

2.5 SCOPING AND SCREENING RESULTS: ELECTRICAL AND INSTRUMENTATION AND CONTROLS SYSTEMS

Review Responsibilities

Primary - Branch responsible for electrical and instrumentation and controls engineering

Secondary - None

2.5.1 Areas of Review

This review plan section addresses the electrical and instrumentation and controls (I&C) scoping and screening results for license renewal. Typical electrical and I&C components that are subject to an aging management review (AMR) for license renewal include electrical cables and connections.

10 CFR 54.21(a)(1) requires an applicant to identify and list structures and components subject to an 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 focus gives the staff reasonable assurance that there has been no omission of electrical and I&C components that are subject to an AMR by the applicant. If the staff’s review identifies no omission, the staff has a basis to find that there is reasonable assurance that the applicant has identified the electrical and I&C components 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 would identify those plant-level systems and structures that are 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 an electrical and I&C system that is within the scope of license renewal, an applicant may not identify the specific electrical and I&C components that are subject to an AMR. For example, an applicant may not “tag” each specific length of cable that is “passive” and “long-lived,” and performs an intended function as defined in 10 CFR 54.4(b). Instead, an applicant may use the so-called “plant spaces” approach (Ref. 1), which is explained below. The “plant spaces” approach provides efficiencies in AMR of electrical equipment located within the same plant space environment.

Under the “plant spaces” approach, an applicant would identify all “passive,” “long-lived” electrical equipment within a specified plant space as subject to an AMR, regardless of whether these components perform any intended functions. For example, an applicant could identify all “passive,” “long-lived” electrical equipment located within the turbine building (“plant space”) to be subject to an AMR for license renewal. In the subsequent AMR, the applicant would evaluate the environment of the turbine building to determine the appropriate aging management activities for this equipment. The applicant has options to further refine this encompassing scope on an as-needed basis. For this example, if the applicant identified elevated temperatures in a

particular area within the turbine building, the applicant may elect to further refine the scope in this particular area by identifying electrical equipment that is not subject to an AMR and excluding this equipment from the AMR. In this case, the excluded electrical equipment would be reported in the application as not being subject to an AMR.

10 CFR 54.21(a)(1)(i) provides many examples of electrical and I&C components that are not considered to be “passive” and are not subject to an AMR for license renewal. Therefore, the applicant is expected to identify only a few electrical and I&C components, such as electrical penetrations, cables, and connections, that are “passive” and subject to an AMR. However, the TLAA evaluation requirements in 10 CFR 54.21(c) apply to environmental qualification of electrical equipment, which is not limited to “passive” components.

An applicant has the flexibility to determine the set of electrical and I&C components for which an AMR is performed, provided that this set includes the electrical and I&C components for which the NRC has determined an AMR is required. This is based on the statements of consideration 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 by 10 CFR 54.21(a)(1).

2.5.2 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 electrical and I&C system components that are subject to an AMR.

2.5.2.1 Components Within the Scope of License Renewal

Electrical and I&C 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).

2.5.2.2 Components Subject to an Aging Management Review

Electrical and I&C 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 without 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)].

2.5.3 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 plant, the reviewer should provide a focused question, that clearly explain 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.

The reviewer should verify that an applicant has identified in the license renewal application the electrical and I&C components that are subject to an AMR for its plant. The review procedures are presented below and assume that the applicant has performed “scoping” and “screening” of electrical and I&C system components in that sequence. However, the applicant may elect to perform “screening” before “scoping”, which is acceptable because regardless of the sequence, the end result should encompass the electrical and I&C components that are subject to an AMR.

The scope of 10 CFR 50.49 electric equipment to be included within 10 CFR 54.4(a)(3) is that “long-lived” (qualified life of 40 years or greater) equipment already identified by licensees under 10 CFR 50.49(b), which specifies certain electric equipment important to safety. Licensees may rely upon their listing of environmental qualification equipment, as required by 10 CFR 50.49(d), for purposes of satisfying 10 CFR 54.4(a)(3) with respect to equipment within the scope of 10 CFR 50.49 (60 FR 22466). However, the License Renewal Rule has a requirement (10 CFR 54.21(c)) on the evaluation of TLAAs, including environmental qualification (10 CFR 50.49). Environmental qualification equipment is not limited to “passive” equipment. The applicant may identify environmental qualification equipment separately for TLAA evaluation and not include such equipment as subject to an AMR under 10 CFR 54.21(a)(1). The environmental qualification equipment identified for TLAA evaluation would include the “passive” environmental qualification equipment subject to an AMR. The TLAA evaluation would ensure that the environmental qualification equipment would be functional for the period of extended operation. The staff reviews the applicant’s environmental qualification TLAA evaluation separately following the guidance in Section 4.4.

