

June 15, 2018

MEMORANDUM TO: Dennis C. Morey, Chief
Licensing Processes Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

FROM: Ekaterina Lenning, Project Manager *R/A*
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SUBJECT: SUMMARY OF APRIL 13-18, 2018, CLOSED PRE-SUBMITTAL
MEETING WITH WESTINGHOUSE ELECTRIC COMPANY TO
DISCUSS FUTURE SUBMITTAL OF WNG-2 TOPICAL REPORT
(EPID: L-2018-TOP-0012)

On April 13-18, 2018, a closed pre-submittal meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and Westinghouse Electric Company (Westinghouse) representatives. The purpose of the meeting was for Westinghouse to present information on the future submittal of Westinghouse WNG-2 Topical Report and the NRC staff to observe testing. The summary of the meeting is enclosed.

Enclosure:
Meeting Summary

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 WITH WESTINGHOUSE ELECTRIC COMPANY TO DISCUSS FUTURE
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 DATED: JUNE 15, 2018

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U.S. NUCLEAR REGULATORY COMMISSION

SUMMARY OF THE APRIL 13-18, 2018, CLOSED MEETING

FOR THE WESTINGHOUSE ELECTRIC COMPANY FUTURE SUBMITTAL OF

WNG-2 TOPICAL REPORT

Four U.S. Nuclear Regulatory Commission (NRC) staff from the Nuclear Performance and Code Review Branch (SNPB) participated in a meeting with Westinghouse Electric Company at their critical heat flux experimental facility in Västerås, Sweden on April 13 through 18, 2018 (Reference 1). During the first day of the meeting, the NRC staff walked down both the ODEN and the FRIGG test loops, which are used for thermal-hydraulic testing for pressurized water reactors and boiling water reactors, respectively. During the walk down, the NRC staff were able to examine the test equipment, instrumentation, control room, and overall experimental set-up. Because the test facility has restricted access during testing due to the high pressure high temperature water in the piping, the NRC staff arrived early on site to tour the facility before the system was fully pressurized. This represented a unique opportunity to walk down the test facility with both the staff who run the tests and those who use the test data to develop correlations.

The second day of meetings focused on the test procedures for the ODEN loop. The discussion focused on the instrumentation in the loop, the redundancy of the instrumentation, and the instrumentation uncertainties. The NRC staff questioned Westinghouse on the criteria used to ensure loop steady-state conditions, the criteria used when taking a data point, the definition of critical heat flux that is applied during testing, and typical test matrices. Other topics of discussion included history of ODEN and FRIGG loops, history of the Columbia University Heat Transfer Research Facility (the antecedent of the ODEN loop), and Quality Assurance program applied during testing and correlation development among other topics of discussions. Additionally, the NRC staff was able to witness and discuss the ODEN loop startup testing involving the heat balance. Majority of the second day discussions helped the NRC staff to better understand the facility and the testing performed there, and also gain a better understanding of the WNG-2 correlation topical report (TR) that Westinghouse plans to submit to NRC for review and approval.

The third day of meetings initially focused on the test procedures for the FRIGG loop. The NRC and Westinghouse staff discussed similar topics surrounding steady-state and transient test procedures as in the previous day, including the criteria used to ensure loop stability, the criteria used when taking a data point, and the definition of boiling transition applied during testing. The Westinghouse and NRC staff also discussed perspectives on the dryout phenomenon and how it is similar to and different from departure from nucleate boiling and other related thermal-hydraulic concepts. In addition, Westinghouse provided the NRC staff with an update about the ongoing investigation into the fuel failure that occurred at the Leibstadt Nuclear Power Plant (KKL) in Switzerland a few years ago.

Overall, the NRC staff were able to fulfill their objectives during this trip. They were able to come to a much better understanding of the experimental setup of both the FRIGG and ODEN loops, the instrumentation that was used and its associated uncertainties, the process for capturing data and the various criteria used to determine if the data point was acceptable, and

the process used to develop and validate critical boiling transition models from the data. The NRC staff also gained a better understanding of the FRIGG loop test procedures and critical power correlations developed from FRIGG loop data, which were in use at KKL when the failure occurred. Westinghouse also presented newest information that has emerged from hot-cell examinations. Finally, the NRC reviewer, who is new to this field, was able to participate in this information exchange, and was able to discuss with Westinghouse and other NRC staff much of the information that will be summarized in the future submittal. Historically, the ability to participate first-hand in these discussions has resulted in significantly shorter review times with the number of request for additional information questions greatly reduced.