REVISED 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.:	**159-8108**
SRP Section:	**16.0 – Technical Specifications**
Application Section:	**16.0**
Date of RAI Issue:	**08/20/2015**

Question No. 16-46

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 states 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. Subsection 52.47(a)(11) requires that technical specifications be provided in the application for a design certification.

The “Background” section of the Bases for generic TS 3.5.1 states that the safety injection tank (SIT) “motor operated isolation valves are normally open with power removed from the valve motor to prevent inadvertent closure prior to or during an accident.” The next to last paragraph discusses that the isolation valves are interlocked with pressurizer pressure instrumentation channels to ensure the [SIT] valves will automatically open as RCS pressure is increased above SIT pressure and that the SIT isolation valves receive an SIAS signal to open. The discussion needs to be clarified.

The discussion should describe when power is and is not removed; the discussion should also mention at what point during startup power is removed from the motor operated isolation valves. The discussion also needs to clearly explain the effect of an SIAS signal on the SIT isolation valves.

Response - (Rev. 1)

At the initial stage of plant heatup, the SIT isolation valves are closed with power available to the valve motors. When RCS pressure increases above 600 psia, the SIT isolation valves are automatically opened through an interlock with the pressurizer pressure channels. When RCS pressure increases above 715 psia, the operators remove power to the SIT isolation valves according to TS SR 3.5.1.5.

If an SIAS occurs, each SIT isolation valve receives an automatic open signal which is a confirmatory signal, even if the power to the valve motor is removed.

Power is restored to the SIT motor operated isolation valves when RCS pressure decreases below 715 psia during plant cooldown. Before RCS pressure is reduced to 640 psia, operators will lower SIT pressure to 400 psig. An interlock prevents the SIT isolation valves from being closed if RCS pressure is greater than 475 psia. Once RCS pressure is below 475 psia, the SIT isolation valves will be closed and power to the valve actuator is maintained available.

Additional description for the SIT operation is provided in DCD Tier 2, Section 6.3.2.1.1.

Impact on DCD

Same as changes described in the Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

The background of bases for TS 3.5.1 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

B 3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

B 3.5.1 Safety Injection Tanks (SITs)

BASES

BACKGROUND The functions of the four safety injection tanks (SITs) are to supply water to the reactor vessel during the blowdown phase of a loss of coolant accident (LOCA), to provide inventory to help accomplish the refill phase that follows thereafter, and to provide reactor coolant system (RCS) makeup for a small break LOCA.

The blowdown phase of a large break LOCA is the initial period of the transient during which the RCS departs from equilibrium conditions, and heat from fission product decay, hot internals, and the vessel continues to be transferred to the reactor coolant. The blowdown phase of the

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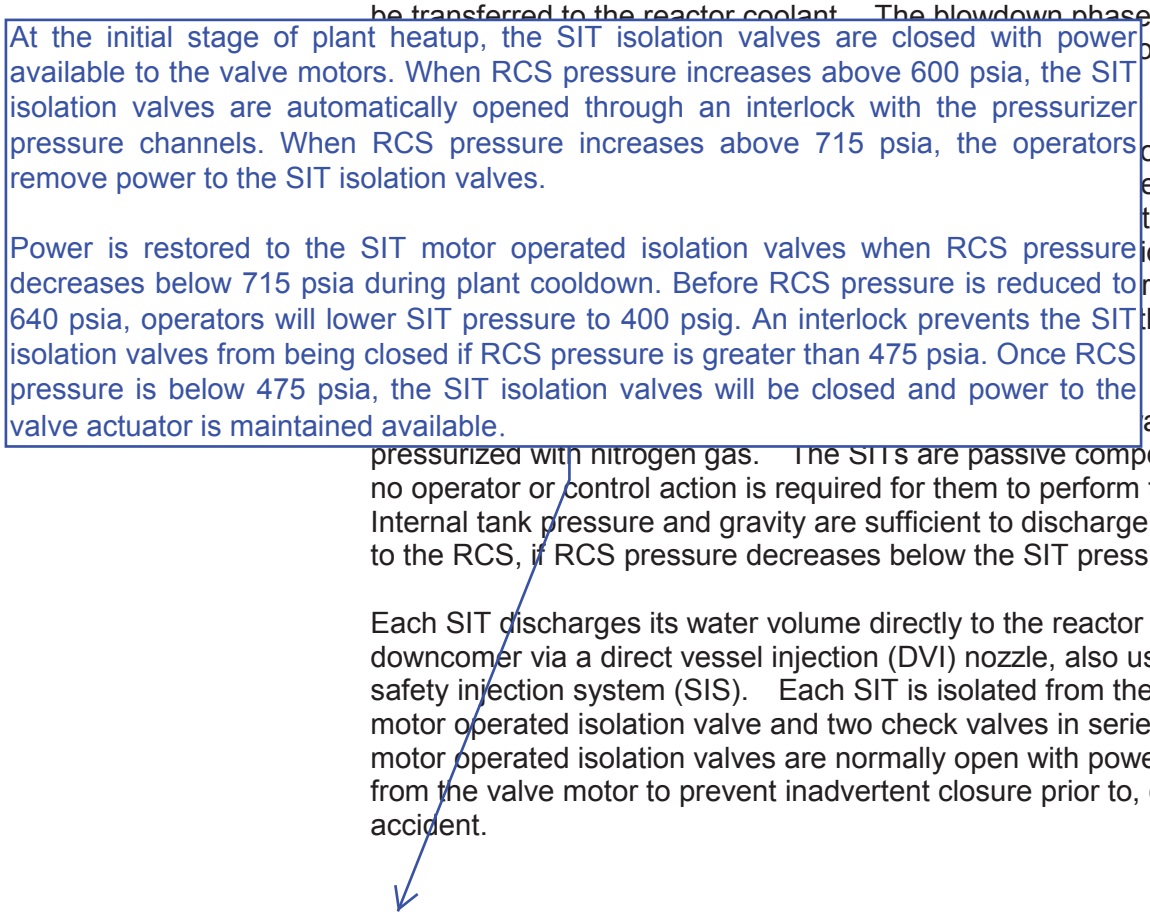

