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Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Industry Comments on License Renewal Interim Staff Guidance Documents

PROJECT NUMBER: 690

Dear Dr. Kuo:

We are providing with this letter the industry comments on the following three license renewal Interim Staff Guidance (ISG) documents:

- ISG-6, *Proposed Interim Staff Guidance (ISG) on Screening of Housings for Active Components for License Renewal*, dated April 8, 2003
- ISG-15, *Proposed Interim Staff Guidance (ISG)-15: Revision of Generic Aging Lessons Learned (GALL) Aging Management Program (AMP) XI.E2, "Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits,"* dated August 12, 2003
- ISG-16, *Information to be included in the License Renewal Application (LRA) for Time-Limited Aging Analyses (TLAAs)*, dated May 12, 2003

These comments are provided in Enclosures 1 through 3, respectively.

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We appreciate the opportunity to provide industry input in these areas, and look forward to the early resolution of any remaining issues.

Should you have any questions, please contact me at 202.739.8080 or Fred Emerson at 202.739.8086.

Sincerely,

Alex Marion

Enclosures

c: K. Steven West, NRC

Enclosure 1

Industry Comments on ISG-6

Industry recommends that ISG-6 be closed and withdrawn. The language from the following excerpt from page E-5 of NEI 95-10, Revision 4, *Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,"* provides sufficient guidance to licensees and eliminates the need for an Interim Staff Guidance document on this issue.

> "ISG-06, Identification and Treatment of Housings for Active Components
>
> > The NRC staff position modified by NEI is: A license renewal applicant must consider the non-active part of a component that performs a function within the scope of Part 54 (e.g. pump casings, valve bodies, and housings for fans and dampers). The proper implementation of the Rule requires that screening evaluations consider not just the active mechanical component but also the intended function of its associated housing for pumps, valves, heat exchangers, dampers and fans."

Appendix B of NEI 95-10 was changed in Revision 4 to show that housings for various active components are subject to aging management review.

Industry Comments on ISG-15

The following line-in, line out comments on ISG-15 are provided.

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~~ is 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, or moisture can result in reduced insulation resistance (IR). Reduced IR causes an increase in leakage currents between conductors and from individual conductors to ground. A reduction in IR is a concern for circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation circuits since it may contribute to signal inaccuracies ~~in instrument 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, either of two methods are ~~calibration results or findings of surveillance testing programs are~~ used to identify the existence of aging degradation. In the first method, calibration results or findings of surveillance testing programs are evaluated to identify the existence of cable aging degradation. ~~For example,~~ In the second method, direct testing of the cable is performed.

This aging management program applies to high-range-radiation and neutron flux monitoring instrumentation cables in addition to other cables used in high voltage, low-level signal applications that are sensitive to reduction in insulation resistance. For these cables ~~XI.E1~~ XI.E1 does not apply.

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 statements of consideration 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 high voltage, low-level signals such as radiation monitoring and nuclear instrumentation that are ~~within the scope of license renewal~~ subject to aging management review.

2. **Preventive Actions:** 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 specific calibrations, surveillances, or testing performed and are based on the specific instrumentation circuit under surveillance or being calibrated, as documented in ~~the surveillance~~ plant procedures.

4. **Detection of Aging Effects:** Review of calibration results or findings of surveillance programs can provide an indication of the existence of aging effects ~~by monitoring key parameters and providing data~~ based on acceptance criteria related to instrumentation circuit performance. By reviewing the results obtained during normal calibration or surveillances, ~~the~~ an applicants may detect severe aging degradation prior to the loss of the cable intended function. The first reviews will be completed before the end of the initial 40-year license term and at least every 10 years thereafter. All calibration or surveillance results that fail to meet acceptance criteria will be reviewed for aging effects ~~as soon as~~ when the results are available. ~~The first reviews will be completed before the end of the initial 40-year license term and every 10 years thereafter.~~

   In cases where ~~cables are not part of~~ a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results described above, the applicant will perform cable testing. A proven cable test for detecting deterioration of the insulation system (such as insulation resistance tests, time-domain reflectometry tests, or other testing judged to be effective in determining cable insulation condition) will be performed. The first test shall be completed prior to the end of the initial 40-year license term and every 10 years thereafter. ~~The test frequency of these cables shall be determined by the applicant based on engineering evaluation not to exceed ten years. The first test will be completed before the end of the initial 40-year license term.~~

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 results or findings of surveillances are to be within the acceptance criteria, as set out in ~~the surveillance~~ procedures.

