May 12, 2003

Mr. Alex Marion
Director of Engineering
Nuclear Energy Institute
1776 I St., NW
Suite 400
Washington, DC 20006-3708

Mr. David Lochbaum
Union of Concerned Scientists
1707 H St., NW
Suite 600
Washington, DC 20006-3919

SUBJECT: PROPOSED INTERIM STAFF GUIDANCE (ISG)-16: TIME-LIMITED AGING ANALYSES (TLAAs) SUPPORTING INFORMATION FOR LICENSE RENEWAL APPLICATIONS

Dear Messrs. Marion and Lochbaum:

The purpose of this letter is to provide you with an opportunity to comment on the supporting information for time-limited aging analyses (TLAAs) that should be included in license renewal applications (LRAs) to maximize the efficiency of the review process and minimize request for additional information (RAI). The staff discussed this with the Nuclear Energy Institute (NEI) in a public meeting on April 22, 2003. In general, the staff believes an applicant should review the staff RAIs on previous LRAs and address them in its application, as appropriate, to minimize the RAIs on its application. At that meeting, it was agreed that this topic should be addressed through the ISG process to document the lessons learned.

Chapter 4 of NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), provides guidance to NRC reviewers on TLAAs. Enclosed is proposed staff guidance on the information that should be included in the LRA to address the identification of TLAAs (Section 4.1 of the SRP-LR), reactor vessel neutron embrittlement analysis (Section 4.2 of the SRP-LR), metal fatigue analysis (Section 4.3 of the SRP-LR), environmental qualification of electrical equipment (Section 4.4 of the SRP-LR), concrete containment tendon prestress analysis (Section 4.5 of the SRP-LR), containment liner plate, metal containments, and penetrations fatigue analysis (Section 4.6 of the SRP-LR), and other plant-specific TLAAs (Section 4.7 of the SRP-LR). The staff developed the enclosure based on lessons learned from reviewing LRAs where some RAIs were sent repeatedly to many applicants.

The staff seeks stakeholders comments on this proposed ISG to clarify the contents in an LRA regarding TLAAs. When finalized, the staff plans to incorporate the information into the license renewal guidance documents (that is, SRP-LR, Generic Aging Lessons Learned Report, and Regulatory Guide 1.188), as appropriate. NEI may want to consider comparable changes in TLAAs to NEI 95-10, Revision 3 "Industry Guidance for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

If you have any questions regarding this matter, please contact Peter Kang at 301-415-2779.

Sincerely,

/***RA***/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project 690

Enclosure: As stated

cc w/encls: See next page

The staff seeks stakeholders comments on this proposed ISG to clarify the contents in an LRA regarding TLAAs. When finalized, the staff plans to incorporate the information into the license renewal guidance documents (that is, SRP-LR, Generic Aging Lessons Learned Report, and Regulatory Guide 1.188), as appropriate. NEI may want to consider comparable changes in TLAAs to NEI 95-10, Revision 3 "Industry Guidance for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule."

If you have any questions regarding this matter, please contact Peter Kang at 301-415-2779.

Sincerely,

/***RA***/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project 690

Enclosure: As stated

cc w/encls: See next page

Distribution:
See next page

C:\ORPCheckout\FileNET\ML031320798.wpd

OFFICE	LA:RLEP:DRIP	PM:RLEP:DRIP	SC:RLEP:DRIP	PD:RLEP:DRIP
NAME	YEdmonds (Ltr. Only)	PKang (KChang for)	SLee	PTKuo
DATE	5/7/03	5/7/03	5/8/03	5/12/03

OFFICIAL RECORD COPY

DISTRIBUTION: Letter to Messrs. Marion and Lochbaum, Dated: May 12, 2003

HARD COPY
RLEP RF
P. Kang
K. Chang
E-MAIL:
PUBLIC
W. Borchardt
D. Matthews
F. Gillespie
C. Grimes
RidsNrrDe
E. Imbro
G. Bagchi
K. Manoly
W. Bateman
J. Calvo
C. Holden
P. Shemanski
H. Nieh
H. Walker
S. Black
B. Boger
D. Thatcher
R. Pettis
G. Galletti
C. Li
J. Moore
R. Weisman
M. Mayfield
A. Murphy
W. McDowell
S. Smith (srs3)
S. Duraiswamy
T. Kobetz
C. Munson
RLEP Staff

A. Thadani
C. Julian
R. Gardner
M. Farber
M. Modes
J. Vora
L. Kozak

Information to be included in the License Renewal Application (LRA)
for Time-Limited Aging Analyses (TLAAs)

Section 4.1, Identification of TLAAs

1. Plant specific TLAAs are defined by the six criteria of 10 CFR 54.3 and are consistent with the guidance provided in NEI 95-10. Tables 4.1-2 and 4.1-3 in NUREG-1800 identify potential TLAAs determined from the review of previous LRAs. The applicant should address each item in these tables. If an item is not applicable to the applicant's facility, the applicant should state that in the LRA. The staff also plans to update these tables to capture additional LRA review experience.

