

# License Renewal Guidance Documents

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## ABSTRACT

License renewal has become a promising option for meeting future energy demands safely and economically. The United States Nuclear Regulatory Commission (NRC) renewed two licenses in 2000 and is now reviewing several applications. A growing list of utilities have announced their intention to submit license renewal applications. The NRC is developing a streamlined process for reviewing applications consistently and expeditiously. The Nuclear Energy Institute (NEI) has drafted guidance for the industry on developing a license renewal application. This paper discusses four license renewal guidance documents developed to describe interrelated aspects of preparing and reviewing license renewal applications: the Generic Aging Lessons Learned (GALL) report, the Standard Review Plan for License Renewal (SRP-LR), the Regulatory Guide for License Renewal (RG-LR), and NEI 95-10, NEI's industry guideline for implementing the requirements of 10 CFR Part 54 (The License Renewal Rule). The purpose of the paper is to explain how to use the guidance documents alone and in combination - to facilitate the renewal process from application development through NRC staff review.

## INTRODUCTION

### License Renewal Rule - Background

The NRC issues licenses for commercial power reactors to operate for up to 40 years. In the early 1990s, the NRC embarked on a rulemaking process to allow operating licenses to be renewed for additional periods of up to 20 years. In 1995 the Commission issued 10 CFR Part 54, the License Renewal Rule. The license renewal rule focuses on managing the adverse effects of aging of plant structures and components. The rule defines a process for evaluating the effects of aging on system, structure, and component performance, and developing a license renewal application. The process has three major steps: 1) perform a scoping assessment, 2) do an integrated plant assessment (IPA), and 3) demonstrate that aging effects will be adequately managed in the period of extended operation. In addition, the rule includes provisions for evaluating time-limited aging analyses and specifies the technical information required in a license renewal application. The rule also deals with changes to an applicant's current licensing basis, the referral of applications to the Advisory Committee on Reactor Safeguards, the environmental report requirement (not discussed in this paper), and standards for the issuance of a renewed operating license.

### Lessons learned from initial application reviews - Credit for existing programs

In 2000 the NRC completed its reviews of the license renewal applications for the Calvert Cliffs and Oconee nuclear stations. These were the first license renewal applications NRC had ever renewed. During the reviews, the NRC and the industry recognized that most of the existing programs at the plants could adequately manage aging effects for license renewal without change. Thus, the NRC staff undertook a generic review and a technical evaluation of existing programs to determine which programs would adequately manage aging effects without change and which need to be augmented. The technical evaluation is documented in the GALL report, which is the technical basis for the SRP-LR (discussed later in this paper).

### The need for a streamlined, efficient review process - Implementation Guidance

The NRC's Strategic Plan established objectives: maintain safety, reduce unnecessary regulatory burden, increase public confidence, and increase the efficiency and effectiveness of key NRC processes. To facilitate the implementation of the License Renewal Rule, the NRC staff developed three license renewal rule implementation guidance documents to incorporate lessons learned from the development and NRC review of the initial renewal applications, provide information on the license renewal process to the public and license renewal applicants, and streamline the license renewal process. These documents were developed to be used collectively and to provide consistent guidance to the staff and applicants. By

providing clear, consistent guidance to potential renewal applicants and NRC staff reviewers, these documents also reduce undue regulatory burden and increase efficiency and effectiveness in accordance with the NRC's Strategic Plan goals. Since these documents are based, in part, upon rigorous technical staff reviews of aging mechanisms, the effects of aging on plant structures and equipment, and the effectiveness of existing programs in managing the aging effects, therefore they help to maintain safety.

### **License Renewal Guidance Documents**

The license renewal guidance documents are the SRP-LR, the GALL report, and the RG-LR, which endorses NEI 95-10. Public and industry participation and comments contributed to the development of these documents. The nuclear power industry, through the NEI, developed NEI 95-10 to provide guidance to the industry on how to perform a license renewal plant assessment on-site and prepare a license renewal application. The staff has concluded that the NEI document describes an acceptable format and content for a license renewal application. The guidance provided in these documents is available for use by a potential applicant for license renewal. However, an applicant may choose to adopt alternative methods for developing an application, which would then be reviewed by the NRC staff in accordance with the SRP-LR. Although the GALL report, the SRP-LR, and the RG-LR do not contain NRC requirements, together they provide a complete, stable, and efficient regulatory framework for ensuring continued plant safety in the period of extended operation.

