February 14, 2002

MEMORANDUM TO: Joseph A. Murphy, Chairman
Committee To Review Generic Requirements

FROM: Jon R. Johnson, Deputy Director */RA/*
Office of Nuclear Reactor Regulation

SUBJECT: LETTER FROM THE NUCLEAR ENERGY INSTITUTE (NEI) TO THE NRC DATED JANUARY 11, 2002, REGARDING "USE OF MANUAL ACTIONS TO ACHIEVE SAFE SHUTDOWN FOR FIRE EVENTS"

The subject letter contends that the NRC staff should modify its guidance to regional inspectors to reflect an industry position regarding manual actions. The Committee To Review Generic Requirements (CRGR) has scheduled a meeting on February 26, 2002, to review this matter.

Attached please find the following materials to support that meeting:

(1) Issue Summary
(2) Letter from the NRC to the NEI dated November 29, 2001, regarding "Fire Protection Training Materials", (ADAMS Accession No. ML013370302), with an attachment containing the lesson plan for the training provided to regional inspectors.
(3) Letter from the NEI to the NRC dated January 11, 2002, regarding "Use of Manual Actions to Achieve Safe Shutdown for Fire Events" (ADAMS Accession No. ML020300069).
(4) Draft letter from the NRC to the NEI regarding "Use of Manual Actions to Achieve Safe Shutdown for Fire Events" (ADAMS Accession No. ML020390072)
(5) Regulatory Analysis
(6) Briefing Slides

Attachments: As stated

Contact: Phil Qualls, NRR/DSSA/SPLB
415-1849

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DISTRIBUTION: ADAMS SPLB r/f JJohnson BSheron GHolahan
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* See previous concurrences

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Attachment 1

ISSUE SUMMARY

As part of the Reactor Oversight Process (ROP), the staff of the NRC's Office of Nuclear Reactor Regulation (NRR) has been conducting quarterly training sessions to enhance the knowledge of NRC inspectors who perform region-based fire protection inspections. The most recent quarterly fire protection training workshop was held at NRC headquarters in November 2001. Findings which were identified during recent inspections indicated that licensees had removed rated fire barriers, which were required for compliance with Section III.G.2 of Appendix R to 10 CFR Part 50, and replaced those barriers with a manual action. Because of the lack of previous training in this area, the regions had called these issues Unresolved Items (URIs) and would have addressed them at a later date. In order to improve the regional inspectors' ability to deal with these findings, the staff conducted training concerning the use of manual actions in lieu of a rated fire barrier. Subsequent to the training, the Nuclear Energy Institute (NEI) requested a copy of the NRC training materials provided to the inspectors. The staff provided a copy to NEI on November 29, 2001.

By letter dated January 11, 2002, NEI sent a letter to the NRC, which suggested that the staff had provided incorrect (new) guidance to NRC fire protection inspectors during the training session conducted on November 14, 2001. In its letter, NEI stated that Section III.G.2 of Appendix R to 10 CFR Part 50, allows manual actions to accomplish fire protection safe shutdown activities (in lieu of physical fire protection features) without prior staff review and approval through the exemption and deviation processes. The staff does not agree with NEI's position. The NEI letter implies that inspector implementation of the training would result in a backfit to the licensees that have made these changes without prior NRC approval. The staff has prepared a response to the NEI letter, stating its belief that neither the November 2001 training nor the response to the NEI letter provided any new guidance or interpretation. The staff based this conclusion on the criteria specified in Section III.G.2 of Appendix R to 10 CFR Part 50, which lists the methods available to a licensee to ensure that one train of equipment in a fire area is free of fire damage. Further, 10 CFR 50.12 allows licensees to request exemptions from these requirements under certain circumstances. The staff concluded that no backfit would occur if regions take action, in accordance with the ROP, for cases in which the licensee did not request NRC staff review and approval. The staff also concluded that rulemaking would be required for licensees to generically perform manual actions in lieu of complying with Section III.G.2 of Appendix R to 10 CFR Part 50 without prior NRC review and approval.

