

## **KHNPDCDRAIsPEm Resource**

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**From:** Ward, William  
**Sent:** Saturday, October 01, 2016 3:07 PM  
**To:** apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; daegeun.ahn@gmail.com; Andy Jiyong Oh; Jungho Kim (jhokim082@gmail.com); Ross, James  
**Cc:** Ward, William; Ciocco, Jeff; Mitchell, Matthew; Honcharik, John; Vera, John  
**Subject:** APR1400 Design Certification Application RAI 523-8684 [4.5.1 Control Rod Drive Structural Materials)  
**Attachments:** APR1400 DC RAI 523 MCB 8684.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, the following RAI question response times. We may adjust the schedule accordingly.

**04.05.01-15 : 45days**

**04.05.01-16 : 60days**

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

Thank you,

**William R. Ward, P.E.**  
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**Acting Branch Chief – LB2**  
**U.S. Nuclear Regulatory Commission**  
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**Washington, DC, 20555-0001**  
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**Sent Date:** 10/1/2016 3:07:22 PM  
**Received Date:** 10/1/2016 3:07:24 PM  
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## REQUEST FOR ADDITIONAL INFORMATION 523-8684

Issue Date: 10/01/2016  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 04.05.01 - Control Rod Drive Structural Materials  
Application Section:

### QUESTIONS

#### 04.05.01-15

GDC 26 establishes requirements for reactivity control system redundancy and capability. GDC 26 requires a control rod system, preferably including a positive means for inserting the rods, capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, the specified acceptable fuel design limits are not exceeded. The control rod drive system provides for rod positioning including insertion for reactivity control. Application of GDC 26 to the control rod drive system materials ensures that material selection and fabrication support reliable rod movement for reactivity control; it also preserves fuel and cladding integrity, the primary barriers to the release of fission products.

This RAI is a follow-up to RAI 436-8538, Question 04.05.01-11.

The response to RAI 8538, Question 04.05.01-11, submitted by letter dated April 19, 2016 (ADAMS Accession No. ML16110A454), stated the following:

"The Versa Vent™ is substituted for the CEDM housing nut and used for venting as long as the vent stem does not leak. In this case the pressure boundary consists of the upper pressure housing and vent stem, and the Versa Vent™ is non pressure boundary. When the vent stem leaks excessively, the Versa Vent™ is removed and CEDM housing nut is installed. In this leaking case the pressure boundary is changed to consist of the upper pressure housing and CEDM housing nut and omega seal weld. Venting is not possible when the CEDM housing nut and omega seal weld is applied. This is why the Versa Vent™ is not pressure a boundary."

The staff does not agree that the Versa Vent™ is not a pressure boundary component since the Versa Vent™ replaces and provides the same function (with the addition of venting capability) as the CRD housing nut. The CRD housing nut is classified as a pressure boundary component in the revised FSAR Section 4.5.1.1 provided in the response to RAI 303-8391, Question 04.05.01-02, dated December 22, 2015 (ADAMS Accession No. ML15356A554). Since the Versa Vent™ replaces the housing nut, it is also pressure boundary, and therefore an acceptable material specification and type should be included in the FSAR so the staff can determine if the material is suitable and compatible with the reactor coolant. Note that only the parts of the Versa Vent™ that provide pressure boundary function need to be classified as reactor coolant pressure boundary. The staff requests that FSAR Section 4.5.1.1 be revised to include the material specifications and types for the Versa Vent™ since it is a pressure boundary component in order to meet the requirements of the following regulations as outlined in SRP Section 4.5.1:

- GDC 1 and 10 CFR 50.55a require that SSCs be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the

## REQUEST FOR ADDITIONAL INFORMATION 523-8684

importance of the safety functions performed. 10 CFR 50.55a also incorporates by reference applicable editions and addenda of the ASME Boiler and Pressure Vessel Code. The control rod drive system positions control rods for reactivity control and comprises a part of the RCPB. Application of 10 CFR 50.55a and GDC 1 to the control rod drive structural materials provides assurance that the control rod drive structure materials will perform as designed.

- GDC 14 requires that the RCPB be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. The RCPB provides a fission product barrier and a confined volume for the inventory of reactor coolant. The RCPB includes portions of the control rod drive system. Application of GDC 14 assures that control rod drive materials are selected, fabricated, installed, and tested for an extremely low probability of significant degradation and, in the extreme, gross RCPB failure that could substantially reduce capability to contain reactor coolant inventory or capability to confine fission products.

### 04.05.01-16

REGULATORY BASIS: GDC 14 and 26

This RAI is a follow-up to RAI 303-8391, Question 04.05.01-02 and RAI 436-8538, Question 04.05.01-11.

The response to RAI 8538, Question 04.05.01-11, submitted by letter dated April 19, 2016 (ADAMS Accession No. ML16110A454), stated the following:

"The Versa Vent™ is installed at the initial installation phase of CEDM and venting is performed through the vent stem to eliminate the air trapped in the top of the CEDM. During normal operation the Versa Vent™ is not used for venting. The Versa Vent™ is used during the refueling period for venting."

The applicant stated that it will eliminate the air trapped in the top of the CEDM (to keep the oxygen levels low) by venting during refueling periods. However, there is no data/justification to substantiate that this approach will actually work so that non-L grade Stainless Steels can safely be used (as previously discussed in RAI 8391, Question 04.05.01.01-2, see also Regulatory Guide 1.44, "Control of the Use of Sensitized Stainless Steel"). Therefore, the staff is requesting data/operational experience that demonstrates this approach works in practice.