May 20, 1999

FOR: The Commissioners

FROM: William D. Travers /s/
Executive Director for Operations

SUBJECT: RECOMMENDATION FOR REACTOR FIRE PROTECTION INSPECTIONS (WITS ITEM 199700021)

PURPOSE:

To provide information about fire risk and the significance of reactor fire protection; to inform the Commission about the completion of the fire protection functional inspection (FPFI) pilot program as directed in a staff requirements memorandum (SRM) of February 7, 1997; and to make recommendations on the appropriate types and frequencies of reactor fire protection inspections and whether they should be part of the new reactor oversight process as directed in an SRM of April 1, 1999.

BACKGROUND:

Overview of Reactor Fire Risk

Risk assessments have shown that fires in nuclear power plants can be risk significant. To ensure that its decisions and recommendations regarding the regulatory program for reactor fire protection are commensurate with its importance and risk significance, the staff considers the underlying purpose of the regulatory requirements and, to the extent practicable, available fire risk data and insights. This paper presents an overview of the considerations applied by the staff.

Fire Protection Functional Inspection Pilot Program

The staff informed the Commission of its plans for implementing the fire protection functional inspection pilot program in SECY-96-267, "Fire Protection Functional Inspection Program," December 24, 1996. In an SRM of February 7, 1997, the Commission informed the staff that it did not object to the staff's plans for the pilot program. In SECY-98-187, "Interim Status Report - Fire Protection Functional Inspection Program," August 3, 1998, the staff described the inspection results to date. The staff described its remaining work and the scope of its planned final report on the FPFI pilot program in SECY-99-040, "Second Interim Status Report - Fire Protection Functional Inspection Program," February 5, 1999. The staff briefed the Commission on February 9, 1999. In an SRM of April 1, 1999, the Commission directed the staff to include in its final report its recommendations on the appropriate types and frequencies of reactor fire protection inspections and whether they should be part of the new reactor oversight process. This paper presents the staff's final report on the FPFI pilot program and the staff's recommendations. This completes the staff's actions on WITS Item 199700021.

DISCUSSION:

Overview of Reactor Fire Risk

Simply stated, the underlying purpose of the NRC fire protection regulation is to provide reasonable assurance that one means of achieving and maintaining safe-shutdown conditions will remain available during and after a fire. This is accomplished by applying the concept of fire protection defense in depth to reduce the likelihood of fires and to limit the extent of fire damage to the structures, systems, and components that would be used to achieve and maintain safe-shutdown in the event of a fire. The stated objectives of fire protection defense in depth are to prevent fires from starting; to rapidly detect, control, and extinguish fires that do start; and to design and protect structures, systems, and components so that a fire that is not promptly extinguished will not adversely affect safe-shutdown.

Fire is not treated as a design-basis accident, nor are fires postulated to occur simultaneously with non-fire-related failures in safety systems, plant accidents, or severe natural phenomena. The regulation requires that only one train of equipment necessary to achieve hot shutdown be maintained free of fire damage. Unlike systems provided to mitigate design-basis accidents, the fire protection regulation does not require redundant or diverse post-fire safe-shutdown methods. Nor does the regulation require that fire protection systems and features or the structures, systems, and components provided for achieving post-fire safe-shutdown be safety related, protected against a single failure, or covered by technical specifications. Finally, the regulation does not require that the equipment provided to achieve cold shutdown or to mitigate the consequences of design-basis accidents be maintained free of fire damage.

In 1989, Sandia National Laboratories issued the "Fire Risk Scoping Study." This study, which included a review of the fire probabilistic risk assessments (PRAs) for four plants, concluded that the most risk-significant plant areas typically are main control rooms, cable spreading rooms, and switchgear rooms. According to this study, although plant modifications made in response to Appendix R reduced, by a factor of 3 to 10, the core damage frequencies (CDFs) at the plants studied, fire can be an important contributor to CDF even after regulatory criteria have been satisfied. The study suggests that without the existing regulatory requirements, fire risk could be higher than it is today. The study also suggests that improper implementation of the regulatory requirements and degradation of fire protection defense in depth could be risk significant. The study concluded, for example, that weaknesses in either manual fire fighting effectiveness or control systems interactions could raise the estimated fire-induced CDF by an order of magnitude.