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pressurized with nitrogen gas. The SITs are passive components, since no operator or control action is required for them to perform their function. Internal tank pressure and gravity are sufficient to discharge the contents to the RCS, if RCS pressure decreases below the SIT pressure.

Each SIT discharges its water volume directly to the reactor vessel downcomer via a direct vessel injection (DVI) nozzle, also used by the safety injection system (SIS). Each SIT is isolated from the RCS by a motor operated isolation valve and two check valves in series. The motor operated isolation valves are normally open with power removed from the valve motor to prevent inadvertent closure prior to, or during an accident.

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Question No. 16-48

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 states 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. Subsection 52.47(a)(11) requires that technical specifications be provided in the application for a design certification.

In generic TS 3.5.2, Condition A applies when two SIS trains are inoperable if the trains are diagonal and allows 72 hours to restore the trains to operable status. If two adjacent SIS trains are inoperable, Condition C applies and requires an immediate unit shutdown. The Bases for generic TS 3.5.2 do not explain the significance of “diagonal trains”; presumably two operable safety injection trains injecting on opposite sides of the reactor vessel is acceptable, but injecting on one side of the reactor vessel is not, possibly because a balanced or symmetric flow into the reactor vessel is necessary to satisfy safety analysis assumptions.

The applicant is requested to include a discussion of the significance of diagonal SIS trains in the Bases for Required Action A.1 of generic TS 3.5.2.

Response – (Rev. 1)

Full flow from two diagonal SIS trains is credited in the APR1400 LOCA safety analysis. If only two adjacent SIS trains are available, the safety analysis criteria cannot be satisfied should a cold leg break occur on one of the two adjacent DVI nozzles due to core bypass flow that could occur.

The Bases for Required Action A.1 of generic TS 3.5.2 will be revised to clarify the significance of diagonal SIS trains.

Impact on DCD

Same as changes described in the Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

The Bases for Required Action A.1 of generic TS 3.5.2 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

BASES

APPLICABILITY (continued)

The SIS functional requirements for MODES 4, 5, and 6 are described in LCO 3.5.3.

ACTIONS A.1

If one train is inoperable or two trains are inoperable and diagonally oriented with respect to the reactor vessel (Trains 1 and 3, or Trains 2 and 4; ~~trains associated with the same emergency diesel generator~~), the inoperable components must be returned to OPERABLE status within 72 hours. The 72-hour Completion Time is based on an NRC study (Reference 4) using a reliability evaluation and is a reasonable amount of time to effect many repairs.

An SIS train is inoperable if it is not capable of delivering the design flow to the RCS. The individual components are inoperable if they are not capable of performing their design function, or if supporting systems are not available (except as allowed by their respective LCOs).

The LCO requires the OPERABILITY of a number of independent subsystems. Due to the redundancy of trains and the diversity of subsystems, the inoperability of one component in a train does not render the SIS incapable of performing its function. ~~Neither does the inoperability of two different components, each in a different train, necessarily result in a loss of function for the SIS. This allows increased flexibility in plant operations when components in opposite trains are inoperable.~~

An event accompanied by a loss of offsite power and the failure of an emergency diesel generator can disable one SIS train until power is restored. ~~Full flow from two diagonally oriented SI pumps is credited for a break in an RCP discharge leg and flow is initially directed to the associated DVI and later a portion of the flow is directed to the hot leg via one of the available trains (Train 3 or 4).~~ Hence, continued operation for 72 hours is justified.

Full flow from two diagonal SIS trains is credited because the safety analysis acceptance criteria cannot be satisfied should a cold leg break occur with the only two operable DVI nozzles being adjacent to the faulted cold leg due to core bypass flow that could occur.