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RULEMAKING ISSUE NOTATION VOTE

SECY-02-XXXX

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: RULEMAKING PLAN ON FIRE PROTECTION MANUAL ACTIONS

PURPOSE:

To obtain the Commission's approval to proceed with rulemaking to revise fire protection program requirements contained in Appendix R of 10 CFR Part 50 and associated guidance to resolve a regulatory compliance issue. This paper also requests the Commission's approval of the staff's plan to propose an interim enforcement policy to exercise enforcement discretion related to the fire protection compliance issue pending completion of rulemaking.

BACKGROUND:

NRC's fire protection requirements prescribe a defense-in-depth approach to protect safe shutdown functions, through (1) fire prevention activities (limits on combustibles through design, construction, and administrative controls); (2) the ability to detect, control, and suppress a fire rapidly (fixed systems and trained fire brigades); and (3) physical separation of redundant safe shutdown trains (distance and fire barriers).

10 CFR 50.48 backfit the fire protection requirements of Appendix R, Paragraph III.G.2, for plants licensed to operate before January 1, 1979. Appendix R, Paragraph III.G.2 specifies three approved methods, any one of which is an acceptable method, to provide reasonable assurance that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the plant. The three methods of protecting at least one shutdown train during a postulated fire when redundant trains are located in the same fire area are:

1. Separation of the redundant system by a passive barrier able to withstand a fire for at least three hours; or
2. Separation of the redundant system by a distance of twenty feet containing no intervening combustible material, together with fire detectors and an automatic fire suppression system; or

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3. Separation of the redundant system by a passive barrier able to withstand a fire for one hour, coupled with fire detectors and an automatic fire suppression system.

Plants licensed to operate after January 1, 1979, are not required to meet Appendix R regulations. For these plants, the staff reviewed the fire protection programs against the regulatory guidance in Branch Technical Position (BTP) CMEB 9.5-1 or the Standard Review Plan (NUREG-0800) which incorporated the provisions of Appendix R, Paragraph III.G.2. Most licensees committed in their fire protection plans to meet the Appendix R, Paragraph III.G.2, equivalent regulatory guidance. These commitments would then become part of the licensing basis for the post-1979 plants.

During recent inspections of licensee fire protection programs, concerns have arisen about licensee compliance with fire protection of redundant safe shutdown systems that are located in the same fire areas. The principal nature of the concerns are summarized as follows:

- a) Instead of providing separation and fire protection systems to protect the safe shutdown capability of redundant trains located in the same fire area, there are numerous instances where licensees are relying on "manual actions" that have not been approved by the NRC. "Manual actions" refer to those actions needed to achieve and maintain safe shutdown during a fire by using operators to perform field manipulations of components that would not ordinarily be necessary if the train were protected from fires as prescribed by the regulations or licensing commitments. Specifically, the staff is concerned that many of these licensees have implemented manual actions without NRC approval of an exemption to Appendix R (for pre-1979 plants) or a deviation to their fire protection program commitments (post-1979 plants).
- b) The staff is also concerned that in some instances, where manual actions are relied upon to ensure safe shutdown capability, the manual actions may not be feasible when factors such as complexity, timing, environmental conditions, staffing, and training are considered.

It is the staff's understanding that most of the unapproved manual actions came about during the resolution of the Thermo-Lag fire barrier issue in the mid-1990s. The staff believes that many licensees utilized manual actions rather than upgrade or replace the Thermo-Lag fire barriers that were originally installed to comply with Appendix R requirements. Furthermore, it is the staff's understanding that most of the licensees that rely on unapproved manual actions have done so on the basis of a 50.59-like change process allowed by their operating licenses. The change process is specified in a standard license condition that allows licensees to change their fire protection program without NRC approval provided that the change has no adverse impact on the ability to achieve or maintain safe shutdown in the event of a fire.