Under the individual plant examination of external events (IPEEE) program, the licensees systematically assessed the fire risk for each operating reactor. Although most licensees have reported numerical fire CDF estimates, the staff has not validated the accuracy of such estimates. Because the licensees may have used simplifying assumptions and approximate procedures in the analyses, the quantified CDF estimates reported in the IPEEE submittals only serve as general indicators of plant fire risk. Nevertheless, the results of the IPEEE fire analyses provide important insights regarding reactor fire risk and confirm the results of the "Fire Risk Scoping Study." For example, the IPEEE results show that fire events are important contributors to the reported CDF for a majority of plants, ranging on the order of 1E-9/yr to 1E-4/yr, with the majority of plants reporting a fire CDF in the range of 1E-6/yr to 1E-4/yr. The reported CDF contribution from fire events can in some cases approach (or even exceed) that from internal events. Licensees proposed or implemented procedural and/or hardware improvements in the fire area in response to the IPEEEs at more than half of the plants. (In most cases any risk reduction achieved by the improvements was not reported separately, but was included in the total CDF.) Overall, the IPEEEs have confirmed that main control rooms, cable spreading rooms, and switchgear rooms are usually the most risk-significant plant areas.

Although it is generally understood that fire events can be serious and risk significant, fire science is a relatively new field. NRC fire research efforts and fire risk assessments have yielded both useful tools and important results. However, a number of important questions remain regarding the assessment and assurance of nuclear fire safety. For example, there are still significant uncertainties in the ability to mechanistically predict the behavior of fires under the broad variety of conditions that are relevant to nuclear power plant safety.

Attachment 1, "Fire Risk Fact Sheet," gives additional information about reactor fire risk.

Fire Protection Functional Inspection Program

Pre-FPFI Pilot Program Inspection Procedures

Since Appendix R was issued in 1981, the staff published three reactor fire protection inspection procedures (IPs). These are IP 64100, "Postfire Safe Shutdown, Emergency Lighting and Oil Collection Capability at Operating and Near-Term Operating Reactor Facilities"; IP 64150, "Triennial Post-Fire Safe Shutdown Capability Reverification"; and IP 64704, "Fire Protection/Prevention Program."

During the 1980s, the staff performed a 1-week team inspection at each facility using IP 64100. These inspections consisted of an audit review of the plant fire protection features and post-fire safe-shutdown capability (hardware and procedures) against the licensee's

commitments and the applicable regulatory requirements. The inspections did not include detailed inspections of the safe-shutdown analysis or of the design bases of fire detection systems, fire suppression systems, and fire barriers installed to protect safe-shutdown equipment. For example, the inspector would verify, on an audit basis, that sprinkler systems installed to protect safe-shutdown equipment in accordance with the regulatory requirements were installed in the appropriate fire areas, but did not verify that the systems met the code requirements. Since these one-time inspections, the staff has re-inspected fewer than 10 plants in accordance with IP 64150, a 1-week regional initiative team inspection. The regions conduct IP 64704, the routine (core) reactor fire protection inspection procedure, at each plant about once every 3 years. The objective of this IP, which is typically conducted by a regional inspector over about a 1-week period, is to inspect, on an audit basis, the overall adequacy of the licensee's fire protection program. The focus of IP 64704 is on such typical fire protection features as extinguishers, fire hose stations, and sprinkler systems. In response to the Thermo-Lag fire barrier and penetration seal issues, the staff recently added to this IP additional guidance for inspecting these features. However, IP 64704, does not address detailed design basis issues or post-fire safe-shutdown capability, nor does it thoroughly evaluate fire protection program configuration management.

Basis For and Scope of FPFI Pilot Program

As documented In SECY-96-267, the FPFI program was based on the following staff commitments to the Commission: (1) to inspect the Thermo-Lag corrective actions at all plants, (2) to assess the NRC reactor fire protection program to determine if it had appropriately addressed all fire safety issues, (3) to determine if licensees are maintaining compliance with NRC fire protection requirements, (4) to identify the strengths and weaknesses of the reactor fire protection program, (5) to reevaluate the scope of the reactor fire protection inspection program, and (6) to develop a coordinated approach for reactor fire protection and systems inspections.

The FPFI pilot program consisted of a new inspection procedure, four pilot inspections, a public workshop, and a final report. The staff conducted four pilot inspections, using fire risk insights to help focus the inspections on areas most important to safety. Three of the four pilot inspections were full-scope FPFIs. The fourth pilot inspection was a reduced-scope inspection of a licensee self-assessment. During the pilot program period, the staff also conducted major team inspections at Quad Cities and Clinton. Attachment 2 is the "Fire Protection Functional Inspection Pilot Program Final Report." Among other things, the final report presents the detailed background of the FPFI pilot program, the program objectives and accomplishments, summaries of the FPFI findings and resulting enforcement actions, insights from the FPFI workshop, interactions with the Nuclear Energy Institute (NEI), and insights and lessons learned from the FPFI pilot program. For this paper and the final report, and for the the purpose of developing its plans for future reactor fire protection inspections, the staff considered the results of the four pilot FPFIs and the results of the inspections at Quad Cities and Clinton.