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

2.5.3.1 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 one line diagrams, and review of FSAR and other plant documents, what portion of the components are within the scope of license renewal. The reviewer must check to see if any components exist that the staff believes are within the scope but are not identified by the applicant as being subject to AMR (any 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 applicant may use the “plant spaces” approach in scoping electrical and I&C components for license renewal. In the “plant spaces” approach, an applicant may indicate that all electrical and I&C components located within a particular plant area (“plant space”), such as the containment and auxiliary building, are within the scope of license renewal. The applicant may also indicate that all electrical and I&C components located within another plant area (“plant space”), such as the warehouse, are not within the scope of license renewal. Table 2.5-1 contains examples of this “plant spaces” approach and the corresponding review procedures.

The applicant would use the “plant spaces” approach for the subsequent AMR of the electrical and I&C components. The applicant would evaluate the environment of the “plant spaces” to determine the appropriate aging management activities for equipment located there. The applicant has the option to further refine this encompassing scope on an as-needed basis. For example, if the applicant identified elevated temperatures in a particular area within a building (“plant space”), the applicant may elect to identify only those “passive,” “long-lived” electrical and I&C components that perform an intended function in this particular area as subject to an AMR. This approach of limiting the “plant spaces” is consistent with the “plant spaces” approach. In this case, the reviewer verifies that the applicant has specifically identified the electrical and I&C components that may be within the scope of license renewal in these limited “plant spaces.” The reviewer should verify that the electrical and I&C components that the applicant has elected to further exclude do not indeed have any intended functions as defined in 10 CFR 54.4(b).

Section 2.1 contains additional guidance on scoping the following:

- Commodity groups
- Complex assemblies
- Scoping events
- Hypothetical failure
- Cascading

If the reviewer does not identify any omissions of components from those that are within the scope of license renewal, the staff would have reasonable assurance that the applicant has identified the components within the scope of license renewal for the electrical and I&C systems.

2.5.3.2 Component 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 2.5.3.1). The reviewer should review selected components that the applicant has identified as being within the scope of license renewal to verify that the applicant has identified these components as being subject to an AMR if they perform intended functions without moving parts or without a change in configuration or properties and are not subject to replacement on the basis of a qualified life or specified time period. The description of “passive” may also be interpreted to include structures and components that do not display “a change in state.”

Only components that are “passive” and “long-lived” are subject to an AMR. Table 2.1-5 lists many typical components and structures, and their associated intended functions, and identifies whether they are “passive.” The reviewer should use Table 2.1-5 in identifying whether certain components are “passive.” The reviewer should verify that electrical and I&C components identified as “passive” in Table 2.1-5 have been included by the applicant as being subject to an AMR. 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.

Section 2.1 contains additional guidance on screening the following:

- Consumables
- Multiple intended functions

If the reviewer does not identify any omissions of components from those that are subject to an AMR, the staff would have reasonable assurance that the applicant has identified the components subject to an AMR for the electrical and I&C systems.

2.5.4 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 electrical and instrumentation and controls system components subject to an aging management review in accordance with the requirements stated in 10 CFR 54.21(a)(1).

2.5.5 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.

2.5.6 References

1. SAND96-0344, "Aging Management Guideline for Commercial Nuclear Power Plants-Electrical Cable and Terminations," Sandia National Laboratories, September 1996, page 6-11.

Table 2.5-1. Examples of “Plant Spaces” Approach for Electrical and I&C Scoping and Corresponding Review Procedures

Example	Review Procedures
An applicant indicates that all electrical and I&C components on site are within the scope of license renewal.	This is acceptable, and a staff review is not necessary because all electrical and I&C components are included without exception and would include those required by the rule.
An applicant indicates that all electrical and I&C components located in seven specific buildings (containment, auxiliary building, turbine building, etc.) are within the scope of license renewal.	The reviewer should review electrical systems and components in areas outside of these seven buildings (“plant spaces”). The reviewer should verify that the applicant has included any direct-buried cables in trenches between these building as within the scope of license renewal if they perform an intended function. The reviewer should also select buildings other than the seven indicated (for example, the radwaste facility) to verify that they do not contain any electrical and I&C components that perform any intended functions.
An applicant indicates that all electrical and I&C components located on site, except for the 525 kV switchyard, 230 kV transmission lines, radwaste facility, and 44 kV substation, are within the scope of license renewal.	The reviewer should select the specifically excluded “plant spaces” (that is, the 525 kV switchyard, 230 kV transmission lines, radwaste facility, and 44 kV substation) to verify that they do not contain any electrical and I&C components that perform any intended functions.

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