When the fire protection regulations were promulgated, it was recognized that there would be plant conditions and configurations where strict compliance with the prescriptive fire protection features specific in Appendix R or associated guidance would not significantly enhance the level of fire safety already provided by the licensee. In cases where a fire hazards analysis

demonstrated that manual actions provided an equivalent level of fire safety to Appendix R or associated guidance, it was expected that licensees would seek NRC approval to use manual actions in lieu of providing separation and fire protection systems to protect the safe shutdown capability (both pre- and post-1979 plants). The staff has granted many exemptions to the technical requirements of Appendix R (pre-1979 plants) or approved deviations from associated guidance (post-1979 plants) that permitted manual actions as an acceptable alternative to the fire protection separation requirements. However, the staff had not envisioned that licensees would use their change process for such significant changes without NRC approval.

The staff sought advice from the Office of General Council (OGC) as to whether Appendix R, Paragraph III.G.2, permits licensees to rely on manual actions in lieu of fire barriers. OGC advised the staff that the regulation cannot be reasonably interpreted to permit reliance upon manual actions with respect to redundant safe shutdown. Therefore, any pre-1979 licensee that is using manual actions without an NRC approved exemption is not in compliance with the regulations.

Fire protection programs for post-1979 plants generally commit to Appendix R, Paragraph III.G.2 (or equivalent guidance) as part of their initial licensing basis. However, commitment to Appendix R, Paragraph III.G.2 (or equivalent) is not legally binding for post-1979 plants. Use of manual actions in lieu of separation and fire protection systems without NRC approval may or may not be a compliance issue depending on how the change was justified and analyzed under the licensee's change control process to demonstrate that the manual actions are feasible and the ability to achieve and maintain safe shutdown had not been adversely affected. However, because of the ambiguity and inconsistency surrounding what constitutes acceptable manual actions, it is likely that manual actions unapproved by the NRC would not be a violation unless the manual actions were demonstrated to be unfeasible.

Regardless of whether or not manual actions can be implemented by the licensee without NRC approval, the staff is more concerned about the feasibility of such actions. In the past, when the NRC staff had specifically reviewed and approved manual actions (by exemption or deviation), the staff's approvals included the following feasibility considerations:

- Are procedures and/or training for the manual actions adequate?
- Is there adequate time, staffing, or diagnostic instrumentation, based on the progression of the fire or the thermal-hydraulic conditions of the reactor, to permit feasible use of the manual actions?
- Are manual actions conducted in locations with environmental conditions suited for the tasks to be performed (i.e., have temperature, radiation, lighting, accessibility, or other limiting habitability problems been analyzed)?

However, since there are currently no generic criteria for feasible manual actions, the staff is uncertain as to what basis licensees (that rely on unapproved manual actions) used to determine the acceptability of the manual actions.

DISCUSSION:

The staff has exchanged correspondence and had meetings with industry representatives from the Nuclear Energy Institute (NEI) on the use of unapproved manual actions. NEI has surveyed licensees as to the extent that unapproved manual actions are used as a method of protecting a safe shutdown train during a postulated fire when redundant trains are located in the same fire area. In a meeting with the staff on June 20, 2002, NEI indicated that the use of unapproved manual actions for protecting a safe shutdown train in the event of a fire is pervasive throughout the industry and that most licensees have at least some instances where they rely on manual actions without NRC approval (via exemption or deviation). However, the industry does not agree with the staff that this is a compliance issue and has stated numerous times that the use of manual actions to achieve safe shutdown is acceptable, without prior NRC approval, as long as the reliance on manual actions does not adversely affect the ability of a plant to achieve and maintain safe shutdown.

As stated previously, while the staff is concerned that licensees have implemented manual actions without NRC approval, the staff is more concerned about the feasibility of these unapproved manual actions. It is presumed that most licensees used plant specific engineering judgement and oversight in implementation of manual actions. These changes would need to have been reviewed in accordance with the plant's quality assurance program and approved by a plant onsite review committee. Even so, there is no assurance that all safety concerns related to manual actions have been appropriately assessed by all licensees. Because there is currently no generic guidance or acceptance criteria for what constitutes feasible manual actions, there is no objective way for the staff to determine if any given licensee's manual actions are feasible or otherwise acceptable without performing a detailed plant specific review.

