May 14, 1992

NOTE TO: Chet Poslusny, DAR, NRR

FROM: Glenn Kelly, PRAB, DREP, NRR

SUBJECT: ABWR SEVERE ACCIDENT FIRE SUBMITTAL; DESIGN INSIGHTS FROM THE ABWR PRA

I have enclosed a fax I sent to Jack Duncan, GE regarding staff questions on the GE ABWR severe accident fire submittal and questions on insights about the ABWR design derived from the ABWR PRA.

Enclosure: as stated

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Enclosure 1

QUESTIONS ON THE ABWR SEVERE ACCIDENT FIRE SUBMITTAL

1. GE should address whether hot shorts (e.g., a switch) from a fire in the main control room (particularly if diversity requirements result in hard-wired controls) can cause the transfer of control back to the main control room for equipment that is on the remote shutdown system panels. If this is possible, GE should address the safety implications of such an occurrence during a control room fire.

2. It appears that the transfer of control from the control room to the remote shutdown system panels is through a MUX. Describe the fail-safe "position" of the transfer if the MUX fails, loses an input, etc. If fail-safe is to retain control in the control room, describe the safety implications in the event of a control room fire. If the fail-safe "position" is to send control to the remote shutdown system panels, describe the safety implication regarding a failure of the MUX during a transient or accident.

3. It appears that the DC power supplies are directly below the main control room. ECCS equipment, including RCIC, depend on DC power. If a fire were to begin in the control room and then propagate (fire, water, hot gases, etc.) to the DC power supplies below, describe the paths available to operators to bring the plant to a safe, long term condition.

4. It appears that hot shorts (e.g., control switch) in the control room due to a fire could start/stop or reposition equipment throughout the plant. Since the control of DC breakers is not transferred to the remote shutdown system panels following control room evacuation, it appears that the DC breakers can be spuriously opened/repositioned by a fire. If so, describe the safety implications.

5. GE indicated that it intended to use qualitative insights from its use of FIVE to help analyze fires when the ABWR is in modes other than full power. The staff notes that FIVE does not consider fires in containment since the containment is inerted at power. Analysis of fires when shutdown must consider fires in containment and added combustible material available during outages (e.g., wood, cloth, welding tanks).

6. Describe whether the ABWR fire PRA analyzed the potential effect of high temperatures in the common exhaust duct in the smoke control system from the point of view of whether these severe accident temperatures could affect either nearby equipment or equipment in the duct. Discuss whether a fire external to the duct area would damage the duct. Discuss whether water sprayed on a hot duct would fail it.

7. It appears that failure of the two-position damper in each divisional exhaust duct could disable the ability of the smoke control system in the reactor building secondary containment to maintain a negative pressure in the divisional area that is affected by fire. (a) Describe the effect of a single failure in the dampers or fans in the smoke

control system for the reactor building secondary containment common supply and common exhaust system headers. (b) Describe the search for a common-cause failure mechanism that could fail all three divisions in a fire. (c) List those areas of the reactor building that contain safety related equipment (and list the types of equipment), but do not have backup emergency ventilation. Describe the effect of lack of backup ventilation on these areas in the event of a fire where the main smoke control system is lost. (d) Confirm that the backup emergency ventilation system is adequate to respond to a failed smoke control system.

ENCLOSURE 2

QUESTIONS ON DESIGN INSIGHTS FROM THE ABWR PRA

1. Provide a comparison of the dominant sequences from previous BWR PRAs (e.g., Shoreham, Grand Gulf, and Brunswick) to the dominant sequences for the ABWR. Explain why sequences dominant in other BWR PRAs are not dominant in the ABWR and/or why estimated core damage frequencies for the dominant sequences for the ABWR are significantly lower than those in the other ABWR PRAs. In this discussion, describe important design features of the ABWR that help to lower core damage frequency estimates.

2. Provide a discussion of why the ABWR design represents a favorable balance of prevention and mitigation of severe accidents for internal and external events.

3. Provide a comparison between the treatment of phenomena challenging containment integrity for the ABWR PRA and operating BWR PRAs. This submittal should include a discussion of applicable special design features of the ABWR design.

4. Provide a write up that discusses the important safety and design insights developed by GE about the ABWR design based on the ABWR PRA.

5. Describe the search for vulnerabilities in the ABWR design performed by GE including a definition of vulnerability. The discussion should include both internal and external events. Describe any vulnerabilities found and the enhancements made by GE because of the vulnerabilities, if any.

6. Discuss the sensitivity of the CDF estimates for the ABWR to changes in allowed outage times and surveillance intervals

7. Describe how the important equipment needed for shutdown cooling will be included in the RAP/Maintenance programs.

8. Walkdowns need to be performed on the as-built ABWR units for seismic, fire, flood events and for verification of the PRA. Provide guidance to COL applicants on how to perform walkdowns for these areas. This is a COL Item.