

2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

Review Responsibilities

Primary - Branches responsible for systems

Secondary - None

2.3.1 Areas of Review

This review plan section addresses the mechanical systems scoping and screening results for license renewal. Typical mechanical systems consist of the following:

- Reactor Coolant System (such as reactor vessel and internals, components forming part of coolant pressure boundary, coolant piping system and connected lines, and steam generators).
- Engineered Safety Features (such as containment spray and isolation systems, standby gas treatment system, emergency core cooling system, and fan cooler system).
- Auxiliary Systems (such as new and spent fuel storage, spent fuel cooling and cleanup systems, suppression pool cleanup system, load handling system, open and closed cycle cooling water systems, ultimate heat sink, compressed air system, chemical and volume control system, standby liquid control system, coolant storage/refueling water systems, ventilation systems, diesel generator system, and fire protection system).
- Steam and Power Conversion System (such as turbines, main and extraction steam, feedwater, condensate, steam generator blowdown, and auxiliary feedwater).

Section 54.21(a)(1) requires an applicant to identify and list structures and components subject to an aging management review. These are “passive,” “long-lived” structures and components that are within the scope of license renewal. In addition, 10 CFR 54.21(a)(2) requires an applicant to describe and justify the methods used to identify these structures and components. The staff reviews the applicant’s methodology separately following the guidance in Section 2.1 of this standard review plan. To verify that the applicant has properly implemented its methodology, the staff focuses its review on the implementation results. Such a focus allows the staff to confirm that there is no omission of mechanical system components that are subject to an aging management review by the applicant. If the staff’s review identify no omission, this forms a basis for the staff to find that there is reasonable assurance that applicant has identified the mechanical system components that are subject to aging management review.

An applicant should list all plant level systems and structures. Based on the Design Basis Events (DBEs) considered in the plant’s current licensing basis (CLB) and other CLB information relating to non-safety-related systems and structures and certain regulated events, the applicant should identify those plant level systems and structures within the scope of license renewal, as defined in 10 CFR 54.4(a). This is “scoping” of the plant level systems and structures for license renewal. The staff reviews the applicant’s plant level “scoping” results separately following the guidance in Section 2.2 of this standard review plan.

For a mechanical system that is within the scope of license renewal, an applicant would identify the portions of the system that perform an intended function, as defined in 10 CFR 54.4(b). The applicant may identify these particular portions of the system in marked-up piping and instrument diagrams (P&IDs) or other media. This is “scoping” of mechanical components in a system to identify those that are within the scope of license renewal for a system.

Mechanical components within this particular portion of the system, which an applicant will (or must) identify the “passive” and “long-lived” as required by 10 CFR 54.21(a)(1)(i) and (ii). These “passive,” “long-lived” mechanical components are those which are subject to an aging management review. This is “screening” of mechanical components in a system to identify those that are “passive” and “long-lived.”

The applicant has the flexibility to determine the set of structures and components for which an aging management review is performed, provided that this set encompasses the structures and components for which the Commission has determined that an aging management review is required. This is based on the statements of consideration for the license renewal rule (60 FR 22478). Therefore, the reviewer should not review components that the applicant has identified as subject to an aging management review, because it is an applicant’s option to include more components than those required to be subject to an aging management review pursuant to 10 CFR 54.21(a)(1).

2.3.2 Acceptance Criteria

The acceptance criteria for the areas of review define methods for determining whether the applicant has met the requirements of the Commission’s regulations in 10 CFR 54.21(a)(1). For the applicant’s implementation of its methodology to be acceptable, the staff should have reasonable assurance that there has been no omission of mechanical system components that are subject to an aging management review.

2.3.2.1 Components Within the Scope of License Renewal

Mechanical components are within the scope of license renewal as delineated in 10 CFR 54.4(a) if they are:

1. Safety-related systems, structures, and components which are those relied upon to remain functional during and following design-basis events [as defined in 10 CFR 50.49(b)(1)] to ensure the following functions --
 - (i) The integrity of the reactor coolant pressure boundary;
 - (ii) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
 - (iii) The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2), or 10 CFR 100.11, as applicable.
2. All nonsafety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii).

3. All systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), pressurized thermal shock (10 CFR 50.61), anticipated transients without scram (10 CFR 50.62), and station blackout (10 CFR 50.63).

