From: PDR
To: Lesar, Michael
Date: 1/29/04 10:56AM
Subject: Fwd: REVISED: Draft Criteria for Determining Feasibility of Manual Actions to Achieve Post-Fire Safe Shutdown

We are forwarding this comment that was sent to the PDR.

11/26/03
68FR66501

The PDR

159

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Add-D. Diec (DTD)

From: "PEARMON, Denise" <dxp@nei.org>
Date: 1/29/04 8:18AM
Subject: REVISED: Draft Criteria for Determining Feasibility of Manual Actions to Achieve Post-Fire Safe Shutdown

January 27, 2004

Chief, Rules and Directives Branch

Division of Administrative Services

Office of Administration

U.S. Nuclear Regulatory Commission

Mail Stop T6-D59

Washington, DC 20555-0001

SUBJECT: Comments on Draft Criteria for Determining Feasibility of Manual Actions to Achieve Post-Fire Safe Shutdown, 68 FR 66501 and 68 FR 69730

PROJECT NUMBER: 689

We appreciate the opportunity to provide industry comments on the NRC's draft manual actions interim acceptance criteria noticed in 68 FR 66501, as well as the extension of the comment period to January 26, 2004, as noticed in 68 FR 69730. We understand that these criteria will be used by the NRC's interim enforcement discretion policy during the period until the planned manual actions rule is final. We believe that these criteria, in general, offer a framework for consistent licensee treatment of manual actions for fire protection safe shutdown and for consistent NRC review of manual actions during inspections in this interim period. We are providing in Enclosure 1 a number of comments on specific aspects of these criteria to enhance their usefulness as NRC proceeds with its intended rulemaking. Further supporting information on the need for detection and suppression is provided in Enclosure 2.

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Enclosures

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Dear Sir:

We appreciate the opportunity to provide industry comments on the NRC's draft manual actions interim acceptance criteria noticed in 68 FR 66501, as well as the extension of the comment period to January 26, 2004, as noticed in 68 FR 69730. We understand that these criteria will be used by the NRC's interim enforcement discretion policy during the period until the planned manual actions rule is final. We believe that these criteria, in general, offer a framework for consistent licensee treatment of manual actions for fire protection safe shutdown and for consistent NRC review of manual actions during inspections in this interim period. We are providing in Enclosure 1 a number of comments on specific aspects of these criteria to enhance their usefulness as NRC proceeds with its intended rulemaking. Further supporting information on the need for detection and suppression is provided in Enclosure 2.

Safety of Manual Actions

In general, nuclear power plant operators perform manual actions in both normal and abnormal plant evolutions, including conditions involving fire events. Operator manual actions, if determined to be feasible, provide a safe and effective element of the defense-in-depth approach inherent in the current fire protection regulations. Other stakeholders have recently chosen to portray manual actions as a desperate, ad hoc approach to achieving safe shutdown born out of a desire to circumvent the

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regulations by not installing required fire barriers. These assertions are most emphatically not true, as discussed below.

First, manual actions are carefully planned operator actions designed to maximize the likelihood of safe shutdown in the event of a serious fire. They are incorporated into plant procedures. They are conducted by experienced plant operators who are thoroughly trained in their conduct. They are planned so that they can be accomplished in the time required to protect the plant's ability to shut down safely. Even so, such actions reflect only one element of the defense-in-depth approach inherent in fire protection regulations. Other elements include fire prevention measures including strict controls over potential ignition sources and combustible materials, and detection and suppression means to quickly detect and extinguish fires if they do begin.

Second, licensees have been diligent in their efforts to comply with fire protection regulations since they were put into effect, including the assurance of safe shutdown capability. These regulations, notably Appendix R Section III.G.2, require adequate spatial separation between redundant safe shutdown trains, or fire barriers or certain combinations of fire barriers and suppression systems where separation could not be achieved. Only in cases where fire barriers could not reasonably be installed were other means sought to comply with the regulations. These other means included cable rerouting, alternate fire barrier materials, and manual actions. These alternatives were reviewed by NRC headquarters staff or inspectors over the course of time.

From a broader perspective, one would have to conclude that the current fire protection regulations have resulted in a very low likelihood that plant safety can be threatened by fires. There have been no cases in the United States (since the Browns Ferry fire in 1975, which led to the current regulations) of fires challenging plant safety. Plant professionals are very diligent in minimizing fire threats at their plants. Every effort is made to comply with the regulations, and frequently more is done than required by regulations.

Comments on Interim Acceptance Criteria

We believe that suitable interim acceptance criteria will provide a structure for more consistent use and inspection of manual operator actions. However, there are elements of the proposed criteria that do not improve safety sufficiently to warrant their inclusion:

- The expectation for having detection and suppression in the area where the fire occurs before manual actions can be credited;

- Focus on Appendix R III.G.2 manual actions rather than considering them holistically; and
- The new "Equipment Preconditions" interim acceptance criterion.

The enclosure provides specific recommendations to address these areas.

We look forward to discussing these comments and concerns with NRC staff in an effort to create fair and unambiguous interim acceptance criteria while the NRC pursues the rulemaking process. Please contact me (am@nei.org or 202-739-8080) or Fred Emerson (fae@nei.org or 202-739-8086) with any questions about this information.

Sincerely,

Alex Marion

Enclosures

c: Suzanne Black, NRC
John Hannon, NRC
Sunil Weerakkody, NRC
Robert Perch, NRC
Document Control Desk, NRC

Enclosure 1

Industry Comments
Manual Actions Interim Acceptance Criteria
68 FR 66501

This enclosure provides the following:

- Background information on the regulatory history of the use of manual actions;
- Comments on manual actions applicability for Appendix R Sections III.G.1, 2, and 3;
- Comments on the need for detection and suppression;
- General comments on 68 FR 66501 draft interim acceptance criteria for manual actions; and
- Specific comments on 68 FR 66501 draft interim acceptance criteria for manual actions.

Background

Industry agrees with the current NRC staff focus on the safety and effectiveness of manual actions, as reflected in the following statement from 68 FR 66501:

"However, the NRC believes that manual actions relied upon by licensees are safe and effective when performed under appropriate conditions."

However, background information in SECY 03-100, *Rulemaking Plan on Post-Fire Operator Manual Actions* (June 17, 2003), as to the need for the current rulemaking on manual actions provides an incorrect view of licensee use of manual actions. This view has led to a misperception by some stakeholders of widespread licensee noncompliance with Appendix R Section III.G.2 through the use of manual actions. This most emphatically is not the case. As we noted during a presentation on June 20, 2002, licensees have maintained compliance, and this has been confirmed repeatedly by inspections.

