
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 116-8054
SRP Section: 14.03.08 – Radiation Protection Inspections, Tests, Analyses, and Acceptance Criteria Application Section:
Application Section: Tier 1, Various Sections
Date of RAI Issue : 07/27/2015

Question No. 14.03.08-9

10 CFR 50.49 and 10 CFR 50, Appendix A, criterion 4 require that certain components important to safety be designed to withstand environmental conditions, including the effects of radiation, associated with design basis events, including normal operation, anticipated operational occurrences, and design basis accidents.

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.

While various ITAAC throughout Tier 1 provide ITAAC verifying that Class 1E components located in potentially harsh environmental conditions are being qualified for the harsh environmental conditions for which they are located, not all Class 1E equipment identified in the equipment qualification program in Tier 2, Section 3.11, as being located in a harsh environment, contain an ITAAC, specifying that they are being qualified to withstand harsh environmental conditions.

For example, both Tier 1, Table 2.7.6.5-1 and Tier 2, Table 3.11-3 identify containment radiation monitors (231A, 232B, 233A, and 234B) as class 1E monitors. While Tier 2, Table 3.11-3, lists these monitors as being located in harsh environmental and radiological environments, Tier 1 does not list the environmental conditions for these monitors and does not provide an ITAAC requiring that an analysis be performed to ensure the monitors can withstand the environmental conditions that they will be exposed to where they are located.

Please explain why some safety related, class 1E equipment, which are identified in Tier 2 Table 3.11-3 as being located within harsh environments, contain Tier 1 ITAAC associated with them verifying that they can withstand the environmental condition where they are located, while others do not.

Response

In response to RAI 184-8209 Question 03.11-14, pertinent information from Table 3.11-3 such as radiation condition, equipment designation, etc. is being relocated to Table 3.11-2 and Table 3.11-3 will be deleted. Table 3.11-2 will also include all Class 1E and the mechanical equipment located in a harsh environment.

KHNP will revise the Tier 1 ITAAC tables to include the Class 1E equipment in a harsh environment that did not have an associated ITAAC and also the mechanical equipment located in a harsh environment. An example of the type of ITAAC that will be added is shown for an I&C component, area radiation monitors (ARMs). For the ARMs, an item is added to the Design Description section of Tier 1 that the Class 1E components and instruments identified in Table 2.7.6.5-1 (Area Radiation Monitoring System Component List) as being qualified for a harsh environment are capable of withstanding the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function. A column is added to the table to denote the applicable components and instruments and an associated ITAAC is added to Table 2.7.6.5-3, Item 7.

Impact on DCD

DCD Tier 1 Section 2.7.6.5.1, Tables 2.7.6.5-1 and 2.7.6.5-3 will be revised as indicated in the example provided in the Attachment.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on the Technical Report.

APR1400 DCD TIER 12.7.6.5 Area Radiation Monitoring System2.7.6.5.1 Design Description

The area radiation monitoring system (ARMS) monitors the radiation levels in selected areas throughout the plant. The area monitors warn operators and station personnel of the visible and audible alarm when unusual radiological events occur.

Components of the ARMS are located in the containment building, the auxiliary building, and the compound building.

1. The functional arrangement of the ARMS is described in the Design Description of Subsection 2.7.6.5.1 and in Table 2.7.6.5-1.
2. The ARMS provides operating personnel with an indication and record of radiation levels in the MCR.
3. The monitors provide local readout and alarm units at the detector locations.
4. Separation is provided between Class 1E channels, and between Class 1E division and non-Class 1E division.
5. The seismic Category I monitors of the ARMS identified in Table 2.7.6.5-1 can withstand seismic design basis loads without loss of safety function.
6. The safety-related divisional cabinet (SRDC) of the ARMS provides an automatic ESF initiation signals, as shown in Table 2.7.6.5-2.

2.7.6.5.2 Inspections, Tests, Analyses, and Acceptance Criteria

The ITAAC for the area radiation monitoring system is described on Table 2.7.6.5-3.

7. The Class 1E components and instruments identified in Table 2.7.6.5-1 as being qualified for a harsh environment are capable of withstanding the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.

