NUREG–1568

License Renewal Demonstration Program: NRC Observations and Lessons Learned

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

R. J. Prato, P. T. Kuo, S. F. Newberry

AVAILABILITY NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 2120 L Street, NW., Lower Level, Washington, DC 20555–0001
2. The Superintendent of Documents, U.S. Government Printing Office, P. O. Box 37082, Washington, DC 20402–9328
3. The National Technical Information Service, Springfield, VA 22161–0002

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC bulletins, circulars, information notices, inspection and investigation notices; licensee event reports; vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the Government Printing Office: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, international agreement reports, grantee reports, and NRC booklets and brochures. Also available are regulatory guides, NRC regulations in the *Code of Federal Regulations*, and *Nuclear Regulatory Commission Issuances*.

Documents available from the National Technical Information Service include NUREG-series reports and technical reports prepared by other Federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission.

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, and transactions. *Federal Register* notices, Federal and State legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free, to the extent of supply, upon written request to the Office of Administration, Distribution and Mail Services Section, U.S. Nuclear Regulatory Commission, Washington DC 20555–0001.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852–2738, for use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018–3308.

NUREG–1568

License Renewal Demonstration Program: NRC Observations and Lessons Learned

Manuscript Completed: September 1996
Date Published: December 1996

R. J. Prato, P. T. Kuo, S. F. Newberry

Division of Reactor Program Management
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001

DISCLAIMER

ABSTRACT

This report summarizes the Nuclear Regulatory Commission staff's observations and lessons learned from the five License Renewal Demonstration Program (LRDP) site visits performed by the staff from March 25, 1996, through August 16, 1996. The LRDP was a Nuclear Energy Institute (NEI) program intended to assess the effectiveness of the guidance provided by NEI 95-10, Revision 0, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," to implement the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

In general, NEI 95-10 appeared to contain the basic guidance needed for scoping, screening, identifying aging effects, developing aging management programs, and performing time-limited aging analyses. However, inconsistent implementation of this guidance in some areas was an indication that clarification of existing guidance and/or the inclusion of some new guidance may be needed for applicants to develop a license renewal program that is consistent with the intent of the rule.

The observations and lessons learned discussed in this report, as well as comments received from the industry and members of the public, will be used to identify additional guidance or changes to existing guidance needed to implement the requirements of license renewal as intended by 10 CFR Part 54. Draft Regulatory Guide (DG) DG-1047, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses," contains the guidance recommended by the staff for implementing the requirements under the rule. This draft regulatory guide, when finalized, is expected to endorse NEI 95-10. In addition, changes as approved by the staff from comments provided by the public and industry will be added prior to final publication of the regulatory guide.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Nuclear Energy Institute (NEI) published NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 0, in March of 1996. NEI 95-10 is an industry guideline for implementing regulatory requirements associated with the renewal of nuclear power plant licenses under Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." Currently, the Nuclear Regulatory Commission (NRC) staff is involved in reviewing this NEI effort with the intention of exercising its option to endorse the industry guideline.

The License Renewal Demonstration Program (LRDP) was an NEI effort intended to assess the effectiveness of the guidance provided by NEI 95-10, Revision 0, to implement the requirements of 10 CFR Part 54. The LRDP consisted of an NRC staff review of five license renewal (LR) programs, including a sample LR methodology, LR application, and supporting information developed by volunteer licensees (hereinafter referred to as participants) from the guidance provided in NEI 95-10, Revision 0.

The site visits were intended to be a review of the processes developed from implementing NEI 95-10 and a review of sample supporting materials to ensure that adequate guidance existed for potential applicants to develop the proper information in sufficient detail to allow the staff to make its findings. The LRDP site visits did not include the review of any plant-specific program for the purpose of determining its adequacy or acceptability in fulfilling the requirements of the rule.

In general, the participants appeared to have performed the scoping and screening functions consistent with the guidance provided by NEI 95-10 and the intent of the rule. However, potential improvements in the existing guidance under NEI 95-10, § 4.1.2 and § 4.2.1.1, that is used to identify intended functions and to assess structures and components passive functions have been identified. In addition, concerns associated with the listing of structures and components were observed during the LRDP, and indicated the need for additional guidance under NEI 95-10, Section 4.

Although a number of good aging management processes were presented during the site visits, concerns were identified with some of the aging management programs presented by the participants during the site visits. In general, NEI 95-10, § 4.2.1, § 4.2.1.2, and § 4.2.1.3, appeared to contain the basic guidance for developing aging management programs but the participants' failure to implement this guidance consistent with the intent of the guideline was an indication that additional description and/or clarification may be needed. The most noted concern, common to all site visits, was the participants' failure to provide a "demonstration" of the effectiveness of the aging management programs to manage the effects of aging under current licensing-basis design conditions during the period of extended operation.