Clarifying information is provided below in this Background section for NRC staff consideration in correcting any misperceptions on this point. This discussion, while applying to a specific group of plants, generally characterizes the industry understanding of the use of manual actions during the past twenty years.

The general context of SECY 03-100, and discussions provided by the NRC Staff during the November 12, 2003, meeting suggests that the use of unapproved manual actions has arisen directly as a result of licensees' strategies for resolving Thermo-Lag issues. We believe that this premise is incorrect, and undermines public confidence in the regulatory process. Generic and plant-specific NRC

correspondence indicates that NRR staff accepted manual actions as a means of complying with Appendix R, and as such did not require specific Staff approval. Plant sites subject to Generic Letter (GL) 92-08, *Thermo-Lag 330-1 Fire Barriers* (December 17, 1992), responded to the NRC's information requests regarding corrective actions, including discussions regarding revisions to safe shutdown strategies and the addition of manual actions. NRC issued numerous requests for additional information (RAIs), tracked completion of specific actions via Confirmatory Action Letters, conducted inspections, and finally closed the GL 92-08 issue.

The licensing bases of one group of plants indicate that NRC and industry's treatment of manual actions evolved over a short period of time between 1980 and 1983. Very early in the Appendix R compliance process, a small number of exemptions to licensees for use of Appendix R, Section III.G.2 were conservatively submitted by some sites for use of manual actions. By 1983, NRC had provided additional guidance to individual plants, typically during project status meetings with NRR, that indicated that manual actions met the "emergency control stations" provision of Appendix R III.G.1.a, and that exemptions were not required. Since NRR indicated that exemptions were not required, explicit prior approval was no longer sought from NRR; however, the safe shutdown methodology for each site in this group was revised to include a general discussion of manual actions. Feasibility criteria were employed at each site, based on fundamental engineering principles and judgment, including the involvement of Operations, and the development of procedures and administrative controls where necessary. Plants that received approval for exemptions for "III.G.2 manual actions" typically did not retract them once the NRC clarified their guidance on manual actions; however additional exemptions were not requested afterwards.

NRC's clarification of GL 81-12 *Fire Protection Rule* (February 20, 1981), provides an initial discussion of operator actions (as an alternative to protection of cables or equipment), in Enclosure 2, "Safe Shutdown Capability". This guidance is provided in the general context of all safe shutdown strategies, and is not limited to the Alternative Shutdown capability, except where specifically stated in the text of the Generic Letter.

> *"For circuits of equipment and/or components whose spurious operation would affect the capability to safely shutdown:*
>
> *(1) provide a means to isolate the equipment and/or components from the fire area prior to the fire (i.e., remove power cables, open circuit breakers); or*

> *(2) provide electrical isolation that prevents spurious operation. Potential isolation devices include breakers, fuses, amplifiers, control switches, current XFRS, fiber optic couplers, relays and transducers; or*
>
> *(3) provide a means to detect spurious operations and then procedures to defeat the maloperation of equipment (i.e., closure of the block valve if PORV spuriously operates, opening of the breakers to remove spurious operation of safety injection);"*

The NRR Staff position that exemptions were not required for manual actions was ultimately provided in SECY-83-269, Attachment C.

> *"Section III.G of Appendix R states that repairs are permitted to provide the cold shutdown capability. Additionally, Section III.L indicates that procedures for these repairs must be developed and materials needed for the repairs stored on site. To establish consistency in the plant designs, the staff issued the following guidelines concerning repairs.* [Memorandum R. Mattson to R. Vollmer, dated July 2, 1982]
>
> *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 safe shutdown has to be operable during and following the 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. However, the removal of fuses for isolation is not permitted. All manual operations must be achievable prior to the fire or fire suppressant induced maloperations reaching an unrecoverable plant condition."*

Additional guidance contained in GL 86-10, *Implementation of Fire Protection Requirements* (April 24, 1986), further clarifies the NRC's expectations regarding manual actions (Section 5.2 *Procedures*, Section 5.3.2 *Hot Short Duration*, and Section 5.3.8 *Short Circuit Coordination Studies*). In addition, GL 86-10 Section 8.13, *Guidance Documents*, lists SECY-83-269 as a document containing Staff positions for licensee use.

The fact that the use of manual actions was not limited to alternative shutdown capability was also recently reinforced by the NRC in Regulatory Guide (RG) 1.189. Specifically, Generic Letter 81-12 guidance is reiterated and expanded in RG 1.189. In addition, the guidance in RG 1.189 for addressing fire-induced maloperations,

including the use of manual actions, is provided in Sections for Normal Redundant Shutdown (Sections 5.3 and 5.5), and is not included in Section for Alternative / Dedicated Shutdown (Section 5.6).

Manual Actions Applicability for Appendix R Sections III.G.1, 2, and 3

Recommendation

This proposed interim acceptance criteria should state NRC's current expectations for feasibility of all manual actions. This maintains the maximum consistency with existing NRC guidance, and avoids the creation of a separate set of standards only applicable to "III.G.2" manual actions.

Establishing criteria specifically applicable to "III.G.2 manual actions" will lead to unnecessary confusion about whether an action is a "III.G.1.a action" or a "III.G.2 action".

Background

We understand that III.G.1, III.G.2, and III.G.3 of Appendix R are meant to be applied as successive filters, through which all the potential fire impacts to the safe shutdown capability can be identified and resolved. Classifying a fire area as a "III.G.1 fire area" or a "III.G.2 fire area" is an imprecise use of terminology that has no basis in the regulation, and leads to further confusion.

First, III.G.1 identifies all of the cables and equipment in the fire area that are necessary to achieve safe shutdown from either the control room or emergency control stations.

- In determining if particular cables or equipment are necessary, the effect of their loss can be investigated to determine the impact on the overall plant shutdown transient. In some cases, this investigation may show that a function is necessary for safe shutdown, but that it can be delayed for some time.

- The cables and equipment that affect the operation of the safe shutdown systems will vary, depending on whether the equipment is controlled from the control room, or from emergency control stations. The "emergency control stations" provision in III.G.1 is provided to offer the flexibility to licensees of controlling equipment from other locations, when it is advantageous to do so. Implicit in this provision is that such actions must be feasible.

After screening each fire area through III.G.1, cases will still exist where protection of cables/equipment is required. These discrepant items are carried forward and resolved under III.G.2 and/or III.G.3.

