

KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Tuesday, September 22, 2015 2:25 PM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Christopher Tyree
Cc: Hernandez, Raul; McKirgan, John; Steckel, James; Lee, Samuel
Subject: APR1400 Design Certification Application RAI 220-8269 (15.02.01-15.02.05 - Loss of External Load; Turbine Trip; Loss of Condenser Vacuum; Closure of Main Steam Isolation Valve (BWR); and Steam Pressure Regulator Failure (Closed))
Attachments: APR1400 DC RAI 220 SRSB 8269.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 the first RAI question, and 30 days for the remaining three RAI questions. 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



Hearing Identifier: KHNP_APR1400_DCD_RAI_Public
Email Number: 268

Mail Envelope Properties (87a777403f694292a473bb69ef8e0ff5)

Subject: APR1400 Design Certification Application RAI 220-8269 (15.02.01-15.02.05 - Loss of External Load; Turbine Trip; Loss of Condenser Vacuum; Closure of Main Steam Isolation Valve (BWR); and Steam Pressure Regulator Failure (Closed))

Sent Date: 9/22/2015 2:24:49 PM

Received Date: 9/22/2015 2:24:51 PM

From: Ciocco, Jeff

Created By: Jeff.Ciocco@nrc.gov

Recipients:

"Hernandez, Raul" <Raul.Hernandez@nrc.gov>

Tracking Status: None

"McKirgan, John" <John.McKirgan@nrc.gov>

Tracking Status: None

"Steckel, James" <James.Steckel@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

"Andy Jiyong Oh" <jiyong.oh5@gmail.com>

Tracking Status: None

"Christopher Tyree" <Christopher.tyree@aecom.com>

Tracking Status: None

Post Office: HQPWMSMRS07.nrc.gov

Files	Size	Date & Time
MESSAGE	666	9/22/2015 2:24:51 PM
APR1400 DC RAI 220 SRSB 8269.pdf		96748
image001.jpg	5040	

Options

Priority: Standard

Return Notification: No

Reply Requested: No

Sensitivity: Normal

Expiration Date:

Recipients Received:

REQUEST FOR ADDITIONAL INFORMATION 220-8269

Issue Date: 09/22/2015

Application Title: APR1400 Design Certification Review – 52-046

Operating Company: Korea Hydro & Nuclear Power Co. Ltd.

Docket No. 52-046

Review Section: 15.02.01-15.02.05 - Loss of External Load; Turbine Trip; Loss of Condenser Vacuum; Closure of Main Steam Isolation Valve (BWR); and Steam Pressure Regulator Failure (Closed)

Application Section: 15.02.01-05

QUESTIONS

15.02.01-1

15.2.1-5, Question 1

GDC 26 requires two independent reactivity control systems with different design principles to control reactivity changes so acceptable fuel design limits are not exceeded. In Tier 2 Table 1.9-2 (Sheet 28 of 33) the applicant stated that they are in conformance with the SRP 15.2.1-5. SRP 15.2.1-5 instructs reviewer to evaluate the consequences of AOOs that could decrease heat removal by the secondary system and lead to reactivity changes within the core causing the fuel cladding thermal design criteria to be exceeded.

FSAR Tier 2 Section 15.2.1 the applicant discusses the consequences of several AOOs (loss of external load, the turbine trip, the loss of condenser vacuum, and the closure of the main steam isolation) that could decrease the heat removal by the secondary system. In several locations the applicant states that the radiological consequences of these events are bounded by the feedwater system piping failure event described in FSAR Tier 2 Section 15.2.8. However the staff determined that the applicant has not provided a justification that demonstrates that the results of the feedwater system piping failure event bound the radiological consequences of the previously mention events. The staff requests the applicant to provide a justification that demonstrates that the results of the feedwater system piping failure event bound the radiological consequences of the following events:

- a. Loss of external load
- b. Turbine trip
- c. Loss of condenser vacuum
- d. Closure of the main steam isolation valve

15.02.01-2

15.2.1-5, Question 2

GDC 10 requires design of reactor core and its coolant, control, and protection systems with appropriate margin so SAFDLs are not exceeded during any conditions of normal operation, including the effects of AOOs. In Tier 2 Table 1.9-2 (Sheet 28 of 33) the applicant stated that they are in conformance with the SRP 15.2.1-5. The SRPs provide an acceptable method of meeting the requirements, SRP 15.2.1-5 instructs the reviewer to evaluate the consequences of AOOs that could decrease heat removal by the secondary system and result in the fuel cladding thermal design criteria to be exceeded. RG 1.105 provides guidance for keeping instrument setpoints within technical specification limits.

