KHNPDCDRAIsPEm Resource

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Sent:	Monday, November 02, 2015 7:38 AM
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Subject:	APR1400 Design Certification Application RAI 281-8232 (14.02 - Initial Plant Test Program - Design Certification and New License Applicants)
Attachments:	APR1400 DC RAI 281 RPAC 8232.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.

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

Thank you,

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Hearing Identifier: KHNP_APR1400_DCD_RAI_Public
Email Number: 330

Mail Envelope Properties (430c132b1102494099f52ad6b747d2c2)

Subject: APR1400 Design Certification Application RAI 281-8232 (14.02 - Initial Plant Test Program - Design Certification and New License Applicants)
Sent Date: 11/2/2015 7:38:18 AM
Received Date: 11/2/2015 7:38:19 AM
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Files	**Size**	**Date & Time**
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image001.jpg	5040	

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Priority: Standard
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REQUEST FOR ADDITIONAL INFORMATION 281-8232

Issue Date: 11/02/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 14.02 - Initial Plant Test Program - Design Certification and New License Applicants
Application Section: 14.2

QUESTIONS

14.02-46

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," provides guidance on initial tests that are acceptable to staff as part of the initial test program. This includes information on testing area and airborne radiation monitors.

While APR1400 FSAR Table 14.2-1 indicates that FSAR Subsection 14.2.12.1.107 provides a preoperational test for the airborne and area radiation monitoring system test, a review of FSAR Section 14.2.12.1.107 indicates that the test only includes the area radiation monitoring system test and not the airborne radiation monitoring system.
Please include airborne radiation monitors in this test or justify why it is unnecessary to test the airborne radiation monitors.

14.02-47

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," provides guidance on initial tests that are acceptable to staff as part of the initial test program. Appendix A to Regulatory Guide 1.68 provides guidance on the types of tests that should be included as part of the initial test program. Section A-1.m. "Radioactive Waste Handling and Storage Systems," indicates in part that testing should be designed to demonstrate compliance with the effluent concentration limits of Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure.:

However, staff does not see any criteria in the initial test program to ensure that Auxiliary and Compound Building ventilation systems meet, at a minimum, the airflow rate values provided in FSAR Table 12.2-26, for cubicles which could potentially contain airborne radioactivity. The HVAC system airflow rates provided in this table are airflow rates relied upon to provide reasonable assurance that airborne concentrations remain below the DAC limits and that airborne radioactivity concentrations are as low as is reasonably achievable. Therefore, please update FSAR Section 14.2, "Initial Plant Test Program," to provide this information.

14.02-48

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," provides guidance on initial tests that are acceptable to staff as part of the initial test program. Appendix A to Regulatory Guide 1.68 provides guidance on the types of tests that should be included as part of the initial test program. Section A-1.k. "Radiation Protection Systems" indicates that, "For radiation monitoring equipment that is used to perform automatic control functions, the tests should confirm, using established instrumentation set-points, that upon detecting elevated levels of radioactivity, the system initiates the proper automatic control features in ensuring the timely closures of isolation valves or dampers."

FSAR Section 10.4.10, indicates that the auxiliary steam system is equipped with a radiation monitor which continuously checks for contamination and if the condensate is contaminated the monitor actuates an alarm in the main control room and automatically redirects the condensate to the liquid waste management system for treatment. However, there does not appear to be anything in the initial test program verifying that this monitor will automatically redirect the condensate to the liquid waste management system for treatment. In addition, in reviewing FSAR Chapters 11 and 12 it is unclear which monitor is performing this function.

1. Please update FSAR Section 14.2 to include a test to ensure that the monitor performs its function of automatically redirecting the condensate to the liquid waste management system.

2. Please specify which radiation monitor performs this function and update FSAR Chapters 11 and 12 to ensure it is clear which monitor performs this function.

14.02-49

10 CFR Part 50, Appendix E, Section IV, indicates that the emergency response data system is required to include various parameters, some of which are associated with radiation monitoring including, reactor coolant radioactivity, containment radiation level, condenser air removal radiation level, effluent radiation monitor, and process radiation monitor levels.

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," provides guidance on initial tests that are acceptable to staff as part of the initial test program. Appendix A to Regulatory Guide 1.68 provides guidance on the types of tests that should be included as part of the initial test program. Section A-1.k. "Radiation Protection Systems" indicates that the initial test program should include a test to test that radiation data is being transmitted to the emergency response data system.

1. Please update FSAR Chapters 11 and 12 to specify which radiation monitors are responsible for transmitting the emergency response data system parameters required in 10 CFR Part 50, Appendix E.

2. Include a test in the applicable initial test program section 14.2 to ensure that each of these radiation monitors are accurately transmitting data to the emergency response data system and that the emergency response data system is accurately providing the correct data.