Coordination With New Reactor Inspection and Oversight Program

After it initiated the FPFI pilot program, the staff began to look for other ways to improve the NRC's reactor oversight process. To ensure that its plans for future reactor fire protection inspections would be consistent with the new reactor inspection and oversight program, the staff responsible for reactor fire protection and the FPFI program coordinated with the reactor oversight task groups and considered the concepts and objectives of the new program when it developed the plans presented below.

Significant Insights and Lessons Learned

The staff developed the following insights and lessons learned from information it gathered during the FPFI pilot inspections, the team inspections of Quad Cities and Clinton, and the FPFI workshop.

As discussed during the Commission meeting on February 9, 1999, one of the results of the FPFI program was renewed industry attention to nuclear power plant fire safety. For example, in response to the FPFI pilot program a number of licensees conducted comprehensive self-assessments of their fire protection programs even though they had not been selected as pilot plants. In addition, in response to the FPFI pilot program, NEI is developing procedures to help licensees conduct self-assessments. (Additional information about this NEI effort is presented under "Ongoing Staff Work," below.) Finally, during NEI Fire Protection Information Forums and other forums the staff has received information from licensees about voluntary changes to fire protection programs and planned self-assessments in response to the lessons learned from the FPFI pilot program.

For each FPFI, a senior NRR risk analyst reviewed available IPEEE results and other sources of risk information. (The FPFI inspection procedure contains guidance for using risk information and insights to focus inspection activities.) The risk insights, which were used as input to the FPFI inspection plans, helped focus the FPFIs on areas in which the potential fire risks were greater and helped the inspectors improve their understanding of the significance of inspection findings.

As noted in SECY-98-187, potentially risk significant FPFI findings related to the regulatory requirements and licensee commitments had not been and would not have been revealed using the current core fire protection inspection procedure (IP 64704). Similarly, licensee quality assurance audits of reactor fire protection programs had not uncovered many of the findings related to the regulatory requirements and licensee commitments that were revealed during the pilot FPFIs.

As noted above, until the FPFI pilot program, the NRC reactor fire protection inspection procedures did not direct the staff to thoroughly inspect the design bases of fire detection systems, fire suppression systems, and fire barriers installed to protect safe-shutdown equipment in accordance with the regulatory requirements or the details of the post-fire safe- shutdown analyses performed by the licensees to demonstrate compliance with the regulatory requirements. The FPFIs included findings associated with the designs of fire protection systems and with safe-shutdown capabilities, including actions taken by licensees to resolve Thermo-Lag fire barrier issues.

The FPFI pilot program inspection results and other indicators, such as licensee event reports, indicate deficiencies and weaknesses in reactor fire protection and post-fire safe-shutdown programs. For example, all of the pilot plants had some fire brigade weaknesses. Other findings were, for example, inadequate safe-shutdown analyses, inadequate or incomplete circuit analyses (discussed separately, below), incomplete safe-shutdown procedures, and inadequate attention to fire protection program management. The FPFI pilot program results suggest that deficiencies could exist in one or more layers of fire protection defense in depth at any given plant. As discussed above, because fires can be important contributors to CDF even after regulatory criteria have been satisfied, and because improper implementation of the regulatory requirements and degradation of fire protection defense in depth can be risk significant, it is important that the licensees maintain the reactor fire protection programs and that the staff monitor licensee performance in this area.

As noted above, the licensees for several of the FPFI pilot plants had conducted fire protection program self-assessments in advance of the FPFI. One of the pilot FPFIs was a reduced-scope inspection of a licensee self-assessment. The self-assessments were based largely on the FPFI procedure and lessons learned by the licensees by observing previous pilot FPFIs. Overall, the licensee self-assessments were of good quality, were commensurate with the scope and depth of an FPFI, and reflected the strengths and weaknesses of the licensees' programs fairly well.

