

NRCREP - NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire, Draft Report for Comment"

From: "RILEY, Jim" <jhr@nei.org>
Date: 01/30/2007 4:25 PM
Subject: NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire, Draft Report for Comment"

January 30, 2007

Chief, Rules and Directives Branch
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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Subject: NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire, Draft Report for Comment"

Project Number: 689

The Nuclear Energy Institute (NEI)^[1] is submitting the following response on behalf of the nuclear industry to the *Federal Register* notice, dated October 12, 2006, *Volume 71, Number 197*, which invited written comments on NUREG-1852, "Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire, Draft Report For Comment."

In general, the nuclear industry considers this NUREG to be a restatement of the requirements previously included in the Rulemaking on Operator Manual Actions. Since the Rulemaking and its associated Draft Regulatory Guide (DG-1136) were withdrawn, the industry believes that the concepts associated with the Rulemaking should not be imposed on the industry by a mechanism with less stature than the rule itself. Industry believes that the effect of this NUREG will be to establish expectations for the treatment of operator manual actions and a NUREG is not the appropriate regulatory communication to use for this purpose.

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1-30-07_NRC_NUREG 1852 Cover Letter.pdf	114554	
1-30-07_NRC_NUREG 1852 - Comments_ Enclosure 1.pdf	199120	
1-30-07_NRC_NUREG 1852 - Acceptance Criteria MA_ Enclosure 2.pdf	123585	
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NUCLEAR ENERGY INSTITUTE

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In general, the nuclear industry considers this NUREG to be a restatement of the requirements previously included in the Rulemaking on Operator Manual Actions. Since the Rulemaking and its associated Draft Regulatory Guide (DG-1136) were withdrawn, the industry believes that the concepts associated with the Rulemaking should not be imposed on the industry by a mechanism with less stature than the rule itself. Industry believes that the effect of this NUREG will be to establish expectations for the treatment of operator manual actions and a NUREG is not the appropriate regulatory communication to use for this purpose.

The industry also believes the resolution of the issues surrounding the use of operator manual actions in support of post-fire safe-shutdown must be addressed in conjunction with the resolution of the fire induced circuit failures issue. Both of these issues are integral parts of the methodology for performing a post-fire safe-shutdown analysis and, as such, they need to be addressed together.

1 NEI is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, nuclear material licensees, and other organizations and individuals involved in the nuclear energy industry.

Detailed industry comments are provided in Enclosure 1. Our main comments are summarized below.

Industry Key Area 1: Bounding Assumptions for Defense-in-Depth

The need to perform an operator manual action is based on a series of bounding assumptions that provide for defense-in-depth (DID). These DID provisions are related to plant fires, their initial size, their ability to be sustained, their ability to spread without being suppressed and, ultimately, their impact on circuitry in the affected area. The vast majority of these bounding analytical assumptions are quite conservative. The set of boundary conditions in a post-fire safe-shutdown analysis is significantly different from the inferred boundary conditions behind many of the requirements of NUREG-1852. Many of the requirements in NUREG-1852 are theoretical in nature. When these theoretical assumptions are layered upon the DID provisions already used for the post-fire safe-shutdown analysis, the requirements of NUREG-1852 become very difficult to apply.

Industry Key Area 2: Provisions to Allow Resolution of Issues

Consideration should be given to allow the necessary time for licensees to properly address future guidance on fire induced circuit failures and the use of operator manual actions once they become final. The Commission directed the Staff to work with the industry to resolve these issues in the SRM for SECY-06-0196. Industry believes that the Commissioners' comments in the above reference are also applicable to this issue. Proliferation of multiple guidance documents and inspection criteria before a viable technical solution is reached on the issues will only serve to de-stabilize the regulatory process and reduce stakeholder confidence. In order to allow time for resolution of these issues and to provide interim guidance for addressing non-compliances, the NRC should reinstitute Enforcement Discretion and Inspection Criteria for circuit analysis and operator manual actions similar to NRC Enforcement Guidance Memorandum (EGM) 98-002, "Disposition of Violations of Appendix R, Sections III.G and III.L Regarding Circuit Failures", March 2, 1998 and February 2, 2000, Revision 2 (ML003710123).

Industry Key Area 3: Acceptance Criteria

The guideline does not currently provide definitive acceptance criteria. Clear criteria should be established similar to that proposed in Enclosure 2.

Industry Key Area 4: Performance Concepts in a Deterministic Framework

The NUREG appears to mix performance-based concepts into a deterministic regulatory framework. Based on recent regulatory interpretations and guidance, many types of operator manual actions may be 'allowed' without requiring the need for exemptions or license amendment requests. However, the methodologies in this NUREG introduce many performance-based concepts such as estimating fire damage time, detector response time, etc. This insinuates that estimating fire damage (e.g., using fire modeling) is an acceptable approach for determining operator manual actions under a deterministic regulatory basis. However, the approach outlined in NUREG-1852 is inconsistent with the traditional approach endorsed by the NRC and

used by the industry for demonstrating compliance under the deterministic post-fire safe-shutdown requirements. As such, the guidance of NUREG-1852 represents a major change in the requirements related to achieving compliance under the deterministic post-fire safe-shutdown requirements.

Industry Key Area 5: Wrong Process to Establish Regulatory Expectations

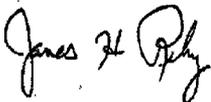
The NRC presentation at the November 29, 2006 public meeting, (ADAMS ML063390044) provided several examples that imply that the use of operator manual actions require detection and automatic suppression to maintain defense-in-depth. These references to detection and suppression expressed in the November meeting, and included in this NUREG, are inappropriate and use the wrong process to establish regulatory expectations.

Based on the above key areas of concern, and the detailed comments of Enclosure 1, it is recommended that NUREG-1852 (FRN: fr12oc06-92) and other related guidance, inspection criteria, and regulatory documents be placed on hold until the base issues related to fire induced circuit failures and operator manual actions are resolved.

