

Table F-1

NEI 00-01 MSO IDENTIFICATION CHECKLIST

Stage	Step	Outcome	Complete?
Phase I: Pre-review of MSOs	Review Generic MSO List for Applicability	Identification of each MSO on the generic list as either applicable or not applicable to the plant	
	Perform PRA runs per NEI 00-01, Appendix F	Identification of potential MSO scenarios. These scenarios are reviewed by the expert panel for applicability	
	Review Existing SSA for Spurious operations and MSOs already addressed	Development of "Table I" as input to the expert panel. Table should identify: a) new scenarios not on the generic list, b) Scenarios already addressed by the SSA, and c) Scenarios dispositioned as requiring multiple spurious operations (and not addressed).	
Phase II: Prepare for Expert Panel	Select the expert panel	Diverse Review Group, including Operations, Electrical, Fire Safe Shutdown, PRA, Fire Protection and Systems Engineers.	
	Schedule MSO expert panel	Experts are scheduled for 2-3 days of expert panel review, provided preparatory work (Phase I) is performed satisfactorily.	
	Develop Training Package for expert panel	Training Material as required by NEI 00-01. Example package is provided in NEI 00-01, Appendix F.	
	Perform Training	All experts are trained prior to starting the expert panel meeting.	
Phase III: Perform the Expert Panel	Review MSOs on generic MSO list for applicability	Expert panel documentation of agreement or disagreement with pre-screening	
		Expert panel agreement on MSOs that are applicable to the plant, with additional discussion.	
	Review MSOs on generic MSO list for additional scenarios.	Identification of similar scenarios not on the MSO list.	
	Review applicable P&IDs, Electrical Diagrams or Logic Diagrams for new scenarios.	Identification of new scenarios not on the MSO list.	
	Review MSO Combinations	Determine whether any of the individual MSOs should be combined with other spurious operations or MSOs.	
	Review PRA Results	Determine if any PRA recommended scenarios affect the SSA and are not previously identified.	
Phase IV: Post-Review	Develop comprehensive plant-specific MSO list	Single location for all MSOs that will need to be addressed in the SSA.	
	Perform MSO categorization	All MSOs are categorized as Required or Important to the SSA (green or orange) per Appendix H.	
	Document Expert Panel Review and post-review.	Documentation supporting SSA implementation of NEI 00-01.	
	Add MSOs to the SSA, and address supplemented with NEI 00-01 performance-based tools (Fire Modeling).	SSA is updated to include MSOs. Implementation of this step may need to be performed on a phased-approach.	
	Expert Panel Review of Fire Modeling Disposition	If Fire Modeling is used in the disposition of the MSO, the expert panel reviews the disposition prior to incorporating into the SSA. expert panel Training on Fire Modeling would be required for this step.	

4.4.3.4 Review of MSO Combinations

As a final measure, the expert panel should review the plant specific list of MSOs to determine whether any of the individual MSOs should be combined due to the combined MSO resulting in a condition significantly worse than either MSO individually. This step may involve a review of MSOs which were previously screened as too insignificant to impact safe shutdown by themselves, but which might provide a significant impact to safe shutdown when combined with another MSO. Considerations might include MSOs where the timing of critical actions could be significantly impacted, and the available time to perform a required operator manual action is significantly reduced for the new combined MSO scenario. Consideration might also include situations where the combined affect of flow diversions from systems credited for post-fire safe shutdown provides a drastically different result than the affect of any of the individual flow diversions. In this review, consideration of key aspects of the MSOs should be factored in, such as the overall number of spurious operations in the combined MSOs, the circuit attributes in Appendix B, and other physical attributes of the scenarios. The goal of this additional step is to identify any new MSO combinations (which are combinations of other MSOs) that could potentially provide worse consequences or timing than any of the individual MSOs of which it is comprised. The results of this review should be documented. New combined MSOs that are potentially significant should be added to the Plant Specific MSO List. New combined MSO should also be forwarded to NEI and the responsible OG for their consideration in revising the generic list of MSOs.