### **The Standard Review Plan for License Renewal (SRP-LR)**

The NRC uses standard review plans to process licensing actions. Standard review plans specify the quality requirements for performing licensing review activities and provide a framework to ensure that staff reviews are conducted uniformly. Standard review plans provide guidance to NRC staff performing application reviews. The SRP-LR has evolved from the basic review plan to incorporate all of the review areas that are specific to license renewal. This standardized guidance ensures that the staff reviews license renewal applications consistently. It defines the depth and breadth of the review of an application and presents a well-defined approach for evaluating aging management programs and activities. The SRP-LR also gives the nuclear power industry and the public information on the license renewal review process. Applicants are not required to follow the SRP-LR format or suggestions, but the guidance facilitates staff reviews. The SRP-LR focuses the NRC review on areas where the GALL report recommended that existing programs be augmented or further evaluated for license renewal.

The SRP-LR has four chapters: 1) Administrative Information, 2) Scoping and Screening Methodology, 3) Aging Management Review (AMR) Results, and 4) Time-Limited Aging Analyses (TLAAs). The Administrative Information chapter provides criteria for determining the sufficiency of an application for docketing. The Scoping and Screening chapter focuses the staff's review on the applicant's identification of "passive" and "long-lived" structures and components. It also directs the staff to determine if the applicant properly implemented a methodology to identify structures and components subject to an AMR. The AMR Results Chapter directs the review staff to perform a consistent and thorough evaluation of the aging effects identified and the AMPs described in the application. The TLAA chapter directs the staff to verify that all applicable TLAAs have been included in an application and have been adequately evaluated for the period of extended operation. A TLAA is a plant-specific calculation or safety analysis that explicitly assumes a 40-year plant life.

An appendix to the SRP-LR contains branch technical positions, which document the staff's resolution of specific complicated regulatory issues. The SRP-LR can be applied to a wide variety of plant designs and site conditions. It has multiple sections, each of which contains a complete set of procedures for performing staff reviews. The staff may focus its review on a particular aspect or aspects of an SRP-LR section as appropriate to ensure an adequate level of understanding to support a licensing decision.

Each SRP-LR section is organized into six subsections, consistent with NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants." Subsection 1 defines the area of review; it describes the systems, structures, components, analyses, data, or other information in the application that should be reviewed and designates the branch that will have primary review responsibility for that area. It also addresses the need for technical support from other branches to facilitate the primary branch's review. Subsection 2 states the purpose of the review; identifies the acceptance criteria (applicable NRC requirements); and defines the technical basis (by referencing NRC Regulatory Guides, Codes and Standards, Branch Technical Positions, etc.) for determining if an applicant's proposal is acceptable. Subsection 3 contains step-by-step review procedures for verifying that applicable acceptance criteria have been met. Subsection 4 identifies evaluation findings and presents alternative staff conclusions that may apply to a particular review area. Subsection 5 addresses implementation of the SRP-LR by specifying the conditions under which the SRP-LR can be applied as guidance for the review of license renewal applications. Subsection 6 contains references.

The staff publishes the results of its review for each of the four SRP-LR chapters in a safety evaluation report (SER). The SER also describes the review (what aspects of the review the staff emphasized, which matters were modified by the applicant, what matters required additional information, issues that will be resolved in the future or remain unresolved, where the applicant's program deviates from the criteria in the SRP-LR, and the bases for any deviations from the SRP-LR or exemptions from the regulations).

In reviewing a license renewal application, the staff identifies the programs the applicant relies on for aging management and evaluates their adequacy against the ten elements listed in Table A1-1 of the SRP-LR (see Table 1). These ten elements are considered essential for effective aging management.