In addition to the comments in this letter, the industry has identified concerns with respect to operator manual actions in several other instances. On July 17, 2006, NEI wrote a letter to Dr. Sunil Weerakkody related to the conflicts between Generic Letter 81-12 and recent documents such as RIS 2006-010 and RIS 2005-030. Additional conflicts between recent NRC guidance and past NRC practice are also discussed in Licensee comments on the original Operator Manual Action Rulemaking, such as ML051440468. The comments included in these letters should also be resolved prior to issuing NUREG-1852.

We appreciate the NRC's consideration of the industry's comments on the draft NUREG. Although we share the NRC's interest in bringing closure to fire protection issues, we believe that the NRC can satisfy that need in ways that do not pose unwarranted burden on NRC licensees. If any further information is desired, please contact Brandon Jamar at (202) 739-8043; btj@nei.org or me at (202) 739-8137; jhr@nei.org.

Sincerely,



James H. Riley

Enclosures

c: Dr. Sunil D. Weerakkody, Branch Chief, Fire Protection, NRC
Ms. Erasmia Lois, Project Manager, Human Factors and Reliability, NRC
Document Control Desk

Comments on Draft NUREG-1852, *Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire* [ML062350292]

Item	Section	Comment
1	General	<p>The need to perform a operator manual action is based on a series of bounding assumptions that provide for defense-in-depth (DID). These DID provisions are related to plant fires, their initial size, their ability to be sustained, their ability to spread without being suppressed and, ultimately, their impact on circuitry in the affected area. The vast majority of these bounding analytical assumptions are quite conservative. The set of boundary conditions in a post-fire safe shutdown analysis is significantly different from the inferred boundary conditions behind many of the requirements of NUREG-1852. Many of the requirements in NUREG-1852 are theoretical in nature. When these theoretical assumptions are layered upon the DID provisions already used for the post-fire safe shutdown analysis, the requirements of NUREG-1852 become very difficult to apply.</p>
2	General	<p>Consideration should be given to allow the necessary time for licensees to properly address future guidance on fire induced circuit failures and the use of operator manual actions once they become final. The Commission directed the Staff to work with the industry to resolve these issues in the SRM for SECY-06-0196. Industry believes that the Commissioners' comments in SECY-06-0196 SRM are also applicable to this issue. Proliferation of multiple guidance documents and inspection criteria before a viable technical solution is reached on the issues will only serve to de-stabilize the regulatory process and reduce stakeholder confidence. In order to allow time for resolution of these issues and to provide interim guidance for addressing non-compliances, the NRC should reinstitute Enforcement Discretion and Inspection Criteria for circuit analysis and operator manual actions similar to NRC Enforcement Guidance Memorandum (EGM) 98-002, "Disposition of Violations of Appendix R, Sections III.G and III.L Regarding Circuit Failures", March 2, 1998 and February 2, 2000, Revision 2 (ML003710123).</p>
3	General	<p>The guideline does not currently provide definitive acceptance criteria. Clear criteria should be established.</p>
4	General	<p>The NUREG appears to mix performance-based concepts into a deterministic regulatory framework. Based on recent regulatory interpretations and guidance, many types of operator manual actions may be 'allowed' without requiring the need for exemptions or license amendment requests. However, the methodologies in this NUREG introduce many performance-based concepts such as estimating fire damage time, detector response time, etc. This insinuates that estimating fire damage (e.g., using fire modeling) is an acceptable approach for determining operator manual actions under a deterministic regulatory basis. However, the approach outlined in NUREG-1852 is inconsistent with the traditional approach endorsed by the NRC and used by the industry for demonstrating compliance under the deterministic post-fire safe shutdown requirements. As such, the guidance of NUREG-1852 represents a major change in the requirements related to achieving compliance under the deterministic post-fire safe shutdown requirements.</p>

Item	Section	Comment
5	11/29/06 Public Meeting	<p>The NRC presentation at the November 29, 2006 public meeting (ADAMS ML063390044) provided several examples that imply that the use of operator manual actions require detection and automatic suppression to maintain defense-in-depth. These references to detection and suppression in this NUREG are inappropriate and use the wrong process to establish regulatory expectations.</p> <p>Also at this same presentation, the NRC indicated (ADAMS ML063390044) that they would backfit NUREG-1852 criteria onto existing actions thru inspection process, including:</p> <ul style="list-style-type: none"> • Actions for licensee's previously-approved Alternative Shutdown capability; • Actions previously approved by exemptions; • Actions previously approved by some other mechanism (ex., approved by initial licensing for Post-1979 plants). <p>Unless a licensee has specifically committed to the NUREG, the use of the NUREG in the inspection process is a backfit.</p>
6	General	<p>NUREG-1852 and other related Guidance, Inspection Criteria and Regulatory documents should be placed on hold until the base requirements, including the requirements for addressing fire induced circuit failures and operator manual actions are resolved.</p>
7	General	<p>The document is excessive in length providing lengthy, repetitive dialogue with many considerations and few proposed criteria. The guide shares similarity with the types of documents that would be considered in the analysis of a single operator manual action in an SDP, but not a practical document for a plant to analyze and group numerous operator manual actions relied upon as a foundation of the fire protection program (which is not uncommon in the industry). It appears to be geared towards the very detailed analysis of a single action with extreme rigor. This is somewhat separated from the actual situations in place at a number of facilities. Recommend the document be condensed to provide a simplified guidance outline for performing the feasibility analysis.</p>
8	General	<p>There are numerous challenges with implementing this guidance. The application of the guidance content is not clear and suggests a large amount of work is required to demonstrate acceptance of the use of operator manual actions. It appears the demonstration of feasibility and reliability is far greater for manual actions following a fire than for other design basis events.</p>