The staff reviewed all existing generic fire protection guidance, including Regulatory Guide 1.189, "Fire Protection for Operating Nuclear Power Plants", dated April 2001, to ensure that the staff had not provided generic industry guidance that allows licensees to substitute manual actions for required fire protection features. In years past, the staff has approved multiple exemptions on a case-by-case, plant specific basis, allowing licensees to substitute manual actions for a barrier requirement. In each case, the basis for approval of these exemptions was an equivalent level of protection, and these approved manual actions were typically easily accomplished and not required immediately during a fire event.

In response to the NEI letter, which implied that the inspection training provided new guidance, the staff is forwarding the response to the CRGR for review. Please find attached the supporting documentation as required by Appendix C to the CRGR Charter. The attachments do not provide any item listed in the charter which would be required for a planned backfit. Such items should be considered to be not applicable, as the training does not constitute a backfit.

Attachment 2

November 29, 2001

Mr. Alexander Marion
Director, Engineering
Nuclear Energy Institute
Suite 400
1776 I Street, N.W.
Washington, D.C. 20006-3708

SUBJECT: NRC FIRE PROTECTION TRAINING MATERIALS

Dear Mr. Marion:

On November 27, 2001, at the NEI licensing forum, in Baltimore, Maryland, you requested a copy of the training material, for manual actions, provided to NRC inspectors. Please find enclosed a white paper on this subject. Mr. Fred Emerson of your staff also requested a copy of fire dynamics calculation that was demonstrated by the NRC at the NEI Fire Protection Information Forum in October. Please find enclosed a floppy disk containing the template for performing fire dynamics calculations. The methods on this disk are still under development and may contain errors. Those methods also require that they be applied within the limits of the validity of their correlations.

Sincerely,

/RA/

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

Enclosure

NRC/NRR/REGIONS I, II, III, IV QUARTERLY WORKSHOP

November 14, 2001

THE USE OF MANUAL OPERATOR ACTIONS FOR ACHIEVING AND MAINTAINING FIRE SAFE SHUTDOWN

INTRODUCTION:

We are going to discuss a complex issue with an interesting regulatory past and hope to remove some of the current confusion. If nothing else, the various guidance provided here should aid the inspector in evaluating manual actions found during the inspection process.

MANUAL ACTIONS

- WHY IS THE NRC CONCERNED?

- WHAT IS THE BACKGROUND AND HISTORY?

- INFORMATION THAT AN INSPECTOR NEEDS TO LOOK AT WHEN REVIEWING A LICENSEES MANUAL ACTIONS.

- IMPORTANCE OF DIAGNOSTIC INSTRUMENTATION.

THE CONCERN

- From a safety system engineering perspective, multiple, complex manual actions appear to present a failure probability greater than having redundant safe shutdown trains separated by the Appendix R, III.G.2 criteria with plant operation and control remaining in the control room. NFPA 805, also notes that where manual operator actions are relied on to provide the primary means of recovery in lieu of providing fire protection features, risk may be increased

- From a risk perspective, a consultant has recently provided risk information to the office of Research which shows that multiple manual actions could, (based on risk insights), result in an unacceptable low probability of accomplishment of safe shutdown. Multiple manual actions, in a fire area, can result in being a significant contributor to fire induced CDF. Regional risk analysts can further discuss this with Dr. Hyslop. NFPA 805, also noted that where manual operator actions are relied on to provide the primary means of recovery in lieu of providing fire protection features, risk may be increased.

- Recent inspection have found that some licensee's have taken manual actions to the extreme interpretation such no wrap is provided with operators solely relying on responding to the mal-operations <u>after</u> they occur in III.G.2 fire areas. This condition is similar to the condition Brown's Ferry was in prior to the 1975 fire. This method is recognized for Alternative SSD for associated circuits in GL 81-12.

A hypothetical example (similar to an actual finding):A licensee program failed to protect the control cables for the charging system pumps or required MOVs. Their argument was that if one train of charging pumps was lost, then the other train pump would be manually started and controlled. However, both trains of charging pump and MOV control cables were unprotected in various fire areas and in close proximity to each other. A single fire that caused loss of one could adversely affect the other.