Independent of the FPFI pilot program and before the staff began the pilot FPFIs, the reactor industry raised questions about the adequacy of the existing staff guidance concerning fire-induced circuit failures and the consistency of staff interpretations of both the guidance and the underlying regulatory requirements. The staff and the industry are currently working to resolve these questions and to develop new guidance, if needed, to resolve this issue. During several of the FPFIs, the inspectors found compliance issues associated with the analyses that the licensees had performed to identify the circuits that require fire protection to support post-fire safe-shutdown in accordance with the fire protection rule. These findings confirmed that plant-specific circuit analysis issues may exist because of differing staff and licensee interpretations of the existing guidance and regulatory requirements. However, during the FPFI pilot program, the staff did not identify any significant new questions or issues concerning the existing fire protection regulatory requirements and guidance, or with the staff's licensing reviews of reactor fire protection programs. (The staff notes that at the FPFI workshop, several participants expressed uncertainty as to what constitutes compliance with the fire protection requirements, indicating that the uncertainty stems from the complexity of reactor fire protection, questions about existing staff guidance, and changing staff expectations. Circuit analysis was the only specific example offered. The ongoing staff and industry activities to resolve the circuit analysis issue and the comprehensive regulatory guide for reactor fire protection that the staff is currently developing will address any uncertainties associated with the existing staff guidance and the regulatory requirements.)

Ongoing Staff Work

Under the new reactor inspection and oversight program, fire protection (an area that includes fire protection features and post-fire safe-shutdown capability) falls within both the initiating events cornerstone and the mitigating systems cornerstone. Fire protection is not presently covered by performance indicators. Therefore, reactor fire protection has been identified as an inspectable area under the new program. As described in SECY-99-007A, "Recommendations for Reactor Oversight Process Improvements (Follow-Up to SECY-99-007)," March 22, 1999, the staff has drafted procedures for baseline inspections of fire protection programs that it plans to test during the pilot program and then incorporate into the final program.

During a public meeting on March 25, 1999, the staff discussed with NEI and other interested stakeholders its proposed fire protection baseline procedures. By letter dated April 14, 1999, NEI submitted comments on the draft procedures and expressed concerns about including fire protection in the pilot program because it was only recently added and the licensees may not have time to fully plan for this aspect of the pilot program. In response to NEI's comments, the staff revised the draft procedures, as appropriate. During a public meeting on May 6, 1999, the staff met with NEI to discuss its letter of April 14, 1999, and gave its revised procedures to NEI. In response to NEI's concerns about including fire protection in the pilot program, the staff and NEI discussed conducting any pilot fire protection inspections late enough in the program to allow for adequate planning and preparation by the staff and the pilot plant licensees. The staff indicated that it currently plans to conduct pilot fire protection inspections at three of the pilot plants. The specific plants have not yet been identified. The staff also indicated that it would take appropriate steps to ensure that the inspections were effective and efficient, including for example, meeting with the pilot plant licensees to discuss the fire protection inspection process and to address any unanswered questions. The staff and NEI agreed to meet again on May 24, 1999. The staff will continue to work with NEI and other stakeholders as appropriate.

At the time of the FPFI pilot inspections, a tool for systematically assessing the risk significance of fire protection inspection findings was not available. During the FPFI workshop, there was general consensus that such a tool would be beneficial to both the staff and the industry. Subsequently, NRR's Plant Systems Branch and Probabilistic Safety Assessment Branch, with assistance from the Office of Nuclear Regulatory Research and the senior reactor analysts, developed a proposed method for assessing the potential fire risk significance of fire protection inspection findings. After it is completed, the Fire Protection Risk Significance Screening Methodology (FPRSSM), which is described in Section 9 of the final report, could be used by inspectors to focus on risk-significant sets of inspection findings, while screening out findings that have minimal or no risk significance. The FPRSSM could also be used to evaluate inspection findings after the inspection. Inspection findings that the FPRSSM finds to be potentially risk significant (i.e., those that are not screened out as having minimal or no risk significance) could be subjected to a more refined evaluation to help establish the appropriate regulatory response to the findings. The FPRSSM could also be used by the licensees to assess deficiencies found during self-assessments.

Although the FPRSSM was not available during the FPFIs or the resulting enforcement proceedings, as a final activity of the FPFI pilot program, the staff used the FPRSSM to assess a sample of the FPFI findings. The results of two FPRSSM assessments, one of potentially high risk significance and one of low risk significance, are summarized in Section 10 of the final report. The staff is working with the reactor oversight task groups to incorporate the FPRSSM into the Inspection Finding Risk Characterization Process described in SECY-99-007A. During a public meeting on March 25, 1999, and the NEI Fire Protection Information Forum on May 3, 1999, the staff discussed the proposed FPRSSM with NEI and other interested stakeholders. During a public meeting on May 6, 1999, the staff gave NEI a copy of the draft FPRSSM for review. The staff and NEI agreed to meet again on May 24, 1999, to discuss any NEI comments and to work through some sample applications.