Second, III.G.2 provides acceptable strategies for resolving discrepant cables or equipment that are located in the fire area, and are necessary for safe shutdown. For fire areas outside of primary containment, these non-compliances can be resolved by use of 3-hour barriers, 1-hour barriers with automatic suppression and detection, or 20-foot spatial separation with suppression and detection. Only cables or equipment "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" require resolution. Cables or equipment that are not in the fire area, or have been resolved through the use of emergency control stations would not require resolution under this provision of III.G.2, since they had already been resolved under III.G.1. Furthermore, if a component is capable of manual operation (and manual operation is feasible), then its supporting cables and/or equipment are not necessary, and do not require protection under III.G.2.

Both III.G.1 and III.G.2 require separation and/or protection of necessary components and cables. To determine which components and cables are necessary, their intended function(s) must be understood first, through use of existing UFSAR transient analyses and/or fire-event specific analyses. If a system or component's intended function is to provide some function later in the event, then the associated cables may not be necessary, if there is another means of controlling the system or component. Only necessary cables and equipment require protection; extending that protection to additional "desired" cables and equipment is not currently required by Appendix R.

After screening all discrepant cables and equipment through III.G.2, most fire areas will be able to achieve compliance and their analysis is complete. In some fire areas, such as the main control room, or cable spreading room, installing barriers to protect all the necessary safe shutdown functions is either not practical or not possible. These fire areas are carried forward and resolved under III.G.3.

Lastly, III.G.3 provides the option of developing a dedicated or alternative shutdown capability that is independent of the fire area, in order to compensate for the functions that could not be protected under III.G.1 and III.G.2. Automatic detection and fixed suppression is required for areas that invoke III.G.3. III.G.3 (and III.L) also provide specific technical requirements governing the capacity and capabilities of the dedicated/alternate shutdown equipment.

Need for Suppression and Detection

The need for suppression and detection with manual actions was stated in 68 FR 66501 as follows (emphasis added):

> *"Licensees who have relied on operator manual actions to comply with Paragraph III.G.2 of Appendix R may be allowed enforcement discretion if* ***the area where the fire occurs has fire detectors and an automatic fire suppression system installed in the fire area*** *and if the manual actions relied upon are consistent with all of the following acceptance criteria"* [followed by listing and discussion of interim acceptance criteria]

The requirement for detection and suppression in the area where the fire occurs does not significantly improve the ability of the operator to perform the manual action and should be removed. The rationale for this position is summarized below:

1. The provision of suppression and detection in the area where the fire occurs does not enhance the ability of the operator to perform a manual action in another area of the plant that is unaffected by the fire. The intent of the original requirement for suppression and detection in Appendix R Section III.G.3 was to minimize the probability of a fire forcing the use of the alternate (i.e., alternative or dedicated) shutdown capability. With respect to Section III.G.2, the normal safe shutdown systems are used from either the control room or Emergency Control Station, and the protection of the safe shutdown functions using normal shutdown systems and manual actions, if necessary, is provided by the fire area boundaries. This is consistent with III.G.2.a that requires 3 hour separation for redundant systems within the same fire area without relying on suppression and detection. Therefore, detection and suppression in the area of concern do not enhance the ability of the operator to carry out a feasible manual action.

2. No safety benefit has been provided to support the addition of this "requirement" for suppression and detection. It is not discussed in SECY-03-0100 or the resulting SRM. Neither is it discussed in JCN W6994, *Risk Insights Related to Post-Fire Operator Manual Actions*, from Sandia National Laboratories.

3. This new "requirement" is also more severe than Appendix R Section III.G.3 because III.G.3 only requires a "fixed" suppression system, either manual or automatic, but does not require an "automatic" suppression system. NRC Branch Technical Positions and Appendix R section III.F already require detection to be installed in plant areas that contain or present an exposure fire hazard to safe shutdown or safety-related systems or components.

Therefore, there is no safety benefit in prescribing detection for areas that simply credit manual actions.

4. For many plants, this new requirement for automatic suppression could impose a significant burden. For example, one site determined that the approved fire protection program consists of 23 fire areas that credit manual actions, of which 15 do not currently have suppression and/or detection. Therefore, this new "requirement" would result in the submission of numerous exemptions for no safety benefit, and conflicts with the NRC's stated goals of reducing unnecessary burden and eliminating requirements that are marginal to safety. Without a corresponding improvement in safety, as noted above, the "requirement" is not likely to meet the criteria imposed by 10 CFR 50.109.

General Comments

1. Crediting manual actions to implement normal shutdown capability complies with Section III.G of Appendix R. Industry is reviewing possible alternatives to rulemaking for addressing this issue, and may provide additional views at an appropriate time.

2. The interim acceptance criteria should be generically communicated to industry via a Regulatory Information Summary prior to NRC revising inspection guidance.

3. The NRC should provide guidance to inspectors and licensees on allowing manual actions that have received prior specific NRC review and approval, but which may not meet all aspects of the proposed feasibility criteria.

4. The general context of SECY-03-0100, and discussions provided by the NRC Staff during the November 12, 2003, meeting suggests that the issue of unapproved manual actions has arisen directly as a result of licensees' inappropriate strategies for resolving Thermo-Lag issues. We believe that this premise is incorrect, and undermines public confidence in the regulatory process. As discussed in the *Background* section above, the approved fire protection programs have credited manual actions for normal shutdown since Appendix R was promulgated.

5. Appendix R Section III.G.2 applies to achieving and maintaining hot shutdown conditions. The term "achieve and maintain post-fire safe shutdown" is used throughout the proposed interim acceptance criteria. Enclosure 1 (Interpretations of Appendix R) to Generic Letter 86-10 (Section 3) states "Note also that Section III.G.2 applies only to hot shutdown.

Therefore an exemption from III.G.2 for cold shutdown equipment is not needed." The wording should be consistent throughout the document that the criteria are applicable only to achieving hot shutdown conditions, not post-fire shutdown, which could imply both hot shutdown and cold shutdown.

6. We have not found any basis to support the statement "Operator manual actions are not permitted in 10 CFR Part 50, Appendix R, paragraph III.G.2," The acceptability of crediting manual actions to implement normal shutdown capability was presented to the industry on numerous occasions, and is documented in Generic Letter 81-12 and Regulatory Guide 1.189. We presented a discussion of this in our presentation materials for the June 20, 2002, meeting with NRC. Operator manual actions are permissible throughout 10CFR50, by virtue of NRC's endorsement of IEEE-603, except where NRC regulations specifically prohibit their use (for example, requirements for automatic protective actions for certain design basis events).