BACKGROUND

REGULATIONS

10 CFR 50.48 backfit 10 CFR 50, Appendix R, Sections III.G, III.J, and III.O, on all reactors licensed to operate prior to January 1, 1979

For plants licensed to operate after January 1, 1979, the identical guidance was put into NUREG-0800, Standard Review Plan. This guidance was to be incorporated during the initial licensing process.

INSIGHTS TO REGULATIONS

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. Supplementary guidance to GL 81-12 DOES allow manual actions for associated circuit resolution for Alternative Shutdown.

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.

During the Thermo-Lag 330-1 resolution activities of the 1990's many utilities, incorporated manual actions to support the removal of the electrical raceway fire barrier system (ERFBS) material WITHOUT prior staff review and approval. This was done using the licensee interpretation of the standard license condition and concluding that the manual actions did NOT adversely affect the ability to achieve safe shutdown.

All of the relevant guidance provided by the staff concerning manual actions were in documents specifically addressing Alternative Shutdown.

GL 81-12 Clarification letter allows manual actions in lieu of protecting associated circuits if a licensee can: detect and defeat the spurious actuation. This will be further developed in later discussion.

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.

LICENSING BASIS - INSPECTOR GUIDANCE

At the beginning of a triennial fire protection inspection, a mutual understanding should be reached with a licensee concerning the licensing basis for their facility. One potential approach is to bring the topic up early (like at an entrance meeting) and say "I consider your licensing basis to be the documents described in 10 CFR 54. If you have basis for a different definition, we need to know this at the beginning of the inspection effort."

10 CFR 54.3 gives the agencies definition of "Current Licensing Basis" (CLB) as used in license renewal. It would make no sense to use a different definition during an inspection.

"Current licensing basis (CLB) is the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect. The CLB includes the NRC regulations contained in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications. It also includes the plant-specific design-basis information defined in 10 CFR 50.2 as documented in the most recent final safety analysis report (FSAR) as required by 10 CFR 50.71 and the licensee's commitments remaining in effect that were made in docketed licensing correspondence such as licensee responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports."

Appendix R Section III.G states:

"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:

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; and

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

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, 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;

3. Alternative or dedicated shutdown capability and its associated circuits, {2} independent of cables, systems or components in the area, room or zone under consideration, shall be provided:

February 13, 2002[1]

a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G.2 of this section; or

b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.

It is important for the inspector to understand the origins of this requirement. In the Statements of Consideration for Appendix R, the basis for III.G.2 was provided.

STATEMENT OF CONSIDERATIONS FOR 10CFR50.48 AND 10CFR PART 50, APPENDIX R

FR 76606, Vol. 45 No. 225, November 19, 1980:

"*G. Protection of Safe Shutdown Capability Technical Basis.* The objective for the protection of safe shutdown capability is to ensure that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the plant. Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified rather than the design basis fire. Three different means for protecting the safe shutdown capability outside of containment are acceptable. The first means is separation of redundant safe shutdown trains and associated circuits by means of 3-hour fire rated barriers. The second means is a combination of separation of redundant safe shutdown trains and associated circuits by a 1-hour fire rated barrier and automatic fire suppression and detection capability for both redundant trains. The third means, which may be used only when redundant trains and associated circuits are separated by 20 feet or more of clear space, requires automatic fire suppression and detection systems in the area. An alternative or dedicated safe shutdown capability independent of the

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[1] {2} Alternative shutdown capability is provided by rerouting, relocating or modification of existing systems; dedicated shutdown capability is provided by installing new structures and systems for the function of post-fire shutdown.

fire area is required if fire protection for safe shutdown capability cannot be provided as outlined above. ... "

Understand also that a "statement of consideration" provides insights into the regulation but is NOT legally enforceable on it's own.

Recently a licensee stated that the NRC had provided old guidance, concerning Appendix R, that manual actions were adequate and that by meeting III.G.1 (one train free of fire damage) they were not required to meet the requirements of III.G.2. No specific reference was cited.

Our review of early NRC guidance given in GL 81-12 would tend to contradict the licensee's view.