Item	Section	Comment
9	General	<p>General observation: This document provides very little guidance on the allowable time available before unacceptable conditions occur. This is a very difficult, yet important, item to understand and is closely related to another generic issue, fire-induced circuit failures (multiple spurious actuations). This 'allowable time' has a number of variables and can greatly influence the acceptability of the answer, yet there is no guidance on the subject. For example, there are implications in the NUREG that fire modeling or analysis can be performed as part of the 'time available' determination. The ability to use these approaches as part of a 'deterministic' approach is unclear.</p> <p>Technical approaches to bound thermal-hydraulic conditions of the plant given simultaneous failures are challenging, since fire losses and spurious actuations are different for different fire areas, and assuming simultaneous failures increases the number of variables that must be considered. Also unknown are the assumed initial conditions and plant behavior due to fire that must be assumed in the analyses, such as:</p> <ul style="list-style-type: none"> • Time = 0 • Time of spurious actuations • Operator response time to initiate procedures and perform actions • Plant initial conditions (i.e. starting pressurizer level, steam generator level, power lineup) • Behavior of other components in the fire area (is everything else failed initially or placed in 'worst case' condition?) <p>It is clear that an analyst would attempt to identify bounding conditions to assess the impact of fire on the plant and operator response. However, for many fire areas, an unlimited number of concurrent failures does not represent a case that can be bounded in a realistic or cost-effective manner and demonstrate compliance with deterministic requirements.</p> <p>Additional guidance on this topic is warranted. Without guidance and consistent analytical treatment, regulatory expectations will be difficult to meet. It is believed that the uncertainties and variations in the plant response (e.g., spurious actuations and plant thermal-hydraulic response) may have a dominant role in the overall feasibility/reliability determination, yet there is no clear guidance on the subject.</p>
10	General	<p>NEI 04-02 Revision 1 (September 2005, ML052590476), Appendix B includes discussion of feasibility and reliability of recovery actions as part of change evaluation process. Regulatory Guide 1.205 (May 2006, ML061100174) endorsed NEI 04-02, with clarifications. There appears to be no cross-reference or consideration of the content of NEI 04-02/RG 1.205 in NUREG-1852.</p>
11	General	<p>What are the qualifications of the feasibility study analysts? It's assumed minimum requirements in terms of education, background/ experience would be defined as part of this complex guidance, which necessitates high-level judgment in order to establish the parameters of the program.</p>
12	General	<p>The report is intended to be a reference guide to address the feasibility and reliability of manual actions based on a deterministic approach. Could the use of NUREG 1805, "<i>Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the USNRC Fire Protection Inspection Program</i>" as modeling tool be applied to screen the necessity of the manual action?</p>
13	General	<p>It's recommended that plants be provided some flexibility to determine the responsibilities of the person assigned to perform the manual action. As long as the manual action is feasible and is conducted by a qualified individual, then the duties/responsibilities of that person are irrelevant.</p>

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14	General	<p>The NUREG repeatedly refers to "hot shutdown" or the ability to achieve and maintain hot shutdown. The term hot shutdown has different definitions for Pressurized Water Reactors and Boiling Water Reactors. In fact, Appendix R section III.G includes wording related to the systems necessary to achieve and maintain hot shutdown without any additional clarification and Appendix R section III.L includes wording related to the ability to achieve and maintain hot standby² conditions for a PWR (hot shutdown² for a BWR). The footnote 2 related to hot standby and hot shutdown refers to the definitions in the Standard Technical Specifications. Regulatory Guide 1.189 (April 2001) Section 5 also refers to hot shutdown for BWRs and hot standby for PWRs.</p>
15	General	<p>NUREG-1852 appears to attempt to re-classify a post-fire safe shutdown as an "Anticipated Operational Occurrence" (AOO), based on an example provided in Table 3-3 of ANSI/ANS 51.1 and 52.1. The NUREG then goes on to impose various new requirements based on this classification as a AOO. As discussed in ANSI/ANS 51.1/52.1 section 3.2, the <u>actual</u> frequency of each Initiating Occurrence must be determined and Plant Condition code assigned based on it's best estimate frequency (Table 3-3 provides examples only). Since a fire requiring post fire safe shutdown and manual operation occurs at a much lower frequency than once per year (PC-2), the classification of these actions as AOOs is inappropriate. Current Regulatory guidance classifies a Post Fire Safe Shutdown as a "Special Event" (refer to ANSI/ANS 58.6, ANSI/ANS 58.14).</p> <p>The incorrect regulatory classification of fire safe shutdown manual operations as AOO's has been cascaded into an inappropriate imposition of 10CFR20, section 20.1201. 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. 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 <u>duration of the event</u> (based on GDC-19).</p>
16	General	<p>NUREG-1852's reference to Reg Guide 1.33 Appendix A specifically requiring post-fire safe shutdown procedures appears to represent a new staff position, as it is inconsistent with Generic Letter 86-10, staff position 5.2.3. Previously, RG 1.33 Appendix A item 6.v had generally been interpreted as applying to the Fire Fighting/Brigade activities. Considering the previous staff position provided in GL 86-10 position 5.2.3, it is clear that NUREG-1852 is re-interpreting RG.1.33.</p>
17	General	<p>NUREG-1852's suggestion that all possible anticipated delay factors or the addition of time margin factors is fundamentally at odds with numerous other aspects of how safe shutdown analyses are performed. The NRC has previously accepted the fundamental concept of using "nominal" values and "best estimate" codes for analyzing the plant's response to the fire event. This includes assuming many plant parameters are initially at nominal values prior to the event, not imposing Appendix K conservatisms such as +2-sigma decay heat, and not requiring explicit treatment of instrument uncertainty. This approach is based on previous and current NRC guidance (ex., "Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena. BTP CMEB 9.5.1 rev 3 section C.1.b). By not permitting a "best-estimate" approach to operator action timing, NUREG-1852 represents a significant departure from existing NRC guidance, and also creates a dissonance where an ultra-conservative method must be used to determine the operator action time estimate, yet a best-estimate approach may be used to calculate the upper time limit for the action. No technical, risk, or regulatory basis is provided for requiring Licensees to go beyond a best-estimate approach for calculating operator action timing. Industry believes that sufficient margin is already built in by the analysis methodology itself, which assumes that all fire damage occurs and consequently all manual actions must be performed, which requires all actions to be sequenced and accounted for in the operator action timing.</p>

