
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.: 334-8373
SRP Section: 03.12 - ASME Code Class 1, 2, and 3 Piping Systems and Piping Components and Their Associated Supports
Application Section: 3.12
Date of RAI Issue: 12/14/2015

Question No. 03.12-16

According to SRP Sections 3.12 and 3.9.3, appropriate loads and load combinations should be included in the evaluation of pipe supports. The loading category termed "Dynamic system loadings" included in the loading columns of DCD Tier 2, Tables 3.9-10 and 3.12-1 and 3.12-2 is explained in the notes of these tables as "Dynamic system loadings associated with the emergency condition." Additional information is needed by the staff to understand the definition of this loading category and determine whether the loading conditions for pipe supports is consistent with the relevant SRP guidance. The applicant is requested to:

1. Identify the loads in category termed "Dynamic system loads"
2. Describe how loads caused by design basis pipe breaks and LOCAs are included in the loads presented in DCD Tier 2, Table 3.9-10, Table 3.12-2 and other related tables or DCD descriptions
3. Revise DCD Tier 2, Section 3.12.6.3 to clarify the how the loading combinations for piping supports are addressed. DCD Tier 2, Section 3.12.6.3 states that loading combinations for piping supports are shown in DCD Section 3.12.5.3. The load combinations discussed in DCD Section 3.12.5.3 are discussed in the context of the pipe stress evaluation and not for pipe support design.

The content of this question also relates to RAI 8360, Question 28501 on Section 3.9.3, so the responses to these questions should be coordinated.

Response

1. SRP 3.9.3 defines the design basis pipe break (DBPB) as those postulated pipe breaks other than a LOCA or MS/FWPB and is considered an emergency condition. This includes postulated pipe breaks in Class 1, 2 and 3 branch lines that result in the loss

of reactor coolant at a rate less than or equal to the capability of the reactor coolant makeup system.

For the APR1400 DC, make-up flow can compensate for the loss of coolant from a break with a 5.56 mm (7/32 in.) internal diameter as described in Subsection 9.3.4. In accordance with the guidance in SRP 3.6.2, postulated breaks in one-inch nominal diameter piping and smaller piping do not require the analysis of the dynamic system loading from a ruptured pipe on components, component supports or core support structures. Therefore, DBPB is not included in DCD Tier 2, Table 3.9-2, which provides the loading combinations for mechanical loads.

The DCD Tier 2 related to this question will be revised to delete the dynamic system load in the loading combination for Level C.

2. For loads caused by DBPBs, refer to the response given in 1 above. Loads caused by LOCAs, except for DBPBs from all potential branch line pipe break (BLPB) conditions, are included only in the Service Level D load combination. They are indicated as pipe break loads in Tables 3.9-10, 3.12-2 and other related tables and DCD descriptions.
3. DCD Tier 2, Subsection 3.12.6.3, Subsection 3.12.5.3 explains the loads and loading combinations for the piping stress analysis. In addition, Table 3.9-10 shows the load and load combination of the pipe supports. Subsection 3.12.5.3, Table 3.12-1 and 3.12-2 explain how the loads due to piping are applied to pipe supports.

In the Table 3.9-10, only some of the loads are considered to directly impact pipe supports, such as the weight of the pipe support itself, the friction load, and the seismic self-weight excitations. Most other loads are considered as inputs into the piping stress analysis. The pipe support reactions derived from the piping stress analysis are applied to the pipe support design. These pipe support loads due to the piping include pressure, weight of piping, fluid load, pipe break loads, thermal expansion, SSE inertia of piping, and other mechanical loads as detailed in Tables 3.12-1 and 3.12-2.

Impact on DCD

DCD Tier 2, Subsections 3.9.3.1, 3.9.4.3, 3.9.5.2, and 3.9.5.2.4, Tables 3.9-2, 3.9-6, 3.9-7, 3.9-10 through 12, 3.12-1, and 3.12-2 will be revised in response to RAI 319-8360 Question 03.09.03-2.

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.