Industry Use of Manual Actions for Post-Fire Safe Shutdown

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Topics

- Goals for meeting
- Issue statement
- Industry position
- Industry understanding of regulatory views
- Basis for industry position
- Conclusions
- Recommended actions

Goals for Meeting

- Staff understanding of industry positions and rationale
- Agreement on pathway for resolving generic issue

Issue Statement

- Issue: Whether the use of manual actions for redundant shutdown requires prior NRC approval

Industry Position

The use of manual actions to achieve safe shutdown (both alternate and redundant) is acceptable, without prior NRC approval, as long as the reliance on manual actions does not adversely affect the ability of the plant to achieve and maintain safe shutdown. Licensees should be able to demonstrate that the actions can be carried out in the time frame and under the environmental conditions applicable to the actions.

Industry Position

- Regulatory aspect
  - Longstanding staff acknowledgement of redundant shutdown manual actions for compliance with regulations is evident in
    - Regulatory guidance
    - SERs
    - Numerous inspections
    - Plant-specific correspondence and meetings with staff
  - November inspection guidance appears to be a recent NRC policy change
    - Conflicts with industry practice based on past understanding of staff position
    - Promulgation of policy change through inspection training guidance not appropriate

Industry Position

- Feasibility aspect
  - Use of manual actions for redundant shutdown is feasible when supported by appropriate analysis

Industry Understanding of Regulatory Views

- Regulatory aspect
  - Use of redundant shutdown manual actions without prior approval is a violation of III.G.2

- Feasibility aspect
  - Use of redundant shutdown manual actions may not be feasible
    - Licensee may not be able to accomplish these actions within time, manpower, and environmental constraints

NEI Letter and NRC Response

- NEI letter January 11, 2002
  - Stated industry position and rationale
  - Recommended revision of November 2001 inspection training information
- NRC response May 16, 2002
  - Stated points of agreement between NRC and industry
  - Indicated disagreement with industry position on fundamental points
  - Requested proposal for resolution

Basis for Industry Position

- Regulatory requirements and guidance
- Licensee/NRC interactions
- Industry survey/practices

Regulatory Requirements

- 10CFR 50 Appendix R, Section III.G
- NUREG-0800

Appendix R, Section III.G.1

G Fire Protection of Safe Shutdown Capability

1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

- One train of systems necessary to achieve and maintain hot shutdown conditions from either the **control room or emergency control stations(s)** is free of fire damage; and
- Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

NUREG-0800

- Section C.5.b(1)(a)
  - One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage

Appendix R, Section III.G.2

2. Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, or shorts to ground, of **redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area** outside of primary containment, one of the following means of ensuring that one of the trains is free of fire damage…

Appendix R, Section III.J

- "Emergency lighting units with at least an 8-hour battery power supply shall be provided in all areas needed for **operation of safe shutdown equipment and in access and egress routes thereto."**

Free of Fire Damage

- GL 86-10 Enclosure 1, Interpretation. 3, Fire Damage:
  - **The structure, system, or component under consideration is capable of performing its intended function during and after the postulated fire, as needed.**

- RG 1.189 Section 5.3 Hot Standby (PWR) Hot Shutdown (BWR) Systems and Instrumentation
  - One success path of equipment necessary to achieve hot standby (PWR) or hot shutdown (BWR) from either the control room or emergency control stations should be maintained free of fire damage by a single fire, including an exposure fire. **Manual operation of valves, switches, and circuit breakers is allowed to operate equipment and isolate systems and is not considered a repair.**

- Industry Interpretation
  - The structure, system, or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. **It may perform this function automatically, by remote control, or by manual operations**.

Emergency Control Station

- RG 1.189 (Glossary):
  - Location outside the main control room where actions are taken by operations personnel to manipulate plant systems and controls to achieve safe shutdown of the reactor.

- Industry interpretation:
  - Emergency control stations consists of : Remote shutdown panels, local control panels, local starters, electrical distribution panels, and local control stations, such as an MOV handwheel, and other plant components designed for local operator use or monitoring.

Regulatory Guidance

- Regulatory guidance addressing use of manual actions for other than alternate/dedicated shutdown
  - Regulatory Guide 1.189, Section 5.3
    - Accepts manual actions for safe shutdown
  - 1982 Mattson to Vollmer memorandum
    - States that manual actions acceptable for achieving hot shutdown

Regulatory Guidance

- Regulatory guidance
  - GL 86-10
    - Question 5.3.8 response recommends manual actions to clear multiple high impedance faults for both III.G.2 and III.G.3 safe shutdown
  - 1997 FPFI guidance (TI 2515)
    - Inspectors should evaluate redundant and alternative safe shutdown operator activities

Regulatory Guidance

- Appendix R Statements of Consideration

  Emergency Lighting Technical Basis.

- Emergency lighting is required in all nuclear power plants. Battery powered lights with capacities of 1-1/2 to 2 hours are usually sufficient for emergency egress. However, the post-fire emergency lighting requirements in a nuclear power plant are of a different kind. **The need is for lighting that aids the access to equipment and components that must be manually operated by plant personnel to effect safe plant shutdown during plant emergencies.** Because such activities may extend over a considerable period of time both during and after the fire, it is prudent to provide 8-hour battery emergency lighting capability to allow sufficient time for normal lighting to be restored with a margin for unanticipated events.

