
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.: No. 19-7899
SRP Section: 14.2 INITIAL PLANT TEST PROGRAM
Application Section: 14.2.12.1.38
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Question No. 14.2-1

The NRC staff determined that the test method as written is too vague. The method should be revised such that the test acceptance criteria in DCD Section 14.2.12.1.38 have items in the test method that 1) verify that spray flow under minimum net positive suction head conditions and 2) verify static head as measured from the pumps ensures the design assumptions made from DCD Section 6.2.2.2 remain valid. These additional items ensure the test will perform its stated purpose and provide assurance that the system works as described in Subsection 6.2.2.2.

Response

In many instances, pre-operational testing confirming system capability under post-accident conditions are performed using a combination of actual test data and analysis. For containment spray system initial testing, pump suction pressure and flow rates are measured at normal operational conditions to calculate the actual line head loss ($h_{line\ loss, actual}$). This is not representative of the post-accident condition due to the different temperature and water level in IRWST. Therefore, the post-accident head loss term ($h_{line\ loss, post\ accident}$) is calculated based on actual line head loss and taking into account the below conditions.

- Minimum IRWST level during an accident
- Saturated IRWST fluid conditions
- As-built piping arrangement for pump inlet piping and component

If the post-accident head loss is smaller than the input value in Table 6.2.2-1 (2.6 m), then the minimum available net positive suction head (NPSH) at post-accident condition is satisfied.

Therefore, test data of the pump suction pressure and system flow rates in accordance with test methods 3.1 and 3.2 will be sufficient to ensure the design assumptions in DCD Section 6.2.2.2 remain valid.

For ensuring adequate static head, an additional test method will be added in DCD Tier 2 Section 14.02.12.1.38 to include verification of the minimum containment spray pump suction static head.

Impact on DCD

DCD Tier 2 Section 14.02.12.1.38 will be revised as indicated in Attachment 1.

Impact on PRA

There is no impact on the PRA.

Impact on Technical/Topical/Environmental Report

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

Impact on Technical Specifications

There is no impact on the Technical Specifications.

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- 2.3 Permanently installed instrumentation is operable and calibrated.
- 2.4 Test instrumentation is available and calibrated.
- 2.5 The ECSB pumping device is operable.
- 2.6 The ECSBS components are located in their designated storage area(s).
- 2.7 The ECSB water source is sufficient for testing.

3.0 TEST METHOD

- 3.1 Verify proper operation of each containment spray pump with minimum flow established.
- 3.2 Verify pump and system performance including head and flow characteristics for all design flow paths.
- 3.3 Verify, if applicable, proper operation, stroking speed, and position indication of control valves.
- 3.4 Verify by using service air that the containment spray header and nozzles are free of obstructions.
- 3.5 Verify the automatic operation of all components in response to a containment spray actuation signal.
- 3.6 Verify the interchangeability of the shutdown cooling pumps with the CSS pumps.
- 3.7 Verify adequate heat removal capability by the CSS heat exchangers.
- 3.8 Verify power-operated valves fail to the position specified in Subsections 6.5.2 and 6.3.2 upon loss of motive power.

3.9 Verify containment spray pump suction static head

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- 3.10 Verify emergency containment spray backup pumping device connectability to the containment spray tee connection. Verify pumping device performance, including head and flow characteristics.
- 3.11 For ECSBS testing in division A:
- a. Confirm that the containment spray header isolation valve (inside containment) is closed.
 - b. Connect the ECSB to the suction (water) source and to the IRWST fill / CSS header flange.
 - c. Establish a flow path to a suitable collection tank (e.g., IRWST).
 - d. Verify ECSB pump performance characteristics at rated flow conditions.

4.0 DATA REQUIRED

- 4.1 Valve position indications
- 4.2 Pump head-versus-flow characteristics
- 4.3 Valve opening and closing time, where required
- 4.4 Setpoints at which interlocks and alarms occur
- 4.5 Position response of valves to loss of motive power
- 4.6 For ECSBS testing in division A:
 - a. Time to connect ECSB and initiate flow
 - b. ECSB pump head at rated flow