

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

RIN 3150 AH-54

Fire Protection Program - Post-Fire Operator Manual Actions

Draft Regulatory Guide: Issuance, Availability

AGENCY: U.S. Nuclear Regulatory Commission.

ACTION: Proposed rule and Issuance of Draft Regulatory Guide.

SUMMARY: The Nuclear Regulatory Commission (NRC) proposes to amend its fire protection regulations for nuclear power facilities operating prior to January 1, 1979. The amendment would allow nuclear power plant licensees to use manual actions by plant operators as an alternative method to achieve hot shutdown conditions in the event of fires in certain plant areas, provided that the actions are evaluated against specified criteria and determined to be acceptable and that fire detectors and an automatic fire suppression system are provided in the fire area. The Commission believes that the proposed action would provide realistically conservative regulatory acceptance criteria for operator manual actions to achieve and maintain hot shutdown condition.

The NRC is also proposing and requesting comments on a draft regulatory guide to support this proposed rulemaking. **The NRC has developed the Regulatory Guide Series to describe and make available to the public such information as methods that are acceptable to the NRC staff for implementing specific parts of the NRC's regulations, techniques that the staff uses in evaluating specific problems or postulated accidents, and data that the staff needs in its review of applications for permits and licenses.**

The draft regulatory guide, entitled “Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire,” is temporarily identified by its task number, DG-1136, which should be mentioned in all related correspondence. This proposed regulatory guide offers guidance for NRC licensees and applicants to use in implementing the feasibility and reliability criteria that the staff developed for post-fire operator manual actions.

DATES: Submit comments on the proposed rule and the draft regulatory guide by **(insert date 75 days after publication in the *Federal Register*)**. Submit comments specific to the information collection aspects of this rule by **(insert date 30 days after publication in the *Federal Register*)**. Comments received after these dates will be considered if it is practical to do so, but assurance of consideration cannot be given to comments received after these dates.

ADDRESSES: You may submit comments on the proposed rule by any one of the following methods. Please include the following number RIN 3150 AH-54 and/or DG-1136 in the subject line of your comments. Comments on the rulemakings or the draft regulatory guide submitted in writing or in electronic form will be made available for public inspection. Because your comments will not be edited to remove any identifying or contact information, the NRC cautions you against including any information in your submission that you do not want publicly disclosed.

Mail comments to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.

E-mail comments to: SECY@nrc.gov. If you do not receive a reply e-mail confirming that we have received your comments, contact us directly at (301) 415-1966. You may also submit comments via the NRC’s rulemaking web site at <http://ruleforum.llnl.gov>. This site provides the capability to upload comments as files (any format), if your web browser supports that function.

Address questions about our rulemaking website to Carol Gallagher (301) 415-5905; email cag@nrc.gov. Comments can also be submitted via the Federal Rulemaking Portal <http://www.regulations.gov>.

Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 am and 4:15 pm Federal workdays. (Telephone (301) 415-1966).

Fax comments to: Secretary, U.S. Nuclear Regulatory Commission at (301) 415-1101.

Publicly available documents related to this rulemaking may be viewed electronically on the public computers located at the NRC's Public Document Room (PDR), O1 F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The PDR reproduction contractor will copy documents for a fee. Selected documents, including comments, may be viewed and downloaded electronically via the NRC rulemaking web site at <http://ruleforum.llnl.gov>.

Publicly available documents created or received at the NRC after November 1, 1999, are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, the public can gain entry into the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. **Electronic copies of Draft Regulatory Guide DG-1136 are available in ADAMS at <http://www.nrc.gov/reading-rm/adams.html>, under Accession #ML050350359. Note, however, that the NRC has temporarily suspended public access to ADAMS so that the agency can complete security reviews of publicly available documents and remove potentially sensitive information. Please check the NRC's Web site for updates concerning the resumption of public access to ADAMS. If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737 or by email to pdr@nrc.gov. Electronic copies of Draft Regulatory Guide DG-1136 are also available**

through the NRC's public Web site under Draft Regulatory Guides in the Regulatory Guides document collection of the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/doc-collections/>.

You may submit comments on the information collections by the methods indicated in the Paperwork Reduction Act Statement.

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I. Background

Section 50.48, Fire protection, requires each operating power plant to have a fire protection plan that satisfies Criterion 3 of Appendix A to 10 CFR Part 50. Criterion 3 requires structures, systems, and components important to safety to be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions. The specific fire protection requirements for safe shutdown capability of a plant are further discussed in paragraph G of Section III of Appendix R to 10 CFR Part 50. The more specific §50.48 and Appendix R requirements were added following a significant fire that occurred in 1975 at the Browns Ferry Nuclear Plant. The fire damaged control, instrumentation, and power cables for redundant trains of equipment necessary for safe shutdown.

In response to the fire, an NRC investigation found that the independence of redundant equipment at Browns Ferry was negated by a lack of adequate separation between cables for redundant trains of safety equipment. The investigators subsequently recommended that a suitable combination of electrical isolation, physical distance, fire barriers, and sprinkler systems should be used to maintain the independence of redundant safety equipment. In response to these recommendations, the NRC interacted with stakeholders for several years to identify and implement necessary plant fire protection improvements. In 1980, NRC promulgated §50.48 to establish fire protection requirements and Appendix R to 10 CFR Part 50 for certain generic fire protection program issues, including paragraph III.G, fire protection of

safe shutdown capability. The requirements for separation of cables and equipment associated with redundant hot shutdown trains were promulgated in paragraph III.G.2.

Paragraph III.G.2 of Appendix R requires that cables and equipment of redundant trains of safety systems in the same fire area be separated by either:

- a. A 3-hour fire barrier, or
- b. A horizontal distance of more than 20 feet with no intervening combustibles in conjunction with fire detectors and an automatic fire suppression system, or
- c. A 1-hour fire barrier combined with fire detectors and an automatic fire suppression system.

Appendix R applies to only those licensees who received operating licenses before January 1, 1979. Plants licensed after January 1, 1979, are not required to meet Appendix R. These plants were licensed to meet Branch Technical Position CMEB 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," that contains criteria similar to the Appendix R requirements. Specific licensing basis information for these plants is usually contained in license conditions issued at time of licensing.

Because the rule was to apply to facilities which were already built, the NRC knew that compliance with various parts of Appendix R might be difficult at some facilities. Accordingly, the NRC included a provision which allowed licensees to submit alternative acceptable methods for protecting redundant equipment for NRC review and approval through an exemption process. During implementation of the Appendix R requirements, the NRC reviewed and approved a large number of exemptions for 60 licensees who proposed alternative acceptable methods of compliance in various areas, including numerous exemptions from paragraph III.G.2.

In the early 1990s, generic problems arose with Thermolag¹ fire barriers, which many licensees were using to comply with paragraph III.G.2 of Appendix R. Licensees were ultimately required to replace Thermolag material with other fire barriers. Several years later, fire protection inspectors began to notice that many licensees had not upgraded or replaced Thermolag fire barrier material (or had not otherwise provided the required separation distance between redundant safety trains) used to satisfy the paragraph III.G.2 criteria. Some licensees compensated by relying on operator manual actions² which were not reviewed and approved by the NRC through the §50.12 exemption process. Currently, operator manual actions are not an alternative specified in paragraph III.G.2 of Appendix R. However, such actions may be an acceptable means of achieving hot shutdown in the event of a fire under certain conditions.

In 2002, the NRC met with nuclear power plant licensees and informed them that the use of unapproved manual actions was not in compliance with paragraph III.G.2. During a meeting on June 20, 2002, the Nuclear Energy Institute representative stated that there was widespread use of operator manual actions throughout the industry based on the industry's understanding of past practice and existing NRC guidance. The industry representative also stated that licensees' use of unapproved manual actions had become prevalent even before the concerns arose with Thermolag material. Subsequent to the public meeting, the NRC developed criteria for inspectors to use in assessing the safety significance of violations resulting from licensee use of unapproved operator manual actions. The criteria were based on past practice and experience by NRC inspectors when reviewing operator manual actions used to comply with Appendix R, paragraph III.G.3, on alternate reactor shutdown capability.

¹Thermolag is a brand-name for a particular type of material used to construct fire barriers typically for protecting electrical conduits and cable trays. In the early 1990's, issues arose regarding the testing and qualification process used for this material. It was determined that barriers made of this material would not provide protection for the required periods of time.

²Operator manual actions are an integrated set of actions needed to ensure that a redundant train of systems necessary to achieve and maintain hot shutdown conditions located within the same fire area outside the primary containment is free of fire damage.

Licensees were familiar with these criteria through their interactions with the NRC staff during the implementation of the NRC inspection process. These criteria were issued in the revision to Inspection Procedure 71111.05 in March 2003. While unapproved operator manual actions are still violations, those actions that meet the interim criteria are viewed to have low or no safety significance.

II. Rulemaking Initiation

Instead of continuing the current practice of requiring all noncompliant licensees to submit individual exemption requests for staff review to determine if their operator manual actions are acceptable, the Commission believes that amending Appendix R to 10 CFR Part 50 would be the most orderly and efficient way to provide an option for licensees to utilize acceptable operator manual actions in lieu of the separation or barrier requirements in paragraph III.G.2. In this way the NRC would codify conservative acceptance criteria for licensees to use in evaluating operator manual actions to ensure that the actions were both feasible and reliable. These criteria would maintain safety by ensuring that licensees perform thorough evaluations of the operator manual actions comparable to evaluations a licensee would provide to NRC for review and approval of an exemption request.

The NRC staff developed a rulemaking plan (SECY-03-0100) and the Commission approved the staff plan on September 12, 2003. The rule change would revise 10 CFR Part 50, Appendix R, paragraph III.G.2 to allow licensees to implement acceptable operator manual actions after documenting that the actions met the regulatory acceptance criteria. Through the established Reactor Oversight Process (ROP), the NRC will continue to inspect licensees' methodologies for achieving and maintaining hot shutdown conditions in accordance with the

requirements set forth in paragraph III.G.2 of Appendix R to 10 CFR Part 50. The NRC fire protection inspectors will verify that the licensees' operator manual actions met the NRC acceptance criteria and will evaluate the licensees' analyses, procedures and training, implementation, and demonstration of operator manual actions to ensure the licensees have adequately demonstrated the feasibility and reliability of manual actions.

