H. B. Robinson Unit 2 Steam Line Break Analysis

For Low Temperature Operation

The NRC Staff Safety Evaluation for Cycle 9 at H. B. Robinson Unit 2 required that additional information be supplied prior to the next refueling that justifies the adequacy and conservatism of the ENC model used in the steam line break (SLB) analysis. The staff concluded that the ENC analysis was excessively conservative, to the extent that the analysis may mask important system effects. Specific issues raised by the staff dealt with the mass and energy inputs from SIS and accumulator activation, and the effect of lower plenum mixing on coolant temperatures in the core.

The ENC analysis does include the mass and energy impacts of SIS. Credit for the accumulator effects have not been included in the analysis since system depressurization is overpredicted in order to give a conservative DNB prediction. Based on the Westinghouse analysis for H. B. Robinson, and the fact that the depressurization is not controlled by fuel design, system pressure should remain sufficiently high for the postulated SLB event to preclude the accumulator activation. Based on ENC sensitivity studies, reduced power/temperature operation will also not impact depressurization. Thus, ENC concludes that the assumption of no accumulator activation in its analysis is appropriate and conservative.

The NRC concern about steam line break was raised during the review of the CP&L submitttal for reduced temperature operation in Cycle 9. ENC sensitivity studies have indicated that the effect of reduced temperature operation on the reactivity insertion during a steam line break event is a

slight reduction in the insertion, and the net result is that the SLB event is essentially unaffected by the low temperature operation. The transient return to power at lower temperature operation is less than for higher temperature operation because of the shape of the moderator coefficient curve as a function of temperature and because of the lower steam pressures. While this result does not provide a generic response to the NRC concerns on lower plenum mixing, this phenomena should be unaffected by reduced temperature operation. Hence ENC concludes that reduced temperature operation does not significantly impact the SLB event.

Also, consistent with standard practice, the steam line break accident is formulated in such a way as to produce maximum cooldown of the primary system, and therefore, the maximum return to power at end of cycle conditions where the moderator temperature coefficient is most negative. Current Cycle 10 designs indicate the moderator temperature coefficient will be less negative than in Cycle 9 and not be less than -20 pcm/^{o}F. This is a sufficient reduction from the bounding modulator temperature coefficient of -35pcm/^{o}F for Unit 2 steam line break and other safety analyses. Therefore, postulated steam line break transients are not considered a safety issue for Cycle 10.

Thus, ENC proposes to delay an extensive evaluation of the steam line break until after the steam generator replacement.