.

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 Environment Report.

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Question No. 16-44

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 state that a design certification (DC) applicant and a combined license (COL) applicant, respectively, are to propose TS prepared in accordance with 10 CFR 50.36 and 50.36a.
DCD Tier 2 Section 16.1.2.4 states "Single brackets ([ ]) are used to identify the preliminary design information or plant-specific information. Double brackets ([[ ]]) indicate the conceptual design information for those portions of the plant for which the application does not seek certification." SRP Section 16.0 explains that COL action items, also referred to as site-specific information, are indicated in the generic technical specifications (TS) and Bases, DCD Tier 2 Chapter 16, usually by use of square brackets. Section 182a of the Atomic Energy Act requires TS to be included with any operating license for a utilization facility issued by the NRC. Consequently, the plant-specific TS issued with a COL must be complete and useable for facility operation. Therefore, a COL applicant must resolve all COL action items in the generic TS and Bases in order to complete the plant-specific TS for issuance with the COL in accordance with 10 CFR 52.97.Since it is possible for "conceptual design information" to not be finalized until after COL issuance, generic TS and Bases cannot contain placeholders for such information. The applicant is requested to revise DCD Tier 2 Section 16.2.4 to omit discussion of the possible use of double bracketed conceptual design information, and delete any placeholders for such information from the generic TS and Bases, or replace it with placeholders for site-specific information in square brackets, which can be finalized by a COL applicant before COL issuance. (Staff observed that double brackets are only used in generic TS 3.7.9, Ultimate Heat Sink.)

In addition, the applicant is requested to provide a list of the Chapter 16 COL Action Items, providing a concise description of each. Staff suggests enumerating each action item using a prefix consisting of either (a) the numerical label designation of the affected generic TS section or subsection, that contains the bracketed TS information (e.g., COL Action Item 3.8.1-1, 3.3.1-3, 2.0-1, 1.1-2, 5.5.4-2); or (b) the alpha numerical designation of the affected generic TS Bases section or subsection (e.g., B 3.8.1-1, B 3.3.1-3, B 2.1.2-1, B 3.0-1, B

3.6.3-2, etc.), that contains the bracketed TS Bases information. To the prefix append a hyphen and a sequential number of the item in that section or subsection, as appropriate.

As necessary, provide guidance to clarify expectations for properly completing or resolving each COL action item needing such guidance. This guidance has been presented by previous design certification applications as bracketed reviewer's notes in the generic TS Bases or in a table listing the action items located in the introductory part of DCD Tier 2 Chapter 16.

Response

KHNP will replace double brackets to single brackets used in generic TS 3.7.9, Ultimate Heat Sink as shown in attached markup. The definition of the double brackets will be removed from section 16.1.2.4 Combined License Information.

KHNP will provide a list of the COL Action Items with a concise description of each item in Section 16.1.2.4 as shown in the attached markup.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

Technical Specification 16.1.2.4 and 3.7.9 Ultimate Heat Sink LCO and Bases sections will be revised as shown in the attached markup.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical, or Environment Report.

16.1.2.4 Combined License Information

The intention of the APR1400 Technical Specifications is to be used as a guide for the development of the plant-specific Technical Specifications for plants which will reference the standard APR1400 plant. Single brackets ([ ]) are used to identify the preliminary design information or plant-specific information. ~~Double brackets ([[ ]]) indicate the conceptual design information for those portions of the plant for which the application does not seek certification.~~

16.1.3 Reference

1. 10 CFR 50.36, "Technical Specifications."

2. NUREG-1432, "Standard Technical Specifications, Combustion Engineering Plants," Rev. 4.0, April 2012.

List of the COL Action Items with a concise description of each item are summarized in Table 16-1

