KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Thursday, April 06, 2017 9:21 AM
To: apr1400rai@khnp.co.kr; Jungho Kim (jhokim082@gmail.com); KHNPDCDRAIsPEm Resource; Andy Jiyong Oh; Tony Daegeun Ahn; David Wagner (david.wagner@aecom.com)
Cc: Strnisha, James; Lupold, Timothy; Umana, Jessica; McCoppin, Michael
Subject: APR1400 Design Certification Application RAI 543-8734 (06.02.02 - Containment Heat Removal Systems)
Attachments: APR1400 DC RAI 543 MEB 8734.pdf

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, 45 days to respond to this RAI. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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United States Nuclear Regulatory Commission
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Options
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REQUEST FOR ADDITIONAL INFORMATION 543-8734

Issue Date: 04/06/2017
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 06.02.02 - Containment Heat Removal Systems
Application Section:

QUESTIONS

06.02.02-46

This is a supplement to RAI 63-7983, Question 06.02.02-22.

In RAI 06.02.02-22, the NRC staff requested the applicant to provide technical justification that debris settling will not occur or affect system operation in piping and any associated valves where the flow velocity for latent debris (dust, dirt, sand) is less than the terminal settling velocity. In response to RAI 06.02.02-22, the applicant stated that settling of latent debris may occur at several locations in the CS spray ring line and the SI pump suction and discharge piping (including valves) where the flow velocity is less than the terminal settling velocity. In the RAI response the applicant explained that the following conservatisms were used when calculating the settling velocity of the latent debris.

- The pump shutoff flow rates (minimum flow rates) at which pump cavitation is likely to occur, rather than the design flow rates, are used to calculate the flow velocities. This lowers the flow velocities for additional conservatism for the debris settling evaluation.
- All particle sizes used for terminal settling velocity of the latent particle debris are assumed to be the strainer hole size of 0.094 inch, which is considerably large compared to Table V-2 of SE for NEI 04-07. This maximizes the terminal settling velocity.

Based on the conservatisms above, the applicant stated that particle debris settling may rarely occur at piping and associated valves with lower assumed flow velocity than the debris settling velocity. The applicant also stated that since the flow cross sectional area decreases as particles settle down and reduction of flow cross sectional area increases the flow velocity, the particle settling may occur no longer after the flow velocity equals the terminal settling velocity. Therefore, the applicant concluded that the piping and associated valves are not blocked and the effect on system operation is negligible.

The NRC staff agrees that conservatisms are incorporated into the settling evaluation such as the pump shutoff flow rates (minimum flow rates) and the assumption that all latent debris is the strainer hole size of 0.094 inch. However, the staff does not consider the licensee's discussion in its RAI response to be sufficient to conclude that settling of latent debris will have a negligible effect on system operation. To support a regulatory finding under GDC 4, the applicant is requested to provide additional information to support its assessment that the settling of latent debris will have a negligible effect on system operation. For example, the applicant is requested to address (1) the fluid flow velocities based on expected pump operation in the applicable systems, (2) the range of particle sizes and their applicable settling velocities to determine the percentage of material that will continue to be transported through the applicable systems without settling; and (3) the remaining material that will settle and its impact on the performance of components in the applicable systems.


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