

LOOP SEAL CLEARING

This Attachment provides additional information concerning the way that analyses are expected to address loop seal clearing near the switch or critical break size.

The modeling and phenomenology associated with the reactor coolant pump (RCP) loop seals is discussed in Section 7 of Topical Report (TR) EMF-2328(P)(A), Revision 0, Supplement 1, Revision 0, in the response to RAI 4, in the evaluation presented in Section 4.5 of the safety evaluation (SE), and this Attachment. The purpose of this Attachment is to clarify the expectations for submittals and associated NRC staff review effort, in the event that multiple loop seals are found to clear below the “switch break” size.

In the response to RAI 4, AREVA Inc. (AREVA) agreed to revise the modeling approach with regard to the RCP loop seals, and to revise the TR accordingly. The revised process, which is reflected in the SE, is as follows:

- For the plant, identify a “switch break” size,¹ below which the loop seals are modeled in a fashion that [].
- For breaks below the “switch break,” []²
- If multiple loop seals clear, [] the “switch break” size, [].
- []
- For breaks at the “switch break” size or []

Hence, based on the above approach, there may be some cases in which AREVA produces analytic results []

[]. AREVA noted, in Section 7.3.1, that []

].

The following table provides an example of the vendor’s approach for a hypothetical break spectrum at a Westinghouse 4-loop plant that has implemented an extended power uprate.

¹ The “switch break” size is []

² AREVA states that []

Note that the loop seal clearing behavior depicted below may be unlikely, but it is only intended to describe the various ways in which loop seal clearing behavior will be treated.

[
*					
]

*[

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In the table, [

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[

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The table also illustrates an additional facet of the analytic approach for modeling the loop seals, which is applicable to breaks that are at, or slightly larger than, the “switch break” size.

[

].

In Section 4.5 of the SE, the NRC staff provides its basis for determining that this approach is acceptable. However, the NRC staff also notes that the analytic process is highly subjective, leaving both the “switch break” size definition and the loop seal biasing amount variable from analysis to analysis.

In consideration of this subjectivity, additional NRC staff review effort is required [

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If an analysis were submitted that appeared similar to the example above, specific review topics could include the following: (1) differences in transient behavior between the []; (2) specific attributes leading to the change from []; (3) whether and how, [] still provides the requisite validation [], (4) whether the limiting PCT were exhibited in []; and (5) the basis for identifying [].

In conclusion, the technical basis for loop seal clearing, as discussed in Section 7 of EMF-2328 is valid and acceptable. The NRC review of this issue is discussed in Section 4.5, which provides the NRC staff basis for concluding that the approach is valid and acceptable. This Attachment serves as additional clarification regarding the expectations for submittals and associated NRC staff review effort, in the event that multiple loop seals [].