

## KHNPDCDRAIsPEm Resource

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**Sent:** Tuesday, July 21, 2015 3:05 PM  
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**Subject:** APR1400 Design Certification Application RAI 94-7999 (12.03-12.04 - Radiation Protection Design Features)  
**Attachments:** APR1400 DC RAI 94 RPAC 7999.pdf; image001.jpg

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 45 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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**Hearing Identifier:** KHNP\_APR1400\_DCD\_RAI\_Public  
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| APR1400 DC RAI 94 RPAC 7999.pdf |             | 99710                  |
| image001.jpg                    | 5040        |                        |

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# REQUEST FOR ADDITIONAL INFORMATION 94-7999

Issue Date: 07/21/2015

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

## QUESTIONS

### 12.03-7

#### REQUIREMENTS

10 CFR 20.1101(b) requires that the licensee use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

10 CFR 20.1406(b) requires that applicants for standard design certifications 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.

#### GUIDANCE

Regulatory Guide 8.8, specifies that components of the primary coolant system and other components in contact with primary coolant should be corrosion resistant and should contain a low cobalt content. In addition, SRP Section 12.3-12.4 references Electric Power Research Institute (EPRI) Report TR-016780, "Utility Requirements Document" as a source of information relevant to ensuring that occupational radiation exposure is ALARA. EPRI TR-016780 and other EPRI documents, including EPRI TR-1003390, provide guidance on cobalt impurity levels. Specifically, EPRI TR-1003390 indicates that cobalt impurity levels in stainless steels should be less than 500 parts per million (ppm) and in Inconels, less than 200 ppm. EPRI TR-016780 indicates that cobalt for components fabricated with stainless steel or nickel base alloy with a large wetted surface area (major piping, clad, etc.) and with operating temperature above 200 degrees Fahrenheit (F) should be restricted to a maximum content of 0.050 weight percentage. In addition, EPRI TR-016780 indicates that components near high neutron flux areas or expected to release significant quantities of corrosion products to the reactor coolant stream, and for components expected to be significant sources of radiation exposure to plant maintenance personnel cobalt content targets (mean values) lower than 0.05 weight percentage should be specified by the plant designer.

#### ISSUE

FSAR Section 12.3.1.3, Section b, provides information on corrosion product control. In this section the applicant discusses the use of corrosion resistant material and reducing cobalt content in primary system materials. Some of the information in this section appears inconsistent with the above mentioned guidance and appears somewhat incomplete. Therefore, the staff has the following questions related to corrosion resistance and cobalt content for systems in contact with primary system fluid.

#### INFORMATION NEEDED

1. While FSAR Section 12.3.1.3, Section b (including Table 12.3-1), and FSAR Chapter 5 provides information on corrosion resistance and cobalt control for the primary coolant system, the application is unclear what is being done to limit corrosion and cobalt content in other systems that will be in contact with primary system fluid, such as the chemical and volume control system. Please update FSAR Section 12.3.1.3 (including Table 12.3-1, as appropriate) to provide information describing how the other systems in contact with primary system fluid will minimize corrosion and cobalt content.
2. FSAR Section 12.3.1.3, Section b, indicates that the cobalt content for components with a large wetted surface area and an operating temperature of greater than 200 degrees F is restricted to a maximum of 0.1 weight percentage cobalt. This appears inconsistent with the EPRI TR-016780, which is referenced in the SRP (as discussed above). Please update this information in the FSAR to be consistent with the above mentioned guidance or provide justification for the current values.
3. FSAR Section 12.3.1.3, Section b, also indicates that for components in or near the core or expected to release significant quantities of corrosion products, cobalt content targets (mean values) lower than 0.1 weight percentage are specified. This also appears inconsistent with EPRI TR-016780. Please update the FSAR to ensure that components near high neutron flux areas expected to release significant quantities of corrosion products to the reactor coolant stream, and components expected to be significant sources of radiation exposure to plant maintenance personnel are limited in cobalt content (mean values) to lower than 0.05 weight percentage, or justify an alternative approach.
4. FSAR Table 12.3-1 indicates that the cobalt content of finished surfaces for the reactor coolant pump is 0.1 weight percentage maximum value. This is inconsistent with the above mentioned guidance. Please update FSAR Table 12.3-1

## REQUEST FOR ADDITIONAL INFORMATION 94-7999

to provide a maximum reactor coolant pump cobalt content value consistent with the above mentioned guidance or provide justification for an alternative approach.

5. FSAR Section 12.4.1.1.1 specifies that the average cobalt content of steam generator tube material is less than 0.015 weight percentage. However, no information is provided in FSAR Table 12.3-1 on the average or maximum cobalt content for the steam generator tubes. Please update FSAR Table 12.3-1 to provide this information.
6. Please indicate the material composition (e.g. stainless steel, nickel/chromium based alloy, etc) of the components currently listed in FSAR Table 12.3-1. If the material is not stainless steel (i.e. if the material is a nickel/chromium based alloy or other), please indicate why the cobalt content for the component is acceptable, provided the guidance documents discussed above.