Add

Table 16-1 List of COL Action Item

TS section	Description	Resolution
3.7.11	Control Room Habitability Area option for design features to protect occupant exposures to toxic gases	The specific toxic gas concentrations in the air intakes will vary depending on site. if the applicant determines that the maximum concentrations for the air intakes for a given toxic gases do not exceed the toxicity limits from RG 1.78 prior to 2 minutes, toxic gas detector is not required and the bracketed phrases are deleted.
3.8.1	SR 3.8.1.4, Day Tank Capacity	The specific value will vary depending on engine manufacturer's specific design recommendations.
	SR 3.8.1.8, Offsite Power Transfer Test	Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy.
	SR 3.8.1.9, EDG Single Largest Load Rejection Test	1) Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy. 2) EDG operation power factor depends on plant specific EDG technical specification.
	SR 3.8.1.10, EDG Full-Load Rejection Test	1) Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy. 2) EDG operation power factor depends on plant specific EDG technical specification.
	SR 3.8.1.12, EDG ESF Actuation Test	Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy.
	SR 3.8.1.13, EDG Bypassed Trip Signal Test	Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy.
	SR 3.8.1.14, EDG Endurance and Load Test	1) Plant operation MODES which allow the Surveillance depend on the plant operation and surveillance policy. 2) EDG operation power factor depends on plant specific EDG technical specification.
3.7.11	Control Room Habitability Area option for design features to protect occupant exposures to toxic gases	The specific toxic gas concentrations in the air intakes will vary depending on site. if the applicant determines that the maximum concentrations for the air intakes for a given toxic gases do not exceed the toxicity limits from RG 1.78 prior to 2 minutes, toxic gas detector is not required and the bracketed phrases are deleted.
3.8.3	Actions E, SR 3.8.3.4 Starting Air Receiver Pressure	The air pressure of the starting air receiver will vary depending on engine manufacturer's specific design recommendations.

3.7 PLANT SYSTEMS

3.7.9 Ultimate Heat Sink (UHS)

LCO 3.7.9 [[Two]] UHS [[divisions]] shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [[One UHS cooling tower inoperable.]]	A.1 [[Restore UHS cooling tower to OPERABLE status.]]	[[72 hours]]
B. [[Required Action and associated Completion Time of Condition A not met. OR]] UHS inoperable [[for reasons other than condition A.]]	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.7.9.1	Verify water level of UHS is ≥ [[7.90 m (25.93 ft) from the bottom of the basin]].	24 hours
SR 3.7.9.2	Verify water temperature of UHS [[basin]] is ≤ [[33.2 °C (91.8 °F)]].	24 hours
SR 3.7.9.3	[[Operate each UHS cooling tower fan for ≥ 15 minutes.]]	[[31 days]]
SR 3.7.9.4	[[Verify each UHS manual, power-operated, and automatic valve in the flow path servicing safety related equipment, that is not locked, sealed, or otherwise secured in position, is in correct position.]]	[[31 days]]
SR 3.7.9.5	[[Verify each UHS automatic valve and each control valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to correct position on an actual or simulated actuation signal.]]	[[18 months]]
SR 3.7.9.6	[[Verify each cooling tower fan starts automatically on an actual or simulated actuation signal.]]	[[18 months]]

B 3.7 PLANT SYSTEMS

B 3.7.9 Ultimate Heat Sink (UHS)

BASES

BACKGROUND

The UHS provides a heat sink for process and operating heat from safety related components during a design basis accident (DBA) or transient, as well as during normal operation. This is done by using the essential service water system (ESWS) and the component cooling water system (CCWS).

The safety function of the UHS is to dissipate the maximum heat load of all modes of operation including that of a LOCA and LOOP under the worst combination of adverse environmental conditions.

[[The UHS consists of two independent, redundant, safety related divisions. Each division cools one of two divisions of the ESWS, which in turn cools 100 % of the safety-related loads. Each division of UHS consists of two mechanical draft cooling towers, associated basin, piping, valves, controls and instrumentation. Each cooling tower consists of three 33 1/3 % capacity cells with fans and motors. Each cooling tower rejects heat from the Essential Service Water (ESW) to ambient and returns the cooled water to the UHS cooling tower basin, from which the ESW pumps take suction. Each UHS cooling tower basin is sized for 30 days of safe shutdown or post-accident operation and ensures adequate volume for the required net positive suction head (NPSH) for the associated ESW pump.]]

[[The four mechanical draft cooling towers and two basins are safety related, seismic Category I structures sized to provide heat dissipation for safe shutdown or post-accident. The cooling tower is protected from tornadoes, external missiles, and seismic phenomena.]]

The basic performance requirements are that a 30-day supply of water be available, and that the design basis temperatures of safety related equipment not be exceeded.

BASES

BACKGROUND (continued)

Additional information on the design and operation of the system along with a list of components served can be found in Reference 1.

APPLICABLE SAFETY ANALYSES

The UHS is the sink for heat removed from the reactor core following all accidents and anticipated operational occurrences in which the unit is cooled down and placed on shutdown cooling.

The operating limits are based on 3.5 hours after shutdown. [[A conservative heat transfer analysis for the worst case accident was performed to ensure that the cooling tower capacity and the basin water inventory adequately remove the heat load for the worst case accident.]] The UHS is designed in accordance with NRC RG 1.27 (Reference 2), which requires a 30-day supply of cooling water in the UHS.