Item	Section	Comment
18	Abstract Foreword Introduction Glossary	<p><u>The ABSTRACT and FOREWORD states:</u> <i>"This report provides criteria and associated technical bases for use in evaluating the feasibility and reliability of post-fire operator manual actions implemented in nuclear power plants. The U.S. Nuclear Regulatory Commission (NRC) developed this report as a reference guide for agency staff who evaluate the acceptability of manual actions as means of achieving and maintaining hot shutdown conditions during and after fire events."</i></p> <p><u>The GLOSSARY defines 'operator manual actions (local actions, in response to a fire)' as:</u> <i>Those actions performed by operators to manipulate components and equipment from outside the main control room (MCR) to achieve and maintain post-fire hot shutdown, but not including "repairs." Operator manual actions comprise an integrated set of actions needed to help ensure that hot shutdown can be accomplished, given that a fire has occurred in a particular plant area.</i></p> <p><u>Footnote 1 on page 1-1 states:</u> <i>"Operator manual actions" are defined in the Glossary of this report. For this report, they do not include the action(s) associated with abandoning the MCR in the case of a fire</i></p> <p><u>The 3rd paragraph on page 1-2 states:</u> <i>"This report, as a reference guide, addresses the feasibility and reliability of operator manual actions, from a deterministic approach, when used to achieve and maintain hot shutdown under fire conditions, and will be used by the NRC staff to support the review of operator manual actions. An operator manual action which meets the guidance provided in this report does not necessarily comply with NRC fire protection regulations. Additional considerations to ensure that adequate defense-in-depth such as fire detection and automatic suppression is maintained are addressed in Revision 5 to Section 9.5.1 of the Standard Review Plan [Ref. 6] and should be considered when applying for an exemption or license amendment."</i></p> <p>COMMENT:</p> <p>Although there are instances where 'hot shutdown' is stated throughout the document, it is not completely clear from the above statements which actions must be demonstrated to be feasible and reliable using the criteria in the NUREG (only III.G.2 areas which contain redundant trains of cables or equipment for hot shutdown equipment or all actions)? Do cold shutdown actions need to be demonstrated to be feasible and reliable to this level of detail? What about hot shutdown actions for alternative shutdown (III.G.3) areas? The footnote states it does not include actions associated with abandoning the main control room (which is typically an alternative shutdown area); what about areas other than the MCR that use alternative shutdown (such as the cable spreading room); are actions associated with those areas required to be demonstrated to this level of detail? It appears from Paragraph 3 on page 1-2 that suppression and detection may also be required when applying for an exemption request. <u>It appears the NUREG guidance is imposing the criteria in the proposed manual action rule that was withdrawn and never adopted.</u></p>
19	Glossary, p. xi	Editorial clarification. Abbreviation for 'American Nuclear Society' should be ANS not ANSI.

Item	Section	Comment
20	Glossary, p. xiv	'Reliable action' is described as an action that can performed under varying conditions that typify uncertainties in the available time with a high success rate. What is considered a high success rate? If a crew fails, what remedial actions are required to remain bounded within Appendix R design function which is crediting the manual operator action?
21	1, p. 1-1	<p><u>Footnote 1 on page 1-1 states:</u></p> <p><i>"Operator manual actions" are defined in the Glossary of this report. For this report, they do not include the action(s) associated with abandoning the MCR in the case of a fire."</i></p> <p>This note and its reference is unclear. Does this apply to actions inside the MCR prior to abandonment or actions following MCR abandonment associated with alternative shutdown capability (Sections III.G.3 / III.L of Appendix R)? Please provide clarification.</p> <p>[Note, the public meeting on 11/29/06, partially addressed this item, but much of the information in the slides presented at the meeting (ML0633900440) is not in the draft NUREG or other regulatory documents.]</p>
22	1, p. 1-1	This section discussed three methods related to compliance with Paragraph III.G.2 of Appendix R, outside of primary containment and discusses Paragraph III.G.3 of Appendix R if the three methods are not met. The section omits Sections d, e, and f of Section III.G.2. This should be corrected to provide a more complete context and scope of the NUREG.
23	1, p. 1-2	<p><u>Page 1-2 states:</u></p> <p><i>"The NRC staff recognizes that certain criteria must be met to ensure that adequate safety is maintained as a result of the use of operator manual actions as an alternative to separation/protection. In particular, the NRC staff notes that such actions must be both feasible and reliable, especially considering that these actions are relied upon in lieu of passive fire barriers, distance, separation, and/or automatic fire suppression system each with relatively high reliability."</i></p> <p>These statements imply that this NUREG is only applicable to the scope of operator manual actions relied upon in lieu of protection per Section III.G.2 of Appendix R. It is not clear if other allowed/approved operator manual actions are subject to the guidance in this NUREG [Refer to NEI Frequently Asked Question 06-0012, 10/26/06 Revision 1, ML063170362 for background and references].</p> <p>[Note, the public meeting on 11/29/06, partially addressed this item, but much of the information in the slides presented at the meeting (ML0633900440) is not in the draft NUREG or other regulatory documents.]</p>

