

## RESPONSE TO AUDIT ISSUES

### APR1400 Topical Reports

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

Docket No. PROJ0782

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

### **Audit Issues No. 45-f**

The guidance in RG 1.157, Section 3.4.2 establishes acceptable controls for the calculation of bypass flow. Address the following concerns about the ECCS bypass bias determination discussed in Section 4.2.3.1 of the topical report:

- f. ATLAS Tests 9, 11 and 15 are included to determine the ECCS bypass bias during the reflood period. However, the figures for Tests 9 and 11 in Appendix E are provided only from 200 seconds after the beginning of the accident. The results from the period before 200 seconds were adjusted to match the measured conditions. The results for ATLAS Test 15 shown in Figures 3-19 and 3-20 in Appendix E of the topical report reveal that RELAP5/MOD3.3/K over-predicts the downcomer and core collapsed water levels for the period from 38 seconds to 150 seconds (early reflood). Provide justification for the neglect of this non-conservatism in the ECCS bypass prediction during the early reflood period.

### **Audit Issues No. 85**

The guidance in RG 1.157, Section 3.16.2 establishes acceptable controls for the data comparisons necessary to justify best estimate models. The Applicant asserts in Section 3.1 of the topical report Appendix E that the abnormalities observed in Tests 9, 11, and 15 are not expected to occur in the APR1400 plant. However, the purpose of integral tests is to demonstrate the expected behavior of the plant. Therefore, stating that certain phenomena observed in the tests are not expected in the plant, defeats the purpose of the tests. In addition, the Applicant's rationale for not expecting the anomalous behavior in the plant is unconvincing. As an example, it is stated that the difference between the lower and upper downcomer wall temperatures is not expected to exist in the plant "...because of the existence of continuous flow in the downcomer..." but such flow will also exist in the test facility which does exhibit the temperature difference. Please justify the representativeness of the selected ATLAS tests and their use for assessment purposes.

**Response to 45-f**

[

]TS

**Response to 85**

As described in Chapter 2 of Appendix E, ATLAS test facility was designed to investigate major phenomena related to the DVI of the ECCW, such as downcomer boiling and ECCW bypass. Target plant of the ATLAS test facility is APR1400.

Downcomer boiling phenomenon can occur during refill and reflood periods. The effects of downcomer boiling on the thermal hydraulic behavior is relatively insignificant because large amount of ECCW is injected during refill and early reflood periods. [

]TS Two uncertainty parameters are selected for downcomer boiling phenomenon in CAREM, and uncertainty parameter ranges and distribution functions are determined by the assessment of ATLAS tests.

ECCW bypass phenomenon is evaluated by assessing against various experiment data including ATLAS test data, and it is treated by bias because it is related to many complex phenomena as described in Section 4.4.1 of the topical report.

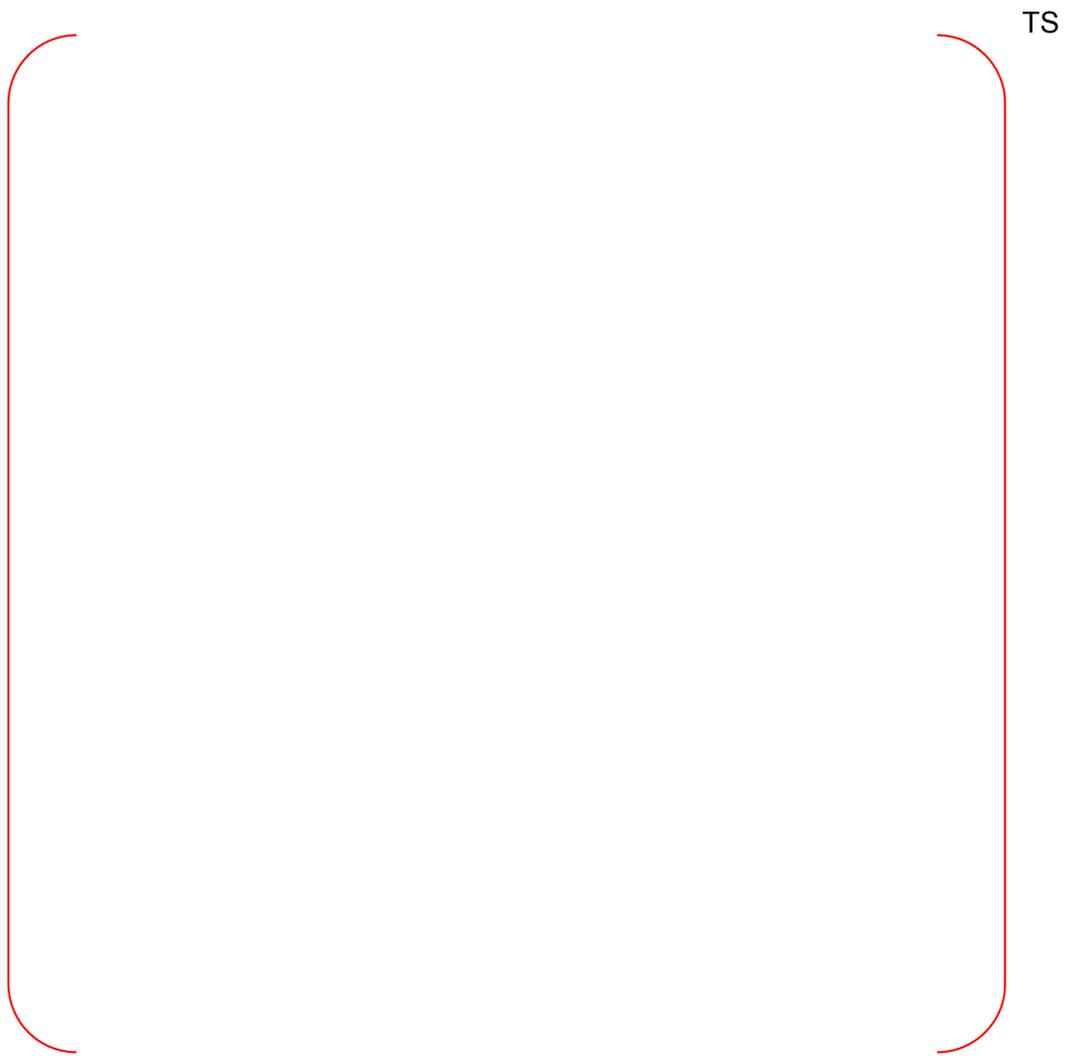


Figure 1. Heat Flux Comparison of Lower Downcomer

## Reference

- [1] "ATLAS Project Experimental Data/Information Transfer; Quick-Look Data Report of LB-CL-15," ATLAS-QLR-LB-CL-15, Revision 5, October 2008.

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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.