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Attachment 4

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**SUBJECT: USE OF MANUAL ACTIONS TO ACHIEVE SAFE SHUTDOWN FOR FIRE EVENTS**

Dear Mr. Marion:

Thank you for your letter of January 11, 2002. There is much common ground in the positions taken by the Nuclear Regulatory Commission (NRC) and NEI. As you know, the NRC has previously accepted plant-specific manual actions in formal exemption/deviation requests and in safety evaluation reports (SERs). We agree that 10 CFR 50.48 and Appendix R to 10 CFR Part 50 do not forbid the use of manual actions. With proper analysis, Manual actions are allowed for fire safe shutdown activities under the following circumstances:

- operation of equipment for which cables are located in fire areas that meet Section III.G.1 of Appendix R to 10 CFR Part 50, by having redundant cables and equipment in a completely different fire area
- manual operation of normally operated manual switches and valves
- staff-approved deviations and exemptions for specific manual actions in lieu of meeting the criteria of Section III.G.2 of Appendix R to 10 CFR Part 50
- manual operation of equipment used to meet the requirements of Section III.G.3 of Appendix R to 10 CFR Part 50, where the performance criteria of Section III.L are met.

However, the NRC and NEI differ in their perspectives regarding the generic use of manual actions to satisfy the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50. Section III.G.2 states "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

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maloperation due to hot shorts, open circuits, 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 redundant trains is free of fire damage shall be provided:

- A. Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier;
- B. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- C. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area."

Manual action to respond to a maloperation is not listed as an acceptable method for satisfying this requirement. Therefore, the use of manual actions for complying with Section III.G.2 requires staff approval by issuance of an exemption prior to implementation. The Commission contemplated the difficulty associated with meeting such specific protection requirements in Section III.G.2, and provided an alternative method in Section III.G.3, which permits the use of manual actions under certain conditions (described in Section III.L).

The staff believes that acceptance criteria could be developed which would facilitate licensee evaluations of certain manual actions that would be acceptable in lieu of meeting the Section III.G.2 criteria for post-1979 licensees. This would encompass those licensees that have the standard fire protection operating license condition which allows the licensee to change the approved fire protection program. The criteria would need to be sufficient to demonstrate that the manual action "would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire." Thus, post-1979 licensees could make these changes without prior staff review and approval. For this criterion to apply to manual actions, used in lieu of meeting the III.G.2 requirements, pre-1979 licensees would still be required to request an exemption from the regulation, but clear guidance agreeable to both parties would expedite the review process. We would welcome a proposal regarding specific acceptance criteria either in NEI-00-01, or pursued separately, if you prefer.

This letter and enclosure, regarding the use of manual actions in lieu of the criteria specified in Section III.G.2 of Appendix R to 10 CFR Part 50 was reviewed by the Committee To Review Generic Requirements (CRGR) on February 26, 2002.

Mr. Alexander Marion

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The enclosure to this letter addresses the specific differences mentioned in your letter. Joe Birmingham will work with Fred Emerson to schedule a meeting on this matter at our mutual convenience. Mr. Birmingham may be contacted at 301-415-2829 or by email at [jlb4@nrc.gov](mailto:jlb4@nrc.gov).

Sincerely,

John N. Hannon, Chief  
Plant Systems Branch,  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission

Enclosure: As stated

cc: See list

Project No. 689

Enclosure

**STAFF RESPONSE TO NEI COMMENT ON NRC INSPECTOR TRAINING LESSON PLAN**

**Regulatory Guide 1.189**

Section 5.3: Manual operation of valves, switches, and circuit breakers is allowed to operate equipment and isolate systems and is not considered a repair.