III. Proposed Action

The Commission proposes to allow the use of operator manual actions coincident with fire detectors and an automatic fire suppression system as an additional alternative method for compliance with paragraphs III.G.2(a), (b) or (c) of Appendix R³. The Commission has determined that implementing any one of the alternatives in paragraph III.G.2 will provide reasonable assurance that at least one method for achieving and maintaining the hot shutdown condition will remain available during and after a postulated fire anywhere in the plant. The Commission proposes to add a new paragraph G.2.c-1 and a paragraph P to section III of Appendix R to 10 CFR Part 50. The new paragraph G.2.c-1 would establish operator manual actions, in conjunction with fire detectors and an automatic fire suppression system, as a fourth compliance option with paragraphs III.G.2(a), (b) or (c), provided that the operator manual actions satisfy the acceptance criteria in the new paragraph P. The new paragraph P would define operator manual actions and set forth the required acceptance criteria which must be met before a licensee could use operator manual actions outside the containment to comply

³ The requirements in Appendix R are applicable only to licensees who received operating licenses before January 1, 1979. Post-January 1, 1979, licensees were licensed to meet GDC-3, §50.48(a), and Branch Technical Position CMEB 9.5-1, which contain criteria that are similar to the Appendix R requirements. Post-January 1, 1979 licensees who use operator manual actions without NRC approval may or may not be in compliance with applicable fire protection requirements. Compliance depends on the specific licensing commitments (usually specified in license conditions for these licensees), the change control process, and how the change was justified and analyzed to demonstrate that the operator manual actions are feasible and reliable and thus do not adversely affect the ability to achieve or maintain safe shutdown.

with paragraph III.G.2 of Appendix R. Compliance with these acceptance criteria is necessary to provide reasonable assurance of the feasibility and the reliability of the operator manual actions.

A. Operator Manual Actions Alternative

The Commission proposes to add a new paragraph c-1 to paragraph III.G.2 of 10 CFR Part 50 to codify the use of operator manual actions in conjunction with fire detectors and an automatic fire suppression system, as an additional alternative compliance method.

Implementing any of the alternatives in paragraph III.G.2 will provide reasonable assurance that at least one method for achieving and maintaining the reactor in a hot shutdown condition will remain available during and after a postulated fire. The basis for this determination is provided below.

The Commission's fire protection requirements constitute a defense-in-depth approach to protect safe shutdown functions. The overall objectives of the NRC's fire protection regulations are to minimize the potential for fires and explosions; to rapidly detect, control, and extinguish fires that do occur; and to ensure that the fires will not prevent the accomplishment of necessary safe shutdown functions and will not significantly increase the risk of radioactive releases to the environment. The NRC has concluded if these objectives are met, there is reasonable assurance that a licensed facility is providing adequate protection of public health and safety. These objectives are met by a set of NRC requirements for control of combustible materials and ignition sources, fire detection and suppression systems, fire brigade procedures and training, and physical separation of cables and equipment of redundant trains of safe shutdown equipment.

The physical separation requirements in paragraph III.G.2 of Appendix R are one component of the NRC's overall fire protection objectives. In paragraph III.G.2, the NRC specified three different methods for providing separation of cables and equipment of redundant trains of equipment located in the same fire area. These three options for compliance with paragraph III.G.2 offer sufficient but varying levels of protection. In general, the 3-hour passive fire barrier is judged to offer more protection than either of the other options (i.e., the 1-hour passive fire barrier or 20 feet of horizontal separation with no intervening combustibles, in combination with fire detectors and an automatic fire suppression system installed in the fire area). The NRC published a final rule in the *Federal Register* on November 19, 1980 (45 FR 76602) stating that redundant trains of safe shutdown systems are best protected by 3-hour passive fire barriers that provide ample time for manual fire suppression activities to control any fire. The proposed operator manual action offers protection comparable to the latter two options, both of which require the additional layer of defense-in-depth protection provided by having fire detection and automatic suppression capability. The basis for automatic suppression capability in III.G.2 is found in the final rule published on November 19, 1980 (45 FR 76602), which stated, "The use of 1-hour barrier in conjunction with automatic fire suppression and detection capability . . . is based on the following considerations. Automatic suppression is required to ensure prompt, effective application of a suppressant to a fire that could endanger safe shutdown capability." The prompt, effective application of a suppressant to a fire also applies to III.G.2.b with 20 feet of horizontal separation with no intervening combustibles. Accordingly, the NRC proposes to allow use of operator manual actions only in conjunction with fire detectors and an automatic fire suppression system.

In issuing the current Appendix R, paragraph III.G.2, requirements on physical separation of safe shutdown systems, the Commission recognized that strict compliance with

the III.G.2 criteria might be difficult for certain licensees at existing facilities. At that time, the Commission was aware that other fire protection alternatives might exist that could provide adequate fire protection at these facilities. For this reason, the Commission included an exemption provision in § 50.48⁴ to allow licensees to propose alternative fire protection methods to the Commission for review and approval. Under the exemption process, the Commission has used its fire protection engineering experience and judgment to review and grant (or in some cases deny) exemptions to licensees who, because of plant physical limitations, sought to implement operator manual actions in lieu of complying with the paragraph III.G.2 separation requirements.

The NRC recognized in the SECY-03-0100 rulemaking plan that “[r]eplacing a passive, rated, fire barrier . . . with human performance activities can increase risk. For some simple operator manual actions, the risk increase associated with human performance may be minimal. For other actions, unless the operator manual actions are feasible, the risk increase could be significant . . . However, if the operator manual actions are feasible, the overall risk increase is minimal.”

On the basis of inspection experience, the NRC has concluded that certain manual actions can be accomplished and provide an adequate level of safety to satisfy the underlying purpose of the fire protection rule for the areas set forth in paragraph III.G.2. In addition, the NRC has reviewed and granted certain exemption requests for the use of manual actions in lieu of the separation criteria of paragraph III.G.2. This experience demonstrates that properly analyzed and implemented manual actions provide an adequate level of assurance that a nuclear power plant could achieve and maintain hot shutdown conditions.

⁴The exemption provision no longer exists in 10 CFR 50.48. It has been subsumed by the exemption provisions in 10 CFR 50.12, which apply to all sections of 10 CFR Part 50.

Due to misunderstanding of acceptable past practice and existing fire protection guidance that led licensees to implement unapproved operator manual actions, the NRC may be faced with a large number of operator manual action exemption requests from licensees. To provide a more efficient and effective process and to ensure more uniform and consistent regulatory treatment of these cases, the NRC is proposing to codify conservative, state-of-the-art acceptance criteria for licensees to use in evaluating operator manual actions to ensure that they are both feasible and reliable. The NRC believes that codifying this alternative in the rule will be more efficient than using the exemption process, and will provide for enhanced safety by allowing resources to be focused on safety rather than administrative compliance.

Something that is “feasible” is “capable of being accomplished or brought about; possible.” Something that is “reliable” will “yield the same or compatible results in different experiments or statistical trials; dependably repeatable.” To credit operator manual actions under paragraph III.G.2 for outside containment, the licensee must prove to the satisfaction of the NRC not only that the actions can be successfully accomplished, but also that they can be accomplished repeatedly by all personnel who are required to perform the actions. Together, proof that the operator manual actions are both feasible and reliable provides the level of reasonable assurance necessary for credited operator manual actions to be in compliance with paragraph III.G.2.

If shown to be feasible and reliable, operator manual actions are likely to be successfully achieved, and any potential increases in risk to the public due to their use will be minimal. Requiring the operator manual actions to meet conservative acceptance criteria provides the NRC with reasonable assurance that such operator manual actions can be accomplished to safely shut down the plant in the event of a fire. These criteria maintain safety by ensuring that licensees perform thorough evaluations of the required operator manual actions and pre-plan

equipment needs. NRC fire protection inspectors will verify that licensees' documented operator manual actions meet the NRC acceptance criteria through the existing triennial inspection process. The use of operator manual actions does not diminish the other defense-in-depth objectives of the NRC fire protection program (i.e., the requirements that minimize the potential for fires and explosions and those which provide for rapid controlling and extinguishing of fires that do occur). To support the objective for rapidly controlling and extinguishing fires, the NRC is requiring fire detectors and an automatic fire suppression system as part of the new operator manual actions option. Accordingly, the NRC has determined that the proposed rulemaking provides reasonable assurance that the public health and safety are protected, consistent with the assurance provided by compliance with the current three options in paragraphs III.G.2(a), (b) or (c).

B. Addition of Paragraph III.P, Operator Manual Actions Acceptance Criteria

The proposed paragraph III.P specifies the required acceptance criteria which must be met before a licensee may utilize operator manual actions to comply with paragraph III.G.2 of Appendix R. A detailed discussion of each criterion is provided further in this Statement of Consideration. These criteria are as follows:

III.P Operator Manual Actions.

- 1 For purposes of this section, operator manual actions means the integrated set of actions needed to ensure that a redundant train of systems necessary to achieve and maintain hot shutdown conditions located within the same area outside the primary containment is free of fire damage.
- 2 A licensee relying on operator manual actions must meet all of the following acceptance criteria:

- (a) Analysis. The licensee shall prepare an analysis for each operator manual action which demonstrates its feasibility and reliability.
 - (1) The analysis must contain a postulated fire timeline showing that there is sufficient time to travel to action locations and perform actions required to achieve and maintain the plant in a hot shutdown condition under the environmental conditions expected to be encountered without jeopardizing the health and safety of the operator performing the manual actions. The fire timeline shall extend from the time of initial fire detection until the time when the ability to achieve and maintain hot shutdown is reached, and shall include a time margin that reasonably accounts for all important variables, including (i) differences between the analyzed and actual conditions and (ii) human performance uncertainties that may be encountered.
 - (2) The analysis must address the functionality of equipment or cables that could be adversely affected by the fire or its effects but still used to achieve and maintain hot shutdown.
 - (3) The analysis must identify all equipment required to accomplish the operator manual action within the postulated timeline, including (but not limited to) (i) all indications necessary to identify the need for the operator manual actions, enable their performance, and verify their successful accomplishment, and (ii) any necessary communications, portable, and life support equipment.

- (b) Procedures and training. Plant procedures must include each operator manual action required to achieve and maintain hot shutdown. Each operator must be appropriately trained on those procedures.
- (c) Implementation. The licensee shall ensure that all systems and equipment needed to accomplish each operator manual action are available and readily accessible consistent with the analysis required by paragraph 2(a). The number of operating shift personnel required to perform the operator manual actions shall be on site at all times.
- (d) Demonstration. Periodically, the licensee shall conduct demonstrations using an established crew of operators to demonstrate that operator manual actions required to achieve and maintain the plant in a hot shutdown condition can be accomplished consistent with the analysis in paragraph 2(a) of this section. The licensee may not rely upon any operator manual action until it has been demonstrated to be consistent with the analysis. The licensee shall take prompt corrective action if any subsequent periodic demonstration indicates that the operator manual actions can no longer be accomplished consistent with the analysis.

These acceptance criteria for operator manual actions are intended to assure the safe shutdown goals and objectives for operating reactors as required in 10 CFR 50.48. The primary objective for safe shutdown is to maintain fuel integrity (i.e., fuel design limits are not exceeded). For alternative or dedicated shutdown capability, the reactor coolant system process variables should be maintained within those predicted for a loss of normal ac power and fission product boundary integrity should not be affected.

