UNITED STATES
NUCLEAR REGULATORY COMMISSION
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NOTE TO: Jack Duncan, GE

FROM: Glenn Kelly, PRAB, DREP, NRR Glenn Kelly

SUBJECT: FOLLOW UP ON OPEN ITEMS FROM THE ABWR PRA DSER AND THE MARCH MEETING IN SAN JOSE

O-2 Support systems as initiators - Based on review by our contractor and further staff discussions, we recommend that the list of initiators to be examined by GE be expanded to include the following:
- loss of a single 6.9 kV bus
- total loss of turbine building closed cooling water system
- reactor vessel water level instrumentation failure

C-4 LOCAs outside containment - Based on our review of Section 19E.2.3.3 of the ABWR SSAR we have the following tentative findings:

1. Some of the bypass probabilities listed in Table 19E.2-13 appear to have been underestimated because common-cause failures do not appear to have been taken into consideration. For example, when calculating the bypass probabilities of feedwater line, SLC injection line, or the vacuum breakers, common-cause failure of check valves appears to have been ignored.

2. As indicated by Eq.4, GE's analysis is based on the presumption that a core damage event has occurred. It is not clear, however, whether some of the data, such as P13, P14, and P15, shown in Table 19E.2-12 represent the failure probabilities before a core melt or the conditional failure probabilities, given a core melt.

3. It appears that split fractions (a crucial parameter in obtaining GE's results) were calculated using Eq.12, which was derived from Eq.10. The detail of how Eq.12 was actually used to obtain split fractions shown in Table 19E.2-13 is not explained in the SSAR. For example, no information was given regarding the actual numerical values used for the geometry-dependent expansion factors, Y, and the resistance coefficients, K, for the broken area, and of the penetration lines. No mention was made of how the differential pressure, dP, which is time dependent, was evaluated for each of the penetration lines including those leading to the suppression pool.

4. Since GE has already identified the major bypass paths (See Table

19E.2-13)), it should be straightforward to identify those piping systems outside of the pressure boundary whose break can lead to loss of coolant that is not automatically isolable. A simple fault tree analysis can then be performed to estimate the frequency of LOCAs outside of containment. Event trees similar to hose shown in Figures 19E.2-8A through 19.2-8K can also be constructed to estimate the frequency of LOCAs outside containment. Once the frequency of LOCAs outside containment is determined, a LOCA event tree can be constructed to analyze the associated core damage sequences.