Table 1. Elements of an Aging Management Program

Element	Description
1. Scope of program	The program should include the specific structures and components subject to an aging management review.
2. Preventive actions	Preventive actions should mitigate or prevent the applicable aging effects.
3. Parameters monitored or inspected	Parameters monitored or inspected should be linked to the effects of aging on the intended function or functions of the particular structure and component.
4. Detection of aging effects	Aging effects should be detected before there is a loss of the intended function of any structure and component.
5. Monitoring and trending	Monitoring and trending should enable the licensee to predict the extent of the effects of aging and timely corrective or mitigative actions. The monitoring, inspection, testing frequency, and sample size should be appropriate for timely detection of aging effects.
6. Acceptance criteria	Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the intended function or functions of the particular structure and component are maintained under all Current Licensing Basis design conditions during the period of extended operation.
7. Corrective actions	Corrective actions, based on good root cause determinations should be taken in time to prevent recurrence.
8. Confirmation process	The confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.
9. Administrative controls	Administrative controls should provide a formal review and approval process.
10. Operating experience	Operating experience involving the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the intended functions of the structure and component will be maintained during the period of extended operation.

## **The Generic Aging Lessons Learned (GALL) Report**

In reviewing the initial license renewal applications, the staff determined that the applicants relied on many existing programs to manage the effects of aging on the functionality of structures and components in the period of extended operation. In an effort to provide credit for existing programs, the Commission directed the staff to undertake a complete review of common existing plant programs to determine which programs would be adequate to manage aging effects without change and which programs should be augmented. NUREG/CR-6490, "Nuclear Power Plant Generic Aging Lessons Learned (GALL)," issued December 1996, provided the foundation for this review. The staff incorporated lessons learned from the recently completed and ongoing application reviews, and the document has evolved into the current GALL report. The GALL report is a living document. It will be updated as needed to reflect new programs and operating experience. By documenting staff evaluations of generic existing programs and the staff's basis for determining the adequacy of those programs, the staff can focus its efforts on existing programs that warrant augmentation, further staff review, or plant-specific consideration.

The information in the GALL report came from several sources. The first GALL document, NUREG/CR-6490, was based on research sponsored by the NRC's Office of Nuclear Regulatory Research (the extensive Nuclear Plant Aging Research (NPAR) program, Generic Safety Issues research, and current plant operating experience evaluations). The GALL report also includes information from the staff review of ten industry reports on license renewal submitted by the Nuclear Management and Resource Council (NUMARC, now NEI). The GALL report contains aging management information: it catalogues plant structures and components; identifies the materials they are made of and their environments; lists the aging mechanisms and effects; and documents the staff's evaluation of generic aging programs to mitigate or manage the aging mechanisms and the corresponding aging effects. Many aging management programs listed in the GALL report are currently implemented and used in the nuclear industry. Some programs are based on national standards, such as those developed by the National Fire Protection Association.

The staff has evaluated each aging management program listed in the GALL report against the ten elements listed in the SRP-LR to determine its adequacy for a specific material composition, environment, aging mechanism, and aging effect. For programs determined by the staff to be adequate, an applicant may reference the GALL report in its license renewal application. The applicant needs to ensure that the specific conditions for which the staff evaluated the programs also apply to the structure or component under consideration. Referencing the GALL report eliminates the need for staff review of a program provided that the specific conditions (structure/component, material, aging mechanism, etc.) defined in the GALL report are met. If an applicant references an AMP from the GALL report, the NRC reviewer confirms that referencing the GALL report is appropriate for the item under consideration. If the aging management program does not require further evaluation in the SRP-LR, no further staff review of that program is required.

While some aging management programs listed in the GALL report were determined to be acceptable without additional staff review, others require further evaluation. For these items, an explanation of the need for further evaluation and suggestions for program augmentation are provided in the GALL report. The GALL report lists acceptable programs, but an applicant has the option of proposing alternative programs in the license renewal application for staff review.