While unfeasible actions might translate to increased core damage frequencies and ultimately increased risk from fires, there is no evidence that this is a generic safety issue—even though the manual actions have not been approved by the NRC. Notwithstanding the staff's concern that some unapproved manual actions may not be feasible, the staff believes that most manual actions are likely to be feasible based on robust change control procedures employed by licensees. Therefore the staff does not consider this an immediate safety issue that requires prompt action. However, because the question of manual action feasibility is associated with regulatory compliance, a remedy must be found.

Given the implied extent of this compliance issue, the staff believes that active enforcement may not be the best remedy for this situation. A concerted enforcement effort related to identifying and correcting manual action compliance on a plant specific basis creates the prospect of significant resource expenditures with uncertain safety benefits. More than likely, licensees faced with enforcement actions would flood the NRC with exemption or deviation requests which will divert NRC attention from more significant safety issues and may not result in any net safety improvement if the manual actions are determined to be acceptable.

The staff has concluded that generic guidance and acceptance criteria for manual actions needs to be developed. The staff believes that it can develop generic acceptance criteria that,

when used in conjunction regulatory guidance, would provide licensees a way of assessing the acceptability of currently unapproved manual actions in a manner that maintains safety and does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. Licensees could then assess their plant specific manual actions against the generic criteria and determine what if any additional actions are necessary. Implementation of this approach would require both rulemaking and interim enforcement policy approval by the Commission.

To resolve the regulatory compliance issue, the staff has evaluated its options in the attached rulemaking plan and recommends that the Appendix R fire protection regulations and associated guidance be revised to permit the use of manual actions that meet certain acceptance criteria. The manual action acceptance criteria would be included in the rule language and detailed supportive guidance would be provided in associated regulatory guidance.

This approach is justified based on an assessment against the agency's strategic performance goals.

- Amending Appendix R and associated guidance will maintain safety by ensuring that the manual actions currently in place (but not evaluated and approved by the NRC) will be assessed for feasibility against generic NRC endorsed acceptance criteria for manual actions.
- Development of generic criteria for the use of manual actions will be an efficient and effective method of providing quality and uniformity in licensee assessments of manual action feasibility.
- Amending Appendix R and associated guidance to permit the use of manual actions will achieve a satisfactory regulatory solution that does not sacrifice safety and avoids the unnecessary burden of large resource expenditures should the NRC elect to enforce the current regulations and license commitments.
- Amending Appendix R and associated guidance should avoid unnecessary NRC and licensee burden and resource expenditure associated with exemption or deviation processing.

The staff realizes that public confidence may be decreased by amending Appendix R to permit the use of manual actions because there is an appearance that regulations are being relaxed to resolve a compliance issue. On the other hand, the rulemaking process will permit ample opportunity for all stakeholders to comment on the technical criteria governing reliance on and feasibility of manual actions for post-fire safe shutdown. Preliminary criteria governing the acceptable use of manual actions have been developed by the staff but have not been published for stakeholder input. Rulemaking, by providing an opportunity for stakeholder comment on the technical sufficiency of the manual action criteria, may offset the reduction in public confidence concerning the staff's resolution of the proposed compliance issue.

In summary, the staff has concluded that amending Appendix R and associated guidance, by allowing the use of manual actions in lieu of fire barrier separation, will provide an alternative method for providing protection of safe shutdown capability from a fire. The staff believes that

this rulemaking would have a positive effect on safety by establishing criteria for feasible manual actions. The criteria should provide confidence that manual actions are uniformly safe and reduce variability and ambiguity in the licensing basis justifications for manual actions. By codifying the use of manual actions that meet feasibility criteria, the staff accepts that licensees can implement manual actions without adversely affecting the ability to achieve and maintain safe shutdown in the event of a fire. Licensees could use their fire protection program change control process to incorporate manual actions without NRC approval. This course of action would also permit licensees that currently rely on unapproved manual actions to achieve compliance through appropriate analysis and documentation against the feasibility criteria without NRC review and approval.

