

## **KHNPDCDRAIsPEm Resource**

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**From:** Ciocco, Jeff  
**Sent:** Thursday, February 11, 2016 11:02 AM  
**To:** apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Steven Mannon  
**Cc:** Ray, Sheila; Zimmerman, Jacob; Wunder, George; Umana, Jessica; Lee, Samuel  
**Subject:** APR1400 Design Certification Application RAI 405-8497 (08.02 - Offsite Power System)  
**Attachments:** APR1400 DC RAI 405 EEB 8497.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 45 days of receipt of RAIs. However, KHNP requests, and we grant, 60 days to respond to this 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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## REQUEST FOR ADDITIONAL INFORMATION 405-8497

Issue Date: 02/11/2016  
Application Title: APR1400 Design Certification Review – 52-046  
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.  
Docket No. 52-046  
Review Section: 08.02 - Offsite Power System  
Application Section:

### QUESTIONS

08.02-9

By letter dated October 21, 2015, the applicant provided a response to RAI 8093, Question 08.02-6. In the response, the applicant stated that the protection schemes including overcurrent, differential current, sudden pressure and ground fault protection for large power transformers (MT, UATs, SATs) are provided in accordance with recommendations in IEEE Std. 666-1991.

However, Table 7.1, “Transformer Protection Devices” in IEEE Std. 666-1991, includes thermal overload relay (49). Please confirm whether or not the thermal overload relay is included in the MT, UATs, and SATs protective relays.

Furthermore, IEEE Std. 666-1991, Section 7.4.2, “Transformer Protection” states that “when the unit service transformer and generator step-up power transformers are connected to the generator terminals, an overall unit differential relay is often provided for backup protection of the equipment. This relay zone includes the neutral side of the generator and the high-voltage side of the unit service and generator step-up and power transformers. Frequently, this zone is extended to include the generator high-voltage circuit breaker(s). A fault occurring anywhere in this zone requires immediate shutdown of the unit.” The applicant stated that device number 87U, the unit overall differential relay, is only provided for the main transformer and not in the list of UAT protective relays. As stated above, IEEE Std. 666-1991 recommends that the relay zone include the high voltage side of the unit service transformer (in the APR1400 design this is defined as Unit Aux Transformer or UAT). Furthermore, DCD Tier 2 Section 8.1.3.3 states that the electric power system is designed to meet industry standards and lists IEEE Std. 242-2001, “IEEE Recommended Practice for Protection and Coordination of Commercial and Industrial Power Systems.” IEEE Std. 242-2001 discusses overall differential backup protection in Section 12.5.3.2.3, such that the overall differential scheme has the capability to detect severe faults. Please discuss why the unit overall differential relay is also not included for the UAT or provide an alternate means of providing generator overall differential protection.

The proposed revision to DCD Tier 2, Section 8.2.1.3 should provide details how the MT, UATs, and SATs protection schemes’ are in accordance with the recommendations in IEEE Std. 666-1991. Please provide the list of protective relays for the MT, UATs, and SATs, in the DCD as how the APR1400 design meets the recommendations in IEEE Std. 666-1991.



**U.S.NRC**

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