7. **Corrective Actions:** Corrective actions such as recalibration and circuit trouble-shooting are implemented when calibration or surveillance results or findings of surveillances do not meet the acceptance criteria. 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 identified a case where a change in temperature across a high range radiation monitor cable in containment resulted in substantial change in the reading of the monitor. Changes in instrument calibration can be caused by degradation of the circuit cable and are a possible indication of electrical cable degradation.

    The vast majority of site specific and industry wide operating experience regarding neutron flux instrumentation circuits is related to cable/connector issues inside of containment near the reactor vessel. ~~There is comparatively far less operating experience in the other more benign areas of the plant.~~

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 E 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.

NRC Information Notice 97-45, Environmental Qualification Deficiency for Cables and Containment Penetration Pigtails, U. S. Nuclear Regulatory Commission, July 2, 1997 and Supplement 1, February 17, 1998.

Enclosure 3

Industry Comments on ISG-16

The language in ISG-16 relative to neutron embrittlement is acceptable with changes as noted in the line-in, line out version below. These comments deal with the specifics in Section 4.2, Reactor Vessel Neutron Embrittlement. This section specifies the information that is needed to address neutron embrittlement of the reactor vessel.

The ISG discussion of requirements for metal fatigue analysis, environmental qualification of electrical equipment, concrete containment tendon prestress analysis, and other plant-specific TLAAs is not required because existing NRC and industry guidance is sufficient to identify the information deemed important for describing these analyses. We understood the NRC staff views to be as follows during a meeting with NRC on April 22, 2003:

- Neutron embrittlement should be the focus of ISG-16
- Other TLAAs can be listed in the ISG as having sufficient guidance available to address them
- LRAs should provide enough information so that staff can state that "actions have been identified" to address these areas
- RAIs can be minimized and the application review process can be more efficient if applicants review the appropriate RAIs on previous LRAs to determine what is sufficient information to provide in the LRA

Further, since some of the ISG discussion for these other TLAAs, particularly for environmental qualification of electrical equipment, is ambiguous or redundant to other guidance (*e.g.*, GALL), this information may be counterproductive and impede the review process. Therefore, we recommend that only the staff views on neutron embrittlement TLAAs be reflected in ISG-16, and specific recommendations for other TLAAs be removed.

The line-in, line-out comments on Section 4.2 of ISG-16 are provided below.

Section 4.2, Reactor Vessel Neutron Embrittlement

The applicant should provide the following information for the staff to confirm all Upper Shelf Energy (USE) and Adjusted Reference Temperature (ART) calculations for the period of extended operation:

All Applicants

1. The applicant should identify the neutron fluence at the inside surface and the 1/4T location of the reactor vessel for each ~~balkline~~ baseline material (limiting weld and shell) at the expiration of the license renewal period. For BWRs, the fluence analysis should extend beyond the top and bottom of the active fuel extending to those portions of the reactor vessel that experience a fluence of 1×10^{17} n/cm^2. For PWRs, there may not be sufficient dosimetry, within surveillance specimen capsules, to validate these analyses. The applicant should identify the number of effective full power years (EFPY) corresponding to the expiration of the license renewal period and justify the assumptions used to determine the EFPY (i.e. unit capacity factors). The applicant should identify the methodology used in determining the neutron fluence and identify whether the methodology used in determining the generation of the fluence was previously approved by the NRC. The methodology should also follow~~ed~~ the guidance in Regulatory Guide (RG) 1.190 and justify any exceptions taken to RG 1.190.