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24	1, p. 1-2	<p><u>Page 1-2, paragraph 3 states:</u> <i>“An operator manual action which meets the guidance provided in this report does not necessarily comply with NRC fire protection regulations. Additional considerations to ensure that adequate defense-in-depth such as fire detection and automatic suppression is maintained are addressed in Revision 5 to Section 9.5.1 of the Standard Review Plan [Ref. 6] and should be considered when applying for an exemption or license amendment.”</i></p> <p>This statement implies that the use of operator manual actions requires a license amendment or exemption. Recent regulatory correspondence acknowledges the use of certain types of operator manual actions are allowed or have regulatory acceptance. This should be reflected in this NUREG. [Refer to NEI Frequently Asked Question 06-0012, 10/26/06 Revision 1, ML063170362 for background and references].</p>
25	1, p. 1-2	<p>Reference is made to Revision 5 of NUREG 0800. Clarification is needed on the reference to Revision 5 of Section 9.5.1 of NUREG 0800. Reference 6, page 5-1, indicates this revision is planned for February, 2007. Will this revision incorporate the impacts of NUREG-1852? There is currently no reference to a Revision 5 in the NRC documentation.</p>
26	2, p. 2-1	<p>Editorial, last sentence page 2-1 should be “...Paragraphs III.G.2 and III.G.3.”</p>
27	2, p. 2-2	<p>First paragraph on page 2-2 is incorrect and should be removed. The reference to Thermo-Lag is misleading and does not represent the fact that operator manual actions have been utilized at licensees for a number of years prior to the Thermo-Lag resolution efforts.</p> <p>This position has been presented previously, most notably in the January 27, 2004 letter from NEI to the NRC, Comments on Draft Criteria for Determining Feasibility of Manual Actions to Achieve Post-Firesafe-shutdown, 68 FR 66501 and 68 FR69730.</p>
28	2.3, p. 2-4	<p>The scope and context of this document is unclear. There does not appear to be a clear tie within RIS 2006-10 to this NUREG to each other. There needs to be a clear description of the scope of this document. The second sentence in section 2.3 refers to revision 5 of the SRP 9.5.1 for details on how NUREG-1852 is going to be used in reviews. Rev. 5 of NUREG-0800 (Nov. 2006, ML062970164) does not have detail on operator manual actions (the redline version shows this information contained in Rev. 4 as being deleted in Revision 5).</p> <p>[Note, the public meeting on 11/29/06, partially addressed this item, but much of the information in the slides presented at the meeting (ML0633900440) is not in the draft NUREG or other regulatory documents.]</p>
29	3.2.1, p. 3-2 3.2.5, p. 3-8	<p><u>Last paragraph, first sentence:</u> The last phrase of this sentence, “...and the thermal-hydraulic conditions of the plant” raises the question of applicability of this NUREG relative to plant modes of operation. It is assumed this NUREG addresses the ability to perform various manual actions necessary to bring the plant to hot shutdown and maintain it there. Implied in this assumption is the plant is at full power operation when the fire event occurs. Obviously, the thermal-hydraulic conditions of the plant vary at the different modes of operation. There does not appear to be a clear reference to applicable modes of operation in the NUREG.</p> <p>Also note Section 3.2.5, page 3-8, last paragraph, last sentence. The phrase “normal plant evolutions” also seems to allude to different modes.</p>

Item	Section	Comment
30	3.2.4, p. 3-6 4.2.4, p. 4-6	The discussion of IN 92-18 in Sections 3.2.4 and 4.2.4 is focused on bypassing of motor-operated valve thermal overloads. The primary technical concern related to this IN in the industry is the potential bypassing of torque switch/limit switch protection and potential valve damage that could potentially inhibit remote or local operation.
31	3.2.5, p.3-7	<p>The NRC's feasibility and reliability criteria on page 3-1 requires:</p> <ul style="list-style-type: none"> • Indications necessary to show the need for the manual actions, enable their performance, and verify their successful accomplishment. • Necessary communications <p><u>Section 3.2.5 Available Indications states:</u></p> <p><i>"In addition to the SSCs needed to directly perform the desired functions, the equipment needs to include diagnostic indications relevant to the desired operator manual actions. These indications are needed to (1) enable the operators to determine which manual actions are appropriate for the fire scenario, (2) direct the personnel performing the manual actions, and (3) provide feedback to the operators to verify that the manual actions have had their expected results and will remain in that state. These indications include those necessary to detect and diagnose the location of the fire."</i></p> <p>COMMENT:</p> <p>For most <u>preventive</u> actions, the only indication needed is the fire alarm; indications to verify successful accomplishment may not be needed (for instances, tripping a breaker to remove power, manually positioning a valve using the hand wheel, pulling fuses to fail a component in it's required position, etc.) may not be required and direct indication of some of these actions may not be possible (i.e., tripping the breaker to a MOV removes the control power for the indicating lights, pulling fuses may also remove power from indicating lights). Also, communications (other than face-to-face) in the main control room (MCR) may not be required; the operator may be directed to perform the action(s) and report back to the MCR after completing the task(s). <u>Thus, diagnostic instrumentation and/or communications may not be required for preventive actions.</u></p>
32	3.2.6, p. 3-8 4.2.6, p. 4-8	Sections 3.2.6 and 4.2.6 address communications related to feasibility and reliability of operator manual actions. The actions imply that protection of communications equipment is necessary to demonstrate that the ability to communicate effective operator manual action accomplishment. There is no regulatory requirement or industry precedent to protection communications equipment and cabling from the effects of fire. There should be flexibilities in approaches to demonstrate that operators can effectively communicate during post-fire safe-shutdown. For example, some sites have evaluated their communication needs, and concluded that "face to face" communication is sufficient, based on the nature of the actions and the time available to perform them.

