

## **4.7 OTHER PLANT-SPECIFIC TIME-LIMITED AGING ANALYSES**

### **Review Responsibilities**

**Primary** - Branch responsible for engineering

**Secondary** - Other branches responsible for systems, as appropriate

#### **4.7.1 Areas of Review**

There are certain plant-specific safety analyses that may have been based on an explicitly assumed 40-year plant life (for example, aspects of the reactor vessel design) and may, therefore, be time-limited aging analyses (TLAAs.) Pursuant to 10 CFR 54.21(c), a license renewal applicant is required to evaluate TLAAs. The definition of TLAAs is provided in 10 CFR 54.3 and in Section 4.1 of this standard review plan.

TLAAs may have evolved since issuance of a plant's operating license, and are plant-specific. As indicated in 10 CFR 54.30, the adequacy of the plant's CLB, which includes TLAAs, is not an area within the scope of the license renewal review. Any question regarding the adequacy of the CLB must be addressed under the backfit rule (10 CFR 50.109) and is separate from the license renewal process.

License renewal reviews focus on the period of extended operation. Pursuant to 10 CFR 54.30, if the reviews required by 10 CFR 54.21(a) or (c) show that there is not reasonable assurance during the current license term that licensed activities will be conducted in accordance with the CLB, the licensee is required to take measures under its current license to ensure that the intended function of those systems, structures, or components will be maintained in accordance with the CLB throughout the term of the current license. The adequacy of the measures for the term of the current license is not within the scope of the license renewal review.

Pursuant to 10 CFR 54.21(c), an applicant must provide a listing of TLAAs and plant-specific exemptions that are based on TLAAs. The staff reviews the applicant's identification of TLAAs and exemptions separately, following the guidance in Section 4.1 of this standard review plan.

Based on lessons learned in the review of the initial license renewal applications, the staff has developed review procedures for the evaluation of certain TLAAs. If an applicant identifies these TLAAs as applicable to its plant, the staff reviews them separately, following the guidance in Sections 4.2 through 4.6. The staff reviews other TLAAs that are identified by the applicant, following the generic guidance in this review plan section. For particular systems, the staff from branches responsible for those systems may be requested to assist in the review, as appropriate.

The following areas relating to a TLAA are reviewed:

##### **4.7.1.1 Time-Limited Aging Analysis**

The evaluation of the TLAA for the period of extended operation is reviewed.

##### **4.7.1.2 FSAR Supplement**

The FSAR supplement summarizing the evaluation of the TLAA for the period of extended operation in accordance with 10 CFR 54.21(d) is reviewed.

## **4.7.2 Acceptance Criteria**

The acceptance criteria for the areas of review described in Subsection 4.7.1 of this review plan section delineate acceptable methods for meeting the requirements of the NRC's regulations in 10 CFR 54.21(c)(1).

### **4.7.2.1 Time-Limited Aging Analysis**

Pursuant to 10 CFR 54.21(c)(1)(i) - (iii), an applicant must demonstrate one of the following for the TLAAs:

- (i) The analyses remain valid for the period of extended operation;
- (ii) The analyses have been projected to the end of the extended period of operation; or
- (iii) The effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

### **4.7.2.2 FSAR Supplement**

The specific criterion for meeting 10 CFR 54.21(d) is:

The summary description of the evaluation of TLAAs for the period of extended operation in the FSAR supplement is appropriate such that later changes can be controlled by 10 CFR 50.59. The description should contain information associated with the TLAAs regarding the basis for determining that the applicant has made the demonstration required by 10 CFR 54.21 (c)(1).

## **4.7.3 Review Procedures**

The requirement for evaluation of TLAAs captures, for review of applications for license renewal, certain plant-specific aging analyses that are explicitly based on the duration of the current operating license of the plant. The concern is that these aging analyses do not cover the period of extended operation. Unless these analyses are evaluated, there is no assurance that the systems, structures, and components addressed by these analyses can perform their intended function(s) during the period of extended operation.

For each area of review described in Subsection 4.7.1 of this review plan section, the following review procedures are followed:

### **4.7.3.1 Time-Limited Aging Analysis**

For each TLAA identified, the review procedures depend on the applicant's choice of methods of compliance from those identified in 10 CFR 54.21(c)(1)(i), (ii), or (iii), as follows:

#### **4.7.3.1.1 10 CFR 54.21(c)(1)(i)**

Justification provided by the applicant is reviewed to verify that the existing analyses are valid for the period of extended operation. The existing analyses should be shown to be bounding even during the period of extended operation.

The applicant should describe the TLAA with respect to the objectives of the analysis, assumptions used in the analysis, conditions, acceptance criteria, relevant aging effects, and intended function(s). The applicant should show that (1) conditions and assumptions used in the analysis already address the relevant aging effects for the period of extended operation, and (2) acceptance criteria are maintained to provide reasonable assurance that the intended function(s) is maintained for renewal. Thus, no reanalysis is necessary for renewal.