*NEI Note: In general, guidance in this Regulatory Guide is applicable only to those plants committing to it. The manual operation guidance in this Regulatory Guide does not restrict the use of manual actions to alternate shutdown.*

Staff response:

We agree that the regulatory guide is applicable to plants that commit to it. However, the regulatory guide was not created using new staff interpretations. The information in the guide was largely a collection of existing NRC requirements and guidance. In this example, the information was drawn from the memorandum used for internal reviews (listed below). Section III.G.1 of Appendix R requires one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) must be free of fire damage. One example of a III.G.1-compliant fire area, is one that contains only the cables, equipment, and associated circuits for only one of the trains of redundant safe shutdown equipment. The cables and equipment for the other train would be located and routed in different fire areas and would remain unaffected by a postulated fire. Since Appendix R did not require protection of automatic functioning of systems, manual actions may be taken in this case, as noted in the memorandum referenced below, to operate the unaffected train of equipment from the control room or emergency control station(s). If redundant fire protection safe shutdown cables or equipment are in the same fire area, however, the requirements of Section III.G.2 or III.G.3 are applicable.

**July 1982 Internal NRC Memorandum, Mattson to Vollmer**

Section III.G.1 of Appendix R states that one train of systems needed for hot shutdown must be free of fire damage. Thus, one train of systems needed for hot shutdown must be operable during and following a fire. Operability of the hot shutdown systems, including the ability to overcome a fire or fire suppressant-induced maloperation of hot shutdown equipment and the plant's power distribution system, must exist without repairs. Manual operation of valves, switches and circuit breakers is allowed to operate equipment and isolate systems and is not considered a repair.

*NEI Note: This guidance indicates that the use of manual actions to achieve hot shutdown is acceptable, and is not restricted to alternate shutdown.*

**Staff Response:**

We disagree; the NEI note takes the interpretation out of context. The context of the internal memorandum was to define a repair as compared to approving manual actions. The regulation specifically requires that if, in a fire area where redundant safe shutdown trains are both present, and a maloperation on one of the redundant trains could occur, the cables must be protected using the separation requirements of Section III.G.2 of Appendix R to 10 CFR Part 50. Manual actions are not an accepted means of meeting III.G.2 criteria for circuits that could prevent operation or cause maloperation. Note that Section III.G.2 specifically addresses the case in which redundant safe shutdown trains are in the same fire area. Section III.G.1 of Appendix R, is discussed in the above guidance, and requires that one train of equipment must remain free of fire damage in the control room or emergency control station(s). This may occur if a postulated fire could damage or cause maloperation of only one of the redundant trains of equipment or cables in a fire area and the other train, cables, and equipment, remain unaffected by the fire and are located in different fire areas. Automatic functions were not required to be protected. The manual actions discussed in this memorandum allow operators to manually start pumps and operate valves in the control room. Thus, in this case, manual actions are allowed to accomplish shutdown using the unaffected train. Additionally, manual actions are acceptable to meet the Alternative Shutdown (ASD) requirements of Section III.G.3 of Appendix R to 10 CFR Part 50.

**Generic Letter 86-10****Response to Question 5.3.8**

To meet the separation criteria of Section III.G.2 and III.G.3 of Appendix R, high impedance faults should be considered for all associated circuits located in the fire area of concern. Thus, simultaneous high impedance faults (below the trip point for the breaker on each individual circuit) for all associated circuits located in the fire area should be considered in the evaluation of the safe shutdown capability. Clearing such faults on associated circuits which may affect safe shutdown may be accomplished by manual breaker trips governed by written procedures. Circuit coordination studies need not be performed if it is assumed that shutdown capability will be disabled by such high impedance faults and appropriate written procedures for clearing them are provided.

*NEI Note: This guidance permits the use of manual actions to clear multiple high impedance faults for both redundant shutdown (III.G.2) and alternate shutdown (III.G.3).*

**Staff response:**

We agree. We note, however, that the switches associated with high impedance faults are typically small circuit breakers, which are not remotely operated and not subject to maloperation.

**TI 2515 Appendix C, Post-Fire Safe Shutdown Capability Inspection Requirements (drafts for River Bend (June 5, 1997) and Prairie Island (April 6, 1998) Fire Protection Functional Inspections)**

4.(a)3. The number of manual actions required to achieve post-fire safe shutdown for the subject plant areas. It would not be expected that numerous manual actions would be required for post-fire safe shutdowns using redundant trains of normal shutdown equipment.

6. For normal (redundant train) and alternative/dedicated post-fire safe shutdown, evaluate operator activities (manual actions both inside and outside the main control room) that are necessary to achieve safe shutdown conditions in the event of fire in the selected area(s).

