

## 2.3 SCOPING AND SCREENING RESULTS: MECHANICAL SYSTEMS

### Review Responsibilities

**Primary** - Branches responsible for systems

**Secondary** - None

#### 2.3.1 Areas of Review

This 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).

10 CFR 54.21(a)(1) requires an applicant to identify and list structures and components subject to an aging management review (AMR). 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. 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 AMR by the applicant. If the review identifies no omission, the staff has the basis to find that there is reasonable assurance that the applicant has identified the mechanical system components that are subject to an AMR.

An applicant should list all plant-level systems and structures. On the basis of the DBEs considered in the plant’s CLB and other CLB information relating to nonsafety-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.

For a mechanical system that is within the scope of license renewal, the applicant should 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.

For these identified mechanical components, the applicant must identify those that are “passive” and “long-lived” as required by 10 CFR 54.21(a)(1)(i) and (ii). These “passive,” “long-lived” mechanical components are those that are subject to an AMR. 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 AMR is performed, provided that this set includes the structures and components for which the NRC has determined that an AMR is required. This is based on the SOC for the license renewal rule (60 FR 22478). Therefore, the reviewer need not review all components that the applicant has identified as subject to an AMR because the applicant has the option to include more components than those required to be subject to an AMR 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 NRC 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 AMR.

#### **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

- Safety-related SSCs that are relied upon to remain functional during and following DBEs [as defined in 10 CFR 50.49(b)(1)] to ensure the following functions:
  - The integrity of the reactor coolant pressure boundary;
  - The capability to shut down the reactor and maintain it in a safe shutdown condition; or
  - 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.
- All nonsafety-related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii).
- All SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48), environmental qualification (10 CFR 50.49), PTS (10 CFR 50.61), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63).

### **2.3.2.2 Components Subject to an Aging Management Review**

Mechanical components are subject to an AMR 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. If the reviewer requests additional information from the applicant regarding why a certain component was not identified by the applicant as being within the scope of license renewal or subject to an AMR for the applicant’s plant, the reviewer should provide a focused question, that clearly explains what information is needed, why the information is needed, and how the information will allow the staff to make its safety finding. In addition, other staff members review the applicant’s scoping and screening methodology separately following the guidance in Section 2.1. 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 that are within the scope of license renewal. The Rule requires applicants, to identify components that are subject to an AMR; not components that are within the scope of license renewal (WSLR). Whereas in the past LRAs have included a table of components that are WSLR, the staff does not expect that information to be submitted with future LRAs. Although that information will be available at plant sites for inspection, the reviewer must determine through sampling of P&IDs, and review of FSAR and other plant documents, what portion of the components are within scope. The reviewer must check to see if any components exist that the staff believes are within scope but are not identified by the applicant as being subject to an AMR (and request that the applicant provide justification for omitting those components that are “passive” and “long lived”).

The reviewer should use the UFSAR, orders, applicable regulations, exemptions, and license conditions to determine the design basis for the SSCs. The design basis specifies the intended function(s) of the system(s). That intended function is used to determine the components within that system that are required for the system to perform its intended functions.

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. The reviewer should verify 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 to include more components within the scope than the rule requires.

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.

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

Section 2.1 contains additional guidance on the following:

- Commodity groups
- Complex assemblies
- Hypothetical failure
- Cascading

If the reviewer does not identify any omissions of components within the scope of license renewal, the reviewer would 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 the basis for their disposition.

### **2.3.3.2 Components Subject to an Aging Management Review**

In this step, the reviewer determines whether the applicant has properly identified the components subject to an AMR from among those which are within the scope of license renewal (i.e., those identified in Subsection 2.3.3.1). 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 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, 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 AMR. Only components that are “passive” and “long-lived” are subject to an AMR. Table 2.1-5 is provided for the reviewer to assist in identifying whether certain components are “passive.” The 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 may not be all inclusive. Thus, the reviewer should use other available information sources, such as prior application reviews, to determine whether a component may be subject to an AMR.

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 AMR. Because Table 2.1-5 indicates that air compressors are not subject to an AMR, the reviewer should find the applicant’s determination acceptable.

Section 2.1 contains additional guidance on screening the following:

- Consumables
- Heat exchanger intended functions
- Multiple functions

If the reviewer does not identify any omissions of components from those that are subject to an AMR, the staff would then have reasonable assurance that the applicant has identified the components subject to an AMR 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 the SRP-LR and that the staff's evaluation supports conclusions of the following type, to be included in the 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 NRC regulations, the method described herein will be used by the staff in its evaluation of conformance with NRC 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/nonsafety-related boundary along a pipe run may occur at a valve location. The nonsafety-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 nonsafety-related ductwork provides cooling to support the applicant's environmental qualification 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 number of days specified in the plant technical specifications following DBEs. 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 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 AMR 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 AMR.
Valve internals (such as disk and seat)	10 CFR 54.21(a)(1)(i) excludes valves, other than the valve body, from AMR. 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 AMR, valve internals are not.

**Table 2.3-3. Examples of Mechanical Component Intended Functions**

Component	Intended Function <sup>a</sup>
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

<sup>a</sup> 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.

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