KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Tuesday, June 23, 2015 10:22 AM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Yunho Kim; Seung Choi
Cc: Travis, Boyce; Segala, John; Umana, Jessica; Betancourt, Luis; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 52-7832 (06.02.01.02 - Subcompartment Analysis)
Attachments: APR1400 DC RAI 52 SCVB 7832.pdf; image001.jpg

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,

Jeff Ciocco
New Nuclear Reactor Licensing
301.415.6391
jeff.ciocco@nrc.gov

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Hearing Identifier: KHNP_APR1400_DCD_RAI_Public
Email Number: 57

Mail Envelope Properties (A67A2D233B3FBB4C8B5109AD7C39550715C4EAD9B8)

Subject: APR1400 Design Certification Application RAI 52-7832 (06.02.01.02 - Subcompartment Analysis)
Sent Date: 6/23/2015 10:21:44 AM
Received Date: 6/23/2015 10:21:47 AM
From: Ciocco, Jeff

Created By: Jeff.Ciocco@nrc.gov

Recipients:
"Travis, Boyce" <Boyce.Travis@nrc.gov>
Tracking Status: None
"Segala, John" <John.Segala@nrc.gov>
Tracking Status: None
"Umana, Jessica" <Jessica.Umana@nrc.gov>
Tracking Status: None
"Betancourt, Luis" <Luis.Betancourt@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"apr1400rai@khnp.co.kr" <apr1400rai@khnp.co.kr>
Tracking Status: None
"KHNPDCDRAIsPEm Resource" <KHNPDCDRAIsPEm.Resource@nrc.gov>
Tracking Status: None
"Harry (Hyun Seung) Chang" <hyunseung.chang@gmail.com>
Tracking Status: None
"Yunho Kim" <yshh8226@gmail.com>
Tracking Status: None
"Seung Choi" <seung.choi@aecom.com>
Tracking Status: None

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APR1400 DC RAI 52 SCVB 7832.pdf	125539	
image001.jpg	5020	

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Priority: Standard
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Expiration Date:
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REQUEST FOR ADDITIONAL INFORMATION 52-7832

Issue Date: 06/23/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 06.02.01.02 - Subcompartment Analysis
Application Section: 6.2.1.2

QUESTIONS

06.02.01.02-1

General Design Criterion (GDC) 4 of Appendix A to 10 CFR Part 50 requires, in part, that structures, systems and components (SSCs) shall be designed to accommodate the effects associated with normal operations, maintenance, testing and postulated accidents, including dynamic effects. GDC 50 requires, in part, that the containment and its internal compartments can accommodate, with sufficient margin, the calculated pressure and temperature conditions resulting from any loss of coolant accident (LOCA). As such, the applicant is required to demonstrate in the APR1400 design control document (DCD) that containment subcompartments can withstand the effects resulting from a high energy line break. This can be shown by meeting the guidance specified in SRP Section 6.2.1.2. The following aspects of SRP Section 6.2.1.2 have not been adequately addressed in the DCD:

There is no reference to the reactor power level or initial primary or secondary coolant conditions used for the mass and energy releases in DCD Tier 2, Section 6.2.1.2. Requirements dictate and the SRP stipulates that assumptions made with regards to the mass and energy release maximize the subcompartment pressure. Provide, in the DCD, a list or table of initial parameters assumed in formulating the mass and energy release described in Section 6.2.1.2. The staff needs this information for making a safety conclusion regarding the integrity of the containment subcompartments and to conduct confirmatory analysis.

06.02.01.02-2

GDC 4 of Appendix A to 10 CFR Part 50 requires, in part, that SSCs shall be designed to accommodate the effects associated with normal operations, maintenance, testing and postulated accidents, including dynamic effects. GDC 50 requires, in part, that the containment and its internal compartments can accommodate, with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. As such, the applicant is required to demonstrate in the APR1400 DCD that containment subcompartments can withstand the effects resulting from a high energy line break. This can be shown by meeting the guidance specified in SRP Section 6.2.1.2. The following aspects of SRP Section 6.2.1.2 have not been adequately addressed in the DCD:

SRP Section 6.2.1.2 states that nodalization schemes should be chosen such that no pressure gradient exists within a node, and that sensitivity studies should be conducted to verify convergence of the nodal scheme. Although such sensitivity studies are mentioned in DCD Tier 2, Section 6.2.1.2, no detail is provided. Provide, in a response, a detailed description of the sensitivity studies performed to arrive at the nodalizations used in the DCD. In addition, provide a brief summary of the nodalization sensitivity in the DCD in order to confirm that nodal scheme used is appropriate.

