High Pressure Coolant Injection System Reliability Study

1 HPCI SYSTEM FAULT TREE

HPCI system unreliability was calculated using a simple PRA model (fault tree). Basic event failure probabilities based on operational data were used to quantify the model.

Splitting the failure to start into two categories allowed use of the results of cyclic surveillance tests in the evaluation of FTSO. The cyclic surveillance tests were not usable in the evaluation of FTSV because the injection valve is not tested under the same conditions seen during unplanned demands. FRO could have been included in the FTR basic event; however, because the failure is not modeled in most PRA/IPEs, and because the demands to reopen required special analysis, FRO was treated separately.

The unreliability of the HPCI system was calculated using the simple fault tree model shown in Figure 1. The model was constructed to reflect the logical combination of six of the seven failure modes developed using the operational data. FRO was excluded because it represents a failure mode not accounted for in most PRAs.

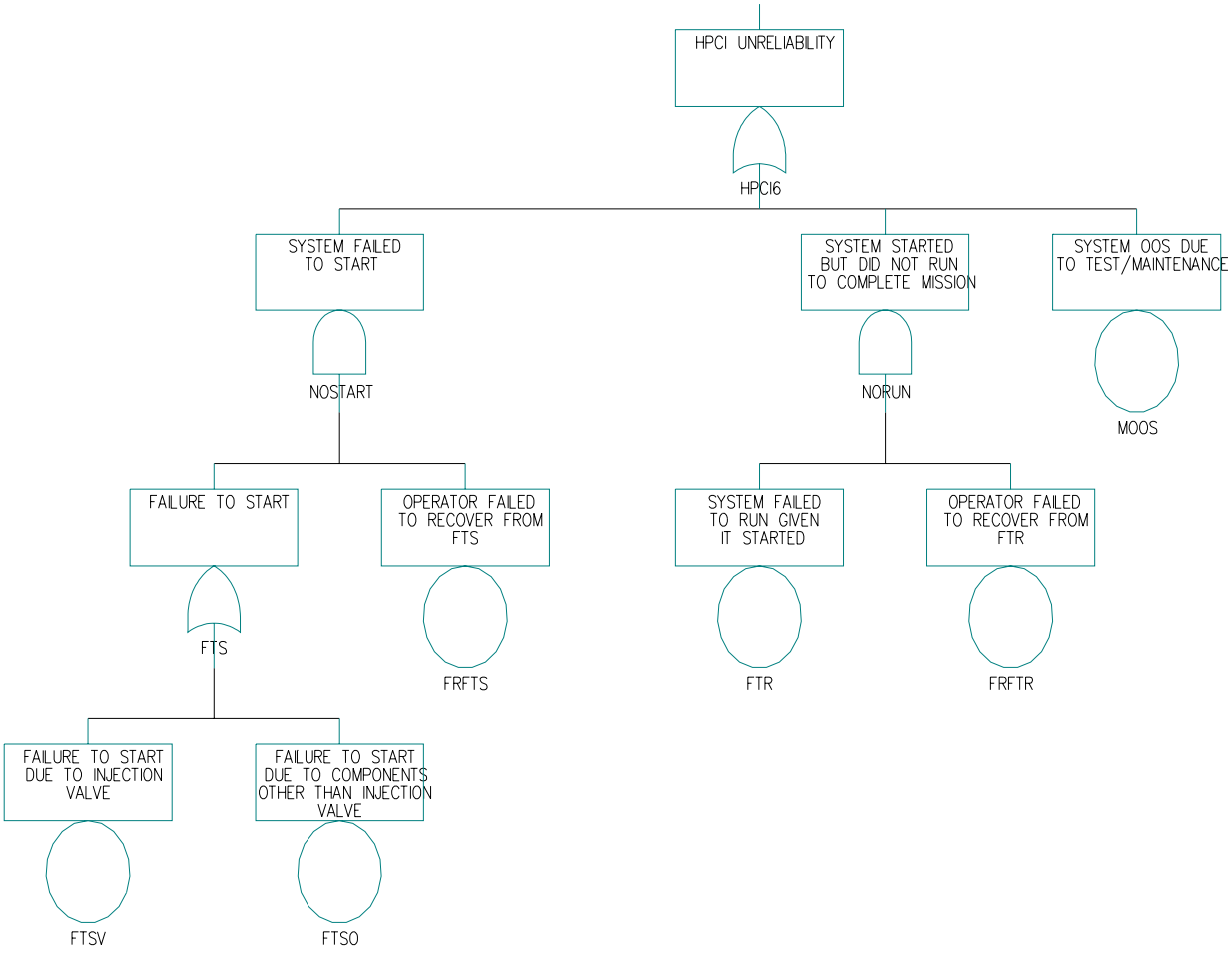

Figure 1. HPCI unreliability evaluation model (includes recovery actions, excludes failure of injection the valve to reopen.