"SUBJECT: FIRE PROTECTION RULE (45 FR 76602, NOVEMBER 19, 1980) -
Generic Letter 81-12

Paragraph 50.48(b) of 10 CFR Part 50, which became effective on February 17, 1981, requires all nuclear plants licensed to operate prior to January 1, 1979 to meet the requirements of Section III.G, III.J and III.O of Appendix R to 10 CFR Part 50 regardless of any previous approvals by the Nuclear Regulatory Commission (NRC) for alternative design features for those items. This would require each licensee to reassess all those areas of the plant "... 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 or (sic) redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment ..."* to determine whether the requirements of Section III.G.2 of Appendix R are satisfied. If not, the licensee must provide alternative shutdown capability in conformance with Section III.G.3 or request an exemption if there is some justifiable basis. "

The complexity of associated circuits was also addressed by additional guidance in the supplement to Generic Letter 81-12. Please note that this section <u>does not</u> apply to circuits of systems <u>REQUIRED</u> for SSD, This guidance is specifically in the section concerning Associated Circuits for Alternative Shutdown (III.G.3). This generic letter guidance would also conflict with the requirement, as stated in the regulation, if the licensee applied it to redundant train safe shutdown circuits.

In paragraph B., Associated Circuits, the Supplemental Guidance states:

"The shutdown capability may be protected from the adverse affect of damage to associated circuits of concern by the following methods....

2.b.3 provide a means to detect spurious operations and then procedures to defeat the maloperation of equipment (e.g., closure of the block valve if PORV spuriously operates, opening of the breakers to remove spurious operation of safety injection)."

Please also note that the paragraph above involves either a control room manipulation or an operator performing a breaker manipulation, using installed plant equipment. Also, implicit in this allowance is that the reactor not exceed the bounds of compliance (e.g. the III.L

performance criteria) in the time needed to recognize the maloperation and take corrective actions. The performance goal for this would be Hot Shutdown conditions (as defined by that plant's technical specifications) for a III.G.2 area or the performance criteria listed in Section III.L of Appendix R for Alternative Shutdown areas. Also, if multiple circuit failures may occur, the licensee should be able to justify why they do not occur simultaneously.

Another common presumption used by licensees in an attempt to justify manual actions is the guidance provided in GL 80-10 concerning "Free of Fire Damage". Some licensees will put forth the argument that this was intended to approve use of manual actions

Generic Letter 86-10 defines "Free of Fire Damage" in interpretation 3.

"3. Fire Damage

Appendix R to 10 CFR Part 50 utilizes the term "free of fire damage." In promulgating Appendix R, the Commission has provided methods acceptable for assuring that necessary structures, systems and components are free of fire damage (see Section III.G.2a, b and c), that is, the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. Licensees seeking exemptions from Section III.G.2 must show that the alternative proposed provides reasonable assurance that this criterion is met. (Note also that Section III.G.2 applies only to equipment needed for hot shutdown. Therefore, an exemption from III.G.2 for cold shutdown equipment is not needed. The term "damage by fire" also includes damage to equipment from the normal or inadvertent operation of fire suppression systems."

The basis for the fire damage definition is discussed in SECY - 85 - 306/306B dated March 7, 1986. The clarification was provided in Generic Letter 86-10 because licensees were not including fire suppression damage as fire damage. This clarification was needed to ensure that licensees were considering fire suppression damage as fire damage. There is NO mention of manual actions as an acceptable alternative in either the generic letter or in the SECY letter which provided background for the generic letter.

WHAT SHOULD AN INSPECTOR LOOK FOR WHEN REVIEWING MANUAL ACTIONS (MAs)

Listed below is a list of suggested questions the inspector may wish to ask the licensee. Please note that this is NOT and all inclusive list. Also note that not all may be licensing basis requirements but may be needed for risk determination if a finding exists.

- Was the MA previously approved by the staff? Refer to specific approval in the licensing basis.

- Is the MA a manual valve operation or switch manipulation to prevent maloperation, or to achieve SSD, or is the MA done in response to a maloperation (spurious actuation)? Is it a REQUIRED circuit or an ASSOCIATED circuit?