06.02.01.02-3

GDC 4 of Appendix A to 10 CFR Part 50 requires, in part, that SSCs shall be designed to accommodate the effects associated with normal operations, maintenance, testing and postulated accidents, including dynamic effects. GDC 50 requires, in part, that the containment and its internal compartments can accommodate, with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. As such, the applicant is required to demonstrate, in the APR1400 DCD, that containment subcompartments can withstand the effects resulting from a high energy line break. This can be shown by meeting the guidance specified in SRP Section 6.2.1.2. The following aspects of SRP Section 6.2.1.2 have not been adequately addressed in the DCD:

In the subcompartment analysis, most of the compartments have what are described as access doors or openings where the subcompartment interacts with the containment atmosphere. What assumptions are applied to the access openings with respect to gratings, doors, signage and other restrictions placed in the access openings, and how do these assumptions affect the flow area available (especially in compartments not otherwise open to the containment atmosphere)? Are any of the flow paths described subject to change (blowout, hinged doors changing orientation) following the application of a differential pressure? The staff needs this information in order to perform confirmatory analysis of the subcompartment pressure analyses.

06.02.01.02-4

GDC 4 of Appendix A to 10 CFR Part 50 requires, in part, that SSCs shall be designed to accommodate the effects associated with normal operations, maintenance, testing and postulated accidents, including dynamic effects. GDC 50 requires, in part, that the containment and its internal compartments can accommodate, with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. As such, the applicant is required to demonstrate in the APR1400 DCD that containment subcompartments can withstand the effects resulting from a high energy line break. This can be shown by meeting the guidance specified in SRP Section 6.2.1.2. The following aspects of SRP Section 6.2.1.2 have not been adequately addressed in the DCD:

The nodalization for the regenerative heat exchanger subcompartment (DCD Tier 2, Figure 6.2.1-24) is not clear. The room is described as having only one access point that interacts with the containment atmosphere in DCD Tier 2, Section 6.2.1.2.2, but is modeled as attached to a second room with access to two additional containment access points. Clarify in the description of DCD Tier 2, Section 6.2.1.2.2 how the regenerative heat exchanger subcompartment is modeled, including a description of the in-core instrumentation (ICI) chase. The staff needs this information to make a finding that the pressure calculation performed shows a reasonable assurance that design pressures will not be exceeded.

06.02.01.02-5

GDC 4 of Appendix A to 10 CFR Part 50 requires, in part, that SSCs shall be designed to accommodate the effects associated with normal operations, maintenance, testing and postulated accidents, including dynamic effects. GDC 50 requires, in part, that the containment and its internal compartments can accommodate, with sufficient margin, the calculated pressure and temperature conditions resulting from any LOCA. As such, the applicant is required to demonstrate in the APR1400 DCD that containment subcompartments can withstand the effects resulting from a high energy line break. This can be shown by meeting the guidance specified in SRP Section 6.2.1.2. The following aspects of SRP Section 6.2.1.2 have not been adequately addressed in the DCD:

While the mass and energy release data for the postulated pipe breaks in various subcompartments are tabulated in the DCD, Regulatory Guide (RG) 1.206 (for COL applicants) also stipulates that a description of the computer program used to calculate the mass and energy (M&E) releases from a postulated pipe break be provided. It is mentioned that COMPARE-MOD1A is used to perform the short-term subcompartment transient pressure analysis. However, it is not clear which code was used to generate the M&E release data. Update the DCD with the code used to perform the mass and energy release calculation or reference another location in the DCD where it is described.


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