*NEI Note: Both of these references indicate that reliance on manual actions was considered acceptable for redundant shutdown at the time this inspection guidance was used.*

**Staff response:**

We agree that manual actions have been accepted, on a plant-specific basis, when reviewed by the staff. These are documented in multiple plant-specific SERs. Many of the original SERs were written during the initial licensing for post-1979 licensees and were, thus, incorporated into the operating licenses for the facilities. Manual actions have been similarly accepted for Pre-1979 licensees through the exemption process. One example of an exemption approving manual actions is an exemption granted to Alabama Power Company for the Joseph M. Farley Nuclear Plant, dated November 19, 1985 (NUDOCS Accession No. 8512060395). As discussed above, some manual actions are acceptable. Examples of this type, found during a plant-specific inspection, are typically few in number. The inspection teams were expected to verify that the manual actions could be safely performed to accomplish fire safe shutdown.

The guidance was included in the Temporary Instruction for the Fire Protection Functional Inspections (FPFIs) to ensure that the teams would identify whether licensees were removing, rather than replacing or upgrading, Thermo-Lag barriers during the Thermo-Lag resolution program, and replacing a III.G.2-rated barrier with a manual action. Regional inspectors have noted this in recent inspections.

**NRC Manual Actions Guidance Document, 11-14-2001**

**Staff comment:**

The document was a lesson plan for inspector training, not a guidance document as the term "NRC Guidance Document", as used in the NEI response, would imply. The training resulted from a concern of the inspectors, who had identified, during recent inspections, that some licensees had removed passive Thermo-Lag fire barriers (required to meet the requirements of Appendix R III.G.2), and replaced the passive barriers, approved in the fire plan, with manual actions. The lesson plan was to provide inspectors with the necessary regulatory background to understand this issue and to provide a list of possible items that the inspectors may need to review, on site, to complete further required compliance and risk evaluations.

1. Insights to Regulations, Page 2: "Appendix R does not offer manual actions as an acceptable alternative to comply with the separation requirements of Section III.G.2 of Appendix R."

*NEI Note: Neither Appendix R nor any known regulatory guidance prohibits the use of manual actions to achieve Section III.G.2 safe shutdown. The fact that NRC inspectors have allowed such usage without prior approval would indicate that such usage is acceptable.*

Staff response:

We agree that some manual actions have been acceptable to meet the requirements of Section III.G.2 on a plant-specific basis. If circuits that could prevent operation, or cause maloperation of equipment required for safe shutdown are not in the area (a III.G.1 condition), Section III.G.2 does not prevent a licensee from performing a manual action. Manual valves and electrical switches that may need to be operated are examples of this activity. The requirement for *prior approval* applies to manual actions credited in lieu of complying with the requirements of Section III.G.2. The authority for accepting these manual actions, however, is not delegated to regional inspectors. Inspectors ensure, through inspection, that the plant is operated in accordance with the licensing basis and do not have the authority to approve the use of a methodology that does not meet NRC regulations or the licensing basis. Furthermore, inspection reports are not considered part of the Current Licensing Basis (CLB) as defined in 10 CFR 54.3.

2. Insights to Regulations, Page 2: "During the Appendix R program initial review process, the staff approved, via the deviation and exemption process specific manual actions at most utilities on a case-by-case basis."

*NEI Note: The staff also accepted the use of manual actions in SERs and during inspections without formal exemptions or deviations.*

Staff response:

We agree that there are multiple examples in which plant-specific programs, submitted to NRC for approval, contained plant-specific manual actions. These were reviewed during the original licensing process and were incorporated into the approved fire protection program for the given licensee with either a deviation or exemption. However, we note that the failure of inspectors to note issues during an inspection, or erroneous acceptance of an issue, does not constitute agency approval for non-compliance with a regulation.

3. Insights to Regulations, Page 2: "All the relevant guidance provided by the staff concerning manual actions were in documents specifically addressing Alternative Shutdown."

