ILLINOIS POWER COMPANY

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March 24, 1980

Andrew J. Szukiewicz
Instrumentation and Control Systems Branch
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Szukiewicz:

Clinton Power Station Units 1 & 2
Docket Nos. 50-461 and 50-462
Construction Permit No. CPPR-137 & CPPR-138

This is in reply to Mr. D. F. Ross, Jr. letter of February 5, 1980, whereby comments were solicited on NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment". Attachment "A" details our comments on the referenced document.

Sincerely,

G. E. Wuller

G. E. Wuller
Supervisor-Licensing
Generation Engineering Department

GEW/jh

Att.

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ADD:	ltr	Enc
S. Hanauer	1	1
S. Zwolinski	1	1
F. Akstulewicz	1	1

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Illinois Power Company Comments on NUREG-0588 (for comment issue)

1. Section 1.2(5)

   In general, surface temperature is not monitored directly during testing. Instead, the ambient air temperature at various locations within the test chamber is monitored. We assume the implication behind requesting measurements of surface temperature is to insure that the device has stabilized at the test temperature prior to timing its exposure. If so, revise this section to so state the above. If not, revise this section to clarify the reason for requesting component surface temperature to be monitored.

2. Section 1.3

   Add words, "where applicable" to this article.

3. Section 1.4.1

   It is stated that 1% of the remaining fission products are released instantaneously to the atmosphere. In contrast, Section 3 of Appendix D ignores these other fission products when determining the airborne sources. Elsewhere in Appendix D, it is stated that these other fission products are released instantly to the sump fluid at T=0. We recommend that this inconsistency be resolved with the other fission products being released to the sump fluid only.

4. Section 1.5(1)

   Comment 1 is applicable to this paragraph.

5. Section 1.5(3)

   Where Class 1E equipment is served by redundant environmental support systems, such as the main control room, this section should not be interpreted to mean the loss of both redundant support systems.

6. Section 2.1

   Throughout Section 2.1, reference is made to "accident" and "DBA." These terms should be defined. Comments pertaining to this section are predicated on the assumption that these terms mean LOCA or MSLB.

7. Section 2.1(3)

   With respect to the last sentence, does the term "operability" mean safety function?

   To what factors or conditions should "safety margin," as used in the last sentence, be applied?

8. Section 2.1(3a & b)

We interpret the equipment referred to in these sections to be that which is subjected to the environment of a LOCA or MSLB.

9. Section 2.1(3)(c)

This paragraph should be clarified to indicate applicability to safety-related equipment only. Non-safety-related equipment is not environmental qualified unless it falls into category 2.1(3)(b).

10. Section 2.2(1 & 2)

Will a failure criteria, which is based solely on the ability of the component to perform its safety function, be acceptable to the NRC?

11. Section 2.2(6)

Comment 1 is applicable to this section.

12. Section 2.2(8)

Add words, "where applicable" to this article.

13. Section 2.2(9)

Does continuous monitoring of equipment operability status mean that equipment is to be exercised throughout the test (e.g., coils energized, motors energized...)? If so, the statement is appropriate when actual environmental conditions are simulated. However, if accelerated aging temperatures are being used, the operability should only be checked at discrete intervals with components at anticipated ambient conditions.

14. Section 2.2(10)

If simulated event environment is accelerated, then voltage and frequency ranges should be applied at discrete intervals with components at anticipated ambient conditions.

15. Section 2.2(11)

The paragraph requires that "dust environments" should be addressed when establishing qualification service conditions. NRC should delete or be more definitive.

16. Section 3 (1 & 2)

It appears that three levels of margin are to be employed. The first is that applied during the derivation of plant conditions.

16. Section 3 (1 & 2) (continued)

The second would be for accident conditions to ensure enveloping postulated accident conditions, and the third would be in accordance with Section 6.3.1.5 of IEEE 323-1974 to account for normal variations in commercial production. Please confirm if the above understanding is correct. There is general concern in the industry regarding regulatory requirements resulting in the cascading of margins. In some instances this leads to unrealistic qualification testing parameters and results.

17. Section 3(4)

This position states that equipment which is required to only perform its safety function within a short period into the event (i.e., within seconds or minutes) is required to remain functional in the accident environment for a period of at least one hour in excess of the time assumed in the accident analysis. We feel that this qualification requirement is unnecessary for this type of equipment.

18. Section 4(3)

To date, contractor qualification procedures have not included testing methods which would establish synergistic effects.

