RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.:	**523-8684**
SRP Section:	**04.05.01 – Control Rod Drive Structural Materials**
Application Section:	**4.5.1**
Date of RAI Issue:	**10/01/2016**

Question No. 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^{TM} 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^{TM} is non pressure boundary. When the vent stem leaks excessively, the Versa Vent^{TM} 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^{TM} is not pressure a boundary."

The staff does not agree that the Versa Vent^{TM} is not a pressure boundary component since the Versa Vent^{TM} 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 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.

Response

The function of the Housing Nut is only to maintain the pressure boundary of the CEDM housing when welded in case of ball seal leak. The Versa Vent™ functions as a tool to turn the Vent Stem for opening/closing a pathway for venting gas and water. The Versa Vent™ can be left in place or removed at the operator's discretion. However, generally it is left on the top of the CEDM housing to save time for installation of the venting tool. Therefore, the Versa Vent™ does not "replace" the Housing Nut. It is a venting tool that can be left in place if desired. If the steel ball below the CEDM Vent Stem starts to leak, the stem of the Versa Vent™ will lift showing visual indication of a Vent Stem ball seal leak. When this occurs, the Versa Vent™ is removed and the ball can be repaired or a standard Housing Nut can be installed and welded in place. When welded in place, the Housing Nut becomes the primary pressure boundary. The Versa Vent™ cannot be the pressure boundary, since it relies upon an elastomeric O-ring for sealing. If the Versa Vent™ (venting tool) remains installed during plant operation, then the pressure boundary is the CEDM Vent Stem.

The Versa Vent™ allows simple and easy venting of the CEDM during reactor fill. It can be left in place or removed at the operator's discretion. If removed, the Housing Nut must be reinstalled. Leaving the Versa Vent™ in place during plant operation allows a reliable method of detecting ball seal leakage.

Impact on DCD

There is no impact on the DCD.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specifications.

Impact on Technical/Topical/Environmental Reports

There is no impact on any Technical, Topical or Environmental Report.