November 30, 2001

MEMORANDUM TO: File

FROM: Drew Holland, Project Manager, Section 2
Project Directorate IV ***/RA/***
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: WCAP-15622, "RISK INFORMED EXTENSIONS TO AC ELECTRICAL POWER SYSTEMS"

The NRC staff compiled a list of 20 questions for the Westinghouse Owners Group (WOG) related to the review of the subject topical report. The list of questions was e-mailed to WOG on November 21, 2001.

Project No. 694

Attachment: List of Questions

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Questions WCAP-15622, “Risk Informed Evaluation of Extensions to AC Electrical Power Systems”

1.A review of the proposed technical specifications shows that condition A.3 and B.4 extend the discovery of failure to meet the LCO from 6-days to 10-days. The 10-day value is based on the proposed 7-day diesel generator completion time and a proposed 72-hour completion time for ACTION B.3. The staff is concerned that the 10-day completion time for discovery of meeting the LCO has not based on a risk perspective but simply reflects an adaptation of the TS to the proposed 7-day DG completion time. The staff notes a similar situation with the proposed 34 hour completion time for LCO 3.8.9. Required Action A.1, "Restore the AC electrical power distribution system(s) to OPERABLE status," Required Action B.1, "Restore AC vital bus subsystem(s) to OPERABLE status," and Required Action C.1, "Restore the DC electrical power distribution system(s) to OPERABLE status" 34 hour completion time for discovery of not meeting the LCO has not been based on a risk perspective but simply reflects an adaptation of the TS to the 8 hour AC power distribution system, plus the 24 hour AC vital buses plus the 2 hour DC electrical power distribution subsystems inoperable. Provide a discussion on the basis for the proposed 10 day and 34 hour completion times that does not rely solely on engineering judgement.

2. The staff noted that WCAP-15622 review methodology does not include PRA quality criteria for the evaluation of AC electrical power source completion times. Discuss PRA quality measures, including peer reviews, and how WCAP-15622 addressed individual plant PRA quality for the proposed plants and PRA quality guidance for subsequent plant specific submittals including those plants not included in WCAP-15622.

3. In Section 8.2.3.5, “Shearon Harris Results Discussion” states that the station blackout (SBO) CDF contribution with a 72-hour completion time is 1.34E-05/yr and that the contribution with a 7-day completion time is 1.36E-06/yr. The WCAP states that the increased value of 1.36E-06 is due to additional activities expected to be performed while at power. Reconcile the values given for station blackout in section 8.2.3.5.

4. WCAP-15622 provides a discussion on the sensitivity of the RCP seal models on the topical report results. The Brookhaven National laboratory LOCA seal model was used with modifications (WOG model) to address the importance of the LOCA seal model on the CDF analysis. At present the Rhodes LOCA seal model is the model approved by the staff. Under certain circumstances the use of the Rhodes model may yield significant differences in the PRA results. Provide a discussion on the CDF contributions when using the Rhodes Model (station blackout) and the effect on the conclusions stated in WCAP-15622.

5. Information Notice 97-2, “Availability of Alternate AC Power Source Designed for Station Blackout Event” addressed potential unavailability of alternate AC power sources and noted that the capability to start on demand depends on the unavailability of support systems that may require AC or DC power. Determine the applicability of information notice 97-02 to WCAP-15622 review methodology and implementation guidelines.

6. Provide the values for emergency diesel generator (EDG) reliability and unavailability used in the PRA calculations including station blackout (include alternate AC source if applicable).

Attachment

Discuss these values in relationship to maintenance rule implementation goals and comparison to actual EDG performance and station blackout commitments. Discuss incorporation into WCAP-15622 implementation guidelines.

7. For plants that take credit for an alternate AC source provide a discussion on the vulnerability of the alternate AC source to external events (including weather related events) that could disable the alternate AC power source, the emergency AC power source or the normal offsite power sources. Include common cause failure mechanisms between the normal electrical distribution system and the alternate AC source. Discuss the impact of external events on the availability of alternate sources of AC power (SBO diesels for example) with respect to WCAP-15622 and the included implementation guidelines. Provide a discussion as to the assumptions (Qualification) and risk impact of the alternate ac source.