The applications of these acceptance criteria are as follows. First, the criteria are the means by which the NRC will establish standards that provide a reasonable level of assurance that operator manual actions will be satisfactorily and reliably performed to bring the plant to a hot shutdown condition, thus protecting public health and safety. Second, a standard set of acceptance criteria will permit both the licensees and NRC to establish consistency as to what operator manual actions will be allowed. Third, the criteria will provide the parameters which both the licensees and NRC will use to conduct evaluations and inspections in a thorough manner. The supporting basis for each criterion is discussed in detail below.

The acceptance criteria in the proposed rule are structured to ensure both feasibility and reliability of the operator manual actions. To credit operator manual actions, the licensee must prove not only that the actions can be successfully accomplished (are feasible), but also that they can be done so repeatedly (are reliable). Central to the approach is the preparation of an analysis that determines what actions must be taken in order to reach a hot shutdown condition. This analysis would also identify the time available (timeline) for successful performance of such actions. A demonstration of the accomplished operator manual actions within the established timeline verifies the feasibility of such actions. In order to also achieve reliability of the actions, the Commission is proposing a criterion for a time margin needed to complete the actions because of potential variations in fire characteristics, plant conditions, and human performance that the demonstration cannot adequately address. This concept is further described in the sections below.

Timeline Analysis

The Commission will require that a licensee perform an analysis to determine the feasibility and reliability of operator manual actions. As part of the analysis, there shall be a fire timeline, which extends from the initial fire detection to the achievement of maintainable hot

shutdown conditions, to define the time boundaries of the analysis for the fire scenario in which the operator manual actions will be performed. The analysis must identify all actions that must be completed, the equipment needed, the number of people needed, the communications equipment required, and the time available to perform the actions before unsafe plant conditions occur (i.e., before exceeding safe shutdown goals and objectives). The proposed rule has more specific requirements on each of these aspects that are discussed in subsequent sections of this notice. The Commission will require a licensee to show that a sufficient amount of extra time would be available for the required operator manual actions and that the process for determining the time available for such actions adequately addressed the potential variations in fire characteristics, plant conditions, and human performance. This concept is referred to in this statement as a “time margin.”

Proper demonstration requires that the licensee meet all operator manual action acceptance criteria other than Time Margin (this is evaluated after all other criteria, including requirements in section 2(d), have been met) and show that at least one randomly-selected, established crew can successfully perform the actions within an acceptable time frame. For example, if there are questions about whether operators can reach the locations where they must perform the manual actions, these questions should be addressed to the extent practicable during the demonstration. However, successful demonstration does not fully determine reliability for the operator manual actions.

Additional factors must be considered to show that the actions can be performed reliably under the variety of conditions that could occur during a fire. For example, factors that the licensee may not be able to recreate in the demonstrations could cause further delay under real fire conditions (i.e., the demonstration would likely fall short of actual fire situations). Furthermore, typical and expected variability among individuals and crews could lead to

variations in operator performance. Finally, variations in the characteristics of the fire and related plant conditions could alter the time available for the operator actions.

In order to ensure that a particular action could be performed reliably, licensees must show that a sufficient amount of extra time (i.e., a time margin) would be available for the action and that the process for determining the time available for the action adequately addressed the potential variations in fire characteristics and plant conditions. The time margin ensures that operator manual actions can be performed reliably: (1) through well-thought out demonstrations that the actions are feasible, (2) by ensuring that there is extra time available for given actions with respect to the fire scenario, and (3) by adequately addressing all other related acceptance criteria.

The analysis should include realistically conservative scenarios, and such variables as environment and human performance uncertainties should be considered in the time margin. For example, a licensee may perform a worst case demonstration that requires the operator to wear a self-contained breathing apparatus (SCBA), if there is a reasonable expectation that the operators will need to pass through a zone containing smoke in order to reach the location where the operator manual action is to be carried out.

Use of a time margin is an appropriate safety factor for ensuring realistically reliable operator manual actions. The rule would require the time margin to account for all important variables, including differences between the analyzed and actual conditions and for human performance uncertainties that may be encountered.

The factors necessitating the time margin are:

1. The time margin should account for what the licensee is not likely to be able to recreate in the demonstration that could cause further delay (i.e., where the demonstration falls short).

2. The time margin should account for the variability of fire and related plant conditions.
3. The time margin should account for the variability in human performance among individuals and between different crews and for the effects of human-centered factors that could become relevant during fire scenarios.

These factors are important considerations for the time margin for the following reasons:

1. They address likely limitations of the demonstration.
2. The demonstration can replicate only a subset of all possible fires and resulting variability in fire and plant conditions.
3. Some degree of human performance variability is to be expected, some of which could further delay the times to perform the desired actions during real fire situations.

In order to establish a standard to show time margin, it was necessary to establish a time margin (or margins) for fire-related operator manual actions to ensure that they would be reliably successful. In other words, if the licensee can meet all of the operator manual action acceptance criteria, which include demonstrating that at least one randomly-selected, established crew can successfully perform the actions, and show that the actions can be performed within an acceptable time frame that allows for adequate time margin to cover potential variations in plant conditions and human performance, then the operator manual action rule would be met. For example, as long as it can be shown that there is an “X-percent” time margin to perform the particular operator manual action, plant damage or an undesirable plant

condition will still be avoided and all of the other criteria have been met, then there is confidence to conclude that the action will be performed reliably.

The establishment of an appropriate time margin requires a supported technical basis. While the best technical basis for a time margin would be empirical data from which it could be derived, a database search was unable to find relevant data that could be used directly for or generalized to the operator manual actions of interest. To further develop this concept, the NRC convened an initial expert panel to identify a time margin for inclusion in this proposed rule statement for further stakeholder consideration and feedback.

The expert panel members concluded that a time margin factor of at least 2 would ensure that the operator manual actions in response to fire are sufficiently reliable. For example, if the operator manual action can be shown typically to take less than 15 minutes, then at least 30 minutes (15×2) should be available to achieve and maintain hot shutdown. A time margin factor of at least 2 is assumed to absorb delays that might be caused by the following set of factors (1) the need to recover from or respond to unexpected difficulties or random problems associated with instruments or other equipment, or communication devices; (2) environmental and other effects that are not easily replicated in a demonstration, such as radiation, smoke, toxic gas effects, and increased noise levels; (3) limitations of the demonstration to account for all possible fire locations that may lend the need for such operator manual actions; (4) inability to show or duplicate the operator manual actions because of safety considerations while at power; and (5) individual operator performance factors, such as physical size and strength, cognitive differences, time pressure, and emotional responses. In addition, the time margin includes adequate time for personnel to recover from any initial errors in conducting the actions. The time margin concept could alternatively consist of a range of multiplicative values. For example, instead of a single multiplicative value of 2, perhaps a range of multiplicative values (e.g., 2-4

times) could determine adequate time margin. This may be appropriate where additional factors were identified that may influence the timeline. These factors may be those unknown and not considered by the expert elicitation panel and which may result in a lower or higher multiplicative factor. The Commission can also foresee situations where a licensee may be able to define a different multiplicative value for different scenarios. For example, an operator manual action consisting of a single action by one plant operator could have a different multiplicative value than a scenario that involves more than one plant operator or where several sequential actions are necessary.

As with the discussion of the range of multiplicative values above, the time margin concept may have to include a minimum additive time (predetermined minimum amount of time added to the demonstrated time) necessary for certain situations. For example, the time in the demonstration is shown to be short (e.g., <5 minutes for a single operator manual action), a single multiplicative value of 2 is applied resulting in an additional time of <5 minutes. There may be situations where the resulting <5 minutes of margin may not be adequate to address the factors that may cause a delay as identified above. In such situations it may be more appropriate to apply a minimum additive time (e.g., 10 minutes) to account for factors that may cause a delay with the operator manual action.

Request for Comment 1: (Time Margin)

The Commission requests opinions specifically on the time margin aspects because of stakeholder interest in this subject and the Commission's desire to consider all stakeholders' input for this important criterion.

Specifically, the Commission asks the following questions:

(A) Considering the factors for time margin discussed above (including the conditional dependence on a worst-case demonstration meeting all the other acceptance criteria), should

the time margin consist of a single multiplicative factor (e.g., 2 times), or a range of multiplicative factors (e.g., 2-4 times)? Please provide a technical basis for your proposed time frames or factors.

(B) If a range is appropriate, what should the range be and what parameters or variables should be considered in determining which part of the range is applicable in a given situation? Please provide a basis for your proposed time frames or factors.

(C) Should there be a minimum additive time (e.g., 10 minutes) for situations where the time in the demonstration is so short that a multiplicative factor would not properly account for the required time margin (e.g., a time in the demonstration of < 5 minutes). Please provide a basis for your proposed time frames or factors.

(D) Are there other means of establishing margin (e.g., through consideration of conservative assumptions in the thermal hydraulic timeline)? Please provide a technical basis.

Environmental Factors

Paragraph 2(a)(1) of the proposed criteria requires that the fire timeline include a time margin that accounts for differences between the analyzed and actual conditions. Adverse environmental factors are one area of concern that must be considered because they affect the operator's mental or physical performance. The environmental factors must be weighed with respect to the location where the operator manual actions will be performed, as well as the access and egress routes to and from this location. Operators' performance may be impeded by their inability to reach the required location and by the difficulty of performing the action in the conditions existing at the required location. The environment along the egress route after completion of the operator manual action must also be considered to ensure personnel health and safety throughout. These environmental factors are considered in the analysis via

preparation and planning thereby ensuring there is sufficient time to travel to the location(s) and perform the action(s) required to achieve and maintain the plant in a hot shutdown condition.

Equipment Performance

Paragraph 2(a)(2) of the criteria requires the analysis to address the functionality of equipment or cables that could be adversely affected by the fire but still used to achieve and maintain hot shutdown. For example, operators may rely upon valves to achieve and maintain hot shutdown conditions. If the functionality of the valves is adversely affected by the fire then it may degrade or prevent the performance of the required operator manual actions. As identified in Information Notice 92-18 for motor-operated valves, bypassing thermal overload protection devices (discussed in Regulatory Guide 1.106, “Thermal Overload Protection for Electric Motors on Motor Operated Valves” Rev. 1, ML 003740323) could jeopardize completion of the safety function or cause degradation of other safety systems due to sustained abnormal circuit currents that can arise from fire-induced “hot shorts.” Even if these overload protection devices are not bypassed, hot shorts can cause loss of power to motor-operated valves by tripping the devices. If an operator manual action requires the manual manipulation of a depowered motor-operated valve, such fire-induced damage could make the manipulation physically impossible. Therefore, if equipment to be used during operator manual actions could be affected by fire, the licensee must determine that the functionality of that equipment will not be adversely affected.