Item	Section	Comment
33	3.2.9, p. 3-10 4.2.11, p. 4-14	<p>The NRC's feasibility and reliability criteria on page 3-1 requires:</p> <ul style="list-style-type: none"> • There should be plant <i>procedures</i> covering each operator manual action required to achieve and maintain hot shutdown and <i>training</i> for each operator on the procedures. • There should be periodic <i>demonstrations</i> of the manual actions, consisting of actual executions of the relevant actions to the extent possible. <p><u>Section 3.2.9 Procedures and Training states:</u> <i>"...each operator that might be required to perform the actions to achieve and maintain hot shutdown, receives training on these manual actions."</i></p> <p><i>"Analogous to the fire brigade drills, drills for operator manual actions should include assessment of alarm effectiveness; operator time response; use of portable equipment, including communication devices and personnel protection; each operator's knowledge of his or her role; and conformance with established plant procedures."</i></p> <p><u>Section 4.2.11, Guidance Regarding How To Perform a Demonstration (page 4-14) states:</u> <i>"...each action needs to be demonstrated at least once (by one randomly selected but established crew) to show that the feasibility and reliability criteria have been and continue to be met."</i></p> <p>COMMENT:</p> <p>Is training, demonstration, and drilling required for each <u>specific</u> manual action required or is it acceptable to train, demonstrate, and drill on types of actions (for instances, generic training, demonstration, or drilling on re-positioning a valve using the hand wheel verses training, demonstration, drilling on all the specific valves requiring manual re-positioning)? <u>For types of actions that operators are trained on (such as re-positioning a valve with the hand wheel or operating a breaker), specific training, demonstration, or drilling on each individual component should not be required. This criteria appears to be more stringent than for other design basis events.</u></p>
34	3.2.10, p. 3-12	<p>The sentence beginning, "In other words, ..." seems to imply that a plant operator can no longer serve on the fire brigade as a "collateral duty during a fire."</p>

Item	Section	Comment
35	3.2.11, p. 3-13	<p>Section 3.2.11 discusses each crew performing an integrated demonstration of fire scenarios. An integrated demonstration is a significant change in expectations that would create extreme burden on operator resources. A typical plant may have between 50 and 100 fire safe shutdown procedures, which contain typical actions that are common to most of the procedures. It seems the draft NUREG finds it acceptable to demonstrate only a couple of bounding procedures, such that all of the typical, complex actions are periodically performed. This seems to be a new expectation not previously expressed. Initial verification and validation of the feasibility of an action should suffice combined with periodic task based training and JPMs. The draft NUREG requires continuous V&V of manual actions, which is extremely burdensome, a configuration control problem, and doesn't seem justified based on the IPEEE insights.</p> <p>The new requirement in Demonstrations Section 3.2.11 creates significant new burden to Operations Department Training with the expectation that each crew perform an integrated demonstration for a fire scenario, including all elements such as diagnostic capability, in plant actions and simulated use of tools and equipment. This concept suggests the integrated use of the simulator in concert with in-plant operator actions. This type of exercise is not typically performed and would be a great burden to have to perform on a regular frequency. Currently, the Operator training program trains licensed operators on use of the fire safe shutdown procedures using the simulator and separately, the non-licensed operators receive task-based training for the typical manual actions, such as manually racking of electrical breakers, local start of an emergency diesel, local start of an Auxiliary Feedwater pump, and local manual operation of motor-operated valves. This training is also applicable to non-fire safe shutdown procedures such as the abnormal procedures. Job Performance Measures (JPM) are periodically performed to test personnel on performance of these tasks, some of them are timed. Therefore, a requirement to have separate fire-only demonstrations would be duplicitous to other training, JPMs and simulator demonstrations that already occur.</p>
36	4.2.2, p. 4-3	<p>Section 4.2.2, Guidance Regarding the Analysis Showing Adequate Time Available To Ensure Reliability (page 4-4) discusses additional uncertainties that require increasing the time required to conduct operator manual actions due to difficulties such as locked doors, stiff handwheel, or erratic communications.</p> <p>COMMENT:</p> <p>This requirement appears to be aimed at adding some type of a failure criterion into the analysis; due to the defense-in-depth nature of Appendix R, single failure criteria is not required to be addressed. This appears to be in conflict with that criterion (ex., "Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena. BTP CMEB 9.5.1 rev 3 section C.1.b). This language also creates the likelihood for differences between subjective technical opinions between the licensee and the NRC.</p>

Item	Section	Comment
37	4.2.2(b), p. 4-5	<p>Evaluating the "expected variability among individuals and crews" per section 4.2.2 (b) of NUREG-1852 exceeds the analysis normally conducted within the scope of HEP (human error probability) development.</p> <p>In addition, the NRC licensing process ensures that nuclear power plant operators meet competency standards under all expected accident conditions. NRC Form 396, assessed per ANSI standards, attests to an applicant's physical and mental fitness for licensure as a NPP operator. The utility provides NRC-396 with the initial license submittal and then again every two years as long as the individual's license is active. A utility would typically ensure that Non-licensed operators meet similar requirements, due to training programs ensuring that competent people serve as EOs/AOs, and because of the natural career progression for an individual from Non-licensed to Licensed operator.</p>
38	4.2.3, p. 4-5	<p><u>Section 4.2.3. Guidance Regarding Environmental Factors (page 4-5) states:</u></p> <p><i>"Heat stress analysis should be performed as necessary."</i></p> <p><i>"Plant staff should account for expected smoke and toxic gas levels to ensure that they will not affect performance."</i></p> <p>COMMENT:</p> <p>What criterion is to be used to determine when a heat stress analysis is required? If fire is in adjacent area, does heat from fire need to be included in analysis? What criteria should plant staff use to account for smoke and toxic gas? If the fire is in adjacent area of action, should you assume smoke and toxic gas is present? How far from actual fire must you assume smoke and toxic gas travels?</p> <p>Currently NRC has closed Generic Safety Issue GSI-148 "Smoke Control and Manual Fire Fighting Effectiveness" (refer to 466th ACRS meeting, September 30, 1999). GSI-148 dealt with this exact issue of smoke and fire effects impacting the operator's ability to perform actions. The conclusion was that the issue was plant-specific, was acceptably resolved under the IPEEE, and no generic backfit of new requirements could be justified. What regulatory process is the NRC using to re-open an issue that was closed under the GSI process?</p>

