# REVISED RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**APR1400 Design Certification**

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

**Docket No. 52-046**

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| **RAI No.:** | **508-8592** |
| **SRP Section:** | **16 – Technical Specifications** |
| **Application Section:** | **Technical Specification Bases 3.1.1** |
| **Date of RAI Issue:** | **08/01/2016** |

## Question No. 16-178

Paragraph (a)(11) of 10 CFR 52.47 states that a design certification (DC) applicant is to propose Technical Specifications (TS) prepared in accordance with 10 CFR 50.36 and 50.36a. NUREG-1432, "Standard Technical Specifications (STS)-Combustion Engineering Plants," Rev. 4, provides NRC guidance on format and content of technical specifications as one acceptable means to meet 10 CFR 50.36 requirements. Staff needs to evaluate all technical differences from standard TS (STS) NUREG-1432, STS Combustion Engineering Plants, Rev. 4, which is referenced by the DC applicant in DCD Tier 2 Section 16.1, and the docketed rationale for each difference because conformance to STS provisions is used in the safety review as the initial point of guidance for evaluating the adequacy of the generic TS to ensure adequate protection of public health and safety, and the completeness and accuracy of the generic TS Bases.

The Writer's Guide for Plant-Specific Improved Technical Specifications (TSTF-GG-05-01) also provides guidance for the format and content of the TS. There are format and content differences between the DCD and the Writer's Guide. These following corrections are necessary to ensure the completeness and accuracy of the TS and Bases.

Correct the following editorial errors within the Bases for Technical Specification 3.1.1.

Section 3.2.2.a of the Writer's Guide for Plant Specific Improved Technical Specifications states: "Upon the first reference in each Specification or Bases to a phrase for which an abbreviation is desired to be used (except as allowed in Writer's Guide Section 3.2.2.b below), use the full phrase followed by the acronym or initialism set off by parenthesis. Use the abbreviation alone on all subsequent references in that Specification or Bases."

- In the second paragraph of the Background section, the abbreviation "RCS" is used without defining it prior to its use.

- In the second paragraph of the Applicable Safety Analysis section, the abbreviation "$k_{N-1}$" is used without defining it prior to its use. This also occurs on page B3.1.2-2 in the final paragraph on the page.

- In the second paragraph of the Actions A.1 section, the abbreviation "IRWST" is used without defining it prior to its use.

These corrections are required to ensure the accuracy and completeness of the Bases and to align the text with the guidance contained in the Writer's Guide.

## Response – (Rev. 1)

In addition to the changes incorporated into Revision 1 of the Technical Specifications, the Applicable Safety Analysis section of the Bases for Technical Specification 3.1.1 will be revised as shown in the attached markup.

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**Impact on DCD**

Same as changes described in Impact on Technical Specification section.

**Impact on PRA**

There is no impact on PRA.

**Impact on Technical Specifications**

The original response indicated future incorporation of Technical Specification changes. These proposed changes have already been incorporated into Revision 1 of the Technical Specifications. Therefore, only the applicable changes to Revision 1 of the DCD for this revision are included in the Attachment.

**Impact on Technical/Topical/Environmental Reports**

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

RAI 508-8592-Question 16-178_Rev.1

BASES

APPLICABLE SAFETY ANALYSES (continued)

The CEA ejection is the accident occurring during conditions allowed by the power dependent insertion limit (PDIL). This event will lead to a rapid positive reactivity addition resulting in a rapid power excursion. A reactor trip on high power is generated to terminate the accident. The CEA ejection can result in limited fuel damage with the subsequent release of radioactive material, so it may be necessary to evaluate the radiological consequence in accordance with the 10 CFR 50.34. SDM is an important parameter in this analysis.

In the analysis of the CEA ejection event, SDM alone cannot prevent reactor criticality following a CEA ejection. The $k_{N-1}$ requirement ensures the reactor remains subcritical and, therefore, satisfies the radially averaged enthalpy acceptance criterion considering power redistribution effects.

, where $k_{N-1}$ is the k effective ($k_{eff}$) calculated by considering the actual CEA configuration and assuming that the fully or partially inserted full strength CEA of highest worth is fully withdrawn.

The function of $k_{N-1}$ is to maintain sufficient subcriticality to preclude inadvertent criticality following ejection of a single CEA. $k_{N-1}$ is a measure of the core's reactivity, considering a single malfunction resulting in the highest worth inserted CEA being ejected.

$k_{N-1}$ requirements vary with the amount of positive reactivity that would be introduced assuming the CEA with the highest inserted worth ejects from the core. The $k_{N-1}$ requirement ensures that a CEA ejection event while shutdown will not result in criticality.

The requirement prohibiting criticality due to shutdown group CEA movement is associated with the assumptions used in the analysis of uncontrolled CEA withdrawal from subcritical conditions. Due to the high differential reactivity worth of the shutdown CEA groups, the analysis assumes that the initial shutdown reactivity is such that the reactor will remain subcritical in the event of unexpected or uncontrolled shutdown group withdrawal.

SDM satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).