- RG 1.189 notes that manual operation of valves, switches, and circuit breakers is allowed to operate equipment and isolate systems that are normally manually operated. In

order, to perform some system lineups, not all control was provided in the control room. The guidance allows manual operation for SSD where the normal operation of the components was achieved normally by manual operation.

- Several issues should be reviewed by the inspector for all MAs questioned. Some of these are deterministic performance criteria and will need to be evaluated by the inspector, while others are information that may be required by a risk analyst to perform a risk evaluation. These include:

- How can the licensee DETECT that a mal-operation occurred? (NOTE: Most licensees read the guidance in IN 84-09 and protected ONLY those circuits specified in 84-09.). Annunciators, indicating lights, pressure gages, and flow indicators are among those instruments typically not protected and thus should not be credited.

- How can the licensee DEFEAT the mal-operation prior to unrecoverable conditions occurring?

- How many MAs are required to accomplish SSD?

- How many locations have MAs required? If coordination is required then communications capability must be considered.

- How complex are the MAs? Are special tools and training required? Are the tools dedicated and placed in a nearby location? Is the training adequate and current?

- Are the MAs in the fire affected area or in an area that may be affected by smoke, toxic combustion products, or hot gas?

- If normal lighting can be lost due to the fire, is emergency lighting provided?

- Accessability should be reviewed. Is a ladder need? Is a containment entry needed? Can an operator even reach the required location?

- Can the MA be accomplished before unrecoverable conditions occur based on the licensee's thermo-hydraulic timeline?

- Is staffing adequate? Have operators been trained on special manual actions?

- Is procedural guidance adequate? Have operators been trained on the procedure?

- Have the MAs been verified and validated by plant walkdowns using the current procedure? Who performed the walkdowns? Were the walkdowns timed to assure accomplishment within required timeframes specified in the plant's safe shutdown analysis?

DIAGNOSTIC INSTRUMENTATION

Section IX of attachment I to IN 84-09 lists instrumentation thought to be needed for ALTERNATIVE shutdown. It states:

"The following lists provide the minimum monitoring capability the NRC staff considers necessary to achieve safe shutdown:

Instrumentation Needed for PWRs

a. Pressurizer pressure and level.
b. Reactor coolant hot leg temperature or exit core thermocouples, and cold leg temperature.
c. Steam generator pressure and level (wide range).
d. Source range flux monitor.
e. **Diagnostic instrumentation for shutdown systems.**
f. Level indication for all tanks used (e.g., CST).

Instrumentation Needed for BWRs

a. Reactor water level and pressure.
b. Suppression pool level and temperature.
c. Emergency or isolation condenser level.
d. **Diagnostic instrumentation for shutdown systems.**
e. Level indication for all tanks used."

(bold added to highlight for training purposes)

Generic Letter 86-10, interpretation 1 provides the following guidance for instrumentation for Alternative Shutdown.:

"1. Process Monitoring Instrumentation

Section III.L.2.d of Appendix R to 10 CFR Part 50 states that "the process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control" the reactivity control function. In I&E Information Notice 84-09, the staff provides a listing of instrumentation acceptable to and preferred by the staff to demonstrate compliance with this provision. While this guidance provides an acceptable method for compliance with the regulation, it does not exclude other alternative methods of compliance. Accordingly, a licensee may propose to the staff alternative instrumentation to comply with the regulation (e.g., boron concentration indication). While such a submittal is not an exemption request, it must be justified based on a technical evaluation".
Generic Letter 86-10 also address diagnostic instrumentation:

"5.3.9 Diagnostic Instrumentation

QUESTION

What is diagnostic instrumentation?

RESPONSE

Diagnostic instrumentation is instrumentation, beyond that previously identified in Attachment 1 to I&E Information Notice 84-09, needed to assure proper actuation and functioning of safe shutdown equipment and support equipment (e.g., flow rate, pump discharge pressure). The diagnostic instrumentation needed depends on the design of the alternative shutdown capability. Diagnostic instrumentation, if needed, will be evaluated during the staff's review of the licensee's proposal for the alternative shutdown capability."