*NEI Note: A number of guidance document citations addressing manual actions were not specifically associated with Alternative Shutdown. Examples are noted in Enclosure 1.*

Staff response:

We agree. Manual actions are specifically addressed in Generic Letter (GL)-81-12 as an acceptable means of dealing with associated circuits for Alternate Safe Shutdown (ASD). Section III.G.2 of Appendix R to 10 CFR Part 50 requires that circuits that could prevent operation or cause maloperation of redundant trains of safe shutdown equipment have one of the required fire protection features. Prior NRC fire protection guidance provides no relief from that requirement. In the context of the training lesson plan, the correct statement would read that no previous NRC guidance allows manual actions to be used, where redundant safe shutdown trains are in the same fire, area in lieu of meeting the requirements of Sections III.G.2 or III.G.3 of Appendix R.

4. Insights to Regulation, Page 2: "It appears that NEI's ongoing effort to resolve associated circuits, NEI 00-01 DRAFT, Rev C, lists manual actions, with no further criteria, as an acceptable solution to comply with Appendix R, III.G.2 criteria."

*NEI Note: The discussion of manual actions appears in Appendix E to NEI 00-01. It provides numerous criteria for their use, but does not differentiate their use between redundant and alternate shutdown.*

Staff response:

The revision of NEI 00-01 (DRAFT) available to the NRC at the time the lesson plan was prepared and the training conducted did not provide specific guidance concerning manual actions. The current revision does contain Appendix E, providing guidance for manual actions.

5. Discussion of Generic Letter 81-12, Page 5: "Also, if multiple circuit failures may occur, the licensee should be able to justify why they do not occur simultaneously."

*NEI Note: The issue of multiple simultaneous circuit failures is being addressed separately in NEI 00-01, and should not be made an issue by this inspection guidance.*

Staff response:

The issue being addressed separately with the NRC is for *multiple actuation of associated circuits*. If an inspector identifies that a licensee is crediting multiple manual actions for required safe shutdown components, in lieu of complying with the regulation, it is fundamental to identify the number and type in order to perform the subsequent SDP analysis. It is also a prerequisite to be able to evaluate related staffing, timeline, and procedural considerations.

6. What an Inspector Should Look For, Page 6, includes a discussion of guidance in Regulatory Guide 1.189 related to manual actions.

*NEI Note: The use of Regulatory Guide 1.189 for inspection guidance is not appropriate unless the licensee submits a docketed commitment to it.*

Staff response:

We disagree that the training document needs revision. Regulatory guides are not



inspection criteria, unless specifically incorporated into licensing-basis documents. This fact did not need to be restated to the highly qualified inspectors at the training session. It is a part of the basic inspector qualification program and does not need to be restated every time a regulatory guide is referenced in a training session. Regulatory guides are simply one identified means of complying with a regulation. The reference was for inspectors to understand that some existing guidance is currently available. It is appropriate to identify to inspectors in a training session that such guidance is available.

7. Summary, Pages 9 and 10: "The use of manual actions to satisfy the requirements of Appendix R, Section III.G.2 has not been accepted by the staff in prior generic guidance for REQUIRED components and cables."

*NEI Note: NRC staff has accepted the use of manual actions to satisfy III.G.2 requirements in TI 2515 and in inspections.*

Staff response:

We disagree. The staff acknowledged that manual actions were being performed as previously noted. Some manual actions were approved in exemptions, deviations, or licensing SERs. The comment takes the inspection guidance out of context. TI 2525, an inspection guidance document, does not approve non-compliance with Section III.G.2 of Appendix R to 10 CFR Part 50, nor is it not a licensing basis document as defined by 10 CFR 54.3. TI 2515 (DRAFT) was used for the Fire Protection Functional Inspections (FPFIs). The primary reason for the FPFIs was to inspect licensees programs for Thermo-Lag resolution. The inspection guidance was to determine if licensees had removed III.G.2 rated required fire barriers and replaced them with manual actions. An inspection procedure that directs an inspector to review a potential noncompliance does not constitute approval for that activity.

8. Summary, Pages 9 and 10: "For redundant (III.G.2 fire areas) safe shutdown, the regulations require that manual actions, necessary to respond to a mal-operation (spurious actuation), receive prior review and approval by the staff in the exemption/deviation process."

