

**DISCUSSIONS ON
REGULATORY ISSUE SUMMARY 2004-03
Risk-Informed Approach to SSD
Circuit Inspections**

March 31, 2005



Engineering Planning and Management, Inc.

SSD Associated Circuits

- The subject of associated circuits has been the *most controversial issue* in the arena of nuclear plant fire protection over the past 25 years.
 - 1999 – Industry effort to perform testing to evaluate the effects of fire on electrical cables.

SSD Associated Circuits (cont.)

- NEI fire testing confirmed that hot shorts can occur just like it happened during the Browns Ferry fire
- Testing showed that inter- and intra-cable short circuits could/do occur and that multiple spurious operations could be expected.
- RIS 2004-03
 - Rev 0 issued March 2004
 - Rev 1 issued December 2004

Current Design Basis

- Evolved from a “Straw man concept”
- Any-and-all, one-at-a-time
- Which Alternate Shutdown Design is based on
- Was established by the NRC in early 80’s
 - To evaluate total area burnout
 - Address any-and-all spurious actuations, one-at-a-time
 - Considered to be sufficient

Inspection and Enforcement Manual 64100

- Inspection procedure issued in 1987
- Section e.2 (f) in part states:
 - ◆therefore consistent with the established NRR review practice of requiring licensees to analyze for “any and all spurious actuations or failures where no such spurious actuations or failures occur simultaneously”

RIS 2004-03 R1

- EPM has implemented the requirements of the RIS for some of our clients.
- Today, we seek to:
 - Clarify our understanding of NRC expectations
 - Support consistent regulatory reviews
 - Ensure uniform RIS methodology

RIS 2004-03 Implementation

- EPM has completed, or is currently developing, RIS 2004-03 assessments for clients for whom we have provided 10CFR50 Appendix R consulting services in the past.
- In accordance with:
 - RIS 2004-03 Revision 1
 - NEI 04-06 (Draft Revision L)

RIS 2004-03 R1 Methodology

- Identify risk-significant scenarios resulting from combinations of spurious operations or circuit failures to be considered.
 - Reactor Coolant System Pressure Boundary
 - Secondary Steam Side Pressure Boundary (PWR)
 - Integrity of credited prime movers (i.e., pumps)

RIS 2004-03 R1 Methodology

(cont.)

- Flow diversion paths (i.e., BWR RHR-LPCI/SPC, tanks such as RWST, CST)
- Electrical power supplies
 - ❑ EDGs start with loss of cooling
 - ❑ Switchgear with failures of electrically operated circuit breakers

RIS 2004-03 R1 Methodology

(cont.)

- Identify Cable Mark No. of SSD-credited cables; classify each as thermoset or thermoplastic.
- Define the RIS scenarios (i.e., multiple risk significant concurrent spurious actuations).

RIS 2004-03 R1 Methodology

(cont.)

- Perform analyses to determine the fire areas in which the (multiple) spurious actuations of concern could occur.
 - Evaluation relies on the credited compliance strategy in that zone or area (e.g., if RCIC is not credited for SSD in that area, failure of RCIC is acceptable).

RIS 2004-03 R1 Methodology

(cont.)

- For fire areas in which multiple spurious ops are indicated, identify specific cables of interest and possible failure modes.
 - Cable and circuit construction may be considered (e.g., no external hot shorts for thermoset cables).

RIS 2004-03 R1 Methodology

(cont.)

- For cables (representing possible spurious ops) not yet resolved, identify the associated raceway (“target”) in the fire area.
- Perform plant walkdowns
- Determine if in-situ or transient hazards present a credible threat to the target raceway(s).
- Obtain data for fire modeling of the hazard.

RIS 2004-03 Issues and Concerns

Issues for discussion:

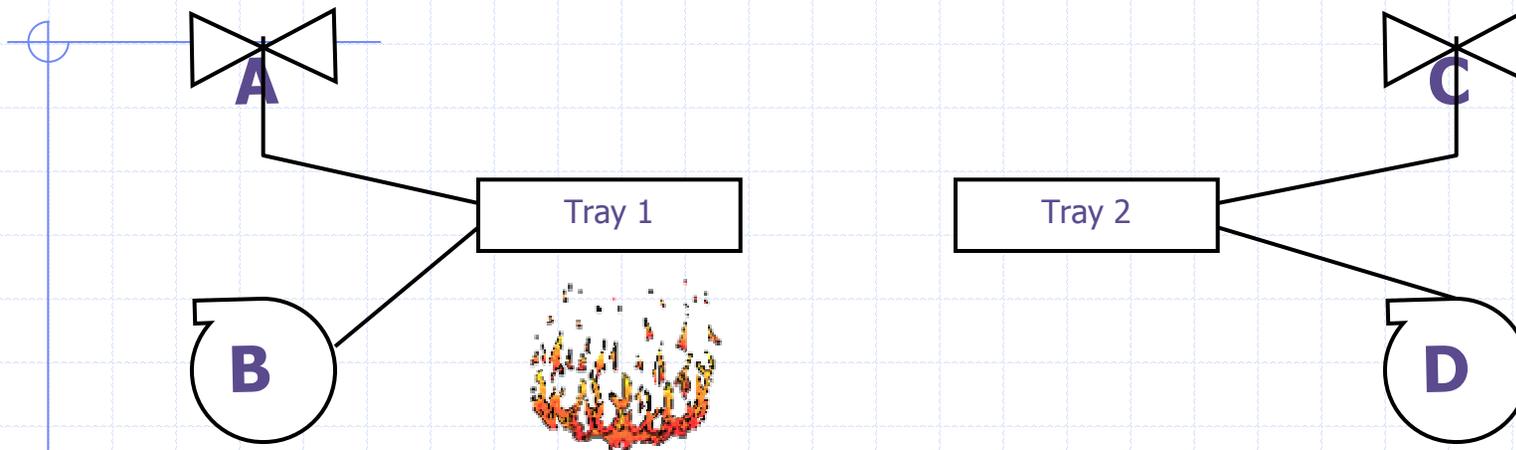
- Application of RIS to Alternative Shutdown Areas
- Fires in Cable Spreading Rooms (CSRs with and without electrical panels)
- Fires in Relay Rooms
- Credit for fire suppression systems?
- Previously approved exemptions

RIS 2004-03 Issues and Concerns (cont.)

Issues for discussion (cont.):

- Spurious start of ECCS pumps with suction and/ or discharge valves closed (BLEVE)
- Loss of breaker trip capability for non-SSD-credited SWGR, potentially leading to secondary fires.
- NFPA-805 and RIS 2004-03
- Risk-informed inspection vs. compliance?
- 3-phase to 3-phase hot shorts viable?

RIS Inspection vs. Compliance



Consider the above configuration in the same fire area Tray 1 is subject to a “credible hazard. Per RIS, requires us to postulate concurrent spurious operations (leading to pump damage); Tray 2 is not vulnerable to a “credible fire hazard” and therefore, can be analyzed as any-and-all, one-at-a-time which allows a “recoverable” approach in a deterministic analysis.