KHNPDCDRAIsPEm Resource

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Sent: Friday, May 22, 2015 10:34 AM
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Cc: Stutzcage, Edward; Lee, Samuel; McCoppin, Michael; Olson, Bruce
Subject: APR1400 Design Certification Application RAI 14-7858 (12.3-12.4 Radiation Protection Design Features)
Attachments: image001.jpg; APR1400 DC RAI 14 RPAC 7858.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 the RAI. We may adjust the schedule accordingly.

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

Thank you,

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Protecting People and the Environment

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REQUEST FOR ADDITIONAL INFORMATION 14-7858

Issue Date: 05/22/2015
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 12.03-12.04 - Radiation Protection Design Features
Application Section: 12.3-12.4

QUESTIONS

12.03-1

REQUIREMENTS

10 CFR 20.1406(b) requires that, “Applicants for standard design certifications, standard design approvals, and manufacturing licenses under part 52 of this chapter, whose applications are submitted after August 20, 1997, shall describe in the application how facility design will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste."

Regulatory Guide (RG) 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning,” provides guidance on meeting the requirements of 10 CFR 20.1406. RG 4.21 indicates that, monitoring of some buried, embedded in concrete, or in contact with soil pipes was not sufficiently sensitive at decommissioned plants to identify small leaks and leakage rates and that such situations and conditions should be avoided during facility design. It indicates that leak detection systems should be included within the facility design that are capable, to the extent practical, of detecting minor leaks that otherwise, over time, could potentially cause significant environmental contamination.

ISSUE

The applicant indicates that the specific systems which contain underground piping will be based upon site-specific plant layout conditions. Therefore, COL 12.4(3) indicates that, “The COL applicant is to implement concrete tunnels for piping of the systems that may include underground piping carrying contaminated or potentially contaminated fluid to minimize buried piping.” However, the COL item provides no information on if there will be leakage equipment within the tunnels. In addition, while FSAR Section 12.4.2.4.4 indicates that underground piping tunnels are coated with epoxy and are equipped with liquid detection level switches, there is no discussion regarding if the design will be such that minor leaks can be detected within the system.

INFORMATION REQUESTED

Please update COL 12.4(3) to have the COL applicant describe the leakage detection capabilities within any underground concrete piping tunnels. The leakage detection capabilities should be designed to detect minor leaks, to the extent practicable.

12.03-2

REQUIREMENTS

10 CFR 19.12 (a) requires that all individuals who in the course of employment are likely to receive in a year an occupational dose in excess of 100 mrem (1 mSv) be trained as radiation workers.
10 CFR 20.1301 requires that the total effective dose equivalent to individual members of the public (those individuals not trained in accordance with 10 CFR 19.2 (a)) does not exceed 100 mrem per year.

ISSUE

COL item 12.4(1) states that, “The COL applicant is to estimate construction worker doses based on the site-specific number of operating units, distances, meteorological conditions, and construction schedule.”

This COL item is necessary in order to provide reasonable assurance that construction workers will meet applicable regulatory requirements, such as 10 CFR 20.1301, if the construction workers are not trained radiation workers in accordance with 10 CFR 19.12. While factors such as those mentioned above need to be considered in calculating the dose to construction workers, other factors may also need to be considered in estimating the construction worker dose, such as if there is existing contamination on the construction site from an existing unit, or the location of an existing independent spent fuel storage installation (ISFSI) near the construction area. Therefore, only considering those factors listed in COL 12.4(1) could result in an incomplete analysis of radiation exposure to construction workers.

INFORMATION NEEDED

Since the appropriate considerations are site specific and since there is no way to definitively list all applicable factors for a given site, please update COL item 12.4(1) to indicate that the construction worker dose estimates should consider all applicable site specific factors and not just those listed above. For example, the applicant may choose to update COL Item 12.4(1) to state, “The COL applicant is to estimate construction worker doses based on site-specific information, such as, the number of operating units, distances from radiation sources, meteorological conditions, and construction schedule.”

12.03-3

REQUIREMENTS

10 CFR 20.1406(b) requires that, “Applicants for standard design certifications, standard design approvals, and manufacturing licenses under part 52 of this chapter, whose applications are submitted after August 20, 1997, shall describe in the application how facility design will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste."

SRP Section 12.5 indicates that plant programs and procedures should be consistent with RG 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning” and the applicable portions of RG 4.22, “Decommissioning Planning During Operations.”

