

NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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USNRC
ADMINISTRATION

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S. Aggarwal

January 19, 1994

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Mr. David L. Meyer
Chief, Rules Review and Directives Branch
Office of Administration
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Meyer:

On November 15-16, 1993, the NRC conducted a public workshop to discuss research possibilities in the area of environmental qualification (EQ). The NRC stated that public comments regarding the workshop received by December 17, 1993, will be considered, and that written comments received after that date will be considered to the extent practical (58 FR 51892). NUMARC¹ is submitting the enclosed comments on behalf of the nuclear power industry.

NUMARC's comments on EQ research was initially presented in prepared remarks at the workshop. The enclosure provides further comments based on discussions at the workshop. In general, we support the NRC's effort at identifying relevant issues in the EQ area for further research activity. We fundamentally agree that research into well-focused problem areas may contribute toward overall plant safety. However, absent a clear definition of problems and nexus to safety, we question the value of research that attempts to confirm the adequacy of current EQ requirements promulgated 10 to 15 years ago.

Specifically, our comments include suggestions for research to identify the safety significance of EQ equipment and for investigations into cable performance and, to a limited extent, condition monitoring. We suggest that some of this research may be coordinated with the Electric Power Research Institute in a cooperative effort. Further,

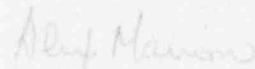
¹NUMARC is the organization of the nuclear power industry that is responsible for coordinating the combined efforts of all utilities licensed by the NRC to construct or operate nuclear power plants, and of other nuclear industry organizations, in all matters involving generic regulatory policy issues and on the regulatory aspects of generic operational and technical issues affecting the nuclear power industry. Every utility responsible for constructing or operating a commercial nuclear power plant in the United States is a member of NUMARC. In addition, NUMARC's members include major architect/engineering firms and all of the major nuclear steam supply system vendors.

Mr. David L. Meyer
January 19, 1994
Page 2

we believe that any NRC research effort should be carefully planned to avoid unnecessarily impacting utility resources.

We appreciate this opportunity to offer comments on the staff's research plan into the EQ area, and we look forward to future interactions with the NRC as the research effort develops. Please contact me or George Wu of the NUMARC staff should you have any questions.

Sincerely,



Alex Marion
Manager, Technical Division

GCW/cma
Enclosure

c: Mr. Eric S. Beckjord, NRC
Mr. Ashok C. Thadani, NRC
Mr. Tom J. Mulford, EPRI

NUMARC COMMENTS ON RESEARCH WORKSHOP ENVIRONMENTAL QUALIFICATION

General

NUMARC commends the NRC staff for its efforts at soliciting industry input and continuing interactions with the industry in implementing the Environmental Qualification (EQ) Task Action Plan (TAP), including the development of the research effort in support of the TAP. We believe that the workshop provided an excellent opportunity for the staff to obtain industry input regarding specific issues involved with EQ of safety-related electric equipment. Based on comments expressed by utility representatives at the workshop, NUMARC would like to provide the following input for consideration by the staff in the development of a research plan.

Extensive discussion occurred at the workshop on four major topics, including testing, preaging/preconditioning, operating experience, and condition monitoring. Concerns expressed primarily involved cable performance. Based on these discussions, our comments focus primarily on the following three areas: safety significance of EQ equipment; condition monitoring; and cable performance following prolonged aging.

Potential Research Areas

1. Safety Significance of EQ Equipment

Several comments expressed at the workshop indicated that probabilistic risk (or safety) assessments (PRAs) may be used for identifying the safety significance of EQ equipment, and that PRAs can provide insights on the relative significance of such equipment in the mitigation of or recovery from accidents. These insights may then provide the basis either for investigations to be directed toward equipment that have the most safety significance and identify priorities for further consideration, or for minimizing EQ efforts for non-risk significant equipment. We agree with this concept and suggest that the NRC develop research in the PRA area to evaluate the safety significance of EQ equipment. For example, we believe that existing PRA information contained in utility submittals of Individual Plant Examinations can be used to facilitate this research effort.

Further, since limited data exists on performance of qualified electric equipment in harsh environments due to actual accidents, and since data from operating experience to date are limited to routine operation, we believe that some investigation may be warranted to relate equipment performance in normal plant operation to performance of safety functions during accident situations. We believe that PRAs would be useful in such investigations.