The staff notes that there may be policy concerns related to this recommended course of action. The proposed rulemaking effectively provides that manual actions that meet feasibility compliance criteria are as acceptable as physical fire barriers. This is a significant policy change in that NRC has previously preferred the use of physical fire barriers over the use of manual actions given the choice. In addition, there is a policy concern regarding the use of manual actions as a resolution of the Thermo-Lag issue. There appears to have been a Commission expectation that Thermo-Lag, where found to be deficient, was to be resolved by replacement or upgrade rather than through the use of manual actions. The basis for this expectation is a statement made to Congress by Chairman Selin in March 1993 (discussed in the attached rulemaking plan). The staff has no safety concerns about using feasible manual actions as an alternative to deficient Thermo-Lag fire barriers where such actions have been previously approved by the staff or where the manual actions have been assessed against generic acceptance criteria.

ENFORCEMENT CONSIDERATIONS

Even with Commission consent to proceed with rulemaking, licensees using unapproved manual actions will still remain non-compliant while the rulemaking is being processed and until the regulations and guidance are formally revised. In the interim, rulemaking, by itself, will not avoid inspection violations and enforcement proceedings or the potential for a large number of exemption or deviation requests associated with manual actions unless conforming changes are adopted in enforcement policy. In order for the NRC and licensees to avoid regulatory burdens associated with enforcement and/or exemptions and deviations processing, the staff will also need to propose an interim enforcement policy. Assuming the Commission approves the attached rulemaking plan, the staff intends to develop an interim enforcement policy to exercise discretion and refrain from taking enforcement action for those licensees that rely on unapproved manual actions, provided these licensees have demonstrated and documented feasibility of their manual actions in accordance with preliminary generic acceptance criteria similar to those in the attachment. These criteria could be adopted as part of the interim enforcement policy (recognizing that the final acceptance criteria might be modified during the rulemaking process). Shortly after staff direction is received from the Commission on the attached rulemaking plan, a specific interim enforcement policy would be submitted to the Commission for approval. If the Commission approves the interim enforcement policy, it will be published in the Federal Register together with a Regulatory Information Summary (RIS).

RESOURCES

Resources to conduct the rulemaking, modify the associated guidance, and process the interim enforcement policy are estimated at 3.0 full-time equivalent (FTE) over the period FY 2003 - 2004 and are currently budgeted. In addition, contract technical assistance may be needed to revise the regulatory guidance in support of the rulemaking and develop the regulatory analysis. It is estimated that these items will cost no more than \$50K in FY03 and \$50K in FY04. The staff will address the need for any contract funding in its mid-year review.

COORDINATION:

OGC has no legal objection to the rulemaking plan. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objection to its content. The Office of Enforcement (OE) concurs with the staff recommended approach to an interim enforcement policy for licensees using manual action in lieu of fire protection separation that have not been approved by the NRC.

RECOMMENDATION:

That the Commission:

1. Approve the attached rulemaking plan to revise 10 CFR Part 50, Appendix R, and associated guidance, as recommended in Option 3 of the plan.
2. Approve the staff's approach to develop an interim enforcement policy relying on preliminary manual action acceptance criteria discussed in the attached rulemaking plan.

William D. Travers
Executive Director
for Operations

Attachment: Rulemaking Plan

PETITION FOR RULEMAKING (PRM-50-68)

The NRC received a petition for rulemaking submitted by Bob Christie of Performance Technology, Knoxville, Tennessee, in the form of two letters dated October 7, 1999 and November 9, 1999. The petition requested that the NRC amend its regulations concerning hydrogen control systems at nuclear power plants. The petitioner believes that the current regulations on hydrogen control systems at some nuclear power plants are detrimental and present a health risk to the public. The petitioner believes that similar detrimental situations may apply to other systems as well (such as the requirement for a 10-second diesel start time). The petitioner believes his proposed amendments would eliminate those situations associated with hydrogen control systems that present adverse conditions at nuclear power plants. The petition was docketed as PRM-50-68 on November 15, 1999. On January 12, 2000, the NRC published a notice of receipt of this petition in the *Federal Register* which summarized the issues it contains (65FR1829).