NEI provided input and feedback on the FPFI pilot program during the FPFI workshop, in correspondence, and during follow-up meetings with the staff. NEI favors more reliance on licensee self-assessments, with FPFIs reserved for use when licensee performance approaches the "unacceptable performance," as defined by the new inspection and oversight program. An NEI issue task force is developing procedures (based on the FPFI procedure) to help licensees conduct self-assessments. It is the staff's understanding that NEI plans to phase in the self-assessment procedures, which will be available for licensees to use on a voluntary basis, beginning in summer 1999. While recognizing the difficulties of doing so, NEI has also formed an issues task force to develop performance indicators for reactor fire protection programs. NEI plans to complete small-scale performance indicator pilot trials at reactor sites by July 2000. During the public meetings on March 25 and May 6, 1999, the staff informed NEI that it would consider the results of NEI's efforts in the new reactor inspection and oversight program as they become available.

Conclusions

Although the FPFI program involved a relatively small sample of plants, the results of the inspections, coupled with other indicators, such as licensee event reports, suggest that continued monitoring of licensee performance is needed to achieve confidence that risk-significant fire protection program deficiencies do not exist at any given plant. Inspection is a proven and appropriate means of both monitoring licensee performance and finding deficiencies. Therefore, on the basis of the insights and lessons learned from the FPFI pilot program, the importance of fire protection from the point of view of potential risk, past operational experience (e.g., such issues as Thermo-Lag and circuit analysis), the absence of fire protection and post-fire safe-shutdown performance indicators, and the existing regulatory requirements, the staff concludes that some level of NRC inspection of reactor fire protection programs is appropriate to maintain safety and increase public confidence. The staff also concludes that future NRC fire protection inspections should be consistent with the concepts and objectives of the new reactor inspection and oversight program and should be included within that program.

The staff believes that future fire protection inspections should be more comprehensive and risk informed than the current core inspections. For example, future inspections should address the existing regulatory requirements regarding post-fire safe-shutdown capability, which are not inspected under the current core inspection program, with emphasis on activities, plant areas, and safe-shutdown configurations where the potential risks are greater. In light of the renewed industry attention to reactor fire safety and NEI's plans for voluntary self-assessments, the staff also concludes that intense fire protection inspections, such as full-scope FPFIs, are not warranted as a routine-type inspection, but should be available for use on an as-needed basis, such as when plant performance declines or to respond to a specific event or problem at a plant.

The staff believes that, over both the short and long terms, licensee self-assessment activity will increase. The number and significance of reactor fire protection program deficiencies should decrease in response to more frequent and more robust self-assessments and NRC monitoring through the baseline inspections. Therefore, the staff concludes that it would be appropriate to consider licensee self-assessments during future NRC inspections, provided that the scope and depth of the self-assessments are equivalent to the scope and depth of the NRC inspections discussed below. In such cases, in addition to some independent verifications of fire protection program features, the NRC inspections would verify the accuracy of the licensees' assessment processes, and would review the licensees' effectiveness in maintaining the appropriate level of performance to assure safe operation, and in finding and resolving problems. In addition, taking into account the new reactor inspection and oversight program, if valid fire protection performance indicators are eventually developed, the staff will reassess the baseline fire protection inspection program (discussed in the following section) and consider changing the scope and frequency of the inspections, as appropriate. The staff's planned actions are presented below.

RECOMMENDATION:

Unless otherwise directed by the Commission, the staff will:

1. Include risk-informed baseline procedures for routine resident inspector walkdowns and for triennial fire protection team inspections within the new reactor inspection and oversight program to monitor licensee performance in the fire protection area. The staff previously described this approach in SECY-99-007A.

2. Structure the triennial baseline inspection procedure to emphasize its modular nature so that it could be used, for example, to independently inspect Thermo-Lag corrective actions, licensee self-assessments, and specific aspects of fire protection defense in depth. To the extent practicable, the staff will schedule the triennial inspections so that plants that have not performed or do not plan to perform self-assessments are inspected before those that have done so.

3. Issue the FPFI pilot procedure as a permanent IP. The staff will format the procedure to emphasize its existing modular structure so that individual modules (e.g., fire barriers, fire brigade, and safe-shutdown capability) could be applied independent of the entire procedure. The FPFI procedure (a) would be used by the staff to support the triennial inspections as specified in the triennial inspection procedure, (b) would be used by the staff when plant performance falls below a threshold to be established by the new inspection and oversight program or in response to a specific event or problem at a plant, and (c) could be used by the licensees as guidance for self-assessments.

