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.:	**478-8568**
SRP Section:	**16 – Technical Specification**
Application Section:	**16.3.6.6, 16.3.9.5**
Date of RAI Issue:	**05/10/2016**

Question No. 16-140

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. Staff needs to evaluate all technical differences from standard TS (STS) NUREG-1432, STS Combustion Engineering Plants, Rev. 4, which is referenced by the DC applicant in DCD Tier 2 Section 16.1, 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.

This request stems from discussion at the February 2016 meeting with the applicant.

1. The applicant is requested to clarify B 3.6.6 ASA Section to point out the following, and that the associated Class 1E 4160 Vac electrical division's SCS pump may be aligned for use in place of the CS pump *in MODES 1, 2, and 3 only*

   Class 1E 4160 Vac Electrical **Division I**

   - Train A -- EDG A -- SCS Pump 1
   - Train C -- EDG C -- CS Pump 1 – CS Division A

   Class 1E 4160 Vac Electrical **Division II**

   - Train B -- EDG B -- SCS Pump 2

- Train D -- EDG D -- CS Pump 2 – CS Division B

2. The applicant is requested to clarify B 3.6.6 Applicability Section last sentence "... the containment spray is not required to be OPERABLE in MODES 5 and 6." This should be modified to list the exception that when the unit is in MODE 6 with REDUCED RCS INVENTORY, LCO 3.9.5.b requires the CS pump, which is in the same Class 1E 4160 Vac Electrical Division as the SCS train in operation, to be OPERABLE. (Depending on how other concerns about the Applicability of Subsection 3.9.5 are resolved, this sub-question may be moot.)

3. The applicant is requested to insert a second paragraph in the Bases for SR 3.9.5.3:

   To be considered OPERABLE, the required CS pump must be in standby for manual start and its flow path must be aligned to perform the shutdown cooling function. The required CS pump must meet the requirements of the associated operating SCS pump in the event the operating SCS pump stops. Therefore, the Surveillance Requirements of this Specification must be applied to the required CS pump, as necessary.

4. LCO 3.9.5.b should say "electrical division" instead of "train" because the spray pump and the shutdown co LCO 3.9.5.b should say "electrical division" instead of "train" because the spray pump and the shutdown cooling pump are powered from separate Class 1E 4160 V buses. That is, "With REDUCED RCS INVENTORY, the containment spray pump in the same train **electrical division** as an operating SCS train shall be OPERABLE."

5. The applicant is requested to include the following SRs in Subsections 3.9.4 and 3.9.5, as appropriate, for the required SCS train(s), and the required CS pump and associated shutdown cooling flow path alignment; or justify not including them:

	SURVEILLANCE	FREQUENCY
SR 3.9.5.5	Verify each SCS manual, power-operated, and automatic valve, and each CS system manual and power-operated valve, which are necessary to align the required CS pump flow path for SCS operation, that are not locked, sealed, or otherwise secured in position are in the correct position.	31 days
SR 3.9.5.6	Verify the required CS pump's developed head at the flow test point is greater than or equal to the required developed head.	In accordance with Inservice Testing Program

Response

1. B 3.6.6 ASA Section will be revised as indicated in the Attachment 1.

2. The applicability of B 3.6.6 will be revised as indicated in the Attachment 2.

3. The Bases for SR 3.9.5.3 will be revised as indicated in the Attachment 3.

4. The LCO 3.9.5.b and ACTION C will be revised as indicated in the Attachment 4.

5. 1) SCS is not standby system initiated by an automatic signal. SCS is used only for refueling operation. The operability of SCS including equipment, valves and correct positions have been provided in SR 3.9.5.1 with a 12 hour frequency. Thus surveillance requirement to verify the correct position is not necessary for SCS with a 31 day frequency.

   In addition each SC or CS system valve which are necessary to align the required CS pump flow path for SCS operation is locked in correct position. SR 3.9.5.5 is not required.

   2) In-service test of CS pump has been described in TS 3.6.6. This addition is not necessary in TS 3.9.5.

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

In DCD Tier 2, 3.9.5, B 3.6.6, and B 3.9.5 on Technical Specification section will be corrected as indicated in the Attachments.

Impact on Technical/Topical/Environmental Reports

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

BASES

APPLICABLE SAFETY ANALYSES (continued)

The CSS actuation time in the containment analysis is based upon a response time associated with a containment high-high pressure signal to achieve full flow through the containment spray nozzles. The CSS total response time includes diesel generator startup (for loss of offsite power), load shedding and sequencing, containment spray pump startup, and spray line filling (Reference 2). The containment spray piping is full of water at least to the 26.213 m (86 ft) by difference in the static head between IRWST water level and containment spray piping. It minimizes the time required to fill the header.

The containment spray system satisfies LCO SELECTION CRITERION 3.

LCO

During a DBA, one containment spray division at least, is required to maintain the containment peak pressure and temperature below the design limits (Reference 2). One containment spray division is also required to remove iodine from the containment atmosphere and maintain concentrations below those assumed in the safety analysis. To ensure that these requirements are met, two containment spray divisions must be OPERABLE. Therefore, in the event of an accident, the minimum requirements are met, even when the worst case single active failure occurs.

Each division of the CSS includes a containment spray pump, a containment spray heat exchanger, a containment spray pump mini-flow heat exchanger, containment spray headers, nozzles, valves, piping, instruments, and controls to ensure an OPERABLE flow path through which the IRWST borated water is supplied for containment spray upon an ESF actuation signal.