Specifically, the petitioner performed a detailed review of the San Onofre Task Zero Safety Evaluation Report (Pilot Program for Risk-Informed Performance-Based Regulation) conducted by the NRC staff and dated September 3, 1998, concerning that plant's hydrogen control system. The petitioner requested the NRC to amend its regulations in the following areas:

1. Retain the existing requirement in § 50.44 (b) (2) (i) for inerting the atmosphere of existing Mark I and Mark II containments.
2. Retain the existing requirement in § 50.44 (b) (2) (ii) for hydrogen control systems in existing Mark III and PWR ice condenser containments to be capable of handling hydrogen generated by a metal/water reaction involving 75% of the fuel cladding.
3. Require all future light water reactors to postulate a 75% metal/water reaction (instead of the 100% required by the current rule) for analyses undertaken pursuant to §50.44 (c).
4. Retain the existing requirements in §50.46 a for high point vents.
5. Eliminate the existing requirement in §50.44 (b) (2) to insure a mixed atmosphere in containment.
6. Eliminate the existing requirement for hydrogen releases during design basis accidents of an amount equal to that produced by a metal/water reaction of 5% of the cladding.
7. Eliminate the requirement for hydrogen recombiners or purge in LWR containments.
8. Eliminate the existing requirements for hydrogen and oxygen monitoring in LWR containments.
9. Revise GDC 41 -- Containment Atmosphere Cleanup -- to require systems to control fission products and other substances which may be released into the reactor containment for accidents only where there is a high probability that fission products will be released to the reactor containment.

10. Additionally, the petitioner emphasized that during the San Onofre review the NRC granted an exemption from the design-basis requirements for the hydrogen control system based on information obtained from analysis of severe accidents. The petitioner stated that the NRC staff's evaluation indicated that adherence to the requirements for design-basis accidents could have a detrimental effect on public health and safety. The petitioner believes that there may be other instances at facilities where adherence to design-basis accident requirements could be detrimental to safety. Thus, the petitioner requested the NRC to issue an interim policy statement applicable to all NRC staff to ensure that the NRC Executive Director for Operations was promptly notified whenever staff discovered cases where compliance with design-basis accident requirements was detrimental to public health.

The Commission received five comment letters on PRM-50-68. The commenters included two nuclear power plant licensees, a nuclear reactor vendor, a nuclear power plant owners group and the Nuclear Energy Institute (NEI). Copies of the public comments on PRM-50-68 are available for review in the NRC Public Document Room, 2120 L Street, NW (Lower Level), Washington, DC 20003-1527. All commenters were supportive of some of the issues raised by the petition. One of the reactor licensees commented that analytical and risk bases exist to support the proposed changes for Mark I Boiling Water Reactor containments. The other licensee endorsed the comments submitted by NEI. The reactor vendor commented that the petitioner's proposal simplifies the language and requirements of the regulation while retaining an equivalent level of safety, but also noted that the proposal does not appear to address the matter of the structural integrity of the containment as does the existing language in §50.44(c) (3) (iv). The owner's group commented that the changes requested by the petitioner for large, dry containments were also applicable to ice condenser containments and suggested that the requirement for all hydrogen control measures in §50.44 be reexamined and made "consistent with many other portions of plant operation and maintenance." The Nuclear Energy Institute stated agreement with the petitioner that the San Onofre hydrogen control licensing actions could be applied generically for pressurized water reactors with large, dry (including subatmospheric) containments. One licensee, the reactor vendor and NEI disagreed with the petitioner's position that an interim policy statement is necessary to instruct NRC staff how to proceed in instances where "adherence to design basis requirements would be detrimental to public health." The other commenters were silent regarding the interim policy statement.

The Commission has evaluated the technical issues and the associated public comments and has determined that the specific issues contained in PRM-50-68 should be granted in part and denied in part. Specifically,

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Issue 9: Revise GDC 41 -- Containment Atmosphere Cleanup -- to require systems to control fission products and other substances which may be released into the reactor containment for accidents only where there is a high probability that fission products will be released to the reactor containment.