The UHS satisfies LCO SELECTION CRITERION 3.

LCO

[[One UHS system division is required to ensure that the system functions to remove post-accident or safe shutdown heat loads. To ensure that this requirement is met, two divisions of UHS system must be OPERABLE, assuming the worst single active failure occurs coincident with the loss of offsite power.]]

[[A]] UHS [[division]] is considered OPERABLE when:

a. [[Cooling tower fans in a cooling tower are OPERABLE.]]

b. [[The associated piping, valves, and instrumentation and controls required to perform the safety-related function are OPERABLE.]]

c. Water temperature of the UHS is less than or equal to [[33.2 °C (91.8 °F)]] and water level of the UHS is greater than or equal to [[7.90 m (25.93 ft) from the bottom of basin with capability to makeup from OPERABLE makeup source during normal operation.]] Definition of OPERABLE makeup source is to be provided by the COL applicant.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, the UHS is a normally operating system that is required to support the OPERABILITY of the equipment serviced by the UHS and required to be OPERABLE in these MODES.

In MODES 5 and 6, the OPERABILITY requirements of the UHS are determined by the systems it supports.

ACTIONS

A.1

~~[~~[If one UHS division is inoperable, action must be taken to restore the inoperable cooling tower(s) and associated fan(s) to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE UHS division is adequate to perform the heat removal function. However, the overall reliability is reduced because a single failure in the UHS division could result in loss of UHS function.

The 72-hour Completion Time is based on the redundant capabilities afforded by the OPERABLE division and the low probability of a DBA occurring during this time period.]~~]~~

B.1

If ~~[~~[the Required Actions and Completion Times of Condition A are not met, or]~~]~~ the UHS is inoperable ~~[~~[for reasons other than Condition A]~~]~~, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours and MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.7.9.1

[[This SR verifies adequate 30 days cooling can be maintained.]] The level specified also ensures sufficient NPSH is available for operating the ESW pumps [[during 30 days]] following DBA or safe shutdown with LOOP. The 24-hour Frequency is based on operating experience related to the trending of the parameter variations during the applicable MODES. This SR verifies that the UHS water level is greater than or equal to [[7.90 m (25.93 ft) from the bottom of the basin.]]

SR 3.7.9.2

This SR verifies that the ESWS is available to cool the CCWS to at least its maximum design temperature within the maximum accident or normal design heat loads for 30 days following a DBA. The 24-hour Frequency is based on operating experience related to the trending of the parameter variations during the applicable MODES. This SR verifies that the UHS water temperature is less than or equal to [[33.2 °C (91.8 °F).]]

SR 3.7.9.3

[[Operating each cooling tower fans for greater than or equal to 15 minutes verify that all fans are OPERABLE and that all associated controls are functioning properly. It also ensures that fan or motor failure or excessive vibration can be detected for corrective action. The 31-day Frequency is based on operating experience, the known reliability of the fan units, the redundancy available, and the low probability of significant degradation of the UHS cooling tower fans occurring between surveillances.]]

SR 3.7.9.4

[[This SR verifies the correct alignment for manual, power operated, and automatic valves in the UHS flow path ensures that the proper flow paths exist for UHS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since they are verified to be in the correct position prior to locking, sealing, or securing. This SR also does not apply to valves that cannot be inadvertently misaligned, such as check valves. This Surveillance does not require any testing or valve manipulation. Rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position.]]

BASES

SURVEILLANCE REQUIREMENTS (continued)

[[The 31-day Frequency is based on engineering judgment, is consistent with the procedural controls governing valve operation and ensures correct valve positions.]]

SR 3.7.9.5

[[This SR verifies proper automatic operation of the UHS valves on an actual or simulated actuation signal. The UHS is a normally operating system that cannot be fully actuated as part of the normal testing. This Surveillance is not required for valves that are locked, sealed, or otherwise secured in the required position under administrative controls.]]

[[The 18-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18-month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.]]

SR 3.7.9.6

[[The SR verifies proper automatic operation of the cooling tower fans on an actual or simulated actuation signal. The UHS is a normally operating system that cannot be fully actuated as part of the normal testing during normal operation. The 18-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a unit outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18-month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.]]

BASES

REFERENCES

1. DCD Tier 2, Subsection 9.2.5.

2. NRC RG 1.27, Rev. 2, January 1976.

~~[~~[3. ASME OM Code.]]~~]~~