The content of the time-limited aging analyses (TLAAs) presented during the LRDP was generally

consistent with the guidance under NEI 95-10, § 5.1, and the intent of the rule. However, some of the participants indicated their intent to postpone of a number of TLAA evaluations until some time after submitting their LR application. The staff emphasized its expectation that TLAA evaluations would be completed at the time of application. Additional guidance may be needed to clarify this requirement.

The site-visit teams observed that the sample Final Safety Analysis Report (FSAR) supplements presented during the LRDP improved from site visit to site visit, but most of the samples presented did not meet the intent of the rule. Additional guidance for developing an LR FSAR supplement is needed to ensure consistent development of FSAR supplements that provide an adequate summary description of the aging management program.

As a result of the LRDP, the staff will make recommendations to revise NEI 95-10 to include some additional description, clarification, and/or new guidance to address the concerns identified during the LRDP.

ABBREVIATIONS

AMP	aging-management program
AMR	aging-management review
CLB	current licensing basis
FSAR	Final Safety Analysis Report
GSI	generic safety issue
LR	license renewal
LRDP	License Renewal Demonstration Program
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
TLAA	time-limited aging analysis
USI	unresolved safety issue

1. INTRODUCTION

This report summarizes the observations and lessons learned from the site visits performed by the Nuclear Regulatory Commission (NRC) during the Nuclear Energy Institute (NEI) License Renewal Demonstration Program (LRDP). The purpose of the LRDP was to assess the effectiveness of the guidance provided by NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," Revision 0, to implement the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." NRC staff participated in this effort by performing the site visits to assess the implementation of NEI 95-10 by volunteer licensees (hereinafter referred to as participants) to determine if the participants understand the intent of the guidance and correctly implement that guidance consistent with the intent of the rule, and to assess the need for any changes to the guideline.

During preparation of NEI 95-10, Revision 0, the staff and industry realized that development of final guidance for certain topics was best deferred until additional implementation experience was gained in the LRDP. These topics included guidance for level of detail of the information needed for a license renewal (LR) application and FSAR supplement, application of topical reports, and overall level of detail of the guidance to develop an LR program consistent with the intent of the rule. These concerns were addressed by the LRDP and potential areas for improvement identified.

1.1 Objective

The observations and lessons learned discussed in this report will be used to identify additional guidance and/or clarifications that need to be added to NEI 95-10, Revision 0, for an acceptible implementation of the LR requirements under 10 CFR Part 54. The resulting guidance from these observations and lessons learned will be incorporated in NEI 95-10 or in the staff's final version of the draft Regulatory Guide (RG) DG-1047, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses."

1.2 Description of the LRDP

The LRDP consisted of staff reviews of five LR programs developed by the LRDP participants from the guidance provided in NEI 95-10, Revision 0. In general, the LRDP participants had not made a final decision to pursue a renewed license but participated in the LRDP to gain a better understanding of the LR process to help them in their decision. Each review involved a week-long site visit, by five to six NRC staff members, to assess a participant's implementation of the guidance provided by NEI 95-10 in a demonstration LR program. The NRC staff's objectives for the LRDP site visits were as follows: (1) assess the extent to which the participants understand and correctly implement the guidance consistent with the intent of the rule; (2) assess the scoping, aging management review (AMR), and time-limited aging analysis (TLAA) evaluation processes and supporting information developed by the participants (based on the guidance contained in NEI 95-10) for documentation, control, consistency, and completeness with respect to the type of information required by the

rule; (3) assess that the LR applications, TLAA evaluations and Final Safety Analysis Report (FSAR) supplements are of sufficient detail for the staff to make findings as required under 10 CFR 54.29; (4) assess the use and integration of topical reports; and (5) assess the material provided by the participants to identify any potential need for modifications to NEI 95-10.

The scope of each participant's demonstration program included a sample LR methodology, an LR application and supporting information for approximately eight systems, two components per system, a minimum of two TLAA evaluations, and a sample LR FSAR supplement. The scope of systems, structures, components, and TLAAs for the LRDP was designed to provide a cross-section of the types of information expected to be seen in a LR application.

The LRDP site visit teams reviewed the processes and sample materials developed from the guidance provided by NEI 95-10 to ensure that adequate guidance existed to develop an application and supporting information in sufficient detail. The site visit teams did not review plant-specific programs for the purpose of determining their adequacy or acceptability in fulfilling the requirements of the rule.

The results of the site visits were documented in site-visit trip reports (References 1-5). The trip reports have been placed in the NRC Public Document Room.

1.3 Description of the Rule for the Renewal of Operating Licenses

Nuclear power plant licensees that choose to extend the operation of their plants beyond the initial licensing period of 40 years are required to satisfy the requirements delineated under 10 CFR Part 54, the LR rule. This rule establishes the criteria for the systems, structures, and components within the scope of LR that include: (1) safety related systems, structures, and components, (2) non-safety related systems, structures, and components whose failure could affect safety-related systems, structures, and components, and (3) those systems, structures and components that are relied upon to perform a function that satisfies the Commission 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).

