

---

---

## 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.:** 547-8819  
**SRP Section:** 06.02.02 - Containment Heat Removal Systems  
**Application Section:**  
**Date of RAI Issue:** 05/22/2017

---

### **Question No. 06.02.02-47**

10 CFR 50.36(c)(2)(ii)(C) requires the design to establish a technical specification (TS) limiting condition for operation (LCO) for a structure, system, or component (SSC) that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient.

As part of the Chapter 6 presentation to the Advisory Committee on Reactor Safeguards (ACRS) Subcommittee, an ACRS member questioned whether the In-containment Refueling Water Storage Tank (IRWST) vacuum protection swing panels need to be included in the design's technical specifications in order to ensure operability of the IRWST and downstream pumps (safety injection, containment spray, shutdown cooling pumps) during an accident. Specifically, if the vacuum protection swing panels failed to open in the event of vacuum conditions in the IRWST (such as an SI event where containment is not pressurized), then would the IRWST structural integrity or the downstream pumps operability be challenged due to a lack of net positive suction head (NPSH), given the analysis assumes a minimum containment pressure? The staff reviewed Chapter 6 of the DCD and could not garner enough information to determine whether or not the vacuum protection swing panels are required to be operable in order to ensure operability of the IRWST itself and the downstream pumps that the IRWST feeds.

The staff requests the applicant to provide additional information in a response that describes whether or not the IRWST swing panels need to function properly in order to ensure the continued operability of the emergency core cooling system (ECCS). If the IRWST swing panels are required to function properly in order to ensure the continued operability of the ECCS, then the staff requests the applicant to add the swing panels to its technical specifications and surveillance requirements.

## **Response**

In order to evaluate the operability of the SI and CS pumps when the IRWST vacuum protection swing panels fail to open in the event of vacuum conditions in the IRWST, a NPSH evaluation of the SI and CS pumps is performed without crediting swing panel operability for vacuum protection.

Initial conditions in the IRWST during normal operation are assumed as follows.

IRWST water level: El. 93.4ft (maximum water level)

IRWST atmosphere pressure: 14.7 psia

IRWST water temperature: 120°F (maximum water temperature)

If the event of vacuum conditions in the IRWST occurs, the atmosphere pressure in the IRWST will drop to 4.8 psia when the IRWST water level drops to the minimum water level for ESF pump operation (El. 86ft). During this condition, the NPSH of the SI and CS pumps at the water temperature of 120°F are calculated as below.

Component	$h_{atm}$ (ft.-water)	$h_{static}$ (ft.-water)	$h_{loss}$ (ft.-water)	$h_{vapor}$ (ft.-water)	NPSHa (ft.-water)	NPSHr (ft.-water)	Margin (ft.-water)
SI pumps	11.22	30	6.28	3.95	30.99	22	8.99
CS pumps	11.22	30.16	9.67	3.95	27.76	17.5	10.26

The calculation results show the SI and CS pumps are operable with margins of 8.99 ft. (water) and 10.26 ft. (water), respectively. It means that the SI and CS pumps are operable in the event of vacuum conditions such as an SI event where containment is not pressurized. Therefore, the vacuum protection swing panels does not impact ECCS and are not required in the Technical Specification.

---

### **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 Environmental Report.