8. The results for Delta CDF and ICCDP shown in Table 8-1, Table 8-5 and Table 8-6 are not consistent with the regulatory guides 1.177 and 1.174 guidance. Numerous results show what appears to be substantial differences from the guidelines. Discuss these differences and include any compensatory measures (or guidance) before and during diesel generator maintenance or AC bus restoration including 10 CFR 50.65 maintenance rule provisions or surveillances be performed to ensure operability of systems associated with the remaining equipment (EDG, AC Bus). Include how these measures will be documented. Discuss any suggested revisions to the requested LCOs that will bring impacts into alignment with RG1.174 and 1.177 guidelines or propose an alternate basis for acceptability.

9. Regulatory Guide 1.177 states that when multiple technical specifications (TS) changes are being considered, the combined impact of the changes should be considered in addition to the individual impacts. Appendix C step 7 states that cumulative risk needs to be determined but the results are not discussed in WCAP-15622. Provide a discussion of the combined impact of the proposed changes with respect to WCAP-15622.

10. For alternate AC sources credited in the analysis confirm that the credited AC source meets the criteria set forth for station blackout performance in industry and staff guidance (RG 1.155 and NUMARC 8700).

11. The proposed completion times are requested in part to facilitate on-line maintenance (or at-power) preventive maintenance. Although the frequency and duration of the completion time may be estimated with the resulting unavailability calculated, discuss the effects that additional testing at power might have on plant risk due to improper maintenance or additional testing required that would have previously been performed during shutdown and not directly related to the extended completion time itself. Studies have shown that restoration failures have the potential to initiate a second loss of power that is difficult to diagnose and recover when that restoration was not always performed in accordance with established procedures.

12. WCAP-15622 discusses the risk impact of moving diesel maintenance activities from shutdown to at-power operation. WCAP-15622 found that performing scheduled maintenance activities at-power results in ICCDPs significantly smaller than for shutdown. The conclusion presented by WCAP-15622 were based on the analysis for one plant and were expected to be applicable for all plants that schedule emergency diesel generator maintenance at the beginning of the outage. It is not clear that a neutral or net risk impact improvement will result from the proposed shift to on-line EDG maintenance. While a qualitative argument could be

made with regard to performing maintenance on-line as opposed to shutdown, it is not clear that a quantitative argument applicable to all plants is would be bounding. Previous studies (NUREG/CR-5994) have indicated that with respect to core damage frequency, taking an emergency diesel generator out of service for maintenance during the early stages of an outage is comparable to short interval maintenance performed during power operation. However, the likelihood of core damage can be reduced substantially by scheduling long duration maintenance during refueling when decay heat is low as opposed to power operation. The staff also notes that the standard technical specifications do not differentiate when work may be performed (what plant state) and therefore any risk averted by performing maintenance during power operation is problematic. Provide a discussion as to the generic applicability of WCAP-15622 results including plants without low power shutdown risk models.

13. The topical report does not discuss whether each emergency diesel generator at a plant is equivalent from a risk perspective when taken out of service. Discuss any differences and the impact on the topical report conclusions. Additionally, discuss whether combining plant reliability data that may obscure the performance of individual emergency diesel generators at multi unit sites.

14. Will the proposed AOTs for EDGs / Vital 120 VAC power remain consistent with maintenance rule reliability goals or commitments for station blackout?

15. Provide a discussion on configuration risk management program implementation to avoid risk significant configurations during extended EDG and Vital 120 VAC power maintenance, repair, or overhaul.

16. Large Early Release Frequency (LERF) or ICLERP is not presented in WCAP-15622. Provide results and discussion.

18. Discuss considerations to prohibit entry or termination of an extended AOTs (maintenance) should external event conditions or warnings exist.

19. For EDG maintenance that is not performed every cycle (5 year EDG overhaul) the EDG overhaul completion time is averaged over a 5-year period. The topical report states that actual (proposed) CT times for ICCDP and realistic CT times for CDF are used. Provide an evaluation of the risk impact for EDG overhauls on ICCDP/ CDF using the actual completion times including EDG 5 year maintenance.

20. Section 7.1 of WCAP-15622 states that the proposed completion times primarily affect CDF and have only a secondary effect on containment integrity such that as the CDF increases the LERF will increase by a similar amount. In other words, if the core damage frequency increases by a set amount, the LERF will also increase by the same amount? Explain