BRIEF EXAMPLE

The following example will serve to illustrate the importance of diagnostic instrumentation. Suppose the licensee may have protected only the instrumentation needed to show conformance to IN 84-09. If, due to lack of circuit protection, the licensee has to respond to a mal-operation, additional diagnostic indication must be sufficient for the operator to direct the correct response.

For example;

With the minimum indications, the operator observes the Pressurizer level decreasing. What caused it? Potential causes could include spurious closure of a in-line motor operated valve, and if so, which MOV? Is a pump lost? Has a bypass valve opened? Has a PORV or head vent opened? Is a plant cooldown occurring due to steam loss? Has something else happened? It should be clear that additional diagnostic instrument would be needed to answer these questions. This information should be a part of the licensee's fire protection safe shutdown analysis.

SUMMARY

In summary, the Regional Inspectors should understand the following:

- Most nuclear power plants have manual actions that have been reviewed and approved by the staff. However, manual actions in excess of what has been previously approved by the staff, or that have never been approved have been found in recent inspections.

- Some system operations and some normal system alignments may require manual actions. These activities differ from responding to a mal-operation due to not complying with the regulatory fire protection separation requirements.

- 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..

- 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.

- Manual actions may result in higher or unacceptable risk to the plant.

- Inspectors need to review all manual actions to ensure that a licensee is capable of performing the action within the time needed by the plant response.

CONCLUSION

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. When manual actions are identified during an inspection, the inspectors should review the manual actions to determine if they can be performed and if they have had prior staff review and approval. The use of manual actions, in lieu of protecting circuits appears to increase the risk associated with a fire in a fire area.

MANUAL ACTION EVALUATION EXAMPLE FOR CLASS DISCUSSION

PROBLEM STATEMENT

During an inspection at a nuclear power station, the inspection team noted while performing a review of the fire procedure for fire area A-4, that the procedure directs operator to manually start an Auxiliary Feedwater Pump. Licensee management states that they believe that this is OK. A review of the approved fire protection program determines that the fire area is NOT an Alternative Shutdown area. According to the licensee's Safe Shutdown Analysis (SSA) control cables for both AFW pumps and suction valves are in the FA and could potentially be affected by the same fire.

QUESTION

What actions would I as an inspector take?

SOLUTION

1. Determine why the manual action (MA) is required.
For example, the team determines that the MA is required to isolate the AFW pump from a mal-operation and to prevent a mal-operation of the suction valve while the pump is operating, because adequate electrical cable protection was not provided.

2. Review the CLB for the station.

If the MA was permitted as an NRC reviewed and approved exemption or deviation, then the MA is allowed and compliance with the NRC requirements is NOT in question. The inspector should however ensure that adequate procedures, accessibility, lighting, training, etc. are available or have been accomplished to ensure that the operators can safely perform the MA within the time required by the timeline.

> 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.

3. The inspector should then review the list of inspection questions listed in the previous section, determine which are applicable, and answer them, as best as possible. This is necessary to be able to properly assess the impact the manual action has on SSD and to address the potential increase in risk.

Attachment 3

NUCLEAR ENERGY INSTITUTE

Alexander Marion
DIRECTOR
ENGINEERING DEPARTMENT
NUCLEAR GENERATION DIVISION

January 11, 2002

Mr. John Hannon
Chief, Plant Systems Branch
Office of Nuclear Reactor Regulation
Mail Stop O11-A11
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Use of Manual Actions to Achieve Safe Shutdown For Fire Events

PROJECT NUMBER: 689

Dear Mr. Hannon:

NEI has been made aware of a growing regulatory concern about licensee reliance on manual actions for safe shutdown related to fire events. This awareness has come through informal discussion with licensees and NRC staff members, and through the related guidance you provided to regional inspectors on November 14, 2001. In this letter, NEI is providing the industry's position on this issue for your consideration. We believe that our position provides a solid basis for resolving this issue on a generic basis rather than through inspection and enforcement actions. We that request NRR issue appropriate additional guidance to regional inspectors accordingly to resolve this issue.