Clarification to GL 81-12

- Section on requirements for **protecting redundant** or alternative equipment
  - B: Can protect shutdown capability from damage to associated circuits by
    - B.1 Protection per III.G.2, or
    - B.2.b.3 For spurious operation, detect spurious operation and **employ procedures** to defeat maloperation

SECY 83-269, Attachment C
(NRC Positions on Post Fire Shutdown Capability)

- "Section III.G.1 of Appendix R states that one train systems needed for hot shutdown must be free of fire damage. Thus, one train of systems needed for safe shutdown has to be operable during and after a fire. Operability … must exist without repair. **Manual operation of valves, switches and breakers is allowed to operate equipment and isolate systems and is not considered a repair**."

Additional Guidance

- TI-2515-62
  - March 16, 1983 meeting with NUFPG
- 1984 NRC workshops
- Inspection Procedure 64100, Section 02-03.a.1 concerning location of emergency lights
- Technical Review of BWROG Post-fire SSD analysis
  - Agreement 4 -- Free from fire damage
  - Agreement 10 -- Manual Actions

Regulatory Guidance Summary

- Regulatory guidance acknowledges the use of manual actions to achieve redundant safe shutdown
  - Need for prior approval not identified
- Manual actions permitted for other types of accident response (such as EOPs)

Industry Practice

- NEI surveyed most plants to determine their usage of manual actions
- Most plants use manual actions for redundant shutdown
  - Numerous plants use them extensively
  - Most plants use them to some degree

Rationale for Plant Use

- Plant use of manual actions for redundant shutdown based on
  - Longstanding plant interpretations of regulatory guidance
  - No previous compliance issues noted during inspections
  - Plant incorporation of manual actions into operating procedures via 10 CFR 50.59
  - Ability to justify particular manual actions
    - Time to perform
    - Environment
    - Availability of personnel

Survey Results

- Plant 1
  - Uses redundant shutdown manual actions without exemptions
  - No indication during recent triennial that lack of exemption was an issue
  - No indication that this was an issue during manual actions vs. repairs discussion with staff in late 90's

Survey Results

- Plant 2
  - Uses manual actions for redundant shutdown, some in abnormal operating procedures
  - Reviewed without comment in triennial inspection
  - Staff asked plant to prioritize manual actions

Survey Results

- Plant 3
  - Modest use of manual actions for redundant shutdown
  - NRR inspectors walked down these manual actions with plant staff in mid-90's, did not comment
  - No comment in triennial inspection

Survey Results

- Plant 4
  - Manual actions performance capability based on operations walkthrough in all fire areas; confirmed during recent self-assessment
  - NRC inspection involved extensive discussion of manual action timelines, but no non-compliance or risk-significant issues identified

Survey Results

- Plant 5
  - Manual actions used for redundant shutdown
  - SER accepts use of manual actions for hot shutdown

Survey Results

- Plant 6
  - Credited manual actions for fires inside and outside control room
  - Credited redundant shutdown manual actions for reducing Thermo-Lag
    - No exemptions or deviations requested
    - NRC accepted plant responses to RAI's; these responses detailed intent to use manual actions

Survey Results

- Plant 7
  - Uses a few manual actions for redundant shutdown
  - Reviewed in triennial inspection
    - Inspectors knew they were redundant shutdown manual actions
    - Asked only what training had been done

Survey Results

- Plant 8
  - Plant analysis includes manual actions used for III.G.1, III.G.2, or III.G.3 shutdown
  - Triennial inspection had no comment

Survey Results

- Plant 9
  - Staff provided guidance on the acceptability of manual actions in 1983 meeting
  - Manual actions used for redundant shutdown (hot & cold SD)
  - Written guidelines for use in fire areas
  - Timeline analyses maintained for all actions
  - UFSAR described actions, approved by global SER
  - RAI response to Thermolag detailed intent to use actions
  - Reviewed during inspections, including triennial
    - One case where staff reviewed a specific hot shutdown manual action, to confirm it was not a “repair”
    - No other adverse comments

Survey Results

- Plant 10
  - Staff queried use of manual actions in RAI
    - RAI focused on time limit before unrecoverable plant condition
    - RAI consistent with July 1982 Internal NRC Memorandum
  - Plant submitted methodology used to perform safe shutdown analysis
    - Methodology included use of manual actions to achieve SSD in all fire areas
    - Detailed description and criteria of manual actions
  - Staff accepted methodology (including manual actions) in SER

Survey Results

- Plant 11
  - Uses manual actions for redundant shutdown
    - Extent of use varies depending on fire area
  - Reviewed extensively during inspections with full knowledge that these manual actions were for redundant shutdown

Conclusions from Survey

- Most plants use manual actions for redundant shutdown without exemptions/deviations
- Their implementation and feasibility has been reviewed by NRR on many occasions
- Their use for redundant shutdown was not questioned by NRC as a compliance issue until very recently
- Generic resolution of the issue is needed

Summary

- Clear pattern of NRC acceptance of manual actions for redundant shutdown without exemptions/ deviations
- Recent NRC inspection training guidance does not accord with prior staff acceptance of industry practice
- Feasibility of manual actions is a prerequisite for use
- Issue requires generic resolution

Recommended Actions

- Suspend enforcement pending issue resolution
  - Provide guidance to regions to suspend pending enforcement actions
- Reflect past staff acceptance of industry practice in a regulatory position
  - Revise inspection training information