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LWP-97-039

April 14, 1997

U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Attention: Document Control Desk

Subject: Quad Cities Nuclear Power Station Units 1 and 2  
Individual Plant Examination of External Events (IPEEE)  
Generic Letter 88-20, Supplement 4  
Docket Numbers 50-254 and 50-265

At a meeting with the NRC on March 31, 1997, ComEd representatives presented information concerning the results of the Quad Cities IPEEE assessment of internal fires in response to Generic Letter 88-20, Supplement 4. We discussed the use of state-of-the-art fire risk analysis methods, consistent with and including the use of conservative assumptions to identify potential fire sequences characterized by severe fires damaging redundant cable divisions. In addition, we described the implementation of specific enhancements in response to the vulnerabilities identified. The enhancements include an alternate shutdown method and additional administrative controls, as interim risk-reducing measures pending development of more permanent solutions. During the meeting, the NRC Staff requested information concerning ComEd's plans and schedule for developing permanent solutions to certain vulnerabilities that have been identified.

We believe that the current approach and timetable for pursuit of a more permanent solution to address Fire IPEEE-identified vulnerabilities is appropriate as detailed below. This would be subject to change if further assessment suggests that a more expeditious schedule is warranted.

- We expect the large early release frequency due to fire to be about an order of magnitude lower than the core damage frequency. The sequence of events following core damage from internal events are similar to that from fire events. Thus, the relationship between core damage frequency and large early release frequency from the internal events study can be applied to the fire probabilistic risk assessment.
- Our fire protection program is designed on the principal of defense in depth. This includes reduction in the likelihood of severe fires through plant design, administrative controls for hazardous activities, and rapid detection and suppression. Although the Fire IPEEE review for severe accidents initiated by fire external events has indicated potential vulnerabilities, each case has been evaluated and the Station has concluded we are consistent with the design basis. Our task force has already identified interim solutions to increase our level of safety. These include an alternate shutdown method and further administrative controls.

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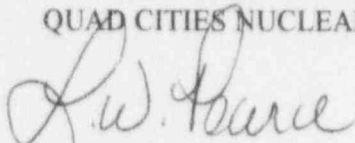
- Conservative assumptions have been applied in the Fire IPEEE assessments. For example, an assumption used in the analysis was that any system with an electrical cable (power or control) involved in a fire was assumed to be unavailable. However, it is expected that these systems will continue to perform, at least for a time, after their cables become involved in the fire. This would allow additional time for the operators to respond to the fire to safely shutdown the plant.
- The IPEEE approach we have followed is consistent with Generic Letter 88-20, Supplement 4, and provides a qualitative understanding of the overall likelihood of core damage. As emphasized during the March 31 presentation to the NRC, the Fire IPEEE methods used are intended for comparison of the relative risks of potential vulnerabilities and not to establish a precise core damage frequency.
- We will be following the guidance in NEI 91-04, Severe Accident Issues Closure Guidelines, in developing permanent solutions for the vulnerabilities we identified. The task force has identified a two part approach. Developing a simplified safe shutdown methodology is expected to eliminate a major portion of the vulnerabilities. The models will then be re-evaluated to determine what other factors are contributing to the risk. Once these factors are identified, hardware or procedural enhancements may be possible to further reduce the likelihood of the source of the risk.

For the above reasons, we believe that the existing November 30, 1997, timetable to identify permanent solutions to the Fire IPEEE vulnerabilities is appropriate. Implementation of these permanent solutions will follow the November 30, 1997, date on a practical but risk-informed schedule. Please contact us with any questions or if further information is desired.

More discussion of our evaluation is contained in the attachment to this letter.

Respectfully,

COMMONWEALTH EDISON COMPANY  
QUAD CITIES NUCLEAR POWER STATION



L. W. Pearce  
Station Manager

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Enclosure

Attachment (A) Resolution of Fire IPEEE Vulnerabilities - Rationale for Schedule

cc: A. B. Beach, Regional Administrator, Region III  
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**Resolution of Fire IPEEE Vulnerabilities**  
**Rationale for Schedule**

Quad Cities Station recently submitted the results of the study required by Generic Letter 8820 supplement 4, the Individual Plant Examination of External Events (IPEEE). The NRC staff requested each plant to perform an IPEEE to identify potential vulnerabilities. We identified potential vulnerabilities in the Fire Protection and Post-Fire Safe Shutdown programs.

Station Management commissioned a task force to evaluate the potential vulnerabilities and recommend solutions to reduce the risk due to fire. The task force has identified an interim alternate shutdown method which has substantially reduced the fire induced risk until permanent solutions are identified. The station will be taking additional administrative controls in the form of risk management to increase the level of safety until permanent solutions are implemented. These types of controls will allow the station to monitor and administratively control risk significant Limiting Condition of Operations (LCO) related to the Fire IPEEE. These controls will be implemented prior to start-up of Unit 2 from its current refuel outage.

The task force will be following the guidance in NEI 91-04, Severe Accident Issues Closure Guidelines, in developing permanent solutions for the vulnerabilities we identified. The task force has identified a two part approach. Developing a simplified safe shutdown methodology is expected to eliminate a major portion of the vulnerabilities. This improved methodology will reduce the likelihood of core damage in the event a fire occurs. The models will then be re-evaluated to determine what other factors are contributing to the risk. Once these factors are identified, hardware or procedural enhancements may be possible to further reduce the fire induced risk.

Quad Cities fire protection program is designed on the principal of defense in depth. This includes reduction in the likelihood of severe fires through plant design, administrative controls for hazardous activities, and rapid detection and suppression. In addition, suppression systems and fire barriers contain fires to limit the extent of damage and allow the use of Emergency Operating Procedures or Safe Shutdown Procedures to protect the core from damage.

The core damage frequency identified by the Fire IPEEE is a measure to determine if potential vulnerabilities exist and the relative risk of these potential vulnerabilities. Because of the amount of conservative bias and uncertainty in the methodologies, the frequency should not be taken as an actual value for core damage frequency. The identification of vulnerabilities does not mean that the plant cannot be safely shutdown. By meeting the prescribed requirements for fire protection, the station continues to maintain an approved level of safety. The identification of potential vulnerabilities means that the station has the potential to further increase the level of safety.

The conservative bias in our analysis is due to the assumptions about damage to emergency systems used in the Emergency Operating Procedures. One assumption used in the analysis was that if any electrical cable (power or control) for a component was in a location likely to be involved in the fire, the equipment was assumed to be unavailable. However, it is expected that these systems will continue to perform, at least for a time, after their cables become involved in the fire. This would allow more time than assumed for operators to take actions to protect the core.

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Past evaluations of uncertainties in probabilistic risk assessment analyses have indicated that uncertainties in average data are generally skewed toward the conservative direction and the results are within a factor of three to six of the upper bound. We believe that the existing uncertainties in our Fire IPEEE are more than offset by the conservatism applied in our analysis.

The 1996 update of our internal events probabilistic risk assessment model determined that the large early release frequency was about 15% of the core damage frequency. Most of this large early release frequency (about 74%) was attributed to containment liner melt-through because of inability to inject any water into the core or containment. We believe that the relationship between core damage frequency and large early release frequency from the internal events probabilistic risk assessment can also be applied to the Fire IPEEE because the failure of the Interim Alternate Shutdown Method will have similar results. Therefore, we expect the large early release frequency due to fire to be about an order of magnitude lower than the core damage frequency.