2.3.2.2 Components Subject to Aging Management Review

Mechanical components are subject to an aging management review if they are within the scope of license renewal and perform an intended function as defined in 10 CFR 54.4(b) without moving parts or a change in configuration or properties ("passive"), and are not subject to replacement based on a qualified life or specified time period ("long-lived") (10 CFR 54.21(a)(1)(i) and (ii)).

2.3.3 Review Procedures

The reviewer verifies the applicant's scoping and screening results. Should the reviewer request additional information from the applicant regarding why a certain component was not identified by the applicant as within the scope of license renewal or subject to an aging management review for the applicant's plant, the reviewer should provide a brief description of why the reviewer believes that this particular component could be potentially within the scope of license renewal or subject to an aging management review. In addition, there are other staff members reviewing the applicant's scoping and screening methodology separately following the guidance in Section 2.1 of this standard review plan. The reviewer should keep these other staff members informed of findings that may affect their review of the applicant's methodology. The reviewer should coordinate this sharing of information through the license renewal project manager.

For each area of review, the following review procedures are to be followed:

2.3.3.1 Components Within the Scope of License Renewal

In this step, the staff determines whether the applicant has properly identified the components within the scope of license renewal. The reviewer should review selected components that the applicant did not identify as within the scope of license renewal to verify that the applicant did not omit components with intended functions.

The reviewer should use the plant Updated Final Safety Analysis Report (UFSAR), orders, applicable regulations, exemptions, and license conditions to determine the design basis for the systems, structures, and components. The design basis determines the system intended function(s), which, in turn, determines the components within that system that are required for the system to perform its intended functions.

An applicant should provide a plant drawings (e.g., P&IDs) marking the portions of the system that are within the scope of license renewal. The reviewer should focus the review on those components that are not identified as being within the scope of license renewal; especially the license renewal boundary points and major flow paths or components not included within the scope of the license renewal. The reviewer should verify using the means available that the components do not have intended functions. Portions of the system identified as being within

the scope of license renewal by the applicant do not have to be reviewed because the applicant has the option of including more components within the scope than the rule requires.

For example, if a reviewer verifies that a portion of a system does not perform an intended function, is not identified as being within the scope of license renewal by the applicant, and is isolated from the portion of the system that is identified as being within the license renewal by a boundary valve, the reviewer should verify that the boundary valve is included within the scope of license renewal, or that the valve is not necessary for the within-scope portion of the system to perform its intended function. Likewise, the reviewer should identify the system functions of as many piping runs and components that are identified as not being within the scope of license renewal as practical to ensure they do not have intended functions that meet the requirements of 10 CFR 54.4.

Further, the reviewer should select system functions described in the UFSAR that are required by 10 CFR 54.4 to verify that components having intended functions were not omitted from the scope of the rule.

Section 2.1 of this standard review plan contains additional guidance on the following:

- commodity groups
- complex assemblies
- hypothetical failure
- cascading

Should the reviewer not identify any omissions of components within the scope of license renewal, the staff would then have reasonable assurance that the applicant has identified the components within the scope of license renewal for the mechanical systems.

Table 2.3-1 provides examples of mechanical components scoping lessons learned from the review of the initial license renewal applications and basis for their disposition.

2.3.3.2 Components Subject to an Aging Management Review

In this step, the staff determines whether the applicant has properly identified the components subject to an aging management review from among those which are within the scope of license renewal (i.e.) those identified in the previous step Subsection 2.3.3.1 of this review plan section. The reviewer should review selected components that the applicant has identified as within the scope of license renewal but as not subject to an AMR. The reviewer should verify that the applicant has not omitted from an AMR components that if they perform intended functions without moving parts or without a change in configuration or properties and that are not subject to replacement on the basis of a qualified life or specified time period.

Starting with the boundary verified in Subsection 2.3.3.1 of this review plan, the reviewer should sample components that are within the scope of license renewal for that system, but were not identified by the applicant as subject to an aging management review. Only components that are “passive” and “long-lived” are subject to an aging management review. Table 2.1-5 of Section 2.1 of this standard review plan is provided for the reviewer to assist in identifying whether certain components are “passive.” Applicant should justify omitting a component from an AMR that is within the scope of license renewal at their facility and is listed as “passive” on

Table 2.1-5. Although Table 2.1-5 is extensive, it is not all inclusive. Thus, the reviewer should use other available information sources, such as prior application reviews, to determine whether a component is subject to an aging management review.