In some instances, the applicant may identify activities to be performed to verify the assumption basis of the calculation, such as cycle counting. An evaluation of that activity should be provided by the applicant. The reviewer should assure that the applicant's activity is sufficient to confirm the calculation assumptions for the 60-year period.

If the TLAA must be modified or recalculated to extend the period of evaluation to consider the period of extended operation, the reevaluation should be addressed under 10 CFR 54.21(c)(1)(ii).

#### **4.7.3.1.2 10 CFR 54.21(c)(1)(ii)**

The documented results of the revised analyses are reviewed to verify that their period of evaluation is extended such that they are valid for the period of extended operation, for example, 60 years. The applicable analysis technique can be the one that is in effect in the plant's CLB at the time of filing of the renewal application.

The applicant may recalculate the TLAA using a 60-year period to show that the TLAA acceptance criteria continue to be satisfied for the period of extended operation. The applicant may also revise the TLAA by recognizing and reevaluating any overly conservative conditions and assumptions. Examples include relaxing overly conservative assumptions in the original analysis, using new or refined analytical techniques, and performing the analysis using a 60-year period. The applicant shall provide a sufficient description of the analysis and document the results of the reanalysis to show that it is satisfactory for the 60-year period.

As applicable, the plant's code of record should be used for the reevaluation, or the applicant may update to a later code edition pursuant to 10 CFR 50.55a. In the latter case, the reviewer verifies that the requirements in 10 CFR 50.55a are met.

In some cases, the applicant may identify activities to be performed to verify the assumption basis of the calculation, such as cycle counting. An evaluation of that activity should be provided by the applicant. The reviewer should assure that the applicant's activity is sufficient to confirm the calculation assumptions for the 60-year period.

#### **4.7.3.1.3 10 CFR 54.21(c)(1)(iii)**

Under this option, the applicant would propose to manage the aging effects associated with the TLAA by an aging management program in the same manner as would be described in the IPA in 10 CFR 54.21(a)(3). The reviewer reviews the applicant's aging management program to verify that the effects of aging on the intended function(s) will be adequately managed consistent with the CLB for the period of extended operation.

The applicant should identify the structures and components associated with the TLAA. The TLAA should be described with respect to the objectives of the analysis, conditions, assumptions used, acceptance criteria, relevant aging effects, and intended function(s). In

cases where a mitigation or inspection program is proposed, the reviewer may use the guidance provided in Branch Technical Position RLSB-1 of this standard review plan to ensure that the effects of aging on the structure and component intended function(s) are adequately managed for the period of extended operation.

#### **4.7.3.2 FSAR Supplement**

The reviewer verifies that the applicant has provided information, to be included in the FSAR supplement, that includes a summary description of the evaluation of each TLAA. Each such summary description is reviewed to verify that it is appropriate such that later changes can be controlled by 10 CFR 50.59. The description should contain information that the TLAA's have been dispositioned for the period of extended operation. Sections 4.2 through 4.6 of this standard review plan contain examples of acceptable FSAR supplement information for TLAA evaluation.

The staff expects to impose a license condition on any renewed license to require the applicant to update its FSAR to include this FSAR supplement at the next update required pursuant to 10 CFR 50.71(e)(4). As part of the license condition, until the FSAR update is complete, the applicant may make changes to the programs described in its FSAR supplement without prior NRC approval, provided that the applicant evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59.

As noted in Sections 4.2 through 4.6, an applicant need not incorporate the implementation schedule into its FSAR. However, the review should verify that the applicant has identified and committed in the license renewal application to any future aging management activities to be completed before the period of extended operation.

The staff expects to impose a license condition on any renewed license to ensure that the applicant will complete these activities no later than the committed date.

#### **4.7.4 Evaluation Findings**

The reviewer verifies that the applicant has provided sufficient information to satisfy the provisions of this review plan section and that the staff's evaluation supports conclusions of the following type, depending on the applicant's choice of 10 CFR 54.21(c)(1)(i), (ii), or (iii), to be included in the staff's safety evaluation report:

The staff concludes that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1), that, for the (name of specific) TLAA, [choose which is appropriate] (i) the analyses remain valid for the period of extended operation, (ii) the analyses have been projected to the end of the period of extended operation, or (iii) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff also concludes that the FSAR supplement contains an appropriate summary description of this TLAA evaluation for the period of extended operation as reflected in the license condition.

#### **4.7.5 Implementation**

Except in those cases in which the applicant proposes an acceptable alternative method, the method described herein will be used by the staff in its evaluation of conformance with NRC regulations.

#### **4.7.6 References**

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