In addition, some discussion occurred at the workshop on failure data recently generated in EQ testing of cables. We note that while a few data points may provide added

information on equipment failures in harsh environment for deterministic evaluations, a much larger volume of similar test data (including manufacturers' EQ tests) exists where the equipment have performed adequately under harsh conditions. Such data may provide substantial input to the development of a data base eventually necessary to a PRA, and relevant information should be gathered.

2. Condition Monitoring

There was substantial discussion at the workshop regarding the expected performance of qualified cables in harsh environments following prolonged aging in service conditions. The NRC's interest in the condition monitoring area appeared to be primarily concerned with the reassurance of cable qualification after a period of service time, and with the degrees of verification of cable condition that can be provided by monitoring techniques. Although we agree that such topics warranted technical interest and discussion, there did not appear to be any identified safety issue in this area.

While we are confident that the use of aging models is adequate to establish qualified life in compliance with regulations, and that existing maintenance and surveillance programs are sufficient for ensuring the continued performance of EQ equipment, we believe that research in the area of condition monitoring may be useful toward developing information for assessing the actual service life of equipment. We believe that the results of such research can be used to quantify the levels of conservatism provided by existing aging qualification techniques.

In particular, we suggest that research be performed to identify monitoring techniques that can provide information on actual equipment conditions following prolonged service in routine plant operation, and that can provide data for specifically quantifying aging qualification conservatisms. However, we see limited value from condition monitoring in directly contributing further toward plant safety, since we believe the existing aging qualification techniques are conservative and adequately comply with regulations. Use of condition monitoring may also allow the extended use of cables, which in some cases may currently have a qualified life of less than 40 years in plant areas with relatively severe normal temperature and radiation environments, due to the conservatisms in the aging qualification techniques. Accordingly, we suggest that the practical benefits of research in this area may be more useful to extending cable life in hot plant areas and to plant life extension rather than safety improvements.

Several monitoring techniques were discussed at the workshop, including some that are being developed and some that are currently available. We believe that the cable indenter technique that was developed in an EPRI effort appears to be a technique that may warrant further development along with others as appropriate. We also suggest that any NRC research into condition monitoring be pursued in cooperation with EPRI so that unnecessary duplication of effort can be avoided.

3. Cable Performance Following Prolonged Aging

Based on discussions at the workshop and on research efforts to date, we believe that there may be some benefit from further research into two specific areas of cable performance in harsh environment. Specifically, we believe that useful information may be generated in the areas of cable performance after prolonged aging in a service environment, and on identifying the impact of bonded jackets on such performance, particularly composite insulations consisting of dissimilar conductor jacket and conductor insulation materials.

More specifically, we note that the NRC aging research program already underway includes investigations into cable performance after prolonged artificial aging, some for more than 40 years of simulated life. Further, we understand the NRC plans to obtain in situ cable samples for testing from plants currently being decommissioned. We support the staff's efforts in this regard, in that cables from different plants can provide a diverse source of samples that represent different aging conditions. We believe that comparison of artificial aging data with cables naturally aged in service at nuclear plants can enhance understanding of actual aging mechanisms. Further, we believe that appropriate research may be useful for determining how cables perform in harsh environments after prolonged in-situ aging in actual plant environments. We also suggest that this research may be suitable as a cooperative effort between the NRC and EPRI.

In addition, we note that cable performance questions had been identified from recent tests conducted for the NRC by Sandia National Laboratories on bonded jacket cables. While we do not believe that the test results to date indicate a significant safety concern, we believe that those results show a need for further research in this area. We therefore support further research to determine the significance of any long term impact from bonded jackets on cable performance in a harsh environment.

Conclusion

In conclusion, NUMARC supports NRC research to investigate specific problems that may challenge the performance of safety-related electric equipment during exposure to design basis accident conditions. We believe this research can be focused in the three following areas: PRA investigations to provide insights on the safety significance of EQ equipment; development of condition monitoring techniques for identifying equipment aging qualification conservatism; and continued research into cable performance in a harsh environment after prolonged service aging. We appreciate the opportunity to interact with the staff in the development of a research plan.