For example, an applicant has marked a boundary of a certain system that is within the scope of license renewal. The marked-up diagram shows that there are pipes, valves, and air compressors within this boundary. The applicant has identified piping and valve bodies as subject to an aging management review. Because Table 2.1-5 of Section 2.1 of this standard review plan indicates that air compressors are not subject to an aging management review, the reviewer should find the applicant's determination acceptable.

Section 2.1 of this standard review plan contains additional guidance on screening the following:

- consumables
- heat exchanger intended functions
- multiple functions

Should the reviewer not identify any omissions of components from those that are subject to an aging management review, the staff would then have reasonable assurance that the applicant has identified the components subject to an aging management review for the mechanical systems.

Table 2.3-2 provides examples of mechanical components screening developed from lessons learned during the review of the initial license renewal applications and bases for their disposition.

If the applicant determines that a component is subject to an AMR, the applicant should also identify the component's intended function, as defined in 10 CFR 54.4. Such functions must be maintained by any necessary AMRs. Table 2.3-3 provides examples of mechanical component intended functions.

2.3.4 Evaluation Findings

The reviewer verifies that the applicant has provided information sufficient to satisfy the provisions of this review plan section and that the staff's evaluation supports conclusions of the following type, to be included in the staff's safety evaluation report:

The staff concludes that there is reasonable assurance that the applicant has appropriately identified the mechanical system components subject to an aging management review in accordance with the requirements stated in 10 CFR 54.21(a)(1).

2.3.5 Implementation

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specific portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

2.3.6 References

None.

Table 2.3-1. Examples of Mechanical Components Scoping and Basis for Disposition

Example	Disposition
Piping segment that provides structural support	The safety-related/non-safety-related boundary along a pipe run may occur at a valve location. The non-safety related piping segment between this valve and the next seismic anchor provides structural support in a seismic event. This piping segment is within the scope of license renewal.
Containment heating and ventilation system ductwork downstream of the fusible links providing cooling to the steam generator compartment and reactor vessel annulus	This non-safety-related ductwork provides cooling to support the applicant's environmental qualification (EQ) program. However, the failure of the cavity cooling system ductwork will not prevent the satisfactory completion of any critical safety function during and following a design basis event. Thus, this ductwork is not within the scope of license renewal.
Standpipe installed inside the fuel oil storage tank	The standpipe as described in the applicant's CLB ensures that there is sufficient fuel oil reserve for the emergency diesel generator to operate for the specified number of days in the plant technical specifications following design basis events. Therefore, this standpipe is within the scope of license renewal.
Insulation on boron injection tank	The temperature is high enough that insulation is not necessary to prevent boron precipitation. The plant technical specifications require periodic verification of the tank temperature. Thus the insulation is not relied on to ensure the function of the emergency system and is not within the scope of license renewal.
Pressurizer spray head	The spray head is not credited for the mitigation of any accidents addressed in the plant's UFSAR accident analyses. The function of the pressurizer spray is to reduce reactor coolant system pressure during normal operating conditions. Therefore, the spray head is not within the scope of license renewal.

Table 2.3-2. Examples of Mechanical Components Screening and Basis for Disposition

Example	Disposition
Diesel engine jacket water heat exchanger, and portions of the diesel fuel oil system and starting air system supplied by a vendor on a diesel generator skid	These are “passive,” “long-lived” components having intended functions. They are subject to an aging management review for license renewal even though the diesel generator is considered “active.”
Fuel assemblies	The fuel assemblies are replaced at regular intervals based on the fuel cycle of the plant. They are not subject to an aging management review.
Valve internals (such as disk and seat)	10 CFR 54.21(a)(1)(i) excludes valves, other than the valve body, from aging management review. The statements of consideration of the license renewal rule provide the basis for excluding structures and components that perform their intended functions with moving parts or with a change in configuration or properties. Although the valve body is subject to an aging management review, valve internals are not.

Table 2.3-3. Examples of Mechanical Component Intended Functions

Component	Intended Function*
Piping	Pressure boundary
Valve body	Pressure boundary
Pump casing	Pressure boundary
Orifice	Pressure boundary Flow restriction
Heat exchanger	Pressure boundary Heat transfer
Reactor vessel internals	Structural support of fuel assemblies, control rods, and incore instrumentation, to maintain core configuration and flow distribution

*The component intended functions are those that support the system intended functions. For example, a heat exchanger in the spent fuel cooling system has a pressure boundary intended function, but may not have a heat transfer function. Similarly, not all orifices have flow restriction as an intended function.