

October 16, 2002

To: P. T. Kuo
Program Director, U. S. Nuclear Regulatory Commission

To: Mike Heath
Chairman, NEI License Renewal Electrical Working Group

Subject: Meeting Minutes from October 9, 2002, IEEE Working Group 3.4 Special Meeting to Draft Proposed Technical Changes to GALL Report Program XI.E2

Dear Sirs,

IEEE Working Group 3.4 is the group under the Nuclear Power Engineering Committee (NPEC) responsible for the treatment of matters relating to aging effects and aging assessments of electrical equipment at nuclear power plants.

Based on discussions with the License Renewal Electrical Working Group (LREWG), NRC staff and the NEI License Renewal Task Force, I became aware of the need for resolution of certain technical issues related to GALL Report aging management program XI.E2.

As a service, IEEE Working Group 3.4 held a special meeting on October 9, 2002, to discuss technical aspects of GALL Report XI.E2. The purpose of this meeting was to start the process for resolving specific technical issues with XI.E2, and to propose changes to XI.E2. The meeting was a success to the extent that several proposed changes were agreed upon, and the discussions during the meeting helped bring further understanding of the issues for all participants. This will help speed the process toward resolution of the issues. The three-hour meeting was attended by personnel from the industry, a national laboratory, and the NRC. An attendance list, along with a marked-up copy of XI.E2, which includes the proposed changes discussed at the meeting, are attached.

Minutes of the meeting and the draft proposed changes worked out in the meeting are being provided to the NRC and to the NEI LR Electrical Working Group for your awareness and to use as you wish. I hope you find them useful.

Sincerely,



Paul Colaianni
Chairman, IEEE WG 3.4

cc: Paul Shemanski, Secretary, IEEE WG 3.4
(for distribution to IEEE WG 3.4 Members)

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**IEEE Working Group 3.4
Special Meeting to Draft Proposed Technical Changes to
GALL Report Program XI.E2
October 9, 2002**

MEETING MINUTES

The meeting was called to order at 9:00 am by Paul Colaianni, Chairman. Paul first explained how the meeting came about and the purpose of the meeting, which was to have a technical discussion of GALL XI.E2 and to draft proposed changes to the program text to improve the program's usefulness and applicability. He also identified topics that were not the subject of the meeting – discussions of eliminating XI.E2 from GALL, and comparison of XI.E2 to other GALL programs regarding adequacy. GALL XI.E2 was to be discussed, not something else. This was followed by comments and questions from other attendees, and then by attendees introducing themselves around the room.

Paul Shemanski, Secretary, then discussed the background of program XI.E2. This program was proposed in the Calvert Cliffs license renewal application to manage aging of non-environmentally qualified cables used in specific applications that are sensitive to a reduction in insulation resistance, which could be caused by age degradation. The applications are neutron monitoring and radiation monitoring. The Calvert Cliffs application was the first to be reviewed by NRC, and the staff accepted the calibration program as an aging management program for these cables. Subsequently, the GALL report was developed and this calibration program was included in GALL since the objective of that effort was to capture all aging management programs previously reviewed and accepted by the NRC. As other plants attempted to implement the calibration program, as described in the GALL report, concerns arose as to whether the program is useful and generically applicable to other plants.

Several plant representatives then spoke about how each of their plants works with and maintains radiation and neutron monitoring systems, which sparked numerous questions and discussions. This provided the attendees with some knowledge of the broad nature of current activities being performed. Some general observations were noted, such as the Calvert Cliffs program was placed into the GALL without any attempt to make it generic to all plant practices. This was in contrast with the program description that was generated for the EQ program, which started from the Oconee description and then specific areas were generalized to make a generically applicable program description.

From the discussions, several issues were raised that challenged the usefulness of the GALL XI.E2 program, including the following:

- Calibration programs are not always included in the plant technical specifications;
- Calibrations are sometimes performed during operation, in which an instrument that may have drifted, but is still within its acceptance range, may be adjusted without recording any data;

- Components in instrument circuits are frequently replaced, which would void the trending of calibration data since the circuit characteristics would be changed

The basic purpose of the program is to help manage the aging of these special application cables. The current program is written based on how Calvert Cliffs does this. It was generally agreed that the descriptions could be broadened to encompass other plants while still accomplishing the basic purpose. These discussions continued until 10:15 am when a break was declared.

Following the break, Paul C. directed the attendees through the program text, paragraph by paragraph. The basic approach was to broaden the descriptions to encompass other plants and come up with text that was agreeable to all. The agreed upon text changes are shown in the attachment. Although there was no agreement on the frequency of actions, there seemed to be general agreement that the periodic actions of gathering and reviewing calibration/surveillance records for significant information was an adequate means of implementing a program for these cables.

Even though the meeting ran long, there was not time to review the entire program. The introduction and program elements 1, 2 and 4 were reviewed during the meeting. The meeting was adjourned at approximately 12:30 pm.