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:

<u>All Applicants</u>

1. The applicant should identify the neutron fluence at the inside surface and the 1/4T location for each balkline material at the expiration of the license renewal period. The applicant should identify the methodology used in determining the neutron fluence and identify whether the methodology followed the guidance in Regulatory Guide (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 materials that is projected to exceed 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.

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

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 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 (Letter to C. Terry dated October 18, 2001; ADAMS Accession No. ML012920549).

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.

Section 4.3, Metal Fatigue Analysis

1. If a fatigue monitoring program (FMP) is used to track the number of operational transient cycles at the facility, the applicant should provide the following information:

a) The number of design cycles, current number of operating cycles, and the number of cycles projected for 60 years of plant operation for each transient and how these cycle counts are determined.

b) For partial cycle transients (as defined in ASME B&PV Code Section III), the method used to determine the fraction of a full cycle.

c) A comparison of the transients monitored with the transients described in the final safety analysis report (FSAR) and discuss the reason for FSAR transients, if any, that are not monitored.

2. The applicant should provide data or references to justify any statement that the number of transients projected to occur during a 60-year term is less than the number of transients originally postulated for 40 years of operation.

3. The applicant should address transient cycles for the pressurizer surge line and the pressurizer for PWR plants. Several plants modified heatup and cooldown procedures to mitigate the pressurizer insurge/outsurge transients in the late 1990s. The applicant should justify the projected transient cycles in view of the past and future heatup and cooldown methods.

4. Standard fatigue analyses stress reports may be referenced or used in plant specific TLAA for certain systems, structures, and components. The applicant should provide justification for the direct applicability of these stress reports to the plant.

5. For BWR plants, the fatigue analysis of the core shroud supports could have been reevaluated for the effects of increased recirculation pump starts with the loop outside thermal limits. The limiting fatigue usage for the core shroud and the jet pump assembly may be based on the standard evaluation of a plant with similar configuration. The applicant should justify the applicability of the standard evaluation and indicate whether the increase in recirculation pump starts has any impact on the fatigue usage of the core shroud and jet pump assembly.

6. Applicants of Westinghouse facilities should address the applicant action items identified in the Westinghouse topical reports, regardless of whether they intend to incorporate the reports, because these are specific technical issues identified by the staff for Westinghouse facilities.

7. For ASME Class 2 and 3 or USAS B31.1 piping systems where the number of cycles is projected to exceed 7,000, the applicant should provide the estimated cycles for the period of extended operation and a positive statement that the evaluation for the projected number of cycles demonstrates that the calculated stresses meet the allowable stresses in the design code for the projected number of cycles.

8. The staff assessed the impact of reactor water environment on fatigue life at high fatigue usage locations and presented the results in NUREG/CR-6260, "Application of NUREG/CR-5999, ‘Interim Fatigue Curves to Selected Nuclear Power Plant Components’," March 1995. Formulas currently acceptable to the staff for calculating the environmental correction factors (F_{en}) for carbon and low-alloy steels are contained

in NUREG/CR-6583, "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," and those for austenitic stainless steels are contained in NUREG/CR-5704, "Effects of LWR Coolant Environments on Fatigue Design of Austenitic Stainless Steels." The applicant should provide the results of environmental assisted fatigue adjusted CUF calculation for each of these locations listed in NUREG/CR-6260 considering the applicable F_{en} provided in NUREG/CR-6583 and NUREG/CR-5704 reports.

9. The applicant should describe any activities to be implemented based on the results of the environmental fatigue evaluations.

10. The FSAR supplement should provide a summary description of the environmental fatigue evaluation and should include licensee commitments for further actions prior to the period of extended operation (for example, licensee commitments regarding the surge line).

Section 4.4, Environmental Qualification of Electrical Equipment

1. The applicant should identify which option in 10 CFR 54.21(c)(1) they have selected to meet the TLAA requirement for environmental qualification (EQ).

