

shutdown margin. The specified control rod insertion limits meet the design basis criteria on (1) potential ejected control rod worth and peaking factor,⁽⁴⁾ (2) radial power peaking factors, $F_{\Delta H}$, and (3) required shutdown margin.

When the control Rod Banks are outside the acceptable insertion limits, they must be restored to within those limits. The restoration may be accomplished either by repositioning control rods to the insertion limits consistent with core power or by boration to reduce power to be consistent with the power limit associated with the existing rod position. Restoration of rod position to the power dependent insertion limit ensures adequate Shutdown Margin in accordance with Figure 3.10-2.

Operation beyond the insertion limits is allowed (for a short time period in order to take conservative action) because the simultaneous occurrence of either a LOCA, loss of reactor coolant flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability. The allowed completion time of one hour for restoring the banks to within the insertion limits provides an acceptable time for evaluating and repairing minor problems without allowing the plant to remain in an unacceptable condition for an extended period of time.

The various control rod banks (shutdown banks, control banks) are each to be moved as a bank; that is, with all rods in the bank within one step (5/8 inch) of the bank position. Position indication is provided by two methods: a digital count of actuation pulses which shows the demand position of the banks, and a linear position indicator (LVDT) which indicates the actual rod position.⁽²⁾ At rod positions ≥ 200 steps, full power reactivity worths of the control rods are sufficiently small such that a 15-inch indicated misalignment from the rod bank has no significant effect on the incore power distribution and is therefore allowable. For rod positions < 200 steps, maintaining indicated rod position within 7.5 inches of the average of the indicated bank position provides an enforceable limit which assures design distribution is not exceeded. In the event that an LVDT is not in service, the effects of a malpositioned control rod are observable on nuclear and process information displayed in the control room and by core thermocouples and in-core movable detectors. The determination of the hot channel factors will be performed by means of the movable in-core detectors.

The two hours in 3.10.1.5 are acceptable because the static misalignment of a single RCCA has been analyzed in Section 15 of the UFSAR and it has been demonstrated that the maximum credible misalignment of a single control rod above or below its bank does not result in exceeding core safety limits in steady state operation at rated power and is short with respect to probability of an independent accident. If the condition cannot be readily corrected, the specified reduction in power will ensure that design margins to core limits will be maintained under both steady state and anticipated transient conditions.