XI.E2 ELECTRICAL CABLES NOT SUBJECT TO 10 CFR 50.49 ENVIRONMENTAL QUALIFICATION REQUIREMENTS USED IN INSTRUMENTATION CIRCUITS

Program Description

In most areas within a nuclear power plant, the actual ambient environments (e.g., temperature, radiation, or moisture) are less severe than the plant design environment. However, in a limited number of localized areas, the actual environments may be more severe than the plant design environment for those areas. Conductor insulation materials used in electrical cables may degrade more rapidly than expected in these adverse localized environments. An adverse localized environment is a condition in a limited plant area that is significantly more severe than the specified service environment for the cable. An adverse variation in environment is significant if it could appreciably increase the rate of aging of a component or have an immediate adverse effect on operability.

Exposure of electrical cables to adverse localized environments caused by heat or radiation can result in reduced insulation resistance (IR). Reduced IR causes an increase in leakage currents between conductors and from individual conductors to ground. A significant reduction in IR is a concern for circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation since it may contribute to inaccuracies in the instrument loop circuits.

The purpose of the aging management program described herein is to provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are used in instrumentation circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation. This program considers the technical information and guidance provided in NUREG/CR-5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.

In this aging management program, ~~routine calibration tests performed as part of the plant surveillance test program~~ reviews of calibration results or findings of surveillance programs are used to identify the potential existence of aging degradation. For example, when an instrumentation loop circuit is found to be significantly out of calibration during routine surveillance testing, trouble shooting is performed on the loop, additional evaluation of the circuit, including the instrumentation cable, is performed.

As stated in NUREG/CR-5643, "The major concern with cables is the performance of aged cable when it is exposed to accident conditions." The statement of considerations for the final license renewal rule (60 Fed. Reg. 22477) states, "The major concern is that failures of deteriorated cable systems (cables, connections, and penetrations) might be induced during accident conditions." Since they are not subject to the environmental qualification requirements of 10 CFR 50.49, the electrical cables covered by this aging management program are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed.

Evaluation and Technical Basis

- 1. Scope of Program:** This program applies to electrical cables used in circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation that are within the scope of license renewal.
- 2. Preventive Actions:** ~~This is a surveillance testing program and~~ No actions are taken as part of this program to prevent or mitigate aging degradation.

3. **Parameters Monitored/Inspected:** The parameters monitored are determined from the plant technical specifications and are specific to the instrumentation loop being calibrated, as documented in the surveillance test procedure.
4. **Detection of Aging Effects:** Review of calibration results or findings of surveillance programs can provide sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptance criteria related to instrumentation loop circuit performance. Periodic reviews, at least every ?? years, of results obtained during the normal calibrations or surveillances frequency specified in the plant technical specifications provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests reviews for license renewal are to be completed before the period of extended operation.
5. **Monitoring and Trending:** Trending actions are not included as part of this program because the ability to trend test results is dependent on the specific type of test chosen. Although not a requirement, test results that are trendable provide additional information on the rate of degradation.
6. **Acceptance Criteria:** Calibration readings are to be within the loop-specific acceptance criteria, as set out in the plant technical specifications surveillance test procedures.
7. **Corrective Actions:** Corrective actions such as recalibration and circuit trouble-shooting are implemented when an instrument loop is found to be out of calibration. As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address corrective actions.
8. **Confirmation Process:** As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the confirmation process.
9. **Administrative Controls:** As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address administrative controls.
10. **Operating Experience:** Operating experience has shown that a significant number of cable failures are identified through routine calibration testing. Changes in instrument calibration can be caused by degradation of the circuit cable and are one indication of potential electrical cable degradation.

References

- EPRI TR-109619, Guideline for the Management of Adverse Localized Equipment Environments, Electric Power Research Institute, Palo Alto, CA, June 1999.
- IEEE Std. P1205-2000, IEEE Guide for Assessing, Monitoring and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations.
- NUREG/CR-5643, Insights Gained From Aging Research, U. S. Nuclear Regulatory Commission, March 1992.
- SAND96-0344, Aging Management Guideline for Commercial Nuclear Power Plants - Electrical Cable and Terminations, prepared by Sandia National Laboratories for the U.S. Department of Energy, September 1996.

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Special Meeting to Draft Proposed Technical Changes to
GALL Report Program XI.E2
October 9, 2002**

ATTENDANCE LIST

IEEE WG 3.4 Members in Attendance:

Paul Colaianni, Chairman	Duke Energy	704-382-5632
Paul Shemanski, Secretary	NRC/NRR	301-415-1377
Robert Lofaro, Member	Brookhaven National Lab	631-344-7191

Others in Attendance:

Duk Nguyen	NRR/DE/EEIB	301-415-3202
Amar Pal	NRR/DE/EEIB	301-415-2760
Steven Schellin	Nuclear Mgmt Co-PBNP	920-755-6451
Cary Martin	Southern Nuclear	205-992-5167
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