7. Definition of Manual Actions:

   a. The term "Operator Manual Action" is defined as "actions taken by operators to manipulate components and equipment from outside the main control room to achieve and maintain post-fire safe shutdown." Actions taken by operators from inside the main control room were identified by NRC staff in a November 12, 2003, meeting as "Operator Actions" and apparently not to be subjected to the draft interim criteria or the rule revision. It is important to clearly define in the draft interim criteria both of these terms, and state those criteria that apply to each term. This will avoid future confusion regarding actions taken from within the main control room that are outside the normal plant shutdown process. Two examples follow that support the need for this clarification:

   Example 1 – An operator takes manual action from the main control room to close a PORV block valve to forestall the potential consequences of a spurious PORV opening due to fire-induced hot shorts in the fire area of concern.

Example 2 – An operator takes manual action from the main control room to close a system cross-connect valve, normally open for DBA mitigation purposes, to avoid a potential flow diversion from the credited shutdown system divisional path due to spurious operation of valves in the non-credited divisional path.

8. Many actions can be completed prior to control room evacuation even though few may be credited in a typical safe shutdown analysis. These can often change the results of a thermal hydraulic analysis. For instance, swapping the suction of the charging pump from the makeup tank to the large borated water tank at T=1 vs. T=10 can mean the pump might not lose its suction source. The interim acceptance criteria should allow for these control room actions.

9. The interim acceptance criteria should note that actions needed to mitigate potential spurious actuations of equipment may often be the same actions needed for other purposes, such as to line up the plant for shutdown operations.

10. The interim acceptance criteria should distinguish operator actions from repairs.

Comments on "Available Indications" Criterion

Text:

Diagnostic indication, if credited to support operator manual actions, shall be capable of:

- *Confirming that the action is necessary;*
- *Being unaffected by the postulated fire;*
- *Providing a means for the operator to detect whether spurious operation of safety-related equipment has occurred; and*
- *Verifying that the operator manual action accomplished the intended objective.*

Comments:

1. Overall: Revise this criterion to read: "There should be indication that confirms that an action is necessary and that the action, once completed, has achieved its objective. This indication is not required to be a direct reading instrument and may be a system change monitored by process indication (level, pressure, flow, etc.)."

   Reason: Direct-reading instrumentation indicating that a spurious operation has occurred typically does not exist, nor is it required. Detecting a specific spurious operation would require independent position indication circuitry be installed on numerous components, to be able to detect that a spurious operation of a specific component had occurred. In practice, the instrumentation provided in IN 84-09 is typically all that is necessary. In most cases, symptom-based procedures can be written to respond to symptoms (for example, flow not obtained) and direct the appropriate response (for example, manually open valve XYZ). In some cases, prescriptive, event-based procedures are more appropriate.

   Successful completion of an action is often obvious to the operator in the field (valve is now open), and can be inferred by the control room based on a change in state of an important process variable (reactor coolant level increasing, RHR flow increasing, pump ammeter, etc).

2. First bullet: If the first bullet is retained after consideration of Comment 1, the bullet should be clarified, since it is not clear what it means to confirm that an action is necessary. In some cases manual actions are preventive, not responsive, and are performed regardless of actual need. If procedural guidance preemptively specifies deenergizing a valve and verifying correct valve position, then it is not necessary to have diagnostic instrumentation to detect a spurious operation of the valve and perform mitigating actions. For clarity, the feasibility criteria should clearly delineate that this is an acceptable practice.

3. Third bullet: If the third bullet is retained after considering Comment 1, change "safety related" to "safe shutdown." Revise this bullet to say "Providing a means for the operator to detect whether spurious operation of safe shutdown equipment has occurred," and give example(s) of providing means for the operator to detect spurious operation.

Reason: The use of "safe shutdown equipment" instead of "safety-related equipment" is more appropriate as manual action is for manipulating safe shutdown equipment. Any safety-related equipment that can spuriously operate and affect safe shutdown capability should be considered "safe shutdown equipment" and have manual actions to mitigate its effects. For clarification, examples should be given for detecting spurious operation (i.e. pressure indicator, temperature indicator, light status indication for valve position).

Comments on "Environmental Considerations" Criterion

Text:

Environmental conditions encountered while accessing and performing operator manual actions shall be demonstrated to be consistent with the following human factor considerations for visibility and habitability:

- *Emergency lighting shall be provided as required in Appendix R, Section III.J, or by the licensee's approved fire protection program, [e.g., lit with 8-hr battery-backed emergency lighting], and sufficient lighting shall be provided for paths to and from locations requiring any actions.*

- *Radiation shall not exceed 10 CFR Part 20, Section 20.1201, limits.*

- *Temperature and humidity conditions shall be evaluated to ensure that temperature and humidity do not adversely affect the capability to perform the operator manual action (See, e.g., NUREG/CR–5680, Vol. 2, "The Impact of Environmental Conditions on Human Performance") or the licensee shall provide an acceptable rationale for why temperature/humidity do not adversely affect performing the manual actions.*

- *Fire effects shall be evaluated to ensure that smoke and toxic gases from the fire do not adversely affect the capability to access the required equipment or to perform the operator manual action.*

Comments:

1. General:

   a. Revise the text of this criterion as follows: "Environmental conditions should not prevent performance of necessary operator manual actions. Anticipated radiation levels, temperature, humidity, smoke, toxic gasses, etc. should not prevent the performance of the action. Adverse environmental conditions have been identified and compensated or mitigated if necessary. Actions required in a fire area experiencing a fire, or that requires travel through a fire area experiencing a fire, may be acceptable if these actions are not required until the fire has been sufficiently extinguished and accessibility restored. Emergency lighting should be provided as required in Appendix R, Section III.J or by the licensee's approved Fire Protection Program."

   b. The NRC's stated purpose is to ensure that environmental conditions do not prevent the performance of the action. The FRN language "do not adversely effect" is a "zero impact test" that precludes the licensee's ability to identify the impact, and mitigate it. Environmental conditions may "adversely affect" the capability to access equipment or perform an operator manual action without preventing them. The sense of this criterion should be that environmental conditions do not prevent the action from being carried out with normal protective gear and reasonable precautions, and without harm.

   b. "Shall be demonstrated:" Guidance for performing this demonstration should be provided, since normal plant operations would preclude introduction of these adverse environments for training purposes.

2. Emergency lighting:

   The phrase "..and sufficient lighting shall be provided for paths to and from locations requiring any actions" is unnecessary and should be deleted, since Appendix R already provides the required guidance for emergency lights for safe shutdown actions.

3. Radiation:

   a. Allowable dose does not appear to be properly treated in this criterion. 10CFR20, Section 20.1201 defines the cumulative annual occupational dose limits. It does not define permissible radiation dose rates, and is not written such that it could be applied as a limit for a specific postulated event.