NRC-NEI Meeting on Deterministic Post-fire Safe Shutdown Methodology

NEI CF ITF

March 30, 2009

Agenda

- **Major Comment Area:**
 - **Circuit Failure Criteria**
 - **Associated Circuits**
 - **Required vs. Important to Safe Shutdown Components**
 - **Use of Test Results**
 - **Hot Short Duration**
 - **Number & Type of Fire-Induced Circuit failures**
 - **Single vs. Multiple Spurious Operations**
 - **IN 92-18 Guidance**
- **Other Comments:**
 - **Combination of MSO's**
 - **Operator Manual Actions**
 - **Emergency Control Station**
 - **Venting SCRAM Air Header**
 - **Use of Relay Room Keylock Switches**
 - **Industry III.G.3**
- **Conclusions:**

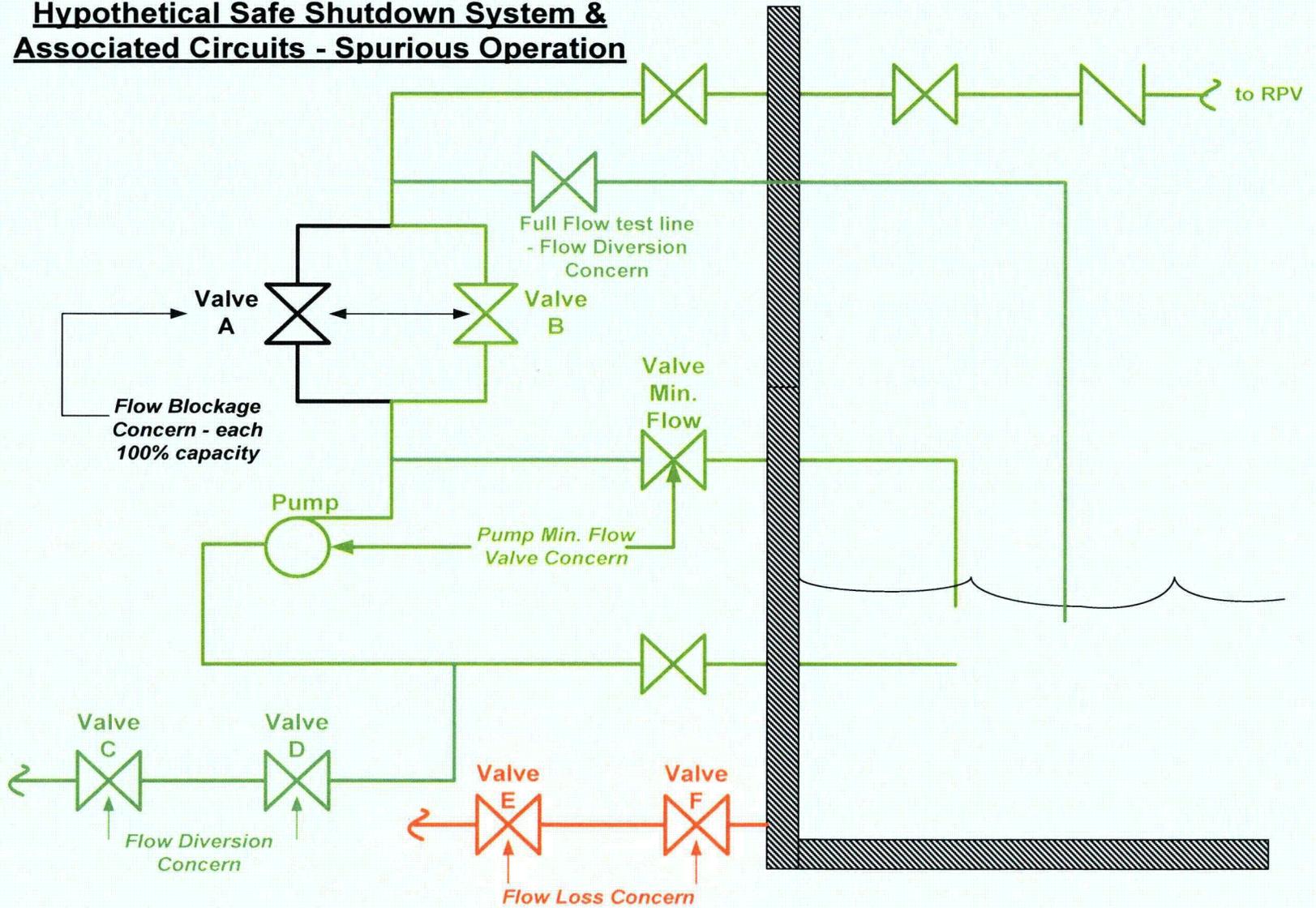
Circuit Failure Criteria

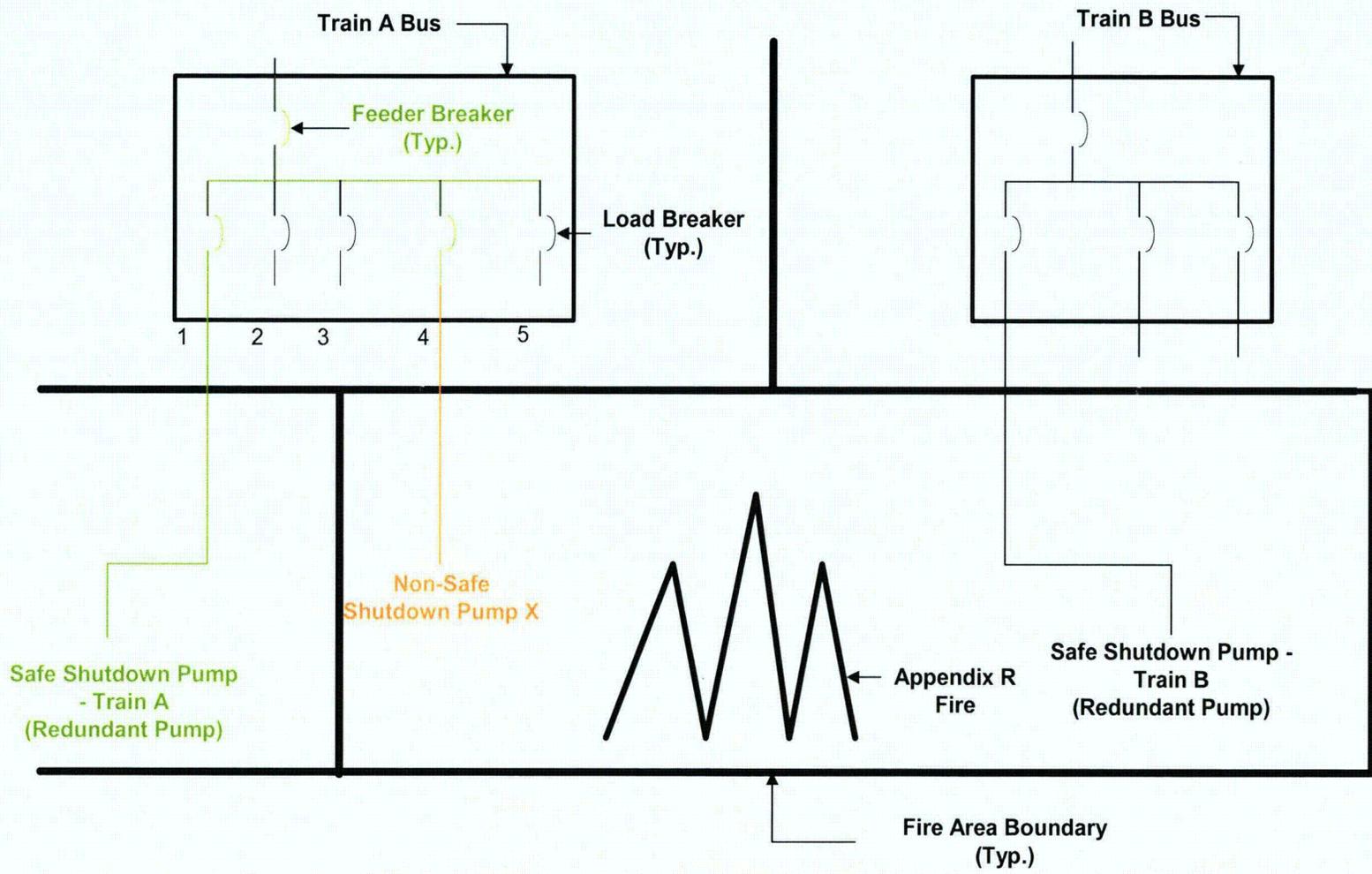
- **Associated Circuits of Concern:**
 - **Required for Hot Shutdown [Ill.G.1 & 2]**
 - **Breaker coordination required**
 - **Flow Diversions failing the threshold of App. H**
 - **T-H Criteria consistent with that used for Internal Events Fault Trees**
 - **Important to Safe Shutdown [GL 81-12]**
 - **Everything Else**