The principal NRC concerns about the use of manual actions appear to be twofold:

1. Regulatory: Licensees rely on manual actions to achieve and maintain Appendix R Section III.G.2 redundant safe shutdown without an approved exemption or deviation

2. Risk: There may be excessive use of manual actions, or supporting evaluations are inadequate to demonstrate that manual actions can be successfully carried out before maloperation of equipment causes an unrecoverable condition, with a resulting potential for increased risk

   Industry Position

   In summary, the industry position is:

   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.

   Regulatory Issue: Use of Manual Actions for Redundant Shutdown

   Applicable Regulatory Guidance

   The use of manual actions to achieve safe shutdown is not directly addressed in 10 CFR 50.48, or in Appendix R. However, a number of regulatory guidance documents have provided guidance on the use of manual actions. Excerpts from pertinent guidance are provided in Enclosure 1. While much of the guidance relates to the use of manual actions for alternate shutdown, the guidance does not confine the use of manual actions to alternate shutdown. In fact, Temporary Instruction 2515 Appendix C (draft guidance for the River Bend and Prairie Island Fire Protection Functional Inspections) clearly indicates that manual actions for redundant shutdown were considered acceptable at the time the guidance was written. These guidance documents also indicate that manual actions to achieve safe shutdown should be achievable prior to the fire or to fire suppressant induced maloperations resulting in an unrecoverable plant condition.

   The NRC also provided a guidance document (*The Use of Manual Operator Actions for Achieving and Maintaining Fire Safe Shutdown*) to the regions on November 14, 2001, for discussion in a quarterly workshop. This document was intended to provide additional clarity for NRC inspectors evaluating manual actions during the inspection process. While the document does provide

additional clarity, it also includes information that could lead to incorrect consideration of licensee positions. Examples of such information are provided in Enclosure 2, along with industry comments. We request that this guidance document be revised.

Industry Experience

NEI surveyed a number of utilities to determine plant experience with NRC acceptance of manual actions to achieve safe shutdown. The survey results indicate many cases where the NRC accepted the use of manual actions as part of the fire protection/safe shutdown program. These acknowledgements by the NRC staff have taken the form of SERs on fire protection/safe shutdown program submittals, and favorable findings in inspection reports. They cover both alternate and redundant shutdown manual actions. The time frame in which these positions have been taken by the NRC staff ranges from the early 1980's until this year.

A number of licensees have considered manual actions to fall within the bounds of the definition of control stations in Appendix R, Section III.G.1a, and therefore concluded that their reliance on manual actions meets regulatory requirements and specific NRC review and approval is not required.

Risk Issue

NRC staff has expressed concern that excessive use of manual actions, or reliance on use of manual actions without supporting evaluations, could raise to an unacceptable level the overall risk of failure to shut down safely. We agree that licensees should be able to demonstrate that manual actions are feasible, given the environment(s) in which the actions are to be carried out, the time frame available for performing the actions, and the availability of equipment and operating staff to perform the manual action(s). The appropriate evaluations could address such factors as accessibility, operator guidance and procedures, emergency lighting availability, adequate time to perform the action, availability of equipment necessary to complete the action, adequate communications, and prevention of spurious actuations that would negate the actions. With appropriate selection of manual actions and the ability to demonstrate their feasibility, no appreciable increase in risk will result.

Summary

Many licensees use manual actions to achieve safe shutdown to meet Appendix R III.G.1, III.G.2, and III.G.3 requirements. NRC has reviewed and accepted such positions, many without exemption or deviation requests. Nothing in NRC regulations or regulatory guidance prohibits the use of manual actions to achieve III.G.1 or III.G.2 safe shutdown. Therefore, a licensee should be able to rely on manual actions that do not adversely affect the ability of the plant to achieve and maintain safe shutdown, and it should not be necessary for a licensee to seek an exemption or deviation to implement such manual actions. Licensees should be able to demonstrate this ability. There is no regulatory justification for the NRC to conclude that violation of NRC regulations has occurred where a licensee appropriately relies on manual actions to comply with Appendix R requirements. We look forward to an opportunity to discuss this position with you in more detail. Please contact Fred Emerson at 202-739-8086 to schedule a meeting for this purpose.