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Table 2.7.6.5-1

Area Radiation Monitoring System Components List

Description	Tag No ⁽¹⁾	Class ⁽²⁾			Range	Display/ Alarm at MCR/RSR
		S	SE	E		
Post Accident Primary Sample Room	RE-205	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Normal Primary Sample Room	RE-285	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Main Steam & FW Containment Piping Penetration Area	RE-237 RE-238	N	II	N	$10^0 \sim 10^5$	Yes/Yes/Yes
Fuel Handling ACC & POST-ACC High Range Monitor In Containment	RE-231A RE-232B	3	I	A B A B	$10^{-3} \sim 10^2$	Yes/Yes/Yes
	RE-233A RE-234B				$10^1 \sim 10^8$	Yes/Yes/Yes
Incore Instrument	RE-235	N	II	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Containment Personnel Access Hatch Area	RE-236	3	I	A B	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Spent Fuel Pool Area	RE-241A RE-242B	N	II	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
New Fuel Storage Area	RE-245	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Hot Machine Shop	RE-293	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Low Level Lab	RE-257	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Instrument Calibration Facility	RE-286	N	II	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Main Control Room Area	RE-275	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
TSC Area	RE-279	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Truck Bay	RE-289	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Waste Drum Storage Area	RE-292	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes
Compound Building Dry Active Waste Storage Area	RE-284	N	III	N	$10^{-3} \sim 10^2$	Yes/Yes/Yes

(1) The column "Tag No." is information only (not part of certified design).

(2) S : Safety Class per ANSI/ANS-51.1; 1=SC-1, 2=SC-2, 3=SC-3, N=NNS

SE : Seismic Category; I, II, III

E : Electrical Class ; A, B, C, D=Class 1E Separation Division, N=Non-Class 1E

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attached page.

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Table 2.7.6.5-3 (2 of 2)

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
<p>5. The seismic Category I monitors of the ARMS identified in Table 2.7.6.5-1 can withstand seismic design basis loads without loss of safety function.</p>	<p>5.a. Inspections will be performed to verify that the as-built seismic Category I monitor identified in Table 2.7.6.5-1 is located in a seismic Category I structure(s).</p>	<p>5.a. The as-built seismic Category I monitor identified in Table 2.7.6.5-1 is located in a seismic Category I structure(s).</p>
	<p>5.b. Type test, analyses, or a combination of type tests and analyses of seismic Category I monitor identified in Table 2.7.6.5-1 will be performed.</p>	<p>5.b. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.5-1 withstands seismic design basis loads without loss of safety function.</p>
	<p>5.c. Inspections and analyses will be performed to verify that the as-built seismic Category I monitor identified in Table 2.7.6.5-1 including anchorages is seismically bounded by the tested or analyzed conditions.</p>	<p>5.c. A report exists and concludes that the seismic Category I monitor identified in Table 2.7.6.5-1 including anchorages is seismically bounded by the tested or analyzed conditions.</p>
<p>6. The safety-related divisional cabinet (SRDC) of the ARMS provides an automatic ESF initiation signals, as shown in Table 2.7.6.5-2.</p>	<p>6. A Testing of the as-built SRDC will be performed using an integral activated check source.</p>	<p>6. Each as-built ESF initiation signal is sent to ESF-CCS group control cabinet upon detection of high radiation of containment operating area and fuel handling area defined in Table 2.7.6.5-2, if plant's radiation monitors exceed predetermined setpoints for containment purge isolation actuation signal (CPIAS) and fuel handling area emergency ventilation actuation signal (FHEVAS).</p>

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A

Harsh Environment Qualified
No
No
No
Yes
Yes
No
No
No
No
No
No
No
Component to be deleted
No
No
No
No
No

B

<p>7. The Class 1E components and instruments identified in Table 2.7.6.5-1 as being qualified for a harsh environment are capable of withstanding the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p>	<p>7.a Type tests, analyses or a combination of type tests and analyses will be performed on Class 1E components and instruments located in a harsh environment.</p>	<p>7.a A report exists and concludes that the Class 1E components and instruments identified in Table 2.7.6.5-1 as being qualified for a harsh environment are capable of withstanding the environmental conditions that would exist before, during, and following a design basis accident without loss of safety function for the time required to perform the safety function.</p>
	<p>7.b Inspections will be performed on the as-built Class 1E components and instruments and the associated wiring, cables, and terminations located in a harsh environment.</p>	<p>7.b A report exists and concludes that the as-built Class 1E components and instruments and the associated wiring, cables, and terminations identified in Table 2.7.6.5-1 as being qualified for a harsh environment are bounded by type tests, analyses, or a combination of type tests and analyses.</p>