

D.C. Cook Application of Leak Before Break on U1 RCS Auxiliary Lines

January 11, 2018

Leak Before Break (LBB) Background



- All SSCs important to Safety require protection from accidents, including pipe break.
- Historically, the method of pipe break protection has been to assume an instantaneous formation of an arbitrary break and separation across the pipe diameter. This methodology is non-mechanistic and provides the most severe condition requiring a complex protection system to counteract the dynamic forces created by the pipe break.
- In reality, a pipe break occurs through the formation of a tiny crack in the line that, if unstable, develops into a full size crack over time. A second method to protect from a pipe break accident is to evaluate the potential for the pipe to crack and, in the event of formation, evaluate whether sufficient warning will be available to safely shut down the plant.
- This methodology has been termed “Leak Before Break” (LBB) and the application for this methodology has been provided for in modified GDC 4 of Appendix A of 10 CFR Part 50. Guidance for the application of LBB methodology is provided in NUREG-1061, Volume 3 and in the Standard Review Plan (NUREG-0800) Section 3.6.3.

D.C. Cook Unit 1 LBB LAR



- LBB methodology has previously been approved by the NRC for Unit 1 and applied to the Main Reactor Coolant Loop piping. (NRC SE ML8402010410, dated 2/1/84)
- LBB methodology has previously been approved by the NRC for Unit 1 and applied to the Pressurizer Surge Line. (NRC SE ML003767675, dated 11/8/2000)
- In this License Amendment Request (LAR), NRC approval is requested for implementation of LBB methodology for Unit 1 RCS Auxiliary Lines, which includes:
 - 8" and 14" RHR lines
 - 10" Accumulator lines
 - 6", 8" and 10" SI lines
- This LAR will not include changes to our Technical Specifications. Previous NRC approval for LBB for Unit 1 Pressurizer Surge Line modified the Technical Specification for Leakage Detection. The existing Leakage Detection capability for Unit 1 is sufficient for the requirements of the LBB analysis for Unit 1 RCS Auxiliary Lines

Why and when?



- Purpose of LBB methodology on RCS Auxiliary Lines for Cook Unit 1:
 - The primary purpose is for risk mitigation for the reactor vessel internals upflow conversion modification being implemented on Unit 1 in the Spring 2019 refueling outage.
 - Analysis to support the modification is scheduled to be completed October 2018.
 - Although a low risk, the analysis for upflow conversion could potentially be unacceptable without the added margin provided by application of LBB methodology on RCS Auxiliary Lines.
 - Baffle bolt replacement activities scheduled for Spring 2019 refueling outage may be able to be reduced in scope given the margin provided by approval of this LBB analysis, resulting in a shorter outage duration.
 - Significantly reduces dynamic loading on equipment and supports
 - Increases available design margins and results in overall reduction of loads on piping and supports
 - Can be used to eliminate the need for existing pipe whip restraints
- The proposed timeline for this LAR is as follows:
 - LAR to be submitted to NRC in February 2018
 - NRC approval requested by December 2018

Questions?