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## RESPONSE TO AUDIT ISSUES

### APR1400 Topical Reports

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. PROJ0782

Review Section	TR Realistic Evaluation Methodology for LBLOCA of the APR1400
Application Section	Topical Report: APR1400-F-A-TR-12004 Realistic Evaluation Methodology for Large-Break LOCA of the APR1400
Issue Date	08/13/2015

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### **Audit Issues No. 86**

The guidance in RG 1.157, Section 3.16.2 establishes acceptable controls for the data comparisons necessary to justify the applicability of the best estimate models. Table 1 of Appendix G provides the downcomer boiling test conditions. Describe how these test conditions correspond to those that would exist in the APR1400 during the late reflood period. Include the transient time at which the test wall heat fluxes correspond to the downcomer/core barrel heat fluxes, expected temperature/pressure of the downcomer coolant, and the expected scaled high pressure safety injection flow at these times.

## **Response**

The basis of selected test conditions for the DOBO is described in reference [1]. The reference states that the experimental condition was obtained by applying Table 1 to RELAP5 results. The test condition was determined from the RELAP5 analysis results at 250 seconds after the initiation of an LBLOCA. [

]TS In the test, the ECC water injected via a DVI nozzle into the test section simulates the penetrating water from the cold-leg level to the lower downcomer region in the APR1400. Therefore, the temperature of the injected ECC water was maintained the same as that of the ECC water where the mixture level exists in the downcomer of the APR1400. [

]TS In the test, the heat flux was changed to cover this range.

Since this test was performed in the development phase of APR1400, the test conditions such as system pressure, ECC flow rate, and wall heat flux might differ from the current APR1400 LBLOCA conditions. Nonetheless, the DOBO is a quasi-steady state test and observes boiling mechanism and fluid distribution with assumption that coolant boiling occurs by residual heat of the wall. The assessment in Appendix G is only used to confirm whether the code can appropriately predict boiling occurrence, boiling location, and fluid distribution in the downcomer with boiling condition. Boiling occurrence in the plant is not the point of this assessment.

Table 1 Scaling Ratio of the DOBO Facility

Parameter	Scaling Law	
	Scaling Ratio	DOBO
Elevation	1	1
Gap Size Ratio	1	1
Width Ratio	$l_R$	1/47.08
Area Ratio	$a_R$	1/47.08
Volume Ratio	$a_R$	1/47.08
Velocity Ratio	1	1
Flow Rate Ratio	$a_R$	1/47.08
Gravity Ratio	1	1
Pressure Ratio	1	1
Temperature Ratio	1	1

Reference

- [1] B.J. Yun, et al., "Downcomer Boiling Phenomena during the Reflood Phase of a Large-Break LOCA for the APR1400," Nuclear Engineering and Design 238, 2008, 2064-2074

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### **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 Report**

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