10CFR20, Section 20.1201 can also be waived if necessary per 20.1206 and 20.1001, in order to protect public health and safety. To satisfy the FRN language, an additional annual administrative dose balance would need to be maintained for every operator, to ensure they had enough annual dose in reserve, in the unlikely event that a fire occurred that required an operator to receive any dose at all. At the November 12, 2003, meeting on manual actions, NRC staff stated that ALARA is a concern for operator actions, and that a fire should not be considered an emergency for design purposes. ALARA is also a concern for the alternatives to operator actions, such as installing fire barriers or suppression, which require hundreds (and sometimes thousands) of man-hours in the plant, and which can also incur significant actual dose. Appendix R allows a fire to damage safety-related equipment. In the event that an actual fire damaged safety-related equipment, the site would be in an ALERT emergency classification, Health Physics would be supporting Operations in their performance of actions if necessary, as directed by the emergency plan procedures.

b. Radiation dose to the operators should meet the requirements of GDC-19, as discussed in NEI 96-07, instead of referring to 10 CFR Part 20.5. NRC may be able to better clarify this item by consulting previous guidance provided in NUREG-0737, Item III.B.2 regarding plant shielding for post-accident operations. NUREG-0737 Item III.B.2 contemplated the need for local actions in the plant, and imposed a 5-rem whole body limit, for the duration of the event (based on GDC-19).

4. Temperature and Humidity:

The reference to the NUREG-CR is not necessary. Licensees already have established heat stress programs and procedures that are adequate for evaluating environmental conditions. Tying environmental conditions to the NUREG-CR creates confusion, since the NUREG-CR is not currently recognized as a source of heat stress guidance for plants, and creates a situation where conflicting guidance would exist.

5. Fire, Smoke, and Toxic Gases:

The capability to access should be consistent with the training and protective equipment provided. The effects of smoke and toxic gasses may vary from facility to facility. This should be based on the type of training received in the handling of hazards and the use of specialized protective equipment. If a manual action is not in the same fire area as the fire, then no further consideration of effects of the fire should be necessary (e.g., smoke escaping into another fire area through a fire door that would not need to be opened to

take the action). If re-entry into the fire-affected area is required, then the feasibility and timing of re-entry should be based on an analysis of the fire hazards and action timing.

Comments on "Staffing and Training" Criterion

Text:

There shall be a sufficient number of plant operators, under all staffing levels, to perform all of the required actions in the times required for a given fire scenario. The use of operators to perform actions shall be independent from any collateral fire brigade or control room duties they may need to perform as a result of the fire. Operators required to perform the manual actions shall be qualified and continuously available to perform the actions required to achieve and maintain safe shutdown. A training program on the use of operator manual actions and associated procedures during a postulated fire shall demonstrate that operators can successfully achieve these objectives.

Comments:

1. Revise text as follows: "Administrative control shall be in place to ensure that t~~T~~here are ~~shall be~~ a sufficient number of plant operators, under all staffing levels, to perform all of the required actions in the times required for a given fire scenario. The use of operators to perform actions shall ~~be independent from~~ not interfere with any collateral fire brigade or control room duties they may need to perform as a result of the fire. Operators required to perform the manual actions shall be qualified ~~and continuously available~~ to perform the actions required to achieve and maintain safe shutdown. Training on ~~A training program on the use of~~ operator manual actions and their associated procedures shall be incorporated in the licensee's operator training program. ~~during a postulated fire shall demonstrate that operators can successfully achieve these objectives.~~"

   In this markup, "continuously available" is redundant to the first sentence and was deleted. It can also pose a conflict with Technical Specifications, which allow for unexpected absences and require their prompt resolution. With respect to training, NRC clarified during the November 12 manual actions meeting that training should be conducted in accordance with the licensee's overall training program, and that the Staff was not trying to overlay additional requirements. The reference to demonstration was removed because that is addressed by the "demonstration" criterion.

2. This criterion should indicate that there should be sufficient operators to perform required actions for safe shutdown, one at a time or simultaneously, within the time frame indicated by analyses supporting the plant licensing basis.

3. The staffing requirements should acknowledge the staffing augmentation provisions of the emergency plan, and the time at which the given "scenario' actions are required to be performed. A plant should not be required to provide additional on-shift staffing to perform actions well into an event when offsite staff augmentation is available in accordance with the emergency plan (or the fire is extinguished and the brigade is released), or to perform system alignments and repairs for cold shutdown.

4. Operators are qualified by watch station, and by system, not by task-specific training. The requirements for operating a valve locally are the same whether it is required for EOPs or for post-fire safe shutdown. This training criterion should ensure that operators are aware of the conditions under which this manual action might be required, and the basis for the action.

   In general, operator training on fire safe shutdown procedures, including operator actions, are already addressed as part of the overall operator training program, which utilized the "systematic approach to training" described in ANSI/ANS-3.1, and endorsed in RG 1.8. In addition, NUREG-0899, Section 3.4 already provides several acceptable options for operator training on emergency procedures.

5. The statement, "The use of operators to perform actions shall be independent from any collateral fire brigade or control room duties they may need to perform as a result of the fire" would appear to preclude the fire brigade from deenergizing an electrical cabinet located within the affected fire zone (or elsewhere), if the deenergization is credited as a 'manual action'. Fire fighting techniques routinely employ deenergizing electrical cabinets that are potential ignition sources or provide power to electrical circuits involved in the fire. As an example, a fire in a Motor Control Center (MCC) could cause fire damage to control circuits resulting in the spurious operation of a valve. Typically, to take manual control of the valve, the associated breaker would be opened, thus deenergizing the circuit and allowing an operator to manually position the valve as required. Obviously, with a fire occurring at the MCC, it would not be expected that the operator assigned to manually operate the valve would enter the affected fire zone to deenergize the component. Instead, fire brigade personnel could deenergize the component as part of their normal fire fighting strategy.

The feasibility criteria should consider this as a viable coping strategy and not categorically preclude actions performed by fire brigade personnel.

6. It should not be required that each operator on shift should be able to perform the action, but only that there be sufficient staff on any shift that are trained to take the action. Example: If someone has a physical limitation such that he cannot access an area, but other qualified operators can access the area and perform the action, then credit should be given for being able to perform the action. Numerous means of communications are available to operators to provide assurance that if a particular operator is incapable or uncomfortable with performing a particular action, means exists to request assistance from other operators and plant personnel.

Comments on "Communications" Criterion

Text:

To achieve and maintain safe shutdown, adequate communications capability shall be demonstrated for operator manual actions that must be coordinated with other plant operations, with this communications capability continuously available.