## **Industry Guidance - NEI 95-10, as endorsed by RG-LR**

NEI developed NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," to provide the industry with guidelines for preparing a license renewal application. The guidance was developed to ensure that an application contains information necessary for the NRC to determine whether the applicant adequately manages aging and should a renewed operating license be issued. The NEI document describes a two-phase approach to developing a license renewal application. The first phase consists of technical reviews; the second phase is preparing the license renewal application.

The technical reviews are performed in accordance with 10 CFR Part 54, the License Renewal Rule, to identify systems, structures, and components whose intended functions brings them within the scope of the rule and subject to an aging management review. The next step in the technical review phase is to identify aging effects that require management and evaluate plant programs that can be applied to manage those aging effects. It also describes the evaluation of time-limited aging analyses that demonstrate that aging will be adequately managed during the period of extended operation.

Once the technical reviews are completed, the applicant starts incorporating the results of the reviews into the license renewal application. The NEI guideline describes the standard format for a license renewal application and stresses the importance of maintaining accurate, detailed supporting documentation (which need not be submitted with the application but must be maintained on-site and be retrievable for NRC audits and inspections).

The NRC staff endorsed NEI 95-10 in Regulatory Guide 1.188 (the RG-LR). Regulatory Guides are used to communicate acceptable methods for meeting NRC regulatory requirements to the nuclear industry and the public. The industry may use alternative methods for meeting regulatory requirements.

## **IMPLEMENTATION ISSUE - APPLICATION OF THE GALL REPORT**

The GALL report should be used like a topical report. The applicant references the GALL report in the application and keeps supporting documentation on-site and must be able to produce it for license renewal inspections. The SRP-LR instructs reviewers to perform no further evaluation of the information covered in the GALL report once an applicant references the GALL report. The staff should find an application acceptable where the application references the GALL report and the evaluation of the item in the GALL report applies to the structure or component and the aging mechanism in question. However, the staff should ensure that the material in the GALL report applies to the applicant's plant. The staff should also verify that the applicant has identified the specific programs described and evaluated in the GALL report if the applicant relied on them for license renewal. If, however, the AMP requires further evaluation according to the SRP-LR and the GALL report, these documents provide guidance to the reviewer suggesting what type of information will satisfy the element disparity or other staff concerns. An applicant is free to submit aging management programs that are not included in the GALL report with justification. Use of the GALL report is not required; however, an applicant will decrease the volume of an application and the review time of the staff by referencing the GALL report where appropriate.

## **CONCLUSION**

License renewal has evolved. In the early 1990s it was just a concept. Now it is a viable option. Several utilities in the United States have successfully pursued this option. For some utilities, extending the operating life of an existing nuclear power station is an economically feasible way to meet future energy demands. NRC's responsibility is to ensure that letting nuclear power plants operate beyond the term of the normal license will not pose undue risk to public health and safety or the environment. Utilities can augment their maintenance, inspection, and testing programs for monitoring and managing plant aging, in accordance with the requirements of the License Renewal Rule, to demonstrate their ability to operate safely in the extended period. The NRC's process for issuing renewed operating licenses involves rigorous safety and environmental reviews to verify that regulatory requirements will continue to be met in the period of extended operation. The license renewal guidance documents described in this paper were developed from equally rigorous research and evaluation. They incorporate lessons learned from the first reviews. The product of this effort is an efficient, consistent, and technically sound process for preparing and reviewing license renewal applications that requires fewer of the NRC's staff and applicant resources while ensuring plant safety.

## **REFERENCES**

Code of Federal Regulations 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

Code of Federal Regulations 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

NUREG-1801, "Generic Aging Lessons Learned" (GALL), NRC, April 2001 (also available on the Internet at <http://www.nrc.gov/NRC/REACTOR/LR/index.html>).

NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," Working Draft, NRC, April 2001.

NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Nuclear Energy Institute (version endorsed in Regulatory Guide 1.188).

Regulatory Guide-1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses," NRC, April 2001

United States Nuclear Regulatory Commission Web site (License Renewal Section at <http://www.nrc.gov/NRC/REACTOR/LR/index.html> ).