KHNPDCDRAIsPEm Resource

From:	Ciocco, Jeff
Sent:	Tuesday, January 19, 2016 1:12 PM
To:	apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Steven Mannon
Cc:	Stutzcage, Edward; McCoppin, Michael; Burkhart, Lawrence; Vera, John; Lee, Samuel
Subject:	APR1400 Design Certification Application RAI 368-8470 (14.03.08 - Radiation Protection Inspections, Tests, Analyses, and Acceptance Criteria)
Attachments:	APR1400 DC RAI 368 RPAC 8470.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, 60 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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From: Ciocco, Jeff

Created By: Jeff.Ciocco@nrc.gov

Recipients:
"Stutzcage, Edward" <Edward.Stutzcage@nrc.gov>
Tracking Status: None
"McCoppin, Michael" <Michael.McCoppin@nrc.gov>
Tracking Status: None
"Burkhart, Lawrence" <Lawrence.Burkhart@nrc.gov>
Tracking Status: None
"Vera, John" <John.Vera@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
"Steven Mannon" <steven.mannon@aecom.com>
Tracking Status: None

Post Office: HQPWMSMRS07.nrc.gov

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REQUEST FOR ADDITIONAL INFORMATION 368-8470

Issue Date: 01/19/2016
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 14.03.08 - Radiation Protection Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: Tier 1

QUESTIONS

14.03.08-14

This is a follow-up to the response to RAI 8054, Questions 14.03.08-4 and 14.03.08-5.

BASIS

10 CFR 52.47(a)(5) requires that the FSAR contain the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radioactive effluents and radiation exposures within the limits set forth in 10 CFR 20.

10 CFR 50, GDC 61, requires that the fuel storage and handling, radioactive waste, and other systems which may contain radioactivity shall be designed to assure adequate safety under normal and postulated accident conditions. These systems shall be designed (1) with a capability to permit appropriate periodic inspection and testing of components important to safety, (2) with suitable shielding for radiation protection, (3) with appropriate containment, confinement, and filtering systems, (4) with a residual heat removal capability having reliability and testability that reflects the importance to safety of decay heat and other residual heat removal, and (5) to prevent significant reduction in fuel storage coolant inventory under accident conditions.

SRP 12.3-12.4 indicates that, the applicant's area radiation monitoring system is designed to monitor the radiation levels in areas where radiation levels could become significant and where personnel may be present.

ANSI/ANS-HPSSC-6.8.1-1981, which the applicant references and which is referenced in the SRP indicates that, "Detectors shall be located in those areas which require entry or exit, or both, to be monitored or controlled for purposes of occupational radiation protection which are normally accessible, and where changes in plant conditions can cause significant increases in personnel exposure rate above that expected for the area. Detectors shall be located to best measure the representative exposure rates within the specific area so as to assist in minimizing exposure to personnel."

SRP Section 14.3 indicates that the purpose of inspections, tests, analysis, and acceptance criteria (ITAAC), is to verify that a facility referencing the design certification is built and operates in accordance with the design certification and applicable regulations.

In addition, SRP Section 14.3.8 indicates that the reviewer should ensure that Tier 1 identifies and describes, commensurate with their safety significance, those SSCs that provide radiation shielding, confinement or containment of radioactivity, ventilation of airborne contamination, or radiation (or radioactivity concentration) monitoring for normal operations and during accidents.

ISSUES

1. In the response to Question 14.03.08-4, the applicant removed the instrument calibration facility area radiation monitor (referred to as RE-286) from Tier 1, Table 2.7.6.5-1 and Tier 2, Table 12.3-6, although the monitor is still shown in Tier 2, Figure 11.5-2R. However, no information was provided in the response regarding why this monitor was being removed from the design.

   The instrument calibration facility is identified as a potential very high radiation area (exceeding 500 Rad/hour) when unshielded radiation sources are present. Since the area is normally a low radiation area when unshielded sources are not present, monitor RE-286 was in place to alert plant personnel of high radiation levels in the area to ensure that appropriate actions are being taken. Therefore, it would appear that monitor RE-286 is necessary in accordance with the aforementioned regulations and guidance documents.

   As a result, please;

   a) Retain monitor RE-286 in Tier 1, Table 2.7.6.5-1 and Tier 2, Table 12.3-6; or

   b) Provide an explanation for why monitor RE-286 is being removed from the design and justify why monitor RE-286 is not necessary to comply with the aforementioned regulations and to conform to the aforementioned guidance. If this option is chosen, please remove monitor RE-286 from FSAR Figure 11.5-2R, for consistency.

2. With the changes made in the response to Question 14.03.08-4, the application now includes two truck bay monitors (RE-288 and RE-289), however, only one truck bay monitor (RE-289) is shown in FSAR Figure 11.5-2T. Please update the figure to include RE-288, as appropriate.

3. 10 CFR 50.34(f)(xvii) requires that instrumentation be provided that measure containment high level radiation intensity and NUREG-0737 specifies that the monitors be widely separated and view a large fraction of the containment volume.

   In response to item 5 in Question 14.03.08-4, the applicant proposed adding ITAAC 7 to Tier 1, Table 2.7.6.5-3, to indicate that the containment radiation monitors will be located in an unimpeded location. However, the acceptance criteria for this ITAAC is subjective, which could lead to disagreement to if the criteria is met or not. Please revise this ITAAC so that it specifies the minimum percent unimpeded exposure path of the containment atmosphere free volume for each high range radiation monitor, sufficient to access post LOCA containment radiation conditions, consistent with 10 CFR 50.34(f)(xvii) and the guidance of NUREG-0737 II.F.1, or to reference a figure which clearly shows the vertical and horizontal locations of the monitors and ensures that it has an unimpeded view.