Sincerely,

Alex Marion

Enclosures

c: Mr. Brian Sheron, U. S. Nuclear Regulatory Commission
Mr. Eric Weiss, U. S. Nuclear Regulatory Commission

Enclosure 1

Selected Regulatory Guidance on Manual Actions

The following are excerpts from regulatory guidance documents related to the use of manual actions for safe shutdown.

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.

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.

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).

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.

Enclosure 2

NRC Manual Actions Guidance Document, 11-14-2001

This guidance document provides useful information on the regulatory guidance for manual actions, but also contains a number of positions or statements, noted below, that should be revised to improve their accuracy.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Mr. Alexander Marion
Director, Engineering
Nuclear Energy Institute
Suite 400
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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. 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.1of 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

Contact: Phil Qualls, NRR/DSSA/SPLB
301-415-1849

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.

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*.

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.

Attachment 5

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 to10 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 to10 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.

Attachment 6

USE OF MANUAL ACTIONS TO SATISFY SECTION III.G.2 of APPENDIX R to 10 CFR PART 50

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ISSUE: The use of manual actions in lieu of meeting criteria specified in Section III.G.2 of Appendix R to 10 CFR Part 50

- In lieu of upgrading or replacing Thermo-Lag barriers some licensees have substituted manual actions
- Identified during recent Triennial inspections
- Regional inspectors made URIs of these findings
- Regions requested training from the staff to address these issues

- Quarterly training has been conducted with fire protection inspectors as a part of the Reactor Oversight Process (ROP) corrective actions

- Training was conducted on November 14, 2001 concerning inspector resolution of this issue

- The lesson plan was prepared using existing NRC guidance

- NEI requested and was provided a copy of the lesson plan

- NEI wrote a letter to the NRC implying that the training constituted a new interpretation of existing guidance by the staff

- The proposed staff response to NEI is provided

- The staff used existing NRC guidance, primarily ~~NUREG~~ R.G. 1.189, in preparing the lesson plan and the response to NEI
- ~~NUREG~~ R.G. 1.189 was derived from existing fire protection guidance and was found acceptable by the CRGR last year
- New inspection guidance has not been provided in training
- During a review of existing NRC guidance, no guidance was identifed that allowed

manual actions in lieu of satisfying III.G.2 criteria

- for previous exemptions, substitution of manual actions for III.G.2 criteria has been reviewed with management and OGC

- Through the exemption and deviation process, The staff has allowed the use of manual actions in lieu of providing fire protection systems or features

- Examples typically include simple actions that are not required to be rapidly accomplished

- Section III.G was specifically backfit on pre-1979 licensees by 10 CFR 50.48

- Some licensees have relied on pre-1979

SERs approving actions that did not meet the additional requirements backfit by 10 CFR 50.48.

- 10 CFR 50.48(c).5 required licensees to submit ALTERNATIVE shutdown programs to the NRC for review

- Generic Letter 81-12 provided licensee guidance on the details of the submittal

- There is no existing requirement for licensees to submit III.G.2 compliance strategies for staff review

- No requirement to protect auto-function of systems for Appendix R compliance; manual operation from the control room or emergency control station(s) is acceptable

- Manual actions are allowed for III.G.3 compliance, but must comply with III.L

- Staff-approved exemptions from III.G.2, and deviations from the Standard Review Plan, allow specific manual actions

Section III.G.2 of Appendix R to 10 CFR Part 50 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."

Section III.G.3 also states, "Alternative or dedicated shutdown capability and its associated circuits, {2} independent of cables, systems or components in the area, room or zone under consideration, shall be provided:

> |{2} Alternative shutdown capability is provided by rerouting,
> | relocating or modification of existing systems; dedicated
> | shutdown capability is provided by installing new structures
> | and systems for the function of post-fire shutdown.

a. Where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph G.2 of this section; or

b. Where redundant trains of systems required for hot shutdown located in the same fire area may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems.

In addition, fire detection and a fixed fire suppression system shall be installed in the area, room, or zone under consideration."