Plant systems, structures and components (SSCs) are used to achieve and maintain hot shutdown conditions. SSCs often require active intervention, through either automatic or manual means, to perform their required function. The analysis of the fire timeline must identify all such SSCs needed to achieve maintainable hot shutdown conditions from the time of initial fire detection, particularly those that require operator manual actions to perform their hot shutdown function and explain how active equipment will be operated. Diagnostic indications relevant to

the SSCs' safety function may be critical to specific operator manual actions and interaction with this equipment. Diagnostic indications are the alerting, information, control, and feedback capability provided through instrumentation. They also provide sufficient information that determines if and when these interfaces must be effected. These indications would typically be needed to: (1) enable the operators to determine which manual actions are appropriate for the fire scenario; (2) direct the personnel as to the proper performance of the operator manual actions; and (3) provide the necessary feedback to the operators verifying that the manual actions have had their expected results. Diagnostic indications are considered in the analysis via identification of the SSCs necessary to accomplish the operator manual action and evaluation of their availability under the fire and environmental conditions expected. Guidance on identifying needed indication is provided as in paragraph c.2 of the draft regulatory guide DG-1136, "Guidance for Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire."

Communications Equipment

Paragraph 2(a)(3)(ii) of the proposed criteria requires the analysis to identify all communications equipment necessary to accomplish the operator manual actions. Communications equipment may be needed to provide feedback between operators in the main control room and personnel out in the plant to ensure that any activities requiring coordination between them are clearly understood and correctly accomplished. The unpredictability of fires can force staff to deviate from planned activities, hence the need to consider constant and effective communications. Communications may be needed in the performance of sequential operator manual actions (where one action must be completed before another can be started) and provide verification that procedural steps have been accomplished, especially those that must be conducted at remote locations. Communications must be considered in the analysis by

identifying the necessary communications equipment and ensuring their availability to the plant operators for the time needed to achieve and maintain hot shutdown. For example, if portable radios are to be used for communications then the analysis should list the equipment and confirm that the equipment can be used in the plant areas (i.e., capable of receiving and transmitting in the necessary plant areas) and are available for the time required (e.g., battery power life has been considered for the time period necessary). Such communications should be identified and addressed as per paragraph c.2 of the draft regulatory guide DG-1136, “Guidance for Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire.”

Portable Equipment

Paragraph 2(a)(3)(ii) of the proposed criteria requires the analysis to identify all portable equipment necessary to accomplish the operator manual actions. Portable equipment, especially tools such as keys to open locked areas, ladders to reach high locations, torque devices to turn valve handwheels, and electrical breaker rackout tools, can be essential to access and manipulate SSCs to successfully accomplish required operator manual actions. Similarly, life support equipment, such as self-contained breathing apparatuses (SCBA), may need to be worn to permit access to and egress from the locations where the operator manual actions must be performed since the routes could be negatively affected by fire effects, such as smoke, that propagate beyond the fire-involved area. Portable equipment must be considered in the analysis by identifying necessary equipment and ensuring their availability to the plant operators during the time needed to achieve and maintain hot shutdown. For example, if SCBA is necessary then the analysis should list the equipment and confirm that the equipment can be used in the plant areas (i.e., access and egress to tight areas are not impeded by the use of SCBA) and are available for the time required (e.g., portable bottle air supply provides sufficient

time to perform the action). Such equipment should be identified and addressed as per paragraph c.2 of the draft regulatory guide DG-1136, “Guidance for Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire.”

Procedures and Training

Paragraph 2(b) of the proposed criteria requires that all manual actions be included in plant procedures, and that each operator receives training on these manual actions. The role of written plant procedures in the successful performance of operator manual actions is three-fold: (1) assist the operators in correctly diagnosing the type of plant event that the fire may trigger, usually in conjunction with indications, thereby permitting them to select the appropriate operator manual actions (or prescribe actions to be taken should a fire occur in a given fire area); (2) direct the operators to the appropriate preventive and mitigative manual actions to place and maintain the plant in a stable hot shutdown condition; and (3) minimize the potential confusion that can arise from fire-induced conflicting signals, including spurious actuations, thereby minimizing the likelihood of personnel error during the required operator manual actions. Written procedures should contain the steps to be performed, how the operator manual actions are performed and the tools and equipment needed to successfully perform the actions.

Training on these procedures serves three supporting functions: (1) establishes familiarity with the procedures, equipment, and potential (simulated) conditions in an actual event; (2) provides the level of knowledge and understanding necessary for the personnel performing the operator manual actions to be well-prepared to handle departures from the expected sequence of events; and (3) provides the personnel with the opportunity to practice their response without exposure to adverse conditions, thereby enhancing confidence that they can reliably perform their duties in an actual event. Determining that operators are appropriately

trained on procedures entails establishing, implementing, and maintaining a training program that incorporates the instructional requirements necessary to provide qualified operators to perform the manual actions. Licensees are already required to establish training programs for licensed operator and nuclear plant personnel under 10 CFR 55.59 and 50.120, respectively. The procedures and training provided to operators and nuclear plant personnel will ensure that the supporting functions and roles discussed above can be met. Such procedures and training should be identified and addressed as in paragraph c.2 of the draft regulatory guide DG-1136, “Guidance for Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire.” The Commission expects plant procedures to be available at or near the locations where the operator manual actions are to occur so that they are easily accessible to the operators.

Implementation and Staffing

Paragraph 2(c) of the proposed criteria requires that equipment and personnel necessary for feasible and reliable operator manual actions must be readily available and accessible. The equipment is available when its functionality is not adversely affected by the fire or its effects. Accessible means that the personnel should be able to find and reach the locations of the components and be able to manipulate the components. Accessibility and availability of equipment must be considered in the analysis by identifying necessary equipment, ensuring operators are knowledgeable of equipment locations, determining that accessibility of such equipment, and that the equipment will not be adversely affected by a fire or its effects. For example, operators may rely upon valves to achieve and maintain hot shutdown conditions. If the functionality of the valves is adversely affected by the fire or if the valves are not accessible for manipulation then the functionality of such valves may be degraded, thereby preventing the performance of the required operator manual actions.

The intent of the staffing requirement is to ensure that qualified personnel will be on site at all times such that hot shutdown conditions can be achieved and maintained in the event of a fire. An individual expected to perform the operator manual actions must not have collateral duties, such as fire fighting or security, during the evolution of the fire scenario. This individual should be exclusively available for the performance of required operator manual actions. Therefore, operating shift staffing levels should include enough personnel on watch for the performance of any operator manual actions that could arise as a result of a fire. The fire brigade would not be expected to perform actions other than those associated with fire fighting. Otherwise, the potential for interfering with either their fire fighting activities or the operator manual actions could exist, such that successful performance of one or the other, or both, could be impaired. For example, during a fire, an individual who is part of the five-person fire brigade could not perform the required operator manual actions because that individual is expected to participate in the fire fighting efforts.

Demonstration

The concepts of feasibility and reliability were examined under Criterion 2(a) of section III.P in connection with the fire timeline and time margin. Demonstration and time margin development complement each other. Paragraph 2(d) of the proposed criteria requires demonstration in order to establish the feasibility of operator manual actions. The demonstration criterion provides reasonable assurance that the operator manual actions can be performed in the analyzed time period for a range of conceivable fire situations.

The use of such demonstrations is supported, for instance, by NUREG-1764, "Guidance for the Review of Changes to Human Actions" and NUREG-0711 "Human Factors Engineering Program Review Model," cited in NUREG-0800, Section 18.0 *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*. NUREG-1764 states that "... [a]

walk-through of the human actions under realistic conditions should be performed...The scenario used should include any complicating factors that are expected to affect the crews['] ability to perform the human actions..." NUREG-0711 states that "... an integrated system design (i.e., hardware, software, and personnel elements) is evaluated using performance-based tests...Plant personnel should perform operational events using a simulator or other suitable representation of the system to determine its adequacy to support safety operations..."

There are several important elements to the demonstration criterion. First, licensees may take credit for operator manual actions only after a successful demonstration. To continue taking credit for operator manual actions, licensees must complete demonstrations such that all operating crews successfully perform the coordinated sets of operator manual actions taken as a result of a fire in a specific fire area. Periodic demonstrations, at a frequency consistent with that established by the licensee in compliance with 10 CFR 50.120, provide valuable training and experience for licensee personnel and also serve to verify that plant configuration and conditions (access, egress, etc.) have not changed over time such that the operator manual actions can no longer be accomplished in accordance with the analysis performed pursuant to paragraph III.P.2(a). Should a licensee be unable to successfully complete a subsequent demonstration, the Commission expects prompt corrective action to retrain the operators, or to modify the operator manual actions, or modify the plant conditions so that the demonstration yields successful results.

Second, the demonstration verifies an action can be completed within the analyzed fire timeline. This can be done utilizing an established crew of operators to show in the demonstration that operator manual actions can be accomplished to achieve and maintain hot shutdown for the entire fire scenario. This serves as a benchmark for the development of a time margin, which is an application of the reliability concept. Another means of establishing time

margin is through consideration of conservative assumptions in the thermal-hydraulic timeline (e.g., end-state).

Third, the demonstration must be completed by an established crew. An established crew is a group of operators that normally work as a team during any one shift. Conducting the demonstration with an established crew instead of a crew assembled just for the demonstration will provide a more valid basis for the fire timeline determination, as well as provide the established crew with the training necessary to work as a team.

Fourth, operator manual actions may not be credited until those actions have been shown in the demonstrations to be feasible by satisfying all the acceptance criteria. The demonstration should ensure that all relevant aspects of the criteria are met and that important characteristics of those criteria are included in the demonstration to the extent possible. For example, environmental conditions must be considered and should be simulated where possible. This may include, but is not limited to, such considerations as expected lighting levels, protective clothing, and noise levels. This is important because it validates the demonstration by conducting it under conditions that are as realistic as possible.

Fifth, prompt corrective actions are required if any demonstration determines that the operator manual action may not be accomplished consistent with the analysis. Prompt corrective actions should be implemented at the first available opportunity consistent with the guidelines of Generic Letter 91-18, Revision 1, Information to Licensees Regarding NRC Inspection Manual Section on Resolution of Degraded and Nonconforming Conditions.

As with training, the demonstration provides the crew with practical experience. All elements of the fire scenario, including the use of equipment and procedures, adequacy of staffing levels, and response to indications, should be integrated into the demonstration to develop this benchmark. In this way, any complexities, such as the number of required operator

manual actions and their dependence upon one another, are evaluated and identified for appropriate consideration in the development of the time margin. Failure of an initial demonstration to show that the operator manual actions can be accomplished consistent with the analysis indicates that the manual actions are not feasible. In such cases, the licensee could modify the actions (e.g., different access/egress routes, redeployment of critical equipment by placing it at the location where the operator manual actions will be performed vs. carrying it to that location), retrain the crew, such that a new demonstration satisfies the analysis, or the licensee could conclude that operator manual actions are not feasible and opt to comply with paragraph III.G.2.

C. Response to Stakeholder Comments on Operator Manual Action Acceptance Criteria

As part of the development of this proposed rule, the NRC considered stakeholder comments that provided additional insights. A number of stakeholder comments were made in response to the draft acceptance criteria intended for use in the interim enforcement discretion policy published for comment (68 FR 66501 and 69730) and in a subsequent public meeting on June 23, 2004. The comments on these criteria involved the demonstration using the same personnel/crews who are required to perform the manual actions during the fire; the application of plant procedures; the application of a fire detection and suppression system; and the application of operator manual actions criteria in all provisions of paragraph III.G.