Item	Section	Comment
39	4.2.4, p. 4-6	<p>Section 4.2.4, second bullet, states that credit should not be taken for manipulation of components exposed to the fire, except for rare cases such as non-fire affected components in the zone long after the fire is extinguished. A number of plants have credited manual operation of valves in affected fire zones after the fire is extinguished and access to the area is re-established. This is an approved FHA assumption that mechanical components don't fail due to fire damage. Specifically, valves are assumed to remain operable via local manual operation following extinguishment of the fire and return of the valve components to the normal ambient temperatures. NRC has previously accepted a variety of "re-entry times" based on the fire hazards and protection available in the area. These re-entry times vary from 30 minutes (one licensee) to 1-hour or more. NRC acknowledges the concept of "re-entry" in SECY-90-016.</p> <p>This section also states that the "plant staff should provide justification as to the continued functionality of the component...". It is not clear what form of justification the NRC is expecting. In the past, the NRC has accepted very qualitative arguments.</p> <p>NRC correspondence to licensees on these issues also reflects the significant use of "judgment" by the NRC vs. quantitative analysis. It is expected that in the future, professional Fire Protection Engineering judgment will still be the only practical way to evaluate these issues.</p>
40	4.2.10, p. 4-14	<p>Section 4.2.10 requires that operators credited with performing manual actions should be on-site at all times. This is written too broadly and becomes an overly-prescriptive requirement. It does not consider plant-specific situations where actions may not be needed for many hours, and does not acknowledge the plant staff augmentation available under the Emergency Plan.</p> <p>This requirement can be re-stated in a more general way such as "Personnel credited with performing actions shall be available within the time-frame credited in the analysis. Credited personnel may be normally on-site, or available thru the Emergency Planning staff augmentation system."</p>
41	Appendix B	<p>Appendix B is a summary of a draft expert elicitation that was associated with operator manual action rulemaking. The panel was comprised entirely of NRC and their contractor staff. This does not appear to provide diverse perspectives on the practical assessment and implementation of operator manual actions at nuclear plants. In addition, the focus of NUREG-1852 is intended to be guidance related to a 'deterministic' approach. The content of the NUREG is very 'performance-based'. In addition, the expert panel referenced in Appendix B was heavily represented by PRA practitioners and expertise.</p>
42	Appendix B	<p>NUREG-1852 provides extensive detail on how to factor in all the uncertainties related to operator actions. Based on all these factors, it is apparent that a significant time margin will be required for manual operator actions. The guideline is so restrictive in nature that many utilities will not have enough time to achieve the standard remote safe shutdown manning function. This task could realistically be accomplished within 30 minutes but if all the unanticipated variations in fire and plant conditions are included, this task timeline could be extended to an hour. Because there's a lack of clear quantitative guidance as to what the operator time margins should be, both utility analysts and regulators will default to using the factor of 2 extra margin guidance inferred in Appendix B, Summary of Expert Opinion Election to Determine Time Margins.</p>

Item	Section	Comment
43	Appendix B	<p>The NUREG states that "For a feasible action to be performed reliably, it should be shown that there is adequate time available to account for uncertainties in estimates of the time available and in estimates of how long it takes to diagnose and execute operator manual actions". There is discussion about the time margin criteria that was planned as part of the proposed manual action rulemaking that was ultimately cancelled. The impression is that since the NUREG contains a discussion of the time margin criteria from the proposed manual action rulemaking that it will become the expectation or certainly be very subjective from one inspector to another going forward. The NUREG states that plant staff should be able to successfully defend their assumptions regarding the ability of the relevant staff to perform under the expected conditions. Accordingly the subjective nature of this NUREG will make successful implementation very difficult.</p>
44	Appendix B, p. B-11	<p>Editorial clarification. First paragraph, second sentence: 'theMRC' should be 'the MCR'.</p>

Comments on Draft NUREG-1852, *Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire* [ML062350292]

ACCEPTANCE CRITERIA MANUAL ACTIONS

I. PURPOSE

This paper provides guidance regarding the use of manual actions to equipment required for post-fire safe shutdown.

II. INTRODUCTION

Manual actions may involve manual operation, remote manual operation or local operation of equipment. Manual actions on equipment for the purpose of performing its required safe shutdown function are allowed under the definition of "free of fire damage." This document provides the criteria to assure that the reliance on manual actions is appropriate. These criteria are intended to assure that the actions specified are capable of being performed, and that reliance on them is balanced within the overall safe shutdown strategy for a given fire area.

III. RELIANCE ON MANUAL ACTIONS VS. AUTOMATIC OPERATION OF EQUIPMENT

Automatic function circuitry is a design feature provided to mitigate or limit the consequences of one or more design basis accidents. 10CFR50 Appendix A requires certain specific protection functions to be automatic for specific design basis events, but this still leaves many features permissible for manual operation, both for design basis events and beyond design basis events. In fact, manual actions are used to respond to numerous design basis events, as well as beyond design basis events.

Section I (Introduction and Scope) of Appendix R states the following:

When considering the effects of fire, those systems associated with achieving and maintaining safe shutdown conditions assume major importance to safety because damage to them can lead to core damage resulting from loss of coolant through boil-off.

The post-fire safe shutdown analyses provide assurance that fire damage will not result in a condition more severe than boil-off, and that manual actions can be performed in a time frame sufficient to restore water level in the core prior to the onset of core damage. Analysis shows that fuel damage will not rapidly occur, since boiloff is a gradually progressing event. Operator training and procedures assure that the necessary system alignment(s) are capable of being made in the times required to prevent such occurrence. Thus manual actions are equivalent in mitigation capability to automatic operation.

IV. DEFINITIONS

This appendix on manual actions includes the following definitions:

Emergency Control Station: An emergency control station includes the remote shutdown panel(s), local starters, electrical distribution panels, motor-operated valve (MOV) handwheels and other equipment locations designed for operator use or monitoring.

Free of Fire Damage: Achieved when the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. It may perform this function automatically, by remote control (which includes manual operations and/or remote manual operations) or by local operation.

Remote Manual Operation: Operation of safe shutdown equipment on the required safe shutdown path using remote controls (e.g., control switches) specifically designed for this purpose from a location other than the main control room.

Manual Operation: Operation of safe shutdown equipment on the required safe shutdown path using the control room control devices (e.g., switches) in the event that automatic control of the equipment is either inhibited based on plant procedures or unable to function as a result of fire-induced damage.

