



NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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October 7, 1991

Mr. Satish K. Aggarwal
Program Manager
Electrical & Mechanical Engineering Branch
Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Aggarwal:

Industry comments on the draft NRC NPAR report NUREG/CR 5762, "Comprehensive Aging Assessment of Circuit Breakers and Relays for Nuclear Plant Aging Research (NPAR) Program, Phase II," are enclosed for your use in finalizing this document.

These comments were coordinated by EPRI and reflect a detailed technical review by an EPRI key reviewer. As before, a copy of this letter has been sent directly to Wyle Laboratories for consideration in finalizing NUREG/CR-5762.

We appreciate the opportunity to review and comment on the draft NUREG. If you have any questions or wish to discuss the comments in further detail, please call.

Sincerely,

Alex Marion

Alex Marion
Manager, Technical Division

GBR/cma
Enclosure

cc: Document Control Room
J. F. Gleason, Wyle Laboratories

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Enclosure 1

The general comments are:

- Much of the testing envelopes are too conservative. For example, excessive cycling of breakers and relays does not reflect the actual equipment application.
- Both new and significantly degraded cases are provided. This may not allow selection of ISM techniques for detecting incipient degradation.
- It is not clear the extent to which vibration analysis provides conclusive insights to degraded conditions, i.e., the significance of different signatures during degraded conditions.
- Recommendations for testing and test intervals are often inconsistent and based on little data, sometimes as few as one or two data points.

The specific comments are:

- Table 2-3 Drop-out voltage has been used as one of the field tests for metal clad circuit breakers but this test is not part of the test envelope.
- Chapter 2 test envelopes are very conservative. Examples would be short time delay overcurrent testing to 2500 amps which is 10 times the rating; time current characteristics testing at 300%, 400%, and 500% of tap value current; etc.
- Chapter 3 does not indicate whether the initial conditions of the devices being tested provided acceptable performance or not. Assuming performance is acceptable, it tends to indicate that a significant amount of variability in the testing results is acceptable.
- The page 3-5 coil resistance conclusions appear to be inconsistent with the data in Figure 3-2. There does not appear to be any increased variability with age for the GE data.
- For the electronic relay, there was no information on initial condition testing and yet all ISM testing was considered "probably effective."

- Tables 5-2, 5-4, 5-6, 5-7, and 5-8, provide inconsistent results. That is, in many cases, the ISM testing is considered to be effective for initial condition testing and yet not effective for degraded conditions. As an example, Table 5-2 has 4 tests that are designated as effective or probably effective for initial conditions but ineffective for all degraded conditions. In many cases, the data from the figures in Chapters 3 and 4 do not agree with these tables nor the recommendations identified in Chapter 7. As an example, Table 5-2 "Coil Resistance" for the degraded condition of "Loose Connection" is identified as effective. However, the data in Figure 3-2 identify the test as ineffective.

- Recommendations listed in Chapter 7 are at times inconsistent with the data presented. The inconsistencies are:

Protective relays - Time/current characteristics, target and seal-in, and instantaneous trip do not yield meaningful results.

Control relays - pick-up voltage and drop-out voltage do not yield meaningful results.

Electronic relays - vibration may be a meaningful test. However, degraded condition spectra were provided without a comparison to baseline spectra.

Auxiliary relays - pick-up does not yield meaningful results. Drop-out voltage appears to provide meaningful results for the Westinghouse and not GE case.

Time relays - pick-up voltage tests do not yield meaningful results.

Molded case circuit breakers - insulation resistance, mechanical actuation, 300% overcurrent, and 100% rated current hold-in do not provide meaningful results.

Metal clad circuit breakers - pole resistance and insulation resistance tests do not yield meaningful results.