Circuit Failure Criteria

- **Required for Hot Shutdown Components**
 - **Flow Path Components**
 - **Functional circuitry required – control & power**
 - **Flow Diversion Components [Appendix H]**
 - **Hot short, short-to-ground or open circuit**
 - **Assume multiple shorts-to-ground for ungrounded circuits**
 - **Assume hot short is from the same source for ungrounded circuits**
 - **Breaker Coordination**

Hypothetical Safe Shutdown System & Associated Circuits - Spurious Operation





Common Power Source (Breaker Coordination)

Circuit Failure Criteria

- **Important to Safe Shutdown Components**
 - **Diversions from flow path [meeting App. H]**
 - **List of MSO's [Appendix G]**
 - **Spurious initiation of safety systems**
 - **Multiple valves in series**
 - **Broad system impacts**
 - **Multiple components**
 - **Various locations**
 - **Varied cable runs**
 - **Some common end point locations [Relay Rooms]**

Circuit Failure Criteria

- **Use of Fire Test Results**
 - **Provide Valuable Insights**
 - **Failures in separate cables not concurrent [e.g. the effect goes away when the fault goes to ground]**
 - **Duration of the fire-induced failure**
- **Apply insights to multiple spurious scenarios**

Circuit Failure Criteria

- **IN 92-18 Guidance**
 - **Evaluate for Control Room fire**
 - **Consider to occur one-at-a-time**
 - **Use available systems to mitigate the effects of each failure individually and still achieve and maintain safe shutdown**
 - **Assure a non-impacted flow path**

Other Comments

- **Combining MSO's**
 - **New criteria for combining MSOs was added to NEI 00-01 based on Pilot Results, under Paragraph 4.4.3.4**
 - **Expert Panel Process is used to discuss combinations of MSOs**
- **Additions to the Generic List**

Other Comments

□ **Operator Manual Actions**

– **Emergency Control Station**

- **Define as the Remote Shutdown Panel or the Auxiliary Shutdown Panel**

– **SCRAM [reactivity control function]**

- **Based on EOP Steps for mitigating the effects of an ATWS – acceptable with an evaluation of path for fire differences**

– **Relay Room Keylock Switches [example]**

- **Based on EOP Steps for Automatic Depressurization – acceptable with an evaluation of path for fire differences**

Other Comments

□ III.G.3

- **Case 1 – Accepted by the NRC in an SER**
 - **No additional actions are required**
 - **Recommending a voluntary effort using any available assessment tools to evaluate and disposition vulnerabilities**
- **Case 2 – Changed by the licensee using the Standard Fire Protection License Condition or the 1989 Rule Change**
 - **Treat the same as III.G.1 and III.G.2 areas**

Conclusions

- **NEI 00-01 Revision 2 and the MSO Resolution Methodology submitted to NRC in December of 2008**
 - **Incorporate Industry and Pilot Plant Comments**
 - **Change to reflect agreements reached.**
 - **May need re-review by NRC & Industry Personnel if changes are significant**
 - **Assuming agreement, next submittal targeted for Late April to Early May of 2009.**