Comments:

1. Revise the text as follows: "To achieve and maintain safe shutdown, adequate communications capability shall be demonstrated for operator manual actions that must be coordinated with other plant operations~~, with this communications capability continuously available~~. Direct communication capability is not required in cases where an individual can be directed to perform the action and the action can be performed with no other instruction."

   The performance-based requirement "adequate communications capability" is sufficient; "continuously available" is redundant to "adequate communications capability," and may cause possible misinterpretation. It could be construed to preclude the use of "fail-over" schemes or transfer schemes commonly used in repeater systems. Given that multiple communications systems are available onsite, the simultaneous failure of these systems is not likely.

2. The requirements for communications should be the same as those already used for operator coordination, unless a fire in a particular area might affect those communications.

Comments on "Special Equipment" Criterion

Text:

Any special equipment required to support operator manual actions, including keys, self-contained breathing apparatus (SCBA), and personnel protective equipment, shall be readily available, easily accessible and demonstrated to be effective.

Comment:

Revise the text as follows: "Administrative controls shall be in place to ensure that a~~A~~ny special equipment required to support operator manual actions, including ladders, keys, self-contained breathing apparatus (SCBA), and personnel protective equipment, are ~~shall be readily~~ available in a location unimpeded by the postulated fire, and are suitable for the intended use.~~, easily accessible and demonstrated to be effective.~~"

Guidance for administrative controls and to have ladders available are added to this criterion and removed from "Local Accessibility" for consistency.

Comments on "Procedures" Criterion

Text:

Procedural guidance on the use of required operator manual actions shall be readily available, easily accessible and demonstrated to be effective.

Comments:

1. Replace text with, "Guidance (e.g., procedures, pre-fire plan, etc.) shall be provided to alert the operator as to when manual actions may be required in response to potential fire damage. The guidance may be prescriptive or symptomatic. Specific procedures are required for activities not addressed in existing operating procedures (normal, abnormal, emergency) for operator actions as a result of fire-induced failures that cannot be readily diagnosed

using fire-protected information to the operator. Typically, plant operators should be capable of performing non-complex manual actions without detailed instructions; however detailed instructions should be readily available, if required."

The FRN text does not add clarity as to the expected content of procedures. Text from NEI 00-01 is provided to add clarity. This comment text is provided to ensure consistency with GL 86-10, section 5.2 "Procedures."

2. With regard to "easily accessible," operational procedures are located within the control room. Typical manual actions would require direction from the control room to an operator in the field to perform a specific task, without having to have a copy of the procedure in the field.

Comments on "Local Accessibility" Criterion

Text:

All locations where operator manual actions are performed shall be assessed as accessible without hazards to personnel, with controls needed to assure availability of any special equipment, such as keys or ladders, being demonstrated.

Comment:

Revise to read: "All locations where operator manual actions are performed shall be assessed as accessible without undue hazards to personnel~~, with controls as required to assure availability of any special equipment, such as keys or ladders being demonstrated.~~"

Reason: The change allows some level of hazard (i.e. low level radiation, smoldering smoke, climbing a ladder) to be permitted instead of no hazard at all to perform manual actions. This is necessary, as some manual actions require entering the fire area where the postulated fire is located, [added] near energized or operating machinery, or on ladders and platforms. Currently the NRC permits entry after a certain period of time and the fire is under control but not absolutely without hazard. Controls of equipment should be moved to "Special Equipment" for consistency.

Comments on "Demonstration" Criterion

Text:

The capability to successfully accomplish required operator manual actions within the time allowable using the required procedures and equipment shall be demonstrated using the same personnel/crews who will be required to perform the actions during the fire; documentation of the demonstration shall be provided.

Comments:

1. Revise the text as follows: "The capability to successfully accomplish required operator manual actions within the time allowable using the required procedures and equipment shall be demonstrated ~~using the same personnel/crews who will be required to perform the actions during the fire~~; documentation of the demonstration shall be ~~provided~~ available.

   The FRN text "using the same personnel/crews who will be required to perform the actions during the fire" is unnecessarily restrictive.

   a. A typical plant may have 5 or more operating crews, and 50 to 100 distinct fire areas, each with unique safe shutdown strategies and procedures. As written, the FRN text would require all operating crews to simulate all fire scenarios, and document each. This cannot be accommodated in a typical plant's training schedule, and would be required to be repeated any time a new individual was added to an operating crew. Demonstration by representative personnel is more appropriate.

   b. In many cases, the same actions are repeated for fires in several areas. The NRC has previously accepted demonstrations of the most limiting scenarios, in order to bound other less involved scenarios.

   c. The extent to which training is required is evaluated by station procedures to job and task analysis. Training for manual actions should be consistent and integrated with other operator training for abnormal or emergency responses. In general, operator training on fire safe shutdown procedures, including operator actions, are already addressed as part of the overall operator training program, which utilized the "systematic approach to training" described in ANSI/ANS-3.1, and endorsed in RG 1.8. In addition, NUREG-0899, Section 3.4 already provides several acceptable options for operator training on emergency procedures.

d. Documentation should be available for NRC review, not provided to NRC in advance of implementation.

2. It should be considered acceptable for the completion of training to occur over several training cycles, and then be subject to a sampling for refresher training over the course of several training cycles. It should also be considered acceptable to "train" without putting every operator in the field.

3. There is no clear guidance for establishing the time allowable. The start time for the spurious operation (which requires the manual action), also called 't = 0' is not clearly defined by the potential fire consequences or by regulatory guidance. Possible definitions for t=0 include reactor trip, the start of a fire, the time the fire is discovered, the time the first cable burns through, the time for the first spurious action, etc. In addition, the calculation of the time for completion of the required action requires numerous assumptions regarding plant conditions.

   While these calculations serve to demonstrate the priority and relative importance of a sequence of manual actions, such calculations do not necessarily represent an absolute criterion for acceptance of a manual action.

Comments on "Complexity and Number" Criterion

Text:

The degree of complexity and total number of operator manual actions required to effect safe shutdown shall be limited such that their successful accomplishment under realistically severe conditions is assured for a given fire scenario. The need to perform operator manual actions in different locations shall be considered when sequential actions are required. Analyses of the postulated fire time line shall demonstrate that there is sufficient time to travel to each action location and perform the action required to support the associated shutdown function(s) such that an unrecoverable condition does not occur.