14.02-50

Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Nuclear Power Plants," provides guidance on initial tests that are acceptable to staff as part of the initial test program. Appendix A to Regulatory Guide 1.68 provides guidance on the types of tests that should be included as part of the initial test program. Section A-1.k. "Radiation Protection Systems" indicates that, "For radiation monitoring equipment that is used to perform automatic control functions, the tests should confirm, using established instrumentation set-points, that upon detecting elevated levels of radioactivity, the system initiates the proper automatic control features in ensuring the timely closures of isolation valves or dampers." It also indicates that, "depending upon design features, the logic sequence and interdependence of the actuation of automatic features should be tested as well when linked to radiation levels process streams and radioactive effluents." In addition, RG 1.68, Section A-1.k, item 6, indicates that radiation monitoring computer systems should be tested.

In addition, FSAR Chapter 12 the applicant references ANSI/ANS-HPSSC-6.8.1-1981 for the area radiation monitoring system. ANSI/ANS-HPSSC-6.8.1-1981 indicates that in preforming functional tests of radiation monitor channels, including alarm functions, a radioactive check source is preferable to other means such as simulated signals.

However, in reviewing FSAR Sections 14.2.12.1.106 and 14.2.12.1.107, it indicates that simulated signals will be used to test control actions and alarms, instead of a calibration source.

1. Please revise the initial test program in order to test the functionality of the radiation monitor computer system in order to ensure that radiation levels, alarms, and control actions are properly being communicated between the radiation monitors, the monitor computer system, the main control room, and any applicable system actuation, or justify why the current approach is acceptable.

2. Update FSAR Sections 14.2.12.1.106 and 14.2.12.1.107, to test the control functions or alarms associated with high radiation levels with a radiation calibration source, or justify why the use of simulated signals is acceptable.

14.02-51

SRP 14.2 indicates that the staff will review the adequacy of testing proposed for specific SSCs.

In FSAR Sections 14.2.12.3.1, “Low-power biological shield survey test” and 14.2.12.4.9, “Biological shield survey test,” the acceptance criteria indicate that the biological shield performs as described in Subsection 12.3.2.2, however, subsection 12.3.2.2 provides no information on how the biological shield is expected to perform. Please clarify what is meant by this statement, update FSAR subsection 12.3.2.2 to provide information on the shielding criteria for the biological shield, or update 14.2.12.3.1 and 14.2.12.4.9 to reference an accurate section.

14.02-52

SRP 14.2 indicates that the staff will review the adequacy of testing proposed for specific SSCs.

In FSAR Section 14.2.12.4.9, “Biological shield survey test,” the acceptance criteria indicate that accessible areas and occupancy times during power operation have been defined as described in subsection 12.3.2. However, FSAR subsection 12.3.2 does not provide any information on occupancy times. Please update FSAR subsection 12.3.2 to provide this information or reference an appropriate FSAR section.

14.02-53

SRP 14.2 indicates that the staff will review the adequacy of testing proposed for specific SSCs.

FSAR Section 14.2.12.4.9 indicates that one of the objectives of the biological shield survey tests is to determine occupancy times for areas outside the biological shield during power operations. However, acceptable occupancy times for radiological areas will need to be based on radiological conditions at the time of occupancy which could change due to plant conditions (for example, if fuel failure occurs) and surveys of radiological areas during operation will need to be conducted to ensure compliance with 10 CFR 20 requirements. In addition, RG 8.8 indicates that dose rates should be measured periodically during operation to determine current exposure potential. Therefore, occupancy times for these areas cannot be determined based on the biological shield survey test alone. Please update the objective for the biological shield survey test in the FSAR, as appropriate, such as to specify that the test will assist in determining allowable occupancy times for areas outside the biological shield.

14.02-54

Regulatory Guide 1.68, “Initial Test Programs for Water-Cooled Nuclear Power Plants,” provides guidance on initial tests that are acceptable to staff as part of the initial test program. Appendix A to Regulatory Guide 1.68 provides guidance on the types of tests that should be included as part of the initial test program. Various radiation protection related items that RG 1.68 indicates should be tested do not appear to be addressed in the initial plant test program for the APR1400 design. These include the following:

1. Testing of laboratory equipment used to analyze or measure radiation levels and radioactivity concentrations (see RG 1.68, Appendix A, Section A-1.k. item 3).
2. Testing for leakage control and detection for the chemical and volume control system and testing the gaseous systems for leak detection or equivalent testing (see RG 1.68, Appendix A, Section A-1.l).
3. Testing of components to control the temperature of the steam generator blowdown system, as discussed in FSAR Section 10.4.8, to protect the steam generator blowdown resin beds, preventing a sudden loss of resin bed efficiency and the release of radioactivity above established limits and contamination of otherwise clean portions of plant systems (see RG 1.68, Appendix A, Section A-1.k).

Please provide the above tests in the initial test program or justify an alternative.

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