4. In response to item 4 in Question 14.03.08-4, the applicant indicated which ITAAC are used to ensure that when the monitors with emergency safety features (ESF) detect high radiation levels that the appropriate ESF are actuated. Regarding this response, please resolve the following;

   a. During the pre-application review, the applicant indicated that these monitors would be tested with an actual radiation check source and not some type of artificial signal. In order to remove any ambiguity, please include the word “radiation” in front of “check source” in ITAAC 3 and 6 in Table 2.7.6.5-3 and ITAAC 4 and 5 in Table 2.7.6.4-3.

   b. The applicant indicates that the tests from detection of the radiation signal to actuation of the ESF functions are overlap tests, however, this does not appear to be the case. As an example, ITAAC 6 in Table 2.7.6.5-3 states that the ESF initiation signals are sent to the ESF-CCS group control cabinet. If the test was an overlap test, it would also ensure that the ESF-CCS group control cabinet receives the signal appropriately. Then, ITAAC 5 in Table 2.5.4-4 would overlap with ITAAC 6 in Table 2.7.6.5-3, because ITAAC 5 in Table 2.5.4-4 begins with the signal being received by the ESF-CCS group control cabinet. Therefore, please update all ITAAC associated with testing from sensor to actuator to ensure that the tests for radiation monitors with ESF functions are performed with appropriate overlap testing. In lieu of revising multiple ITAAC, the applicant may elect to include a new or separate ITAAC that appropriately tests the monitors with ESF functions from sensor (with a radiation source) to ESF function actuation, in one ITAAC.

   c. The purpose of the ITAAC is to ensure the facility is constructed and operates as referenced in the design certification. In ITAAC Table 2.7.3.2-3, it is unclear why ITAAC 10 would have an acceptance criteria indicating that it is met based on the conclusions reached in a report. It would appear that the isolation of dampers and the start of emergency ventilation would be something that should be physically tested to ensure that everything functions properly. Please revise the acceptance criteria for this ITAAC and other ITAAC associated with actuation functions from radiation monitors so that they ensure that the proper dampers physically close and that the emergency exhaust ventilation physically starts properly (or other action is appropriately performed) or explain and provide justification for why it is appropriate to rely on the conclusions reached in a report for these ITAAC.

   d. In addition, ITAAC 10 in Table 2.7.3.2-3 does not provide any minimum timeframe for damper closure or the start of the emergency ventilation. Please update ITAAC 10 in Table 2.7.3.2-3 or provide a new ITAAC to include this information.

5. In the response to item 1 of Question 14.03.08-5, the applicant proposed adding new information to Tier 1, Table 2.7.6.4-1. The following questions are a result of the proposed changes:

   a. Staff notes that the seismic category of monitors PR-RE-111 and PR-RE-104 is listed as “A.” Since there is no definition for seismic category A in the design, please correct this apparent error.

   b. For the CVCS Letdown Line monitor (CV-RE-036), the class and range information is blank. In addition, staff cannot find any information in Tier 2 Chapters 11 and 12 regarding this monitor. Please provide additional information regarding this monitor and its purpose and resolve these issues.

   c. The proposed addition of Note (4) to the table states, “Q = Quality Class: Q, A, S” however, there is no relevant information provided in Table 2.7.6.4-1 corresponding to this note. In addition, Tier 2 Tables 11.5-1 and 12.3-6 include the same note and the tables include a quality class column with each monitor listed as either Q, A, S, or T. Please provide information defining quality class and describing what the different designations mean and either remove the designation from Tier 1 or provide the column listing the information. Provide FSAR updates to describe quality class, delete unnecessary information or resolve inconsistencies, as appropriate.

6. In item 4 of Question 14.03.08-5, staff requested that the applicant provide information on the overlap testing ITAAC in place for the main control room air intake monitors to ensure that the appropriate ESF function of isolating normal ventilation and starting emergency ventilation occurs (beginning with Tier 1 Table 2.7.6.4-3). Instead of providing this information the applicant provided information on the testing provided for the radiation monitors associated with containment purge isolation and fuel handling emergency ventilation. However, staff believes the correct set of ITAAC for

testing the main control room radiation monitors for emergency actuation are ITAAC 5 in Table 2.7.6.4-3, ITAAC 5 in Table 2.5.4-4, and several ITAAC in Table 2.7.3.1-3 (including items 10 and 12).

a. Similar to item "4.b" above, (this time for main control room air intake monitors associated with Table 2.7.6.4-3), please ensure that sufficient overlap testing is provided to test the monitors from sensor to the completion of the ESF functions or provide a separate individual ITAAC testing the function from the detection of high radiation levels (with a radiation check source) to completion of actuation of the ESF function (e.g. altering appropriate dampers and activating emergency ventilation).

b. ITAAC 9 in Table 2.7.3.1-3 indicates that upon detection of radiation in the outside air intakes, the air intake isolation dampers in the air intake having the higher radiation level close automatically. When one air intake is closed, the radiation readings on the associated radiation monitor will likely greatly decrease because there is no longer air being drawn in the intake. During an accident, please indicate if the intake that initially has the higher radiation is closed and will remain closed regardless of radiation levels, or if the closed intake will automatically open if higher radiation levels are detected in the open intake. If the design is such that the open intake could continually change automatically based on radiation levels, please discuss why this design is appropriate.


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