

SUPPLEMENTAL 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.: 92-8068

SRP Section: 03.09.05 – Reactor Pressure Vessel Internals

Application Section: 3.9.5

Date of RAI Issue: 07/21/2015

Question No. 03.09.05-16

GDC 1 and 10 CFR 50.55a require that reactor internals be designed to quality standards commensurate with the importance of the safety functions performed. Standard Review Plan Section 3.9.5, "Reactor Pressure Vessel internals," Areas of Review 2 includes the basis for the design of the reactor internals, loading conditions of normal operation, anticipated operational occurrences, potential adverse flow effects of flow-excited vibrations and acoustic resonances, postulated accidents, and seismic events.

The staff reviewed the service loads described in DCD Tier 2, Section 3.9.5 in comparison to the transients presented in DCD Tier 2, Table 3.9-1 and found several apparent discrepancies in the description and categorization of these events. For example, based on the information provided in DCD Tier 2, Table 3.9-1, a main steam pipe break and a main feedwater pipe break are included in faulted events 1 and 2. It is, however, unclear to the staff whether the other faulted events listed in DCD Tier 2, Table 3.9-1 are included in the Service Level D loads for reactor internals. Therefore, the applicant is requested to clarify this discrepancy and describe and justify any differences between Table 3.9-1 and the loads applied to the reactor internals for all service levels. A summary of this information should be included in the DCD.

Response

For Level A service loading, DCD Tier 2, Section 3.9.5.2.2 include all the system operating transient loads from normal events presented in Table 3.9-1.

For Level B service loading, DCD Tier 2, Section 3.9.5.2.3 includes all the system operating transient loads from upset events presented in Table 3.9-1. Additionally, the loss of external load with turbine control failure is considered a Level B service loading to evaluate fatigue

with this combination of loadings for conservatism. (See the response to Question 03.09.05-14.)

For Level C service loading, there are no system operating transient loads from emergency events in Table 3.9-1. However, DCD Tier 2, Section 3.9.5.2.4 considers DBPB loads as mechanical load for conservatism. (See the response to Question 03.09.05-15.)

For Level D service loading, DCD Tier 2, Section 3.9.5.2.5 includes all the system operating transient loads from faulted events presented in Table 3.9-1. Specifically, the main steam/feed water pipe break (MS/FWPB) or LOCA loads are larger than the loads from faulted event-3, faulted event-4, and faulted event-6 in Level D service loadings. Additionally IRWST discharge loads are considered as a faulted event-5. The explanation provided is considered excessive to be specifically included in the DCD.

Supplemental Response

Of the three faulted events listed in Table 3.9-1, the "Inadvertent open of a pilot operated safety and relief valve (POSRV fails to close)" event in Faulted Event-5 results in an IRWST injection and discharge loads.

Second Supplemental Response

Of the upset events listed in Table 3.9-1, the "Loss of condenser vacuum" event and "Main steam isolation valve closure" event in Upset Event-2, and the "Inadvertent opening of a pilot operated safety and relief valve (POSRV closed as expected)" event in Upset Event-6 result in an IRWST discharge. Therefore, the IRWST discharge loads are considered in Level B service loadings.

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.