Local Operation: Operation of safe shutdown equipment on the required safe shutdown path by an operator when automatic, remote manual or manual operation are no longer available (e.g., opening of a motor operated valve using the hand wheel).

Remote Control: Plant design features that allow the operation of equipment through a combination of electrically powered control switches and relays. Remote control can typically be performed from the control room or from local control stations, including the remote shutdown panel and other locations with control capability outside the control room.

V. CRITERIA

To credit the use of manual actions to achieve post-fire safe shutdown, certain criteria must be met. These criteria are identified below.

- There shall be sufficient time to travel to each action location and perform the action. Actions should be verified and validated by plant walkdowns using the current procedure. The action must be capable of being identified and performed in the time required to support the associated shutdown function(s) such that an unrecoverable condition does not occur. Previous action locations should be considered when sequential actions are required.
- Fire tests indicate that spurious actuations do not typically occur for 30 minutes or more, especially for thermoset cable, allowing for additional action time. For example, pre-emptive actions to lock out charging pumps or close PORV block valves may be considered feasible.
- There shall be a sufficient number of plant staff available to perform the required actions in the times required, based on the minimum shift staffing. The use of personnel to perform actions should not interfere with any collateral fire brigade or control room duties they may need to perform as a result of the fire. Administrative controls shall exist to ensure that the personnel necessary to perform actions are available when required, and that unexpected absences are promptly corrected. If staff augmentation consistent with the licensee's Emergency Plan Implementing Procedures is credited, then the licensee must demonstrate that un-recoverable conditions would not occur in the time period before staff augmentation is achieved.
- The action location shall be accessible. In evaluating actions and the route through the plant for performing any actions, consideration should be given to the potential effects of temperature, humidity, radiation levels, smoke, and toxic gases. Actions required in a fire area experiencing a fire, or that require travel through a fire area experiencing a fire, may be credited if it is demonstrated that these actions are not required until the fire has been sufficiently extinguished to allow completion of necessary actions in the fire area.

In addition, if the action required is to be performed in the fire area experiencing the fire, it must be assured that fire damage within the fire area does not prevent completion of the action. Actions taken in the fire area, or adjoining fire areas must be reviewed for impact on personnel safety to assure that taking the action will not endanger the operator as a result of actuation/discharge of fire suppression systems (water/electrical shock, CO₂/asphyxiation, etc.). NOTE: NUREG-0737 II.B.2 addresses dose limitations for operators performing emergency. Specifies that GDC 19 applies to operator actions post accident, i.e., 5 REM whole body (or its equivalent to any part of the body) for the duration of the accident.

- The action locations and the access and egress path for the actions shall be lit with 8-hour battery-backed emergency lighting. Tasks that are not required until after 8 hours do not require emergency lights as there is time to establish temporary lighting. The path to and from actions required at remote buildings (such as pump house structures) does not require outdoor battery backed lights, if other lighting provisions are available (portable lights, security lighting, etc.).

- There should be indication, which is unaffected by the postulated fire, 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 (level, pressure, flow, amps, temperature, etc.). Additional instrumentation may be needed to properly assess spurious operation; however it may not be necessary to make a diagnosis of the specific spurious operation that occurred, if symptom-based plant procedures provide the appropriate guidance to respond to the situation. If pre-emptive actions will be taken to preclude spurious actuations, then event-based procedures should be provided for the situation.
- Administrative controls shall be provided to ensure that any tools, equipment or keys required for the action shall be functional, available, and accessible. This includes consideration of self-contained breathing apparatus (SCBA) and personnel protective equipment, if required. This also includes the availability of ladders or special equipment, if these items are required for access.
- There shall be provisions for communications to allow coordination of actions with the main control room or the alternative shutdown facility, if required. The nature of the action and need for coordination with other related actions or the control room should be considered when determining the need for and the type of communications required.
- Guidance (e.g., procedures or pre-fire plan) should be provided to alert the operator as to when actions may be required in response to potential fire damage. This guidance shall be provided in locations that will be accessible during and after the fire.

The guidance may be prescriptive or symptomatic. Specific event-based procedures are required for activities not addressed in existing operating procedures (normal, abnormal, emergency) for actions as a result of fire-induced failures that cannot be readily diagnosed by the operator using means protected from the effects of fire. The "skill of the craft" should be considered when determining the level of procedural guidance to provide. Typically, plant operators should be capable of performing actions without detailed instructions.

Detailed instructions should be readily available, if required. The guidance shall provide the level of detail required to enable plant personnel to perform the task. Personnel shall be trained and qualified, as appropriate, to perform the specified actions, in accordance with INPO's Systematic Approach to Training.

- The complexity and number of manual actions required for safe shutdown shall be limited, such that their successful accomplishment under realistically severe conditions is ensured for a given fire scenario.

Other Types of Actions

When performing the post-fire safe shutdown analysis, additional actions that are not credited in the post-fire safe shutdown analysis may be identified that have a positive benefit to the safe shutdown scenario such as minimizing the shutdown transient or reducing commercial property damage. Since these actions are not specifically required by the Regulation or the safe shutdown analysis, it is not

necessary to provide 8-hour emergency lighting or communication for these actions.

It is also not required to specifically address the required timing for these actions.

Similarly, manual actions specified as precautionary or confirmatory backup actions (prudent, but unnecessary or redundant) for a primary mitigating technique that are not credited in the post-fire safe shutdown analysis do not require 8-hour emergency lights, communications or timing considerations.

VI. REFERENCES

10 CFR 50 Appendix R Fire Protection for Operating Nuclear Power Plants

NRC Inspection Procedure 71111.05, March 6, 2003

NRC Draft Regulatory Guide DG-1136, February 2005

NUREG-1778, Knowledge Base for Post-Fire Safe-Shutdown Analysis, January 2004

SECY-03-0100, Rulemaking Plan on Post-Fire Operator Manual Actions, June 17, 2003

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10CFR50.55a "Codes and Standards"