Comments:

1. Revise the text to read, "The degree of complexity and total number of operator manual actions required to effect safe shutdown shall be ~~limited~~ considered, such that their successful accomplishment under ~~realistically severe~~ anticipated conditions is assured for a given fire scenario. The need to perform operator manual actions in ~~different~~ multiple locations shall be considered when sequential actions are required. Analyses of the postulated

fire time line shall demonstrate that there is sufficient time to travel to each action location and perform the action required to support the associated shutdown function(s) such that an unrecoverable condition does not occur."

As stated by the NRC in the November 12, 2003, meeting there is no pre-selected "upper limit" that the NRC is trying to impose on the number of manual actions. The word "limited" here implies that there is an upper limit that the NRC has in mind, when this is not the case. "Realistically severe" is ambiguous, and recommend replacing with "anticipated."

The acceptable level of complexity and the number of operator actions can be addressed through Criterion 8, demonstrating the ability to accomplish the actions.

2. A spurious actuation may require two actions in different locations. This should not be interpreted as requiring the same operator to perform both actions. Based on analysis and resources, simultaneous actions can be justified by analysis and resources.

3. The number of manual actions can vary widely from fire area to fire area. A number of stations have what may appear to be a large number of manual actions (if counted in aggregate). However, only one or a few of these manual actions would be expected to be required to prevent/mitigate the impact of any one spurious actuation.

4. The term "unrecoverable condition" is not currently defined in the regulatory guidance. At some stations this term has been interpreted to mean the process limitations imposed by Section III.L - at other stations this term has been interpreted to mean "not resulting in fuel damage". This term should be replaced with performance-based criteria. As described in NEI 00-01, for redundant shutdown scenarios, fuel damage is generally considered to be the limiting criterion when considering unrecoverable conditions.

Comments on "Equipment Pre-Conditions" Criterion

Text:

Possible failure modes and damage that may occur to equipment used during a fire shall be considered to the extent that the equipment's subsequent use could be prevented, or at least made difficult. Credit for using equipment whose operability may have been adversely affected by the fire due to smoke, heat, water, combustion products or spurious actuation effects shall account for such possibilities (e.g., over-torquing an MOV due to a spurious signal, as discussed in Information Notice 92–18).

Comments:

1. While on the surface it is reasonable to suggest that fire-induced damage to equipment should be considered in the use of manual actions, it is very difficult to predict the availability of equipment impacts from fire without detailed fire modeling, or to accurately predict the effects of smoke, heat, water, or combustion products. A very conservative approach would require the assumption that all equipment which could be impacted is in fact lost. This goes beyond the requirement that assumes a protected safe shutdown train is always available, and essentially requires the licensee to develop multiple safe shutdown paths for various combinations of damaged equipment.

   Therefore, a reasonable approach would be to not require consideration of this criterion if:

   a. The manual action is a pre-emptive one (most fire scenarios will not involve sufficient damage at the time of the action to prevent it from being successful)

   b. Damage is not likely to occur until after a reactive (in response to a fire) manual action is taken (based on cable materials, heat release rate, or fire location)

2. "Credit for using equipment whose operability may have been adversely affected by the fire" adds unnecessary burden on the licensee to document equipment qualification requirements under potential fire exposure conditions. The fire loadings in most areas of the nuclear plant are such that the equipment commonly credited for post fire operation (manual valves, piping, check valves, heat exchangers, manual operation of MOVs) would

clearly not be affected by the fire environment. Such assumptions have been reviewed and approved by the NRC in licensee submittals since BTP 9.5-1 Appendix A.

3. The general concept of fire-induced circuit failures leading to component damage should be addressed by industry and NRC through current discussions on the use of NEI 00-01, rather than through these interim acceptance criteria.

Supporting Information Related to the Need for Suppression and Detection

Section III.G.2.a does not require detection and suppression, but instead relies on the passive 3-hour barrier to protect redundant and/or associated circuits located within the same fire zone. The obvious supposition is that manual fire fighting activities will be initiated long before the fire intensity impacts the integrity of the 3-hour barrier. Licensees have installed this type of passive protection for redundant cables (within a given fire area) that are required to function and (in some cases) on associated cables that could cause a spurious operation of a component for which a mitigating action is not feasible. It is generally recognized that the fire area boundaries provide the equivalent protection of a 3-hour barrier within a given fire area. Thus, whether the redundant components are located in separate fire areas or within the same fire area but protected by a 3-hour rated barrier, detection and suppression is not necessary to ensure that redundant components are free from fire damage.

Both Section III.G.2.b and Section III.G.2.c require detection and suppression. It is logical to implement this requirement since the passive barriers specified by these sections (i.e., 20-foot separation or a 1-hour rated barrier) are not as robust as a 3-hour rated barrier. Without early detection and subsequent actuation of the associated suppression system, a fire could grow to such intensity that the protection afforded by the 1 hour barrier or the 20-foot separation is defeated. If these conditions are reached, then required redundant components could be damaged prior to the successful completion of manual fire fighting activities.

Adding manual actions to Section III.G.2 as an acceptable alternative to III.G.2.a, b or c should not contain a requirement for detection and suppression. Manual actions are not credited to compensate for the loss of required cables. Instead, manual actions compensate for the loss of 'desired' cables or associated cables.

For example, assume the power cable for a safe shutdown pump is required. It must function in order for the motive force to be applied to the pump. However, the control cable that allows a remote start in the control room is not required nor will it prevent operation of the pump. The pump can be started (via manual action) at the emergency control station (e.g., the related 4160V switchgear) with or without protecting the functionality of the control cable. Therefore, the control cable can be considered an associated circuit (if its failure could cause a spurious 'stop' signal) or considered as not required (if its failure has no effect on pump operation).

Obviously, the required power cable would be provided with the protection specified in III.G.2.a, b or c to ensure that the safe shutdown function could be accomplished. The analysis would assume that the power cable is functional even though located

in the fire area under consideration. Conversely, the analysis would assume the control cable is fire damaged. If the cable is not required to function, there is no need to protect the cable per the options specified in III.G.2.

Likewise, if the failure of the cable could lead to a spurious operation, but a manual operation can prevent (or mitigate) the spurious operation, there is no need to protect the cable (i.e. cable damage does not impact ability to achieve safe shutdown). In this case, the safe shutdown function is protected by the fire area boundary (i.e., the manual action is performed in a separate fire area).

Additional justification for the industry comment is provided in the following discussion, which provides specific examples indicating that the addition of detection and suppression does not improve the operator's ability to carry out the manual action. The discussion assumes that the feasibility aspects (lighting, access, sufficient time, etc.) necessary to accomplish the described manual actions have been established. Also, the deterministic analysis of fire zones assumes the eventual damage of all components, and the addition of detection and suppression would not reduce the amount of postulated fire damage.

