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response

January XXX, 2002

Mr. Alexander Marion  
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Washington, D.C. 20006-3708

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

Dear Mr. Marion:

Thank you for your letter of January 11, 2002 on this subject. There is much common ground in the positions taken by the NRC and NEI. The NRC has previously accepted plant specific manual actions in formal exemption/deviation requests and in safety evaluation reports (SERs). However, the NRC and NEI differ in their perspective regarding the generic use of manual actions to satisfy the requirements of 10 CFR Part 50, Appendix R, Section III.G.2.

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 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 an acceptable alternative to satisfy this requirement and therefor requires staff approval prior to implementation.

2-2

There is much in common between the NRC and NEI guidance concerning manual actions. The staff believes that a agreement could be reached concerning criteria which would make licensee evaluations of manual actions more easily reviewed and accepted. For this criteria to apply to manual actions, used in lieu of meeting the III.G.2 requirements, licensees would still be required to request an exemption or a deviation, but clear guidance agreeable to both parties would make the expedite the review process. We expect that agreement of such specific acceptance criteria in NEI-00-01 can be reached, or pursued separately, if you prefer.

An enclosure addressing specific differences mentioned is attached. Joe Birmingham will work with Fred Emerson to schedule a meeting on this matter at our mutual convenience.

Sincerely,

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

Enclosures: As Stated

DOCUMENT NAME:

OFFICE	SPLB:DSSA:NRR	SC:SPLB:DSSA	RGEB:DRIP:NRR	OGC	BC:SPLB:DSSA
NAME	PQualls:bw	EWeiss	JBirmingham	GMizuno	JHannon
DATE	/ /02	/ /02	/ /02	/ /02	/ /02

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## Enclosure 1

### 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, the regulatory guide is applicable to plants committing 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 is from the memorandum used for internal reviews 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) be free of fire damage. One example, of a III.G.1 compliant fire area, is a fire area containing 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/routed in different fire areas and would remain unaffected by a postulated fire. Manual actions may be taken in this case, as noted in the memorandum referenced below, to operate the unaffected train of equipment.

#### 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 agree, manual actions are allowed if necessary to operate equipment to achieve hot shutdown. The regulation however, specifically requires that if, in a fire area where redundant safe shutdown trains are both present, a maloperation on one of the redundant trains could occur, then the cables be protected using the separation requirements of Appendix R, Section III.G.2. Manual actions are not an accepted means of meeting III.G.2 for circuits that could prevent operation or cause maloperation. Note that III.G.2 specifically addresses the case when 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 remain free of fire damage. 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 remains unaffected by the fire and is located in different fire areas. 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,

## **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, 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, 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 license for the facility. Manual actions have been similarly accepted for Pre-1979 licensees through the review and approval process. 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 (FPFI) to ensure that the team would identify if licensees were removing, rather than replacing or upgrading, Thermo-Lag barriers during the Thermo-Lag resolution program, and replacing a III.G.2 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 for understanding 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."

*Comment: 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, some manual actions have been acceptable to meet 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) then, III.G.2 does not prevent performing a manual action. Manual valves and electrical switches which 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 III.G.2.

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."

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

##### **Staff response:**

We agree, multiple examples are available where the program, submitted to NRC for approval, contained manual actions. These were reviewed during the licensing process and were

incorporated into the approved fire protection program. However, we note that the failure of inspectors to note issues during an inspection, or to erroneously accept an issue, does not constitute agency approval for a 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."

*Comment: 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 relevant guidance in GL-81-12 concerning acceptable means of dealing with associated circuits for Alternate Safe Shutdown (ASD). As noted above, III.G.2 does not prohibit manual actions. It requires that circuits that could prevent operation or cause maloperation be protected. Prior NRC fire protection guidance provides no relief from that requirement.

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."

*Comment: 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."

*Comment: 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 in lieu of complying with the regulation for required safe shutdown components, it is fundamental to identify the number and type to perform subsequent SDP analysis. It is also a prerequisite to be able to evaluate 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.

*Comment: 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, 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 certainly 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."

*Comment: 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. Other manual actions, such as manually operated valves, need no staff approval. TI 2525, an inspection guidance document, does not approve non compliance with 10 CFR 50, Appendix R, Section III.G.2.

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."

*Comment: 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 III.G.2 requirements are used to protect certain equipment. If a manual action were substituted for a required barrier, then 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."

*Comment: 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. Some misinterpretations and missed observations occur in the inspection process. The process is a sampling process and not a 100% verification of licensing basis or proper implementation of the licensing basis. The purpose of the training conduct on 11/14/2001, 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."

*Comment: 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. When replacing a passive, rated, fire barrier, or an automatic suppression system with human performance it does increase risk. For some simple actions the risk increase of human performance may be minimal. For some actions, it could be significant. Risk calculations typically do not assume that a rated barrier configuration fails prior to the fire exceeding test conditions. Human performance typically has some failure probability associated with it.

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."

*Comment: 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 where a licensee was using a manual action to recover which could be affected by a maloperation, the use of a required piece of safe shutdown equipment. The equipment was not protected from mal-operation 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 Appendix R, Section III.G.2 or the approved fire protection program depending upon the licensing date at the facility.