Demonstration Criterion

A number of public comments indicated that the requirement for the demonstration to use “the same personnel/crews who will be required to perform the actions during the fire” is unnecessarily restrictive. The Commission agrees that requiring all crews to demonstrate performance under all conditions is unnecessarily restrictive. The intent is to provide reasonable assurance that whatever crew is on duty at the time of a fire can reliably perform the required

actions, allowing for variabilities and uncertainties. The Commission considers it sufficient that an established crew (i.e., one that typically works as a team) shows the ability to perform the required operator manual actions through documented demonstration. This demonstration should show that the crew can successfully perform all operator manual actions required by the entire fire scenario within the analyzed fire timeline. The demonstration should be part of the periodic operator training. To reasonably assure that the remaining crews (i.e., the ones that receive training but do not perform the demonstration during a particular training cycle) can reliably perform the actions, the “time margin” addressed in the analysis criterion is used to offset the variability among crews. In this way, the demonstration by the established crew with an appropriate margin, will reasonably assure that any of the crews could likewise perform the required actions. Another means of determining margin is through consideration of conservative assumptions in the thermal-hydraulic timeline (e.g., end-state).

Procedural Guidance vs. Guidance

A number of public comments suggested that the phrase “procedural guidance” be replaced by “guidance” (e.g., pre-fire plan). The Commission considers this term insufficient to provide feasible and reliable operator manual actions. In fact, the Commission has strengthened the wording from the original “procedural guidance” to “plant procedures” to reflect the need for formal written steps. Typically, plant operators should be capable of performing noncomplex manual actions without detailed instructions. However, there are fire scenarios which could conceivably be atypical such that what would “normally” be non-complex could prove to be difficult in an actual situation. The reading of procedures from the control room to direct remote activities could be impeded by communication difficulties or other control room activities. In addition, operators who perform actions outside the control room may require immediate feedback from the control room, and vice versa, to determine if certain actions have produced

the intended results. The Commission expects plant procedures to be available at or near the locations where the operator manual actions are to occur so that they are easily accessible to the operators.

Need for Detection and Suppression Where Fire Occurs

There appeared to be some confusion on the part of a few commenters regarding where fire detection and automatic suppression would be required in conjunction with the addition of the option for operator manual actions in complying with paragraph III.G.2. Some thought they would be required in the areas where the operator manual actions would occur. The proposed requirement for fire detectors and an automatic fire suppression system applies only to the area where the fire occurs, not to the area(s) where the operator manual actions will take place.⁵

A few commenters questioned whether the requirement for fire detection and automatic suppression installed in the area where the fire occurs should accompany the proposed compliance option for operator manual actions, and why this could not be left to the discretion of the licensees and review by the NRC, depending on the specific conditions to be encountered in that fire area. As discussed in the staff's proposed Appendix R, dated May 29, 1980, protective features shall be provided for fire areas that contain cables or equipment of redundant systems important to achieving and maintaining safe shutdown conditions to ensure that at least one means of achieving said conditions survives postulated fires. The protective features may consist of a combination of automatic and manual fire suppression capability, fire propagation retardants, physical separation, partial fire barriers, or alternative shutdown capability independent of the room. The proposed operator manual action option in conjunction with fire

⁵ Only in the presumably rare case where the operator manual actions would also occur in the same fire area as the fire itself would fire detectors and an automatic fire suppression system have to be installed "in the area where the operator manual actions are taken" for these operator manual actions to receive credit. This is envisioned only if a very large fire area experiences a very localized fire such that the fire effects do not preclude access to, egress from, and operator manual actions in, a distant location within the very large area.

detectors and an automatic fire suppression system is consistent with the requirement of protective features and maintains a similar defense-in-depth concept as with a 1-hr passive fire barrier or a 20-ft separation with no intervening combustibles.

The paragraph III.G.2 compliance option of a 3-hr passive fire barrier requires no fire detection or automatic suppression to be installed in the area where the fire occurs. To consider the option for operator manual actions as providing reasonable assurance at a level comparable to this option, one must be convinced that the implementation of operator manual actions by itself provides a sufficient level of defense-in-depth without the additional level of protection provided by fire detectors and an automatic fire suppression system. The reason that the 3-hr barrier was “exempted” from the additional need for fire detection and automatic suppression was the prevalent acknowledgment that a fire at a nuclear power plant lasting longer than three hours, without intervention, is highly unlikely, if not incredible. Therefore, unlike a 1-hr barrier or a 20-ft separation without intervening combustibles, this compliance option was considered to be sufficient without the additional level of defense-in-depth provided by the fire detection and automatic suppression. Experience in both the nuclear and non-nuclear industry clearly indicates that human reliability is not at a level approaching that provided by a 3-hr barrier as the sole level of defense-in-depth. Therefore, without substantial additional justification such as can be provided by using the risk-informed, performance-based option in the Fire Protection Regulation at 10 CFR 50.48(c), it is not reasonable to consider the implementation of operator manual actions without fire detection and automatic suppression as a sufficient compliance option to paragraph III.G.2.

A few commenters indicated that requiring fire detection and automatic suppression in conjunction with operator manual actions if creditable under III.G.2 “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 ... [Furthermore], 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”

With regard to the first claim, requiring fire detectors and an automatic fire suppression system in the fire area under consideration would enhance the ability of the operator to achieve and maintain safe shutdown from an unaffected area. The activation of detection and automatic suppression as indicated in the staff's statements of consideration for Appendix R to 10 CFR Part 50 (as amended on December 1, 1980; 45 FR 79409) would ensure prompt and effective application of suppressant to a fire that could endanger safe shutdown capability. As a result, the time it takes a fire to adversely affect the licensee's ability to achieve and maintain a safe reactor shutdown may be extended, thereby enhancing the licensee's ability to perform feasible and reliable operator manual actions.

While a proposed requirement of automatic suppression for operator manual actions under paragraph III.G.2 may appear to be more severe than that of fixed suppression under paragraph III.G.3, the Commission believes that this difference is minor in practicality. Part 50, Paragraph 48(a)(1), *Fire Protection*, of 10 CFR states that “each operating nuclear power plant must have a fire protection plan that satisfies Criterion 3 of Appendix A to this part.” Appendix A, Criterion 3, *Fire Protection*, states that “Fire detection and fighting systems of appropriate capacity and capability shall be provided and designed to minimize the adverse effects of fires on structures, systems, and components important to safety.” If a non-water, fixed suppression system (i.e., a gaseous suppression system) is used to comply with III.G.3, the governing standards from the NFPA essentially dictate that the system be automatic, unless an exception

is granted.⁶ If a fixed water system is used to comply with III.G.3, it can be non-automatic (i.e., manually activated). However, the requirement that it be “fixed” means that its infrastructure is essentially the same as an automatic system, such that the practical difference between automatic and fixed suppression in areas III.G.2 and III.G.3 is minimal.

Finally, in both paragraphs III.G.2 and III.G.3, the requirement for fire detection and suppression (automatic or fixed) provides a degree of “defense-in-depth” to the passive fire protection features already in place (except in the case of the 3-hr fire barrier, where this is deemed sufficient without detection or suppression). Defense-in-depth is a recognized cornerstone in NRC policy to protect the public health and safety. Therefore, maintaining defense-in-depth is recognized as providing safety benefit in and of itself.

When the NRC proposed the original “Fire Protection Program for Nuclear Power Plants Operating Prior to January 1, 1979,” on May 29, 1980 (45 FR 36082), it specified that “the following minimum fire protective features shall be provided: (a) an early warning detection system; (b) manual fire suppression capability; and (c) fixed fire suppression systems and alternative shutdown capability as shown on Table 1.” In Table 1, the need for fixed fire suppression systems, automatic or manual, was based on four factors: (1) does the fire/water disable normal shutdown capability; (2) is shutdown available from the control room; (3) is shutdown required from an alternate panel (if not available in the control room); and (4) is the access for manual fire fighting “good” or “poor.” A fixed fire suppression system was required whenever shutdown had to be performed at an alternate panel, except if (a) the only in-situ

⁶ NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, Section 1-8.1.1, requires use of “automatic detection and automatic actuation,” with the exception that “manual-only actuation can be used if acceptable to the authority having jurisdiction [the NRC] where automatic release could result in an increased risk.” NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, Section 2-3.1.1, similarly states that “automatic detection and automatic actuation shall be used,” with a similar exception that “manual-only actuation shall be permitted to be used if acceptable to the authority having jurisdiction [again, the NRC].” NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, Section 2-3.1.1, parallels NFPA 12A exactly.

combustible was cable insulation; (b) measures were provided to retard propagation; and (c) separation between redundant systems was at least 10 feet horizontal and vertical of clean air space. These requirements were enhanced when they subsequently became paragraphs 1, 2 and 3 of section III.G in the final rule. It should be noted that even during the original rulemaking for Appendix R, the need for at least fixed fire suppression was recognized when shutdown operations would consist of ex-control room operator manual actions (which include those performed at an alternate panel).

In developing Appendix R, section III.G, the NRC originally considered fire detection and automatic suppression, if not as the primary level of defense-in-depth, at least as an equal level of defense-in-depth in conjunction with fire-retardant coatings, and subsequently their successors, fire barriers and/or physical separation, as stated in the "Statements of Consideration, 10 CFR Part 50, Fire Protection Program for Operating Nuclear Power Plants," (November 19, 1980, 45 FR 76602)

"... [T]he NRC staff has indicated to the Commission that there are requirements . . . in which the protection afforded by Appendix R over and above that previously accepted, may be desirable. The Commission has decided that these requirements should be retroactively applied to all facilities . . . to take fully into account the increased knowledge and experience developed on fire protection matters over the last several years. The first of these [requirements] . . . is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain a safe shutdown are free from fire damage. Appendix A to BTP CMEB 9.5-1 permits a combination of fire-retardant coatings and fire detection and suppression systems without specifying a physical separation distance to protect redundant systems, and such arrangements were

accepted in some early fire protection reviews. As a result of some separate effects tests, the staff changed its position on this configuration, and subsequent plans have been required to provide additional protection in the form of fire barriers or substantial physical separation for safe shutdown systems. No credit for such coatings as fire barriers is allowed by Section III.G of Appendix R."

The NRC originally characterized fire-retardant coatings, and subsequently their successors, fire barriers and/or physical separation, as "additional," implying that detection and suppression were intended to be primary. The requirement that detection and suppression (automatic) be included with Appendix R, paragraph III.G.2, operator manual actions is not only consistent with the corresponding options currently there, but also is consistent with NRC's original intent in developing Appendix R, section III.G.