For clarity, assume two fire areas; A – the location of the analyzed fire and B – the location of the components that will be manually operated. This discussion does not directly apply to manual actions that may be required within the same fire area as the one under consideration. Seven scenarios are presented that illustrate why the provision for detection and suppression is not necessary for enforcement discretion for manual actions:

1. Opening a manual discharge valve on a tank
2. Isolation of a flow path (closing an AOV)
3. Isolation of a flow path (closing an MOV)
4. Keeping a flow path open (maintaining in position a normally open MOV)
5. Opening a flow path (opening a normally closed MOV)
6. Keeping a flow path open (maintaining in position a normally open flow control (solenoid) valve)
7. Operation of a safe shutdown pump

Scenario 1

Consider a discharge valve on a tank. In order to accomplish safe shutdown, the valve must be opened. As we understand the NRC's position, if the valve is a manual valve and is located in Area B, then crediting the manual action to open the valve meets 10CFR50 Appendix R, Section III.G. One would assume it meets Section III.G.1 since the component is not subject to fire damage. Since the component is located outside the fire area under consideration, the criteria of

Section III.G.2 would not apply. Since crediting operation of a manual valve is within the rule, then detection and suppression would not be necessary in Area A. This is logical since a fire in Area A cannot impact the manual valve located in Area B.

Scenario 2

Consider a flow path that needs to be isolated in order to accomplish safe shutdown. In the flow path, there is an AOV that functions as an isolation valve. Upstream of the AOV is a normally open manual valve. Closing either the AOV or the manual valve will provide the proper isolation. Both valves are located in Area B. In order for the AOV to close, a solenoid valve must energize to dump air from the actuator and allow the valve to close. The power cable for the solenoid valve is routed through Area A. Thus, a fire in Area A could damage the power cable and prevent remote operation of the valve. Since the upstream manual valve is free of fire damage (i.e., located in Area B), crediting the operation of the manual valve would be within the rule. Also located in Area B are two manual control air valves; one that can be closed to isolate the control air header and one that can be opened to dump air from the actuator. Operating these two valves performs the same function as energizing the solenoid (i.e. dumping air from the actuator and causing the AOV to close). Since both of the control air valves are not subject to fire damage, crediting the manual operation of the valves would also be within the rule. Similar to the above, detection and suppression would not be necessary in Area A, even though a safe shutdown component (i.e., the AOV) is impacted.

Scenario 3

Consider a similar scenario except the isolation valve is a MOV. The power cable for the MOV is routed through Area A and is subject to fire damage. As noted in Scenario 2, the upstream manual valve is free from fire damage and detection/suppression would not be necessary in Area A, even though a safe shutdown component (i.e., the MOV) is impacted.

Note that in Scenario 3, safe shutdown can also be accomplished by manually closing the MOV (i.e., achieves the same goal as closing the manual valve). The remote control function may be impacted, but the local control function is free of fire damage. Thus, even though the MOV is not capable of being remotely operated, installing detection and suppression in Area A does not improve the ability to perform the manual operation in Area B and should not be required by the new rule.

Scenario 4

Consider a flow path from a pump that must remain open in order to accomplish safe shutdown. Located in the flow path are a normally open manual valve and a normally open MOV. Both of these valves are located in Area B.

The power cable for the MOV is routed through Area A and is subject to fire damage, but the control circuit is independent of Area A. However, since the power cable is not required to function and a three phase hot short does not have to be considered (i.e., a non-High/Low interface valve), the power cable would not be considered an associated circuit. Since both valves are in the proper position, no protection of the circuit (including detection and suppression) is necessary in Area A.

Scenario 5

Now consider Scenario 4 with a normally closed MOV. A bypass line contains a normally closed manual valve. In order to achieve safe shutdown, either the MOV or the manual valve must be opened to allow the required flow. For an Area A fire, the power cable to the MOV could be damaged. Since the manual valve is not subject to fire damage, crediting the manual operation of the valve would be within the rule. Detection and suppression would not be necessary in Area A, even though a safe shutdown component (i.e., the MOV) is impacted.

Note that in Scenario 5, safe shutdown can also be accomplished by manually opening the MOV (located in Area B). Although the remote control function may be impacted, the local function is not subject to fire damage. In this case, the power cable is a desired circuit, but is not a required circuit. Thus, even though the MOV is not capable of being remotely operated, installing detection and suppression in Area A does not impact the ability to perform the manual operation in Area B and should not be required by the new rule even in the case where there is no bypass line.

Scenario 6

Now consider Scenario 4 with a normally open flow control valve instead of a MOV. The flow control valve (i.e., a solenoid valve) must be energized to close. Thus, if power is lost to the flow control valve, the valve fails open. The power and/or control cables are routed through Area A and are subject to fire damage. Although the cables are not required to function to achieve shutdown, an intra-cable hot short could cause the valve to spuriously operate. However, the power/control circuit can be deenergized at a panel outside of Area A (e.g., opening a circuit breaker from the

control room). Once deenergized, failures on the circuit cannot cause the valve to close. Therefore, the safe shutdown function (i.e., to provide an open flow path) can be accomplished by manually deenergizing the power/control circuit. The ability to accomplish this function is not impacted by an Area A fire. Consequently, installing detection and suppression in Area A does not impact the ability to perform the manual operation and should not be required by the new rule even though the manual action is mitigating (or preventing) a spurious operation.

Scenario 7

Consider redundant safe shutdown pumps; one located in Area A, the other in Area B. Obviously, no credit is taken for the availability of the pump located in Area A. The power cables for the Area B pump room ventilation system are routed through Area A. From an analysis standpoint, it appears that redundant systems are impacted by the Area A fire. However, calculations indicate that if the Area B pump room door is propped open (note: door is not an interface to Area A), then excessive room temperatures will not be encountered. Thus, the manual action of propping open a door in Area B can ensure that safe shutdown conditions can be reached. Although redundant cabling is routed through Area A, the safe shutdown function (i.e., adequate room cooling) is free from fire damage. The installation of detection and suppression in Area A should not be required by the new rule, even though redundant cables are impacted.

These are just a few examples of the many plant configurations that could lead to crediting manual actions. The examples also provide clarification on the difference between protecting cables and/or equipment necessary to achieve safe shutdown, versus cables and equipment that are not necessary (but merely convenient or desirable). Both Appendix R III.G.1 and III.G.2 are focused on protecting cables and equipment that are necessary. Detection and suppression for all scenarios where manual actions are credited does not necessarily enhance the operator's ability to carry out the manual action.