

June 27, 2013

Dr. Myung-Ki Kim
Project Manager
APR1400 Design Certification
Korea Hydro and Nuclear Power Co., Ltd.
1312 Beon-gil 70, Yuseong-daero
Yuseong-Gu, Daejeon
305-343 Korea (Republic of)

SUBJECT: ACCEPTANCE FOR THE REVIEW OF TOPICAL REPORT
APR1400-Z-M-TR-12003, REVISION 0, "FLUIDIC DEVICE DESIGN FOR THE
APR1400" (PROJ0782)

Dear Dr. Kim,

By letter dated January 7, 2013, Korea Hydro and Nuclear Power Co., Ltd. (KHNP) submitted for the U.S. Nuclear Regulatory Commission (NRC) staff's review, Topical Report APR1400-Z-M-TR-12003, Revision 0, "Fluidic Device Design for the APR1400." The NRC staff has performed an acceptance review of the topical report and found that, except for the key issues identified below, the material presented provides the technical information in sufficient detail to enable the staff to complete a detailed technical review.

The following key issues will be subject to requests for additional information (RAIs) once the official review is initiated.

- Complete Safety Injection Tank Fluidic Device (FD) Verification Test Results - The topical report provides only a brief summary of the results of various test cases and runs. The NRC staff expects that complete results for all test cases and runs be documented and included in the topical report.
- Effect of Cavitation – The topical report does not address any observation or potential for cavitation occurring in the FD vortex chamber or at the outlet nozzle throat where the minimum pressure is expected to occur, and the effect of potential cavitation on the FD discharge flow rate and pressure drop coefficients during the large-flow and small-flow injection periods, respectively. The NRC staff expects KHNP to provide an evaluation of the potential for cavitation and its effects.
- Uncertainty Evaluation - The topical report describes uncertainties of the FD pressure loss coefficient analyzed at a 95 percent confidence level. The analysis does not appear to have considered all elements that may have effects on the FD pressure loss coefficient, e.g., manufacturing uncertainty of the facing angle between the supply nozzle and control nozzle in the vortex chamber, and the variation in the results of various test cases/runs.

- Application of FD Loss Coefficients to Safety Analysis - The topical report describes the results of various test cases/runs, and uncertainties associated with the FD pressure loss coefficients for the large flow and small flow periods. It does not address how they will be applied to the safety analyses, e.g., how the results of various test cases/runs will be utilized and the uncertainties accounted for in the loss coefficients for the large flow and small flow periods to be used in the safety analysis, and the criterion (such as safety injection tank water level and uncertainty) to be used to determine switchover from the large flow to small flow injection phase.

The NRC staff expects to issue its first RAIs by December 30, 2013, and issue its draft safety evaluation report by November 30, 2014, provided that KHNP is able to satisfactorily respond to the RAIs and address issues identified during the review process in a timely manner. The staff also expects to perform audits related to (1) the database of FD performance verification experiment, and (2) test procedure and quality assurance program related to the FD performance verification experiment. The NRC staff estimates that the review will require approximately 1,000 staff hours including project management time. The review schedule milestones and estimated review efforts were discussed and agreed upon in an email from Hyun Seung Chang of KHNP to William Ward of the NRC staff on June 24, 2013.

Section 170.21 of Title 10 of the *Code of Federal Regulations* requires that topical reports are subject to fees based on the full cost of the review. You did not request a fee waiver; therefore, NRC staff hours will be billed accordingly.

If you have any questions regarding this matter, please contact the Lead Project Manager, William Ward at (301) 415-7038 or William.Ward@NRC.gov.

Sincerely,

/RA/

Samuel Lee, Chief
Licensing Branch 2
Division of New Reactor Licensing
Office of New Reactors

Project No. 0782

cc: See next page

- angle between the supply nozzle and control nozzle in the vortex chamber, and the variation in the results of various test cases/runs.
- Application of FD Loss Coefficients to Safety Analysis - The topical report describes the results of various test cases/runs, and uncertainties associated with the FD pressure loss coefficients for the large flow and small flow periods. It does not address how they will be applied to the safety analyses, e.g., how the results of various test cases/runs will be utilized and the uncertainties accounted for in the loss coefficients for the large flow and small flow periods to be used in the safety analysis, and the criterion (such as safety injection tank water level and uncertainty) to be used to determine switchover from the large flow to small flow injection phase.

The NRC staff expects to issue its first RAIs by December 30, 2013, and issue its draft safety evaluation report by November 30, 2014, provided that KHNP is able to satisfactorily respond to the RAIs and address issues identified during the review process in a timely manner. The staff also expects to perform audits related to (1) the database of FD performance verification experiment, and (2) test procedure and quality assurance program related to the FD performance verification experiment. The NRC staff estimates that the review will require approximately 1,000 staff hours including project management time. The review schedule milestones and estimated review efforts were discussed and agreed upon in an email from Hyun Seung Chang of KHNP to William Ward of the NRC staff on June 24, 2013.

Section 170.21 of Title 10 of the *Code of Federal Regulations* requires that topical reports are subject to fees based on the full cost of the review. You did not request a fee waiver; therefore, NRC staff hours will be billed accordingly.

If you have any questions regarding this matter, please contact the Lead Project Manager, William Ward at (301) 415-7038 or William.Ward@NRC.gov.

Sincerely,
/RA/

Samuel Lee, Chief
Licensing Branch 2
Division of New Reactor Licensing
Office of New Reactors

Project No. 0782

cc: See next page

DISTRIBUTION:

PUBLIC	RidsOgcMailCenter	RidsNroLACSmith	RidsAcrsAcnwMailCenter
LB2 R/F	JDonoghue, NRO	RidsNroDnrLB2	YHsii, NRO
D101	RidsOpaMailCenter	WWard, NRO	SLee, NRO

ADAMS Accession No.: ML13175A402 **via email*** **NRO-002**

OFFICE	DNRL/LB2:PM	DNRL/LB2:LA*	DNRL/LB2:BC
NAME	WWard	CMurphy	SLee
DATE	06/27/13	06/25/13	06/27/13

KHNP Mailing List

6/27/2013

Harry (Hyun Seung) Chang
Senior Manager
KHNP New York Office
Parker Plaza 16th Floor
400 Kelby St, Fort Lee, NJ07024

Dr. Myung-Ki Kim
Project Manager
APR1400 Design Certification
Korea Hydro and Nuclear Power Co., Ltd.
1312 Beon-gil 70, Yuseong-daero,
Yuseong-gu, Daejeon
305-343, Korea (Republic of)

Jung-Ho Kim
Senior Manager
Technology Policy & Planning Dept.
KHNP Headquarters
512 Yeongdong-daero Gangnam-gu
Seoul, 135-791, Korea

KHNP APR1400 Mailing List

Email

kimmk89@khnp.co.kr [Myung-Ki Kim]
jhi6118@khnp.co.kr [Hae-In Jeong]
sj.oh@kings.ac.kr [Seung J Oh]
dhsmf@khnp.co.kr [Do-Hwan Lee]
hchang@khnp.co.kr [Harry (Hyun Seung) Chang]
nuclearjho@khnp.co.kr [Jung-Ho Kim]
yunhokim@khnp.co.kr [Yunho Kim]