The risk-informed, performance-based option in 10 CFR 50.48(c) is available to those licensees who wish to demonstrate that operator manual actions in particular situations provide a reasonable assurance that the public health and safety can be maintained without fire detection or automatic suppression. Although the exemption process is available for cases that can be justified under § 50.12, the Commission considers the use of the option proposed by this rulemaking or the risk-informed, performance-based option currently provided in 10 CFR 50.48(c) more desirable in order to minimize the need for future exemption requests for addressing operator manual actions.

Request for Comment 2:

After considering the technical implications and historical background of the proposed criteria as discussed above, the Commission has tentatively decided that the proposed operator manual actions rulemaking should require fire detectors and an automatic fire suppression system in the fire area to permit operator manual actions as a compliance option under

paragraph III.G.2, provided the acceptance criteria delineated in a new paragraph III.P are satisfied. The basis for the requirement is discussed above. However, because of the stakeholder interest in this subject, the Commission is asking for specific feedback and opinions from stakeholders on requiring an automatic versus fixed fire suppression system in the fire area.

The Commission asks the following specific question:

Under the proposed option of using operator manual actions under III.G.2.c-1, when redundant trains are located in the same fire area, should the requirement for a suppression system in the fire area be automatic or fixed? An automatic suppression system is required in III.G.2(b) and (c). However, a fixed system is specified in III.G.3. Provide the rationale for why requiring fixed or automatic suppression would provide the appropriate level of protection in the proposed paragraph III.G.2(C-1).

Application of Operator Manual Actions Acceptance Criteria to Paragraphs III.G.1 and III.G.3

The proposed operator manual actions rulemaking would modify requirements in paragraph III.G.2 to permit operator manual actions as a compliance option under this paragraph, provided the acceptance criteria delineated in a new paragraph III.P are satisfied. The proposed rule language would not apply to paragraphs III.G.1 or III.G.3, although the term “operator manual actions” may be construed as applicable to the same types of actions taken under these paragraphs. This issue has been raised by stakeholders during discussions conducted thus far, and therefore, the Commission is providing background information about this subject and a specific request for comment.

Appendix R to 10 CFR 50, section III.G.1 requires fire protection features capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot

shutdown conditions from either the control room or emergency control station(s)⁷ is free of fire damage. The NRC considers redundant trains located in completely separate fire areas to comply with III.G.1. Paragraph III.G.1 also allows a licensee to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s).

Where redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located in the same fire area, paragraph III.G.2. requires one of three means to ensure that one of the trains is free of fire damage. Through this rulemaking, the Commission is proposing to add a fourth means.

Where the protection of systems required to function properly for hot shutdown does not satisfy the requirement of paragraph III.G.2, or where redundant trains of systems required for hot shutdown may be subject to damage as a result of fire suppression activities or the inadvertent actuation of fire suppression systems, paragraph III.G.3 requires that an alternative or dedicated shutdown capability must be provided and must be independent of cables, systems or components in the area, room, or zone under consideration. In addition, paragraph III.G.3 further requires that fire detection and a fixed fire suppression system must be installed in the area, room, or zone under consideration. Specific criteria for implementing this capability are contained in Appendix R, paragraph III.L, “alternative and dedicated shutdown capability,” including such features as the performance goals for specific functions (e.g., maintaining RCS process variables within those predicted for a loss of normal AC power, with makeup function capable of maintaining the reactor coolant level above the top of the core for BWRs and within level of pressurizer indication for PWRs), and to achieve cold shutdown within 72 hours.

⁷ Regulatory Guide (RG) 1.189 Fire Protection for Operating Reactors defines an “emergency control station” as a “location outside the MCR where actions are taken by operations personnel to manipulate plant systems and controls to achieve safe shutdown of the reactor.”

Feedback from the stakeholders on the *Federal Register* Notice (68 FR 66501; November 26, 2003) made clear that some stakeholders believe that acceptance criteria for operator manual actions should be expanded to other provisions of paragraph III.G of Appendix R to 10 CFR Part 50. For example, one commenter stated that “[R]ather than changing Appendix R, Section III.G.2, we recommend that the NRC issue generic industry guidance clarifying that manual actions are permissible to satisfy all subsections of Appendix R, Section III.G, and that manually operating equipment locally satisfies the “emergency control stations” provision of Appendix R, Section III.G.1. This approach maintains maximum consistency with existing NRC guidance and avoids the creation of a separate set of standards that are only applicable to “III.G.2” manual actions. Otherwise, establishing criteria specifically applicable to Appendix R, Section III.G.2, will lead to new disputes when manual actions previously credited to satisfy Sections III.G.1 and III.G.3 are reviewed during the inspection process.”

Another commenter stated that “This [sic - These] 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.”

In addition to the written public comments, the NRC received comments during a June 23, 2004, Category 3 public meeting in Rockville, Maryland discussing application of operator manual actions criteria to paragraphs III.G.1 and III.G.3. During this meeting the industry stated that it will conduct a survey of licensees shortly following issuance of the proposed rule to determine their position and consensus on the application of operator manual action criteria to 10 CFR Part 50, Appendix R, paragraphs III.G.1 and III.G.3.

There were two issues identified by stakeholders relative to operator manual actions. The first was specific operator manual actions within individual paragraphs III.G.1, III.G.2, and III.G.3. The second was the applicability of the proposed operator manual actions acceptance criteria to all provisions of paragraph III.G.

Operator manual actions, as currently outlined in the proposed rule, would be used as an additional option to satisfy paragraph III.G.2 requirements. However, based on stakeholder comments, the NRC is asking for feedback from stakeholders on the advantages and disadvantages of also applying operator manual action acceptance criteria to paragraphs III.G.1 and III.G.3.

The NRC believes that there are technical and backfit considerations associated with expanding the applicability of operator manual action acceptance criteria to paragraphs III.G.1 and III.G.3.

A III.G.3-compliant Fire Area contains redundant trains of shutdown equipment or cables and one train has not been ensured to remain free of fire damage (per III.G.2 criteria), or redundant trains are vulnerable to damage as a result of fire suppression activities or the inadvertent actuation of fire suppression systems. As noted, paragraph III.L contains specific provisions concerning this alternate or dedicated shutdown capability. For instance, it contains criteria such as III.L.3 "Procedures shall be in effect . . . ," and III.L.4 "The number of operating shift personnel . . . required to operate such equipment shall be on site at all times." However, they are not as comprehensive as the proposed acceptance criteria in paragraph III.P. The NRC believes that if it applied the proposed acceptance criteria in paragraph III.P to paragraph III.G.3, it may be necessary to modify paragraph III.L.

In addition, the NRC believes that operator manual actions previously approved for paragraph III.G.3 would need to be revisited in order to ensure that they satisfy the acceptance criteria as proposed for paragraph III.G.2.

Applying the same new acceptance criteria to all fire protection manual actions in paragraph III.G may require a generic backfit analysis since the current rule allows the use of manual actions at emergency control stations in III.G.1 with no codified acceptance criteria and in III.G.3 with less specific acceptance criteria. Section 50.109 (a)(3) provides the standard for a backfit analysis that must show “a substantial increase in the overall protection . . . and that the direct and indirect costs of implementation . . . are justified in view of this increased protection.” The extent of licensees’ usage of manual actions is highly plant specific and the associated costs and benefits of backfitting are therefore difficult to quantify. Furthermore, applying the acceptance criteria to all paragraph III.G manual actions could invalidate the use of some existing manual actions. The subsequent hardware/fire barrier/program modifications that would then be needed could be very expensive. Thus, value-impact analyses in many cases would probably show that backfitting is not cost-beneficial.

Alternatively, if a generic analysis cannot justify the backfit under 10 CFR 50.109(a)(3), the NRC may be able to justify the backfitting as necessary for “adequate protection” under 10 CFR 50.109(a)(4)(ii). Recent inspection experience has not shown major issues with respect to the use of operator manual actions, thus, not providing significant support to justify that the backfit is needed for adequate protection. Further, NRC inspections of potentially risk-significant (“greater than green”) findings on such manual actions are already handled by the Reactor Oversight Process (ROP) corrective action program or are evaluated as plant-specific backfits, as applicable.

Regardless of the applicable section under 10 CFR 50.109, a backfit may ultimately enhance safety, as a result of a consistent set of rules. However, backfitting the operator manual actions' acceptance criteria to all plants may cause plants with existing operator manual actions previously approved under a different set of criteria to resubmit exemption requests for staff review and approval.

Applying new acceptance criteria on a forward-fit basis for operator manual actions under III.G.3 might be a means of addressing this backfit concern. Under this approach, application of the new acceptance criteria to III.G.3 would apply to operator manual actions that resulted from future licensing basis changes after the effective date of the new rule. The new acceptance criteria would thus apply to all III.G.2 operator manual actions, but to only a small percentage of the manual actions credited under III.G.3. This approach, however, may increase the regulatory complexity and burden associated with fire protection inspections and further complicate the fire protection licensing basis of each facility.

Applying the new acceptance criteria to all operator manual actions in III.G.2 and III.G.3, would make fire protection implementation and inspections more consistent, reliable and predictable. However, the NRC also notes that the existing requirements vary among plants for several reasons; for example, post-1979 plants were not specifically licensed to Appendix R, and thus these provisions would not apply to them absent other regulatory action, which would tend to offset the possible consistency gain.

Request for Comment 3:

After considering a number of technical and regulatory implications, the Commission has tentatively decided to limit the applicability of this proposed rule on operator manual actions to paragraph III.G.2. However, because of the stakeholder interest in this subject, the Commission is also asking for specific feedback and opinions from stakeholders on applying operator manual

actions acceptance criteria to paragraphs III.G.1 and III.G.3. Depending on the comments received, the Commission may extend application of the criteria to paragraphs III.G.1 and III.G.3.

The Commission asks the following specific question:

Should the operator manual action acceptance criteria developed for III.G.2 also be applied to operator manual actions for III.G.1 and III.G.3? Are there advantages or disadvantages not noted by the Commission that should be considered? Please provide a discussion outlining the basis for your response taking into account the considerations outlined in the supplementary information section of this document.

IV. Interim Enforcement Discretion Policy

In SECY-03-0100, "Rulemaking Plan on Post-Fire Operator Manual Actions," dated June 17, 2003, the NRC staff recommended development of an interim enforcement policy relying on preliminary acceptance criteria for manual actions. The staff proposed this strategy based on a belief that interim acceptance criteria could be developed that would be consistent with the manual actions acceptance criteria in the final rule. The Commission had previously approved a similar enforcement discretion policy related to a fitness-for-duty proposed rulemaking. In an SRM dated September 12, 2003, the Commission approved the staff's recommendation.