2. The applicant should provide the following information for the staff to confirm the applicant's USE analysis meets the requirements of Appendix G of 10 CFR Part 50 at the end of the license renewal period:

   a) For each beltline material~~s~~ with USE that is projected to ~~exceed~~ be less than 50 ft-lb. at the end of the license renewal period, the applicant should provide the unirradiated Charpy USE, the projected Charpy USE at the end of the license renewal period, whether the drop in Charpy USE was determined using the limit lines in Figure 2 of RG 1.99, Revision 2 or from surveillance data and the percentage copper.

   b) If an equivalent margins analysis was required to demonstrate compliance with the USE requirements in Appendix G of 10 CFR Part 50, the applicant should provide the analysis or identify an approved topical report that contains the analysis. Information the applicant should provide for the staff to assess the equivalent margins analysis includes: the unirradiated USE (if available) for the limiting material, its copper content, the fluence (1/4T ~~and at 1-inch depth~~), the EOLE USE (if available), the operating temperature in the down comer at full power, the vessel radius, the vessel wall thickness, ~~the J-applied analysis for Service Level C and D,~~ the vessel accumulation pressure, and the vessel bounding heatup/cooldown rate during normal operation. Note that Appendix G of 10 CFR Part 50 applies to Service Levels A and B, which include normal operation and anticipated operational occurrences. For this reason, J-applied analysis for Service Levels C and D is not required. Additionally, a fluence analysis at 1 inch reactor vessel depth (which is less than 1/4T) is not necessary as this is only a requirement of J-applied analysis and does not apply to Service Levels A and B.

3. The applicant should ~~describe differences in~~ use the data (copper, ~~nickle~~ nickel, unirradiated RT_{NDT}, chemistry factor, and method of calculating chemistry factor) submitted in the ~~application to the data~~ applicant's responses to GL 92-01, Revision 1; GL 92-01, Revision 1, Supplement 1, or other subsequent submittals to the NRC. An applicant using other data must describe the differences and justify its use.

Pressurized Water Reactors

The applicant should provide the following information for the staff to confirm the applicant's Pressurized Thermal Shock (PTS) analysis results in RT_{PTS} values below the screening criteria in 10 CFR 50.61 at the end of the license renewal period:

1. For each beltline material the applicant should provide the unirradiated RT_{NDT}, the method of calculating the unirradiated RT_{NDT} (either generic or plant-specific), the margin, the amount of copper and nickel ~~nickle~~, the chemistry factor, the method of calculating the chemistry factor, the mean value for the shift in transition temperature and the RT_{PTS} value.

2. If there are two or more data for a surveillance material that is from the same heat of material as the beltline material, the applicant should provide analyses to determine whether the data are credible in accordance with RG 1.99, Revision 2 and whether the margin value used in the analysis is appropriate.

3. If there are two or more data for a surveillance material that is not from the same heat of material as the beltline material, the applicant should provide analyses of the data to determine whether the data is consistent with the RG 1.99, Revision 2 methodology.

Boiling Water Reactors

1. The applicant should evaluate beltline materials in accordance with Renewal Applicant Action Items 10, 11, and 12 in ~~the staff's safety evaluation report (SER), for~~ BWRVIP-74-A Appendix C ~~(Letter to C. Terry dated October 18, 2001; ADAMS Accession No. ML012920549)~~. Action items 11 and 12 in BWRVIP-74-A Appendix C only apply to those applicants seeking relief from reactor vessel circumferential weld inspection. The analysis required by action items 11 and 12 should not be required if the licensee commits to management of the aging effects on circumferential welds (i.e. periodic inspections). If such analyses are required, then the applicant should receive an exemption from inspection of the circumferential welds during the extended period of operation.

2. The applicant should identify whether there are two or more sets of material surveillance data available that are relevant to the RPV beltline materials. If there are two or more data for a surveillance material, the applicant should provide analyses of the data to determine whether the data are consistent with the RG 1.99, Revision 2 methodology that was utilized in the BWRVIP-74 analyses.

~~Additional TLAAs for BWRs~~

1. ~~The applicant should evaluate all TLAAs identified in NRC license renewal SERs for the BWRVIP programs.~~