One or two shutdown cooling pumps can be aligned to meet the requirements of the associated containment spray pump in MODES 1, 2, and 3 when the shutdown cooling pumps are not required to be OPERABLE. In MODE 4 this is not allowed, since the shutdown cooling pumps should be in service for supporting the shutdown cooling function.

The associated electrical division of shutdown cooling pump can be aligned as back-up for the containment spray pump in MODES 1, 2, and 3 when the containment spray pump is not available.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause a release of radioactive material to containment and an increase in containment pressure and temperature, requiring the operation of the containment spray divisions.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the containment spray is not required to be OPERABLE in MODES 5 and 6.

When the unit is in MODE 6 with REDUCED RCS INVENTORY, LCO 3.9.5.b requires the CS pump, which is in the same Electrical Division as the SCS train in operation, to be OPERABLE.

ACTIONS

A.1

With one containment spray division inoperable, the inoperable containment spray division must be restored to OPERABLE status within 72 hours. In this Condition, the remaining OPERABLE spray division is capable to perform the iodine removal and containment cooling functions. The Completion Time was determined to be 72 hours with taking into account the redundant heat removal capability, reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.1 and B.2

If the inoperable containment spray division cannot be restored to OPERABLE status within the required Completion Time, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 84 hours. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

The allowed Completion Time of 84 hours to reach MODE 5 allows additional time for the restoration of the containment spray division and is reasonable when considering that the driving force for a release of radioactive material from the reactor coolant system is reduced in MODE 3.

C.1

With two containment spray divisions inoperable, the unit is in a condition outside the accident analysis. Therefore, LCO 3.0.3 must be entered immediately.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance verifies that the SCS train is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal and to prevent thermal and boron stratification in the core. In addition, this surveillance demonstrates that the other SCS train is OPERABLE.

In addition, during operation of the SCS train with the water level in the vicinity of the reactor vessel nozzles, the SCS train flow rate determination must also consider the SCS pump suction requirements. The 12-hour Frequency is sufficient considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SCS system in the MCR. This Frequency ensures that flow is checked and temperature monitored at adequate intervals.

Verification that the required trains are OPERABLE and in operation ensures that trains can be placed in operation as needed, to maintain decay heat and retain forced circulation. The 12-hour Frequency is considered reasonable, since other administrative controls are available and have proven to be acceptable by operating experience.

SR 3.9.5.2

Verification that the required pump is OPERABLE ensures that an additional SCS pump can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation.

Verification is performed by ensuring correct breaker alignment and indicated power available to the required pumps. The 7-day Frequency is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

SR 3.9.5.3

Verification of the correct breaker alignment and indicated power available to the operable CS pump ensures that the CS pump will be able to remove heat from the RCS in the event of a power failure to the operating SCS train. The 24-hour Frequency is based on operating experience.

To be considered OPERABLE, the required CS pump must be in standby for manual start and its flow path must be aligned to perform the shutdown cooling function. The required CS pump must meet the requirements of the associated operating SCS pump in the event the operating SCS pump stops. Therefore, the Surveillance Requirements of this Specification must be applied to the required CS pump, as necessary.

3.9 REFUELING OPERATIONS

3.9.5 Shutdown Cooling System (SCS) and Coolant Circulation – Low Water Level

LCO 3.9.5 The heat removal system shall be in the following status:

a. Two SCS trains shall be OPERABLE and one SCS train shall be in operation.

b. With REDUCED RCS INVENTORY, the containment spray pump in the same ~~train~~ as an operating SCS train shall be OPERABLE.

electrical division

APPLICABILITY: MODE 6 with the water level <7.0 m (23 ft) above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SCS train inoperable.	A.1 Initiate action to restore SCS train to OPERABLE status. AND A.2 Initiate actions to establish ≥ 7.0 m (23 ft) of water above the top of reactor vessel flange.	Immediately Immediately
B. No SCS train OPERABLE or in operation.	B.1 Suspend operations involving a reduction in reactor coolant boron concentration. AND B.2 Initiate action to restore one SCS train to OPERABLE status and to operation AND B.3 Initiate action to raise RCS level to > EL 38.72 m (127'-1/4") when in REDUCED RCS INVENTORY.	Immediately Immediately Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Containment spray pump in the same ~~train~~ as an operating SCS train inoperable.	C.1 If the containment spray pump in the ~~alternate SCS train~~ is OPERABLE, initiate action to place that SCS train in operation. AND C.2 Monitor SCS performance. AND C.3 Restore containment spray pump to OPERABLE status.	Immediately Every 30 minutes 48 hours
D. Required Action and Completion time of Item C.3 not met.	D.1 Raise RCS level > EL 38.72 m (127'-1/4").	6 hours
E. Required Actions and associated Completion Tmes of Conditions A, B, and C not met.	E.1 Close equipment hatch and secure with [four] bolts. AND E.2 Close one door in each air lock. AND E.3.1 Close each penetration providing direct access from the containment atmosphere to the outside atmosphere with a manual or automatic isolation valve, blind flange, or equivalent. OR E.3.2 Verify each penetration is capable of being closed by an OPERABLE containment purge system.	4 hours 4 hours 4 hours 4 hours

electrical division

same electrical division as the alternate SCS train