In March 1998, the NRC issued EGM 98-02, "Enforcement Guidance Memorandum - Disposition of Violations of Appendix R, Sections III.G and III.L Regarding Circuit Failures," that provides enforcement guidance for issues related to fire-induced circuit failures, which encompasses the vast majority of manual actions as compensatory measures to satisfy the regulatory requirements. This EGM was developed based on an apparent widespread

misunderstanding of the requirements on the part of licensees and remains in effect until December 31, 2005. The EGM provides guidance for disposition of noncompliances involving fire-induced circuit failures, which could prevent operation or cause maloperation of equipment needed to achieve and maintain post-fire safe shutdown. Among the enforcement conditions, discretion will be given for cases where licensees do not dispute that a violation of regulatory requirements has occurred with respect to a nonconformance and that licensees take prompt compensatory actions and also take corrective action within a reasonable time. The expectations of this EGM have been incorporated into the current NRC Enforcement Manual. In addition, the Office of Nuclear Reactor Regulation issued a revised Inspection Procedure (IP) 71111.05 in March 2003 incorporating interim operator manual actions acceptance criteria. The inspection procedure provides guidance to assess and ensure that plant specific operator manual actions meet the interim acceptance criteria and that corrective actions taken by the plants will achieve and maintain safe shutdown condition.

On November 26, 2003 (68 FR 66501), the NRC staff published a *Federal Register* notice soliciting public comments on specific acceptance criteria for operator manual actions to be considered for use in developing an interim enforcement discretion policy for post-fire operator manual actions. In addition, as part of the proposed rule development, the staff has had numerous interactions with industry and public stakeholders to discuss rule requirements and the more developed operator manual actions acceptance criteria. Based on these meetings and comments in response to the November 26, 2003, *Federal Register* notice, the Commission believes that the proposed rule's acceptance criteria and detection and suppression requirements are still evolving, such that the new interim enforcement guidance developed in conjunction with the proposed rule may not be consistent with the requirements specified in the final rule.

The current applications of EGM 98-02 and IP 71111.05 are effective to ensure and maintain the overall plant safety by licensees through the use of adequate and appropriate compensatory measures in the form of operator manual actions implemented under the licensee's Fire Protection Program. Manual actions that fail to meet the criteria in the inspection procedure are not considered to be feasible or to be adequate compensatory measures. Such manual actions will result in the non-compliance being entered into the enforcement process. The new interim enforcement policy for the post-fire operator manual actions would utilize a disputed set of acceptance criteria and trigger additional reviews (by licensees and inspectors) of past findings, with the prospect of a third review being necessary upon issuance of the final rule. Issuing such an enforcement discretion policy at this time could also have the unintended consequence of preempting the rulemaking process without a clear safety benefit.

Based on the above, the Commission believes that the continued use of the current enforcement discretion policy of EGM 98-02 and the guidance in IP 71111.05 is sufficient in the interim and that a revision of the existing policy or development of additional policy to include specific operator manual actions acceptance criteria is not warranted.

V. Section-by-Section Analysis of Substantive Changes

Part 50, Appendix R, paragraph III.G.2. Add an "or" at the end of the paragraph c. The change is necessary for the introduction of a new option that recognizes operator manual actions as an alternative method to satisfy the requirements set forth in paragraph III.G.2.

Part 50, Appendix R, paragraph III.G.2. Add paragraph c-1, "*Operator actions that satisfy the acceptance criteria in paragraph III.P. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.*" This paragraph would codify use of operator manual actions in conjunction with fire detectors and an automatic suppression system

installed in the fire area as an additional alternative compliance method. The licensees implementing this voluntary alternative or any of the existing alternatives currently set forth in this paragraph would provide reasonable assurance that at least one method for achieving and maintaining hot shutdown condition would remain available during and after a postulated fire anywhere in the plant. This paragraph numbering was chosen to preserve the numbering of subsequent requirements within paragraph III.G.2.

Part 50, Appendix R. Add paragraph III.P [*Acceptance Criteria for Operator Manual Actions*]. The new paragraph P would define operator manual actions and set forth the required acceptance criteria which must be met before a licensee may use operator manual actions to comply with paragraph III.G.2 of Appendix R.

Proposed paragraph III.P.1 [*Definition*]. Paragraph III.P.1 adds a definition for operator manual actions.

Proposed paragraph III.P.2. Paragraph III.P.2 sets forth the requirements and acceptance criteria for relying on operator manual actions.

Proposed paragraph III.P.2.a requires that an analysis be performed for operator manual actions and that the feasibility and reliability of these actions be demonstrated. The analysis must also address the fire timeline and identify all manual actions that must be completed; the equipment needed; the number of operators needed; the communication equipment needed; and the time available, including time margin, for the operators to perform the actions before unsafe plant conditions occur.

Proposed paragraph III.P.2.b contains requirements for plant procedures that must include each operator manual action required to achieve and maintain hot shutdown. It also includes operator training requirements for those procedures.

Proposed paragraph III.P.2.c contains requirements that systems and equipment needed to accomplish operator manual actions are available and equipment is readily accessible consistent with the analysis required by subparagraph III.P.2(a). It also includes a requirement that the number of operating shift personnel required to perform the operator manual actions must be on site at all times.

Proposed paragraph III.P.2.d contains requirements for periodic demonstrations of the operator manual actions and corrective actions.

VI. Plain Language

A June 1, 1988, presidential memorandum entitled “Plain Language in Government Writing” directed that the Government’s writing be in plain language. This memorandum was published on June 10, 1998 (63 FRN 31883). In compliance with this directive, editorial changes have been made in the proposed revision to improve the organization and readability of the existing language of the paragraph being revised. These types of changes are not discussed further in this document. The NRC requests comments on the proposed rule specifically with respect to the clarity and readability of the language used. Comments should be sent to the address listed under the ADDRESSES heading of the preamble.

VII. Voluntary Consensus Standards

The National Technology Advancement and Transfer Act of 1995, Pub. L. 104-113, requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies, unless the use of such standards is inconsistent with applicable law or otherwise impractical. The NRC is aware of the guidance on operator manual

actions contained in ANSI/ANS Standard 58.8 (1994), "Time Response Design Criteria for Safety-Related Operator Actions." This standard contains criteria that establish time requirements for use in the design of safety-related systems for nuclear power plants. The objective of the criteria is to determine whether sufficient time exists for operators to perform the required operator manual actions to operate safety-related systems or whether automatic actuation is required. The scope of the standard is "limited to safety-related operator actions associated with design basis events (DBEs) that result in a reactor trip and is required to be analyzed in safety analysis reports (SARs)." The NRC considers this industry consensus standard relevant to the proposed rulemaking, but not acceptable as a replacement for it. Operator manual actions performed for the purpose of fire protection are beyond the intended application of this standard. However, the principles and methods contained in the standard may be adaptable to the proposed rulemaking and have been considered as part of the NRC's effort to develop generic operator manual actions acceptance criteria.

The NRC is further aware of draft guidance for review of license amendment requests that contain risk-important human actions. The NRC staff issued NUREG-1764, "Guidance for the Review of Changes to Human Actions," as a draft report for public comment with the comment period closing on March 31, 2003. This NUREG proposes a risk-informed methodology for the review of the human performance aspects of licensees' proposed changes to plant systems and operations in license amendment requests. In addition to using risk insights to help the staff determine the level of regulatory review expended on licensees' submittals relying on human actions, the NUREG provides deterministic review criteria for evaluating the acceptability of human actions proposed by licensees.

The NRC notes that a separate rulemaking for 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA 805," has recently been completed which permits nuclear

power plant licensees to develop a risk-informed, performance-based fire protection program consistent with voluntary consensus standard NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Appendix B of NFPA 805 specifies a method for assessing the feasibility of operator manual actions. The NRC believes that licensees who choose to implement the NFPA 805 approach could alternatively, with appropriate analysis and documentation, use it to justify the acceptability of certain operator manual actions in their fire protection programs.

In preparing the proposed rule, the NRC considered the applicability of the risk-informed approach and the deterministic review criteria presented in NUREG-1764 and Appendix B of NFPA 805 to help refine the regulatory requirements and the implementation guidance. The NRC is not aware of any other consensus standard that could be adopted to provide guidance or criteria for the use of operator manual actions, but will consider using an alternative standard if one is identified during the rulemaking process.

VIII. Finding of No Significant Environmental Impact: Environmental Assessment

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, that this rule, if adopted, would not be a major Federal action significantly affecting the quality of the human environment. Therefore, an environmental impact statement is not required. The basis for this determination is as follows:

This action would establish regulations that allow nuclear power plant licensees to use manual actions by plant operators as an alternative method to achieve hot shutdown conditions in the event of fires in certain plant areas, provided that the actions are evaluated against specified criteria and determined to be feasible and reliable, and that fire detectors and an

automatic fire suppression system are provided in the fire area. This proposed action also provides conservative and thorough regulatory acceptance criteria for operator manual actions taken under Paragraph III.G.2 of Appendix R to achieve and maintain hot shutdown conditions.

The proposed action will not significantly increase the probability or consequences of an accident. No changes are being made in the types or quantities of radiological effluents that may be released off site, and there is no significant increase in public radiation exposure since there is no change to facility operations that could create a new or affect a previously analyzed accident. The staff believes there will be no net change in occupational radiation exposure. Any potential increase in exposure to personnel performing or demonstrating operator manual actions will likely be offset by a reduction of occupational radiation exposure since fewer personnel will be required to install or maintain fire barriers in or near radiologically controlled areas.

With regard to nonradiological impacts, no changes are being made to nonradiological plant effluents and there are no changes in activities that could adversely affect the environment. Therefore, there are no significant non-radiological impacts associated with the proposed action.

The primary alternative to this action is the no-action alternative. The no-action alternative would result in licensees proposing to use the risk-informed, performance-based alternative provided in 10 CFR 50.48(c) or submitting exemptions to authorize the use of acceptable operator manual actions. The NRC's approval of these actions would have the same environmental impacts as the proposed action.

The determination of this environmental assessment is that this action will have no significant offsite impact on the public. Comments on any aspect of the environmental assessment may be submitted to the NRC as indicated under the ADDRESSES heading.

The NRC has sent a copy of this proposed rule to all State Liaison Officers and requested their comments on the environmental assessment.

IX. Paperwork Reduction Act Statement

This proposed rule contains new or amended information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq). This rule has been submitted to the Office of Management and Budget for review and approval of the information collection requirements.

Type of submission, new or revision: Revision

The title of the information collection: 10 CFR Part 50, "Fire Protection Program - Post Fire Operator Manual Actions" (Proposed Rule)

The form number if applicable: Not applicable.

How often the collection is required: As needed.

Who will be required or asked to report: Licensees for nuclear power plants licensed to operate before January 1, 1979, who wish to implement fire protection manual actions.

An estimate of the number of annual responses: 8.

The estimated number of annual respondents: 8.

An estimate of the total number of hours needed annually to complete the requirement or request: A reduction of 745 hours annually (-2,880 hours reporting plus 2,135 hours recordkeeping,) or a reduction of 93 hours per respondent.

Abstract: The NRC is proposing to amend its regulations pertaining to fire protection under 10 CFR Part 50, Appendix R, Paragraph III.G.2, to allow the voluntary use of manual actions by operators of nuclear power plants licensed to operate prior to January 1, 1979, to achieve hot shutdown conditions in the event of fires in certain plant areas, provided the actions are evaluated against specific criteria that have been determined to be acceptable by the NRC.