REQUEST FOR ADDITIONAL INFORMATION 220-8269

GDC 13 requires the provision of instrumentation that is capable of monitoring variables and systems over their anticipated ranges to assure adequate safety, and of controls that can maintain these variables and systems within prescribed operating ranges. In order to demonstrate conformance with this GDC, SRP 15.2.1-5 instructs the reviewer to evaluate the sequences of events, including automatic actuations of protection systems, and manual actions, and determines whether the sequence of events is justified, based upon the expected values of the relevant monitored parameters and instruments indications.

In SRP 15.2.1-15.2.5 "Loss Of External Load; Turbine Trip; Loss Of Condenser Vacuum; Closure Of Main Steam Isolation Valve (BWR); And Steam Pressure Regulator Failure (Closed)" states that the applicant must present a quantitative analysis of the most limiting event.

In FSAR Tier 2 Section 15-2.3.4.2 "Input Parameters and Initial Conditions," the applicant discusses the scenario of the LOCV with outside power available (without LOOP). In this scenario, the RCP is available and improves the heat transfer between the primary and secondary systems, therefore limiting RCS peak pressure. However, the staff finds that the applicant has not addressed how this scenario impacts the peak pressure on the secondary system.

The staff requests the applicant to discuss the consequences on the secondary side (peak SG pressure) if the LOCV event occurs with outside power available (RCP operating, and non-safety systems in manual control).

15.02.01-3

15.2.1-5, Question 3

GDC 10 requires design of reactor core and its coolant, control, and protection systems with appropriate margin so SAFDLs are not exceeded during any conditions of normal operation, including the effects of AOOs. In Tier 2 Table 1.9-2 (Sheet 28 of 33) the applicant stated that they are in conformance with the SRP 15.2.1-5. SRP 15.2.1-5 instructs the reviewer to evaluate the consequences of AOOs that could decrease heat removal by the secondary system and result in the fuel cladding thermal design criteria to be exceeded. RG 1.105 provides guidance for keeping instrument setpoints within technical specification limits.

GDC 13 requires the provision of instrumentation that is capable of monitoring variables and systems over their anticipated ranges to assure adequate safety, and of controls that can maintain these variables and systems within prescribed operating ranges. SRP 15.2.1-5 instructs the reviewer to evaluate the sequences of events, including automatic actuations of protection systems, and manual actions, and determines whether the sequence of events is justified, based upon the expected values of the relevant monitored parameters and instruments indications.

SRP 15.2.1-15.2.5 "Loss Of External Load; Turbine Trip; Loss Of Condenser Vacuum; Closure Of Main Steam Isolation Valve (BWR); And Steam Pressure Regulator Failure (Closed)" Section III.3, states that to the extent deemed necessary, the reviewer evaluates the effect of single active system or component failures that may affect the course of the transient.

In FSAR Tier 2 Section 15-2.3.4.2 the applicant also states that the analysis determined that there were no single failures that, when combined with the event, resulted in a more severe peak pressure or minimum DNBR than the LOCV by itself. In FSAR Tier 2 Table 15.0-4 "Single Failures," the applicant identifies the individual single failures evaluated. The staff identified that this table did not include the failure of a POSRV or a MSSV.

REQUEST FOR ADDITIONAL INFORMATION 220-8269

The staff requests the applicant to discuss the impact of a single active failure of a POSRV or a MSSV on the event progression and the results.

15.02.01-4

15.2.1-5, Question 4

GDC 10 requires design of reactor core and its coolant, control, and protection systems with appropriate margin so SAFDLs are not exceeded during any conditions of normal operation, including the effects of AOOs. In Tier 2 Table 1.9-2 (Sheet 28 of 33) the applicant stated that they are in conformance with the SRP 15.2.1-5. SRP 15.2.1-5 instructs the reviewer to evaluate the consequences of AOOs that could decrease heat removal by the secondary system and result in the fuel cladding thermal design criteria to be exceeded. RG 1.105 provides guidance for keeping instrument setpoints within technical specification limits.

In SRP 15.2.1-15.2.5 “Loss Of External Load; Turbine Trip; Loss Of Condenser Vacuum; Closure Of Main Steam Isolation Valve (BWR); And Steam Pressure Regulator Failure (Closed)” the staff identified five (5) events that need to be evaluated by the applicants. The staff identified that FSAR Tier 2 Section 15.2.5 “Steam Pressure Regulator Failure,” states that this event is not applicable to the APR1400 design. The staff determined that the applicant has not provided a justification that describes why this scenario is not applicable for the APR1400 design.

The staff requests the applicant to update the FSAR to include a justification as to how the applicant determined that this event is not applicable to the APR1400 design.



U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment