KHNPDCDRAIsPEm Resource

From: Ciocco, Jeff
Sent: Friday, August 21, 2015 9:08 AM
To: KHNPDCDRAIsPEm Resource
Subject: FW: APR1400 Design Certification Application RAI 158-8174 (09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System)
Attachments: APR1400 DC RAI 160 SRSB 8174.pdf; image001.jpg

From: Ciocco, Jeff
Sent: Thursday, August 20, 2015 8:50 AM
To: apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource <KHNPDCDRAIsPEm.Resource@nrc.gov>; Harry (Hyun Seung) Chang <hyunseung.chang@gmail.com>; Jiyong Andy Oh <jiyong.oh5@gmail.com>; Christopher Tyree <Christopher.tyree@aecom.com>
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Subject: APR1400 Design Certification Application RAI 158-8174 (09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System)

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.

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

Thank you,

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REQUEST FOR ADDITIONAL INFORMATION 160-8174

Issue Date: 08/20/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 09.03.04 - Chemical and Volume Control System (PWR) (Including Boron Recovery System)
Application Section: 9.3.4

QUESTIONS

09.03.04-1

In DCD Tier 2, Section 9.3.4.3.4, "Prevention for Wall Inward Buckling and Failure in Tanks," the applicant stated: "The VCT is designed to withstand vacuum conditions to prevent wall inward buckling and failure." The applicant provided no other information regarding vacuum condition mitigation for the VCT.

Following the guidance provided in SRP Section 9.3.4, the staff was unable to determine if adequate wall inward buckling protection is provided for the VCT. The staff needs the applicant to clarify how the VCT is designed to withstand vacuum conditions to prevent wall inward buckling and failure and to what conditions the VCT is designed. The applicant is requested to update the DCD as appropriate.

09.03.04-2

The applicant stated in DCD Tier 2, Section 9.3.4.3.2, "Accident Response," that neither a CIAS nor a SIAS isolates the charging line; however, the CIAS and SIAS both isolate the letdown line. The staff noted that the charging line containment isolation valve, CV-524, according to DCD Tier 1, Table 2.4.6-2 and Figure 2.4.6-1, is normally open and fails as-is on a loss of motive power. However, DCD Tier 1, Table 2.4.6-2 indicates that the active safety function of CV-524 is to close.

GDC 55 requires containment isolation valves to be provided in lines that are a part of the reactor coolant pressure boundary and penetrate primary reactor containment. One way of meeting this requirement is to provide: "One automatic isolation valve inside and one automatic isolation valve outside containment. A simple check valve may not be used as the automatic isolation valve outside containment." The staff determined that the applicant's current isolation scheme for the charging line penetrating containment does not meet GDC 55 because the automatic isolation valve provided outside of containment could fail in the open position during an accident.

In accordance with SRP 9.3.4, the staff can not conclude that the CVCS contains adequate provisions for isolating the charging line during accident scenarios. The staff needs the applicant to justify how the existing charging line meets GDC 55, provide justification for why this line does not need to meet GDC 55, or update the current design to reflect conformance with containment isolation requirements. The applicant is requested to update the DCD as appropriate.

09.03.04-3

In accordance with GDC 33, "Reactor Coolant Makeup," the design shall contain a system to supply reactor coolant makeup for protection against small breaks in the RCPB. The system shall be designed to assure that the system safety function can be accomplished, assuming only offsite power is available or only onsite power is available, using the piping, pumps, and valves which are used to maintain coolant inventory during normal reactor operation. The staff reviewed the applicant's design and confirmed that the CVCS is not required to supply reactor coolant makeup to mitigate small breaks or leaks in the RCPB; however, the staff noted that the CVCS does have the capacity to replace the flow lost to containment due to a break in a small RCS line, such as instrument and sample lines, and has the provisions for being powered from either onsite or offsite power sources.

The staff noted that the applicant implied, in DCD Tier 2, Section 3.1.29, "Criterion 33 – Reactor Coolant Makeup," that conformance with GDC 33 is met by the system function of the CVCS. While the staff agrees that the CVCS does provide for normal RCS makeup and chemistry control, and that the CVCS has the capability of mitigating the effects of certain small sized breaks, it does not have a safety-related coolant makeup function. The intent of GDC 33 is aimed at providing a system, whose piping, pumps, and valves are used in normal operation to maintain coolant inventory, and whose safety function is to assure that specified acceptable fuel design limits are not exceeded as a result of reactor coolant leakage or a small break in the RCPB. Although the APR1400 CVCS has piping, pumps and valves relied upon for normal operation, it is the staff's understanding that those piping, pumps and valves are not safety-related nor are they relied upon during an accident.

Since CVCS does not have a safety-related coolant makeup function, the staff needs the applicant to justify the reference to CVCS in DCD Tier 2, Section 3.1.29 and/or update the DCD as appropriate.

09.03.04-4

The applicant stated in DCD Tier 2, Section 9.3.4.2, that neither a CIAS nor a SIAS isolates the RCP controlled bleedoff (CBO) line isolation valves (CV-505 and CV-506); however, a CSAS does isolate the CBO isolation valves. The staff noted that CV-505 and CV-506, according to DCD Tier 1, Table 2.4.6-2 and Figure 2.4.6-1, are normally open but fail closed on a loss of motive power. Furthermore, DCD Tier 1, Table 2.4.6-2 indicates that the active safety functions of CV-505 and CV-506 are to close.

GDC 55 requires containment isolation valves to be provided in lines that are a part of the reactor coolant pressure boundary and penetrate primary reactor containment. One way of meeting this requirement is to provide: "One automatic isolation valve inside and one automatic isolation valve outside containment. A simple check valve may not be used as the automatic isolation valve outside containment." The staff determined that the applicant's current isolation scheme for the CBO line penetrating containment does not meet GDC 55 because the automatic isolation valves provided inside and outside of containment do not automatically close during an accident.

In accordance with SRP 9.3.4, the staff can not conclude that the CVCS contains adequate provisions for isolating the CBO line during accident scenarios. The staff needs the applicant to justify how the existing CBO line meets GDC 55, provide justification for why this line does not need to meet GDC 55, or update the current design to reflect conformance with containment isolation requirements and update the DCD as appropriate.

09.03.04-5

According to DCD Tier 1, Table 2.4.6-2 and Figure 2.4.6-1, the staff noted that the IRWST makeup line containment isolation valve (CV-509) fails as-is on a loss of motive power; however, the active safety function of this valve is to close. GDC 55 states that "isolation valves outside containment shall be located as close to containment as practical and upon loss of actuating power, automatic isolation valves shall be designed to take the position that provides greater safety."

The staff needs the applicant to justify how CV-509 meets GDC 55 regarding its loss-of-motive-power failure position (i.e. justify how CV-509 failing as-is, when the valve is open, is the valve position that provides greater safety than a failure position of closed) and update the DCD as appropriate.

09.03.04-6

In DCD Tier 1, Figure 2.4.6-1, the staff noted that containment isolation valve, CV-362, was lacking indication of valve position status. However, in DCD Tier 2, Figure 9.3.4-1, the staff noted that CV-362 is locked closed during normal operation. Tier 1 information should be derived from and consistent with Tier 2 information.

REQUEST FOR ADDITIONAL INFORMATION 160-8174

The staff requests the applicant to update DCD Tier 1, Figure 2.4.6-1 to include valve position status of CV-362 consistent with what is shown in DCD Tier 2, Figure 9.3.4-1.


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