2. The applicant should provide additional information on the following:

   a) whether there have been any major plant modifications or events at the applicant's plant of sufficient duration to have changed the temperature and radiation values that were used in the underlying assumptions in the EQ calculations,

   b) whether the conservatism in the EQ equipment qualification analyses is sufficient to absorb environmental changes occurring due to plant modification and events, and

   c) the specific controls used to monitor changes in plant environmental conditions to periodically validate the environmental data used in analyses.

3. The applicant should address whether the wear cycle aging effect is applicable to equipment within the EQ program, including motors, limit switches, and electric connectors.

Section 4.5, Concrete Containment Tendon Prestress Analysis

1. The applicant should pay special attention to the "acceptance criteria" of the GALL report in addressing 10 CFR 54.21(c)(1)(iii). The applicant should plot the prestressing trend lines for each group of tendons, as part of the operating experience.

Section 4.6, Containment Liner Plate, Metal Containments, and Penetrations Fatigue Analysis

1. The buckling load of the liner plate was calculated in the design analysis. Loads on containment linear and penetration sleeves may cycle but buckling will not occur if they are lower than the buckling load. The applicant should describe the analysis performed to derive the buckling load and provide the usage factor based on component stresses calculated from the buckling load to show the containment liner plate/penetration sleeves meets the design code fatigue acceptance criteria for the renewed license period.

2. The allowable cycles of heatup and cooldown were determined from the analysis of concrete temperature. The applicant should provide the heatup and cooldown temperatures used in the analysis and confirm whether a thermal fatigue analysis for concrete was performed. The applicant should describe the analysis concept and procedures, and the expected condition of concrete at the end of the allowable cycles. In addition, the applicant should justify the projected number of cycles in 60-year of operation, accounting for shutdowns due to maintenance or other reasons.

3. The applicant should identify the design code for the penetration components.

Section 4.7, Other Plant-Specific TLAAs

1. If applicable, the applicant should perform a reactor coolant pump flywheel fatigue growth analysis to ensure that pressure boundary is maintained against flywheel missile.

2. For CE half-nozzle designs and mechanical nozzle seal assemblies, the applicant should perform fatigue crack and ferritic boric acid corrosion assessments if relief has been granted to use either of these alternatives for repairing or replacing leaking Class 1 Alloy 600/690 nozzles.

3. The applicant should review previous NRC-approved leak-before-break (LBB) analysis to determine whether the assumptions and results of the LBB analysis are still bounding for the extended period of operation.

4. The staff considers pipe break postulation based on fatigue usage factor a TLAA. If an applicant postulated pipe breaks based on fatigue usage, then the applicant should evaluate this as a TLAA.

5. For TLAAs involving proprietary information, the applicant should stride to provide sufficient non-proprietary description and evaluation information in the LRA for the staff review. If the staff requires more detail information that is proprietary after reviewing the LRA, the applicant should submit the proprietary information, along with a non-proprietary version, in accordance with 10 CFR 2.790.

NUCLEAR ENERGY INSTITUTE

Project No. 690

cc:

Mr. Joe Bartell
U.S. Department of Energy
NE-42
Washington, DC 20585

Ms. Christine S. Salembier
Commissioner
State Liaison Officer
Department of Public Service
112 State St., Drawer 20
Montipelier, VT 05620-2601

Mr. Fred Emerson
Nuclear Energy Institute
1776 I St., N.W., Suite 400
Washington, DC 20006-3708

Mr. Stephen T. Hale
Florida Power & Light Company
9760 S.W. 344 St.
Florida City, FL 33035

Mr. William Corbin
Virginia Electric & Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. Frederick W. Polaski
Manager License Renewal
Exelon Corporation
200 Exelon Way
Kennett Square, PA 19348

George Wrobel
Manager, License Renewal
R.E. Ginna Nuclear Power Plant
1503 Lake Rd.
Ontario, NY 14519

Ronald B. Clary
Manager, Plant Life Extension
V.C. Summer Nuclear Station
Bradham Blvd.
P.O. Box 88
Jenkinsville, SC 29065

Mr. John B. Herman
Manager - Nuclear Licensing
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 550
Fort Calhoun, NE 68023-0550

Mr. Paul Gunter
Director of the Reactor Watchdog Project
Nuclear Information & Resource Service
1424 16th St., NW, Suite 404
Washington, DC 20036

Mr. Hugh Jackson
Public Citizen's Critical Mass Energy & Environment Program
215 Pennsylvania Ave., SE
Washington, DC 20003

Mary Olson
Nuclear Information & Resource Service
Southeast Office
P.O. Box 7586
Asheville, NC 28802

Talmage B. Clements
Manager - License Renewal
Nuclear Engineering Services
CP&L
410 South Wilmington St.
Raleigh, NC 27602