19. Section 4(4)

The Arrhenius equation can be linearized by assuming activation energies are independent of temperature. The linear equation can be used to derive an accelerated aging time by inputing an aging temperature, the desired component life, and ambient temperature. The accelerated aging parameters are then used to type test the component. An alternate approach is to cycle material samples at a number of test temperatures until failure occurs. The data is then used to form a linear regression as described in IEEE 101, "IEEE Guide for the Statistical Analysis of Thermal Life Test Data." The regression line can be extrapolated to determine a life based on an ambient temperature. Do these approaches meet the NRC's intent of using the Arrhenius methodology?

20. Appendix D

The values given in the table on Page D-1 do not correspond to those in Tables D-5 through D-8. This inconsistency should be resolved.

21. Appendix D

The discussion in Appendix D, Section 7a, considers the airborne gamma and beta dose to the containment centerpoint plus the

21. Appendix D (continued)

gamma dose to that point from plateout on the containment walls. Why has the gamma and beta dose from plateout on centrally located equipment been ignored? In the past we have found this to be a significant source.

22. Appendix D

We assume that all doses calculated are for a dose point material of air. We would recommend normalizing dose to rads-carbon. This should be stated explicitly and thereby indicate the appropriate method of dosimetry to be applied when testing.

23. Appendix D

The discussion in Appendix D, Section 7b ("Surface Dose and Dose Rates"), considers the contribution from airborne beta and gamma sources and plated-out beta sources but it dismisses the plated-out gamma dose contribution as not being significant. The argument given for this is that "the coating is calculated to be relatively permeable to gammas with only about 1% of the plated-out gammas absorbed by the coating." This seems to be a case of misunderstanding of the definition of "dose," viz, $\Delta E/\Delta M$. Although the amount of energy deposited in a thin layer may be small, the mass of that thin layer is correspondingly small so that (attenuation ignored) the absorbed dose due to a given incident gamma field is independent of the coating thickness. (Note: Microdosimetric considerations such as electron equilibrium are second order effects and have no impact on the above mentioned concerns.)

24. Appendix D

Any justification of the assumption in Appendix D, Section 7b, that, "all betas directed toward the coating were assumed to be absorbed in the coating," would be analytically difficult. We feel that it would be more appropriate for the actual beta dose at a designated depth to be evaluated; the 10 mil. depth where adhesion occurs would probably be most appropriate.

25. Appendix D

Also in Appendix D, Section 7b, the method of dose evaluation to be applied to cable insulation layers is vague. Is it intended that the total absorbed energy be distributed throughout the mass of the insulation or that the dose determined for the coatings be applied to the entire cable insulation? The first method would under-estimate while the second would be an over-estimate. Once again, we recommend that it would be more appropriate to determine the actual beta dose at a predetermined critical depth. It should also be noted that Item 1.4.9 on Page 9 implies that the beta dose from plateout on cables can be ignored, but this contradicts Item 1.4.7 on Page 9.

26. Appendix D

A definition of "shielded" as it is used in Items 1.4.7 and 1.4.8 on Page 9 is needed.

27. Appendix D

Item 1.4.14 on Page 10 states that qualification levels given in Appendix D are adequate. However, the Appendix D analysis ignores the normal operation dose which is required in Item 1.4 on Page 7. This should be resolved.

28. Appendix D

The effect on radiation qualification of ECCS equipment leakage is mentioned on Page D-2. Was this effect ignored in the Appendix D analysis?

29. Appendix D

Table D-10 gives the dose rates near an ECCS recirculation pipe. To be useful, it is important to know the size of the pipe and the time post-accident for which the dose rates were determined. Integrated doses would be more useful for radiation qualification purposes than are the dose rates.

30. Appendix D

Our attempts to reproduce the evaluations of Appendix D lead us to believe that gamma buildup factors were not taken into account. We recommend that this consideration be included.

31. Appendix D

More consideration should be given to the accurate use of dosimetric terminology. Rad and R (Roentgen) are used interchangeably in the tables of Appendix D where they shouldn't be. In particular (for example), the use of R (Roentgen) to specify beta-dose is inappropriate. The Roentgen is a unit of "exposure" which is a dosimetric concept reserved for the measurement of ionization of air in a gamma or x-ray field. All doses must be given in rads, and for exactness should be given in rad-carbon, since at the high energies experienced post-accident the "Z" of the receiver material will have a significant effect on the absorbed dose from gammas.

32. Appendix D

A conflict exists between the postulated source term values in NUREG-0588 and NUREG-0578 (TMI Short Term Lessons Learned). The use of NUREG-0578 source terms will result in even higher values than those presently given in NUREG-0588.