The U.S. Nuclear Regulatory Commission is seeking public comment on the potential impact of the information collections contained in this proposed rule and on the following issues:

1. Is the proposed information collection necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?
2. Is the estimate of burden accurate?

3. Is there a way to enhance the quality, utility, and clarity of the information to be collected?
4. How can the burden of the information collection be minimized, including the use of automated collection techniques?

A copy of the OMB clearance package may be viewed free of charge at the NRC Public Document Room, One White Flint North, 11555 Rockville Pike, Room O-1 F21, Rockville, MD 20852. The OMB clearance package and rule are available at the NRC worldwide Web site: <http://www.nrc.gov/public-involve/doc-comment/omb/index.html> for 60 days after the signature date of this notice and are also available at the rule forum site, <http://ruleforum.llnl.gov>.

Send comments on any aspect of these proposed information collections, including suggestions for reducing the burden and on the above issues, by **(INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER)** to the Records and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to INFOCOLLECTS@NRC.GOV and to the Desk Officer, John A. Asalone, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0011), Office of Management and Budget, Washington, DC 20503. Comments received after this date will be considered if it is practical to do so, but assurance of consideration cannot be given to comments received after this date. You may also e-mail comments to John_A._Asalone@omb.eop.gov or comment by telephone at (202) 395-4650.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

X. Regulatory Analysis

The Commission has prepared a draft regulatory analysis on this proposed regulation. The analysis examined the costs and benefits of Commission alternatives for updating the existing rule to accommodate technological advances.

The analysis examined two baselines. The Main baseline reflects the effects of the rule as of the date of publication, that is, full compliance with all existing regulations. The Industry Practices baseline reflects a more “real world” assessment of compliance.

The regulatory alternatives examined under each baseline were No Action, under which no regulatory changes would be undertaken; Regulatory Guidance, under which Section 50.48 and Appendix R would not be modified but regulatory guidance would be updated; and the Proposed Alternative, under which the proposal outlined above would be implemented.

The regulatory analysis showed that the proposed alternative was the most cost beneficial of the three alternatives. The benefit is the greatest under the Industry Practices baseline because fourteen reactors would take immediate advantage of the proposed rule with corresponding savings to industry.

Option 3, the Proposed Alternative, was determined to be the most preferable based on best professional judgment and quantitative analysis because it (1) improves effectiveness and efficiency of the NRC regulatory process by assuring adequate and uniform operator manual

actions; (2) eliminates the need for some licensees to request exemptions from Paragraph III.G.2 or make equipment modifications; and (3) reduces NRC costs by reducing the number of exemption requests to be reviewed. Under Option 3, public health and safety would be maintained at the current level.

The results of the analysis are summarized in the following table.

Net Present Value of Regulatory Alternatives

Baseline	Option 1 No Action	Option 2 Regulatory Guidance	Option 3 Proposed Alternative
Main	--	(\$42,240)	\$13,992,793
Industry Practices	--	(\$42,240)	\$16,839,000

The Commission requests public comment on the draft regulatory analysis. The regulatory analysis may be viewed and downloaded via the NRC rulemaking web site at <http://ruleforum.llnl.gov>. Single copies of the analysis are also available from David T. Diec, Office of Nuclear Reactor Regulation, (301) 415-2834, e-mail dtd@nrc.gov or Alexander Klein, Office of Nuclear Reactor Regulation, (301) 415-3477, e-mail ark1@nrc.gov. Comments on the draft analysis may be submitted to the NRC as indicated under the ADDRESSES heading.

XI. Regulatory Flexibility Certification

As required by the Regulatory Flexibility Act, as amended, 5 U.S.C. 605(b), the Commission certifies that this proposed rule, if adopted, would not have a significant economic

impact on a substantial number of small entities. This proposed rule would affect only licensees authorized to operate nuclear power reactors. These licensees do not fall within the scope of the definition of "small entities" set forth in the Regulatory Flexibility Act or the Size Standards established by the Nuclear Regulatory Commission (10 CFR 2.810).

XII. Backfit Analysis

Section 50.109 (a)(1) defines backfitting as "the modification of or addition to systems, structures, components, or design of a facility . . . any of which may result from a new or amended provision in the Commission rules or the imposition of a regulatory staff position interpreting the Commission rules that is either new or different from a previously applicable staff position." The requirements in Appendix R are only applicable to licensees who received operating licenses before January 1, 1979. To resolve an existing regulatory compliance issue for these licensees under paragraph III.G.2 of Appendix R, the proposed rule represents a voluntary alternative to the current requirements. The proposed rule would allow the use of operator manual actions for achieving and maintaining hot shutdown during a fire in an area where redundant shutdown trains are located as an additional method beyond the three alternatives presently provided. Licensees who currently have approved operator manual actions will not be required to perform any additional actions (such as analysis or documentation). Licensees who employ operator manual actions but have not received NRC approval are in violation of paragraph III.G.2 of Appendix R. There is no backfitting as defined in 10 CFR 50.109(a)(1) because licensees may choose to continue to meet paragraph III.G.2 through other provisions.

Post-January 1, 1979 licensees who use operator manual actions without NRC approval may or may not be in compliance with applicable fire protection requirements (GDC-3,

§ 50.48(a), applicable license conditions, or current fire protection programs). Compliance for plants licensed after January 1, 1979, depends on the specific licensing commitments, the change control process, and how the change was justified and analyzed to demonstrate that the operator manual actions are feasible and reliable and do not adversely affect the ability to achieve or maintain safe shutdown. This rule is not applicable to these licensees as they are not required to meet Appendix R.

Based on the above discussion, the NRC has concluded that the proposed rule would not constitute a backfit as defined in 10 CFR 50.109(a)(1).

List of Subjects 10 CFR Part 50

Antitrust, Classified information, Criminal penalties, Fire protection, Intergovernmental relations, Nuclear power plants and reactors, Radiation protection, Reactor siting criteria, Backfitting, Reporting and record keeping requirements.

For the reasons set forth in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 553, the NRC is proposing to adopt the following amendments to 10 CFR Part 50.

PART 50—DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation for Part 50 continues to read as follows:

AUTHORITY: Secs. 102, 103, 104, 105, 161, 182, 183, 186, 189, 68 Stat. 936, 937, 938, 948, 953, 954, 955, 956, as amended, sec. 234, 83 Stat. 444, as amended (42 U.S.C. 2132, 2133, 2134, 2135, 2201, 2232, 2233, 2236, 2239, 2282); secs. 201, as amended, 202, 206, 88

Stat. 1242, as amended, 1244, 1246 (42 U.S.C. 5841, 5842, 5846); sec. 1704, 112 Stat. 2750 (44 U.S.C. 3504 note).

Section 50.7 also issued under Pub. L. 95-601, sec. 10, 92 Stat. 2951 (42 U.S.C. 5841).

Section 50.10 also issued under secs. 101, 185, 68 Stat. 955, as amended (42 U.S.C. 2131, 2235); sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332).

Sections 50.13, 50.54(dd), and 50.103 also issued under sec. 108, 68 Stat. 939, as amended (42 U.S.C. 2138).

Sections 50.23, 50.35, 50.55, and 50.56 also issued under sec. 185, 68 Stat. 955 (42 U.S.C. 2235).

Sections 50.33a, 50.55a and Appendix Q also issued under sec. 102, Pub. L. 91-190, 83 Stat. 853 (42 U.S.C. 4332).

Sections 50.34 and 50.54 also issued under sec. 204, 88 Stat. 1245 (42 U.S.C. 5844).

Sections 50.58, 50.91, and 50.92 also issued under Pub. L. 97-415, 96 Stat. 2073 (42 U.S.C. 2239).

Section 50.78 also issued under sec. 122, 68 Stat. 939 (42 U.S.C. 2152).

Sections 50.80 - 50.81 also issued under sec. 184, 68 Stat. 954, as amended (42 U.S.C. 2234).

Appendix F also issued under sec. 187, 68 Stat. 955 (42 U.S.C. 2237).

2. In Appendix R to Part 50, Section III.G.2.c. is revised and a new Section III.G.2.c-1 and Section III.P. are added to read as follows :

Appendix R to Part 50-Fire Protection Program For Nuclear Power Facilities Operating Before
January 1, 1979

* * * * *

III. Specific Requirements

* * * * *

G. * * *

2. * * *

c. Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire areas; or

c-1. Operator manual actions that satisfy the acceptance criteria in paragraph III.P. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

* * * * *

P. 1. For purposes of this section, operator manual actions means the integrated set of actions needed to ensure that a redundant train of systems necessary to achieve and maintain hot shutdown conditions located within the same area outside the primary containment is free of fire damage.

2. A licensee relying on operator manual actions must meet all of the following requirements:

(a) Analysis. The licensee shall prepare an analysis for each operator manual action which demonstrates its feasibility and reliability.

(1) The analysis must contain a postulated fire timeline showing that there is sufficient time to travel to action locations and perform actions required to achieve and maintain the plant in a hot shutdown condition under the environmental conditions expected to be encountered without jeopardizing the health and safety of the operator performing the manual action. The fire timeline shall extend from the time of initial fire detection until the time when the ability to achieve and maintain hot shutdown is reached, and shall include a time margin that reasonably accounts for all important variables, including (i) differences between the analyzed and actual conditions, and (ii) human performance uncertainties that may be encountered.

(2) The analysis must address the functionality of equipment or cables that could be adversely affected by the fire or its effects but still used to achieve and maintain hot shutdown.

- (3) The analysis must identify all equipment required to accomplish the operator manual actions within the postulated timeline, including (but not limited to) (i) all indications necessary to identify the need for the operator manual actions, enable their performance and verify their successful accomplishment, and (ii) any necessary communications, portable, and life support equipment.
- (b) Procedures and training. Plant procedures must include each operator manual action required to achieve and maintain hot shutdown. Each operator must be appropriately trained on those procedures.
- (c) Implementation. The licensee shall ensure that all systems and equipment needed to accomplish each operator manual action are available and readily accessible consistent with the analysis required by paragraph 2(a). The number of operating shift personnel required to perform the operator manual actions shall be on site at all times.
- (d) Demonstration. Periodically, the licensee shall conduct demonstrations using an established crew of operators to demonstrate that operator manual actions required to achieve and maintain the plant in a hot shutdown condition can be accomplished consistent with the analysis in paragraph 2(a) of this section.

The licensee may not rely upon any operator manual action until it has been demonstrated to be consistent with the analysis. The licensee shall take prompt corrective action if any subsequent periodic demonstration indicates that the operator manual actions can no longer be accomplished consistent with the analysis.

Dated at Rockville, Maryland, this 24th day of February, 2005.

For the Nuclear Regulatory Commission.

/RA/

Annette Vietti-Cook,
Secretary of the Commission.