Resolution of Issue 9:

The Commission has denied the petitioner's request on this issue. The Commission believes that the final §50.44 alleviates the need to revise Criterion 41. In a December 4, 2001, letter from the petitioner to the NRC, the petitioner stated that the intent of the proposed change was to focus Criterion 41 on the containment capability when a severe accident occurs. This concern is addressed the final §50.44. The final §50.44 establishes the design criteria for reactor containment and associated equipment for controlling combustible gas released during a postulated severe accident. The General Design Criteria were established to set the minimum requirements for the principal design criteria for water-cooled nuclear power plants. The postulated accidents used in the development of these minimum design criteria are normally design-basis accidents. The Commission believes it is not appropriate to address severe accident design requirements in Appendix A of §50.

Issue 10: The petitioner requested the NRC to issue an interim policy statement applicable to all NRC staff to ensure that the NRC Executive Director for Operations was promptly notified whenever staff discovered cases where compliance with design-basis accident requirements was detrimental to public health.

Resolution of Issue 10:

The petitioner's additional request for an interim policy statement is not part of the petition for rulemaking. Nevertheless, the NRC has evaluated the request and public comments and has concluded that the specific hydrogen control requirements referenced by the petitioner in the San Onofre case have been modified in today's final rule so that design basis requirements will not be detrimental to public health and safety. Also, the Commission believes that if NRC staff members discover other situations where design basis requirements detract from safety, staff will elevate these issues for management review; thus, no staff guidance in this area is necessary.

PETITION FOR RULEMAKING (PRM-50-71)

The NRC received a petition for rulemaking submitted by the Nuclear Energy Institute. The petition, dated April 12, 2000, was published in the *Federal Register* for public comment on May 31, 2000. The petitioner requested that the NRC amend its regulations to allow nuclear power plant licensees to use zirconium-based cladding materials other than zircaloy or ZIRLO, provided the cladding materials meet the requirements for fuel cladding performance and have received approval by the NRC staff. The petitioner believes the proposed amendment would improve the efficiency of the regulatory process by eliminating the need for individual licensees to obtain exemptions to use advanced cladding materials which have already been approved by the NRC.

Specifically, the petitioner states that the NRC's current regulations require uranium oxide fuel pellets, used in commercial reactor fuel, to be contained in cladding material made of zircaloy or ZIRLO. The petitioner indicates that the requirement to use either of these materials is stated in 10 CFR 50.44 and 10 CFR 50.46. The petitioner notes that subsequent to promulgation of these regulations, commercial nuclear fuel vendors have developed and continue to develop materials other than zircaloy or ZIRLO that NRC reviews and approves for use in commercial power reactor fuel. Each of these approvals requires the NRC to grant an exemption to the license of the utility that requests use of fuel in these cladding materials. The petitioner requests that NRC amend its regulations to allow licensees discretion to use zirconium-based cladding materials other than zircaloy or ZIRLO, provided that the cladding materials meet the fuel cladding performance requirements and have been reviewed and approved by NRC staff. The petitioner notes that during the past nine years there have been at least eight requests for exemptions and each exemption has cost in excess of \$50,000. The petitioner states that the requests for exemption have become increasingly more frequent, causing significant administrative confusion and having a potentially adverse affect on efficient and effective use of NRC, licensee, and vendor resources.

Thus, the petitioner believes the NRC should amend §50.44 and 50.46 to allow the use of other zirconium-based alloys in addition to those specified in the current regulations. The petitioner states that the stated goal of the existing regulations is to ensure adequate coolability for reactor fuel in case of a design-basis accident. However, the petitioner asserts that the proposed amendment does not degrade the ability to meet that goal. Rather, it removes an unwarranted licensing burden without increasing risk to public health and safety.

The Commission received ???comment letters on PRM 50-71. [Add discussion of commenters and comments]

The Commission has evaluated the petition and the public comments received and has determined that the petition will be granted?

[If so, are the changes in the current 50.44 revision?]