The LR rule requires applicants to perform a structured AMR of structures and components that perform an intended function without moving parts or change in configuration or property (passive) and are not subject to replacement based on a qualified life or specified time period (long lived). The AMR may result in the development of new aging management programs for passive/long-lived structures and components to ensure their functionality during the period of extended operation.

The rule also requires an applicant to evaluate TLAAs for systems, structures and components within the scope of the rule that involve time-limiting assumptions defined by the current operating term. The applicant must demonstrate that (1) the analyses remain valid for the period of extended operation, (2) the analyses have been projected to the end of the period of extended operation, or (3) the effects of aging on the intended functions will be

adequately managed for the period of extended operation. The aging management programs and licensee evaluations of TLAAs will become part of the plant's licensing basis, and will be subject to the NRC's ongoing regulatory requirements.

1.4 Implementation

After publication of the amended LR rule in May 1995, the NRC staff and industry began preparing implementation guidance. In March 1996, NEI 95-10, Revision 0, was published. From March through August of 1996, the staff performed the five site-visit reviews for the LRDP. In August 1996, NRC published DG-1047. This draft guide proposes to endorse the guidance contained in NEI 95-10. The staff will use the experience gained through its observation of the plant-specific demonstrations and any information or comments received from members of the public to determine whether changes might be needed in NEI 95-10 or DG-1047.

2. LESSONS LEARNED FROM THE LRDP SITE VISITS

2.1 General Issues

2.1.1 Topical Reports

The use of topical reports, that have been approved by NRC, is an acceptable practice for addressing process and technical matters consistent with 10 CFR 54.17(e). The use of approved topical reports is addressed in NEI 95-10, § 4.2.2.

2.1.1.1 Observations

The staff observed that some of the participants did not adequately demonstrate the site-specific applicability of topical reports used during the LRDP.

2.1.1.2 Lessons Learned

NEI 95-10, § 4.2.2, states that if an applicant chooses to rely "on referenceable results of a previous aging management review...the elements of the AMR should include identifying and demonstrating the applicability of a previous review and then demonstrating that the results and conclusions are in effect at the plant." In referencing a generic topical report, an applicant should verify the applicability of the information within the report to the specific site being considered for a renewed license at the time of application, considering appropriate applicability statements made within the report and the staff safety evaluation report. Information comparing the topical report and site-specific characteristics such as design, materials of construction, configuration, and environment stressors, consistent with NEI 95-10, § 4.2.2, should be discussed in the LR application. In addition, due to the potential for an extended period of time between the development of a topical report and the submittal of an LR application, the site-visit team concluded that the applicants should have made a statement about any changes, or the absence of any changes, in plant conditions as they relate to the information presented in the report. Any "outlying" conditions must be evaluated on a plant-specific basis. The staff will make recommendations to add additional description and/or clarification to address the applicability of topical reports.

2.1.2 GSIs and USIs

Generic safety issues (GSIs) and unresolved safety issues (USIs) are to be considered for determining the scope of the AMR and TLAAs as dis-

cussed in the background information (60 FR 22484) issued with the rule. NEI 95-10, § 1.5, provides general guidance for considering these issues, without regard for the priority assigned to the issues under the NRC GSI program (Ref. 6).

2.1.2.1 Observations

During a review of a participant's handling of GSIs/USIs, the site-visit team noted that those GSIs designated as "low priority" in the NRC GSI program (Ref. 6) were not being considered in identifying potential aging effects relating to LR. The participants along with NEI initiated actions to address this concern.

In addition, the staff observed that participants were not discussing applicable generic safety issues in their AMR and TLAA documentation. For example, GSI 168, "Environmental Qualification of Electrical Equipment," was not discussed by four participants in TLAAs relating to equipment qualification.

2.1.2.2 Lessons Learned

NEI 95-10, § 1.5, provides guidance for assessing GSIs/USIs. However, additional guidance appears to be necessary regarding the consideration of age-related GSIs.

2.2 Scoping Process

The scoping process for LR includes the identification of the system, structures, and components within the scope of LR and identifying their intended functions. The scoping process performed by the five participants typically involved a two-step process. Each participant first identified the scope of systems and structures within the scope of LR and their system-/structural-level intended functions. The participants then identified (refer to § 2.3 of this report) the structures and components requiring AMRs and/or evaluation of TLAAs, and their structural-/component-level intended functions. This approach is consistent with NEI 95-10 and the intent of the rule.

2.2.1 Identifying Systems, Structures, and Components

The LR scoping process presented during the LRDP includes the identification of the systems and structures that meet the criteria under 10 CFR 54.4(