In addition, SRP Section 12.5 also states that, Regulatory Positions of C.4 and C.5 of RG 4.22, provide guidance (not discussed in RG 4.21) for complying with 10 CFR 20.1406(c) and 10 CFR 20.1501 to minimize the introduction of radioactive materials in plant facilities and environment, and document the results of radiological surveys, conducted during plant operation, to characterize radiological

contamination and plan decommissioning at the time of license termination that is applicable to all licensees.

ISSUE

1. COL item 12.4(2) states that the COL applicant will implement a minimization of contamination approach. However, there is no mention if the programs and procedures will be consistent with RG 4.21 and 4.22. Staff notes that while much of RG 4.22 applies only to reactors currently in operation, portions of the RG apply to all licensees.

2. FSAR Table 1.9-1 indicates that RG 4.22 is not applicable to the APR 1400. However, portions of RG 4.22 provide guidance that would apply to all licensees.

INFORMATION NEEDED

1. COL item 12.4(2) should indicate if their programs and procedures will be consistent with RGs 4.21 and 4.22.

2. Please review FSAR Table 1.9-1 and modify the information related to the applicability of RG 4.22, as appropriate. If RG 4.22 is not applicable to the APR1400 design, please justify this deviation from the SRP

12.03-4

REQUIREMENTS

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, Appendix A, Criterion 61, requires that systems which may contain radioactivity be designed to assure adequate safety under normal and postulated accident conditions, with suitable shielding for radiation protection, and with appropriate containment, confinement, and filtering systems.

SRP Section 12.3-12.4 states that the plant should be subdivided into radiation zones with maximum design dose rate zones and the criteria used in selecting maximum dose rates identified. It also indicates that the assumptions and technics used for radiation shielding should be provided and that anticipated operational occurrences should be considered in the determination of plant shielding and zoning.

ISSUE

While FSAR Section 12.3 indicates that the normal operation shielding and zoning for the plant is based on the source terms provided in 12.2, the application is unclear on how shielding and zoning was determined for radiation sources which are not explicitly provided in 12.2, such as pipes, pumps, ventilation ducts, etc, which are not modeled in FSAR Section 12.2.

INFORMATION NEEDED

1) For sources which are not provided in FSAR Section 12.2, provide a general description of how the dose contributions from those sources were addressed in the plant shielding design and how radiation zone designations were developed for those sources. As part of the response, a) indicate if significant sources (such as piping that will contain resin during resin transfer) were modeled the same way as the sources that are provided in 12.2, based on the 0.25% failed fuel source term and using the same radionuclide transport and shielding and dose assessment codes identified in the FSAR or if an alternative method was used; b) If any shielding thicknesses or zone designations throughout the plant were determined

using a different methodology than what is described in the FSAR, please include a description of the alternative methodology and how it was used in the response; c) Provide a general description of the methodology used for determining shielding and zoning for pipe chase and valve rooms; d) Please ensure that the information provided includes a general, but complete, description of the methodology used for determining radiation shielding and zoning throughout the plant and that significant assumptions are identified.

2) Please update FSAR section 12.3 to provide general information indicating how dose contributions from sources which are not explicitly provided in FSAR Section 12.2 are considered in the plant shielding design and the determination of plant radiation zones.

3) While FSAR Section 12.3.2.3 indicates that shielding design thicknesses provided in the FSAR are based on the use of ordinary concrete as the shield material, the application does not discuss the shielding properties of doors or any other shielding material where concrete will not be used. For example, it is unclear if doors will provide equivalent radiation attenuation as the shield wall on which they are located and what other materials throughout the plant may be relied on for radiation shielding.

   a. Please indicate if there are any doors/hatches being relied on to maintain doses within the radiation zone designations provided in the Chapter 12 radiation zone figures. If so, update the FSAR to describe the material composition and shielding properties of these doors/hatches and indicate if they are sufficient to maintain dose rates within the zones specified.

   b. Please update the FSAR to describe all types of materials that will be relied on for radiation shielding throughout the plant, other than concrete or water (as used to shield spent fuel assemblies), which are already discussed in the FSAR. The description should discuss the composition of the material used, the service life of the material (if it will degrade due to the effects of radiation, heat, etc, found at the location where the material will be used), and where it will be used. (the purpose of this question is to identify permanent or long term shielding materials and locations, which will be relied upon and/or included as part of the physical plant design and not temporary shielding, such as lead blankets, which may be used under the operational radiation protection program to address short term or unanticipated shielding needs during operation).