4. Delete IP 64100, IP 64150, and IP 64704 after the new reactor inspection and oversight program is implemented. (The procedures recommended above would supersede these existing procedures. Therefore, IPs 64100, 64150, and 64704 would no longer be needed.)

Staff requests action within 10 days. Action will not be taken until the SRM is received. We consider this action to be within the delegated authority of the EDO.

COORDINATION

The Office of the General Counsel has reviewed this Commission paper and has no legal objections.

The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections.

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Attachments:
1. Fire Risk Fact Sheet
2. FPFI Pilot Program Final Report

ATTACHMENT 1

FIRE RISK FACT SHEET

- The average reported fire frequency at operating plants for the period 1965-1994 is 3.3E-1/yr[(1)]
- The average reported fire frequency for the pre-Appendix R implementation period 1965 - 1985 is 3.8E-1/yr[1]
- The average reported fire frequency for the post-Appendix R implementation period 1985 - 1994 is 2.8E-1/yr[1]
- During the post-Appendix R implementation period (1986-1994) there were two fire events that resulted in a scram and a loss of function of one safety related division or a loss of offsite power. This compares to 10 such events (not including the Browns Ferry fire) during the pre-Appendix R implementation period (1965-1985).[1]
- There were 41 fire events that resulted in a plant scram with no loss of function of a safety related division in the 20 year pre-Appendix R implementation period and 40 such events in the 8 year post-Appendix R period.[1]

- Thirteen large losses from fire events at nuclear power plants during the period from 1966 - 1995 resulted in a total reported monetary loss of approximately $800 million, with an average monetary loss per event of approximately $62 million.[(2)]

- On June 21, 1991, the NRC issued GL 88-20, Supplement 4, requesting licensees to perform an Individual Plant Examination of External Events (IPEEE) to (1) develop an appreciation of severe accident behavior, (2) understand the most likely severe accident sequences, (3) gain a qualitative understanding of the overall likelihood of core damage and radioactive release, and (4) if necessary, to reduce the overall likelihood of core damage and radioactive release by modifying hardware and procedures that would help prevent or mitigate severe accidents.[(3)]

- Based on the IPEEE results, fire events are important contributors to the reported core damage frequency (CDF) for a majority of plants. The reported CDF contribution from fire events can in some cases, approach (or even exceed) that from internal events.[(4)]

- The reported IPEEE fire CDFs range on the order of E-9/yr to E-4/yr, with the majority of plants reporting a fire CDF in the range from 1E-6/yr to 1E-4/yr.[(5)] More than half of the plants proposed or implemented procedural and/or hardware improvements in the fire area in response to their IPEEE.

- Although most licensees have reported numerical fire CDF estimates, it is important to note that the accuracy of such estimates has not been validated under the IPEEE submittal review. Because simplifying assumptions and approximate procedures may have been used in the analyses, the quantified CDF estimates reported in the licensees' IPEEE submittals should only serve as a general indicator of plant risk. With that in mind the following preliminary information is provided.

    a. Fire CDFs for approximately 40 units were greater than or equal to 1E-5/yr.

    b. Fire CDFs for approximately 11 units were greater than or equal to 1E-4/yr.

    c. Of those 29 units whose fire CDF was between 1E-5/yr and 1E-4/yr, approximately 17 had a reported fire CDF greater than or equal to the reported internal events CDF.

    d. Of those 11 units whose fire CDF was greater than or equal to 1E-4/yr, 9 units had a fire CDF greater than or equal to the reported internal events CDF. For the remaining 2 units the fire CDF was comparable to the internal events CDF.

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1. Special Study Fire Events - Feedback of U.S. Operating Experience, June 1997, James R. Houghton, Office for Analysis and Evaluation of Operational Data, USNRC

2. A 30-Year review of Large Losses in the Gas and Electric Utility Industry - 1966 - 1995, James B. Biggins, J&H Marsh & McLennan, 1997

3. NUREG 1407, "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," USNRC, June 1991

4. January 20, 1998, memorandum to the Commissioners from L. Joseph Callan, Executive Director for Operations, Preliminary IPEEE Insights Report

5. This range includes all plants except Quad Cities. The licensee for Quad Cities will submit a revised and updated IPEEE fire analysis during May 1999.