*NEI Note: There is no requirement in the fire protection regulations for prior review and approval of manual actions to achieve III.G.2 safe shutdown.*

Staff response:

We disagree. In the context of the training, prior staff review and approval is required if means other than the specified Section III.G.2 fire protection features are used to protect certain equipment. Since Section III.G.2 is very specific with regard to acceptable compliance strategies, if a manual action were substituted for a required barrier, the licensee does not comply with the regulation and prior staff review and approval is required.

9. Conclusion, Page 10: "Manual actions have not been accepted, without prior approval, in lieu of complying with the separation requirements of Appendix R, Section

III.G.2, for required equipment.”

*NEI Note: NRC inspectors have accepted manual actions for achieving Section III.G.2 safe shutdown without prior approval. Examples can be provided.*

Staff response:

NRC inspections and inspectors do not set agency policy and cannot grant exemptions from NRC regulations. There may have been isolated occurrences in which NRC inspectors may appear to have erroneously accepted manual actions in lieu of complying with the regulation. The inspection process is a sampling process and not a 100% verification of the licensing basis or proper implementation of the licensing basis. The purpose of the training conduct on November 14, 2001, with the accompanying handout, was to reduce those occurrences.

10. Conclusion, Page 10: “The use of manual actions, in lieu of protecting circuits, appears to increase the risk associated with a fire in a fire area.”

*NEI Note: Prior statements in this inspection guidance document indicate that manual actions could increase risk. It is not appropriate to conclude that they appear to increase risk. While it is possibly true in specific cases, it is inappropriate to generalize that conclusion. If a licensee is able to demonstrate the feasibility of manual actions, there should be little or no increase in risk.*

Staff response:

We disagree. Replacing a passive, rated, fire barrier or an automatic suppression system with human performance does increase risk. For some simple actions, the risk increase associated with human performance may be minimal. For other actions, it could be significant. Risk calculations typically do not assume that a rated barrier configuration fails before the fire exceeds test conditions. Human performance typically has some associated failure probability.

11. Item 2, Page 11: “If the MA has NO NRC reviewed and approved exemption, deviation, or SER, then the licensee should be cited for violating Appendix R, Section III.G.2 (for a pre-1979 unit). If the plant is a post-1979 plant, the inspector would cite against the approved fire protection program.”

*NEI Note: Citing a licensee for a violation of regulations merely because there was no prior NRC approval of a manual action is entirely inappropriate. NRC has accepted via the inspection process licensee programs that included manual actions to achieve redundant shutdown.*

Staff response:

We disagree. The example cited a case in which a licensee was using a manual action to recover required equipment, which could be affected by a maloperation, due to a fire in a fire area containing redundant trains of this equipment. The equipment was not

protected from maloperation in accordance with Section III.G.2 of Appendix R. The violation, in the example cited, would not be for performing a manual action. The violation would be for failure to implement the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50, or the approved fire protection program, depending upon the licensing date of the facility.

## REGULATORY ANALYSIS

### Statement of the Problem

Inspectors have identified that licensees have been substituting manual actions for fire protection features that are required by Section III.2 of Appendix R to 10 CFR Part 50 without receiving prior staff review and approval. The staff has been conducting quarterly training sessions to improve the knowledge of regional inspectors.

The Nuclear Energy Institute (NEI) reviewed some of the training and wrote a letter to the NRC stating that the training was inappropriate and implying that the staff was providing new guidance to the inspectors. The NEI letter, dated January 11, 2002, states that Section III.G.2 of Appendix R to 10 CFR 50 allows the use of manual actions in lieu of fire protection features. The training stated that an exemption or deviation, requiring prior staff review and approval, was required for a licensee to substitute a manual action for a fire protection feature required by Section III.G.2. The existing fire protection guidance makes no allowance for the application of risk-informed or performance-based approaches. Several examples of Unresolved Items were identified to the staff where inspectors were uncertain of how to resolve this issue when identified.

### Objective

To provide training to NRC inspectors who are unfamiliar with all of the previously existing NRC guidance documents, on the background, NRC guidance, and NRC regulations concerning this issue. This would result in a timely resolution of findings and could increase plant safety.

### Alternatives

Rulemaking would be required for all plants to substitute manual actions for required fire protection features. The NRC is currently considering rulemaking which would allow adoption of a risk-informed, performance-based approach.