

## KHNPDCDRAIsPEm Resource

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**Sent:** Wednesday, July 22, 2015 1:56 PM  
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**Subject:** APR1400 Design Certification Application RAI 99-7836 (10.04.01 - Main Condensers)  
**Attachments:** APR1400 DC RAI 99 SPSB 7836.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, the following days to respond to the RAI's questions. We may adjust the schedule accordingly.

10.04.01-1: 60 days  
10.04.01-2: 60 days  
10.04.01-3: 90 days  
10.04.01-4: 60 days

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

Thank you,

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# REQUEST FOR ADDITIONAL INFORMATION 99-7836

Issue Date: 07/22/2015

Application Title: APR1400 Design Certification Review – 52-046

Operating Company: Korea Hydro & Nuclear Power Co. Ltd.

Docket No. 52-046

Review Section: 10.04.01 - Main Condensers

Application Section:

## QUESTIONS

### 10.04.01-1

GDC 60 requires, in part, a power unit design to “include means to control suitably the release of radioactive materials in gaseous and liquid effluents ... produced during normal reactor operation, including anticipated operating occurrences.” As stipulated in SRP Section 10.4.1, Section II, “Acceptance Criteria”, Item 1, the design of the main condenser (MC) is acceptable if the integrated design of the system meets the requirements of GDC 60 as related to failures in the design of the system which do not result in excessive releases of radioactivity to the environment.

DCD Tier 2, Section 10.4.1.3, “Safety Evaluation,” provides an evaluation of the APR1400 MC system. The DCD states that non-condensable gases are removed by the mechanical vacuum pumps, as addressed in DCD Tier 2, Section 10.4.2, and there is no hydrogen buildup in non-condensable gas constituents in the MC.

While reviewing DCD Tier 2, Section 10.4.1, the staff could not find adequate details to justify the requirements of GDC 60, as it relates to the detection and main control room annunciation of a potential explosive environment due to hydrogen buildup.

The applicant is requested to provide additional information in the DCD, with full justification, to conform to the GDC 60 criteria as described above.

### 10.04.01-2

GDC 4 requires, in part, that SSCs important to safety be “appropriately protected against dynamic effects, including...the effects of discharging fluids ...” According to Section III, “SRP Review Procedures,” Item III.2.A of SRP Section 10.4.1, “Main Condensers,” the requirements of GDC 4 are met by providing a means for controlling and correcting cooling water leakage into the condensate.

DCD Tier 2, Section 10.4.1.2, “System Description,” describes that the main condenser (MC) interfaces with the tube leak detection system to permit sampling of the condensate in the condenser hotwell. The DCD further states that, if circulating water in-leakage occurs, this system permits identification of which tube bundle has sustained leakage. The waterbox is then drained to permit access for repairs by isolating the circulating water system from the affected waterbox of the MC. The tube leak detection system is further described in DCD Tier 2, Section 9.3.2.

While reviewing DCD Tier 2, Section 10.4.1, the staff could not find further details on the controlled collection of the waterbox drainage which may contain radioactive contaminants.

The applicant is requested to provide additional information in the DCD as related to the provisions to determine which MC tube bundle is affected with the leakage.

### 10.04.01-3

In accordance with GDC 2 and 4, flood waters from a failed main condenser (MC) or its components, due to natural phenomena (GDC 2) or dynamic effects (GDC 4), that drain from the turbine building to the exterior should not present an adverse effect on safety-related SSCs located in other buildings (e.g., auxiliary building). This statement meets the guidance of Item 3.A in SRP Section 10.4.1.III (SRP Review Procedures), as it relates to flood protection of the safety-related structures, systems, and components.

## REQUEST FOR ADDITIONAL INFORMATION 99-7836

DCD Tier 2, Section 10.4.1.3, "Safety Evaluation," states that the failure of the APR1400 MC and any resultant flooding does not prevent safe shutdown of the reactor since the flood water from the turbine building does not enter the safety-related building. The DCD states that the opening or access door between the turbine building and auxiliary building is located at a higher level than the basic grade of the turbine building. DCD Tier 2, Section 3.4.1 further describes the flood protection from internal sources.

While reviewing DCD Tier 2, Section 10.4.1, the staff could not identify enough information for the staff to confirm with reasonable assurance that the MC flood water does not reach any safety-related equipment.

The applicant is requested to provide additional information in the DCD regarding flood effects due to failure of the MC and its components. Specially, the staff requests the applicant to specify the flood analysis height compared to the height of the bottom of the non-watertight openings. In addition, the staff is seeking additional information regarding the drainage away from the structures containing safety-related equipment (e.g., auxiliary building).

### 10.04.01-4

Conformance to GDC 64 requires that effluent discharge paths shall be provided with a means to monitor for radioactivity that may be released during anticipated operational occurrences, such as steam generator tube leakage.

DCD Tier 2, Section 10.4.1 states that during normal operation and shutdown, the main condenser (MC) does not have radioactive contaminants. Typically, main condensers would only be expected to receive radioactive contaminants through a steam generator tube leak. A discussion of the radiological aspects of these leaks is included in DCD Tier 2, Subsection 11.1.1.3.

While reviewing the DCD, the staff could not find adequate details to justify the requirements of GDC 64, as it relates to the detection and main control room annunciation of radioactive contaminants found in the MC.

The applicant is requested to provide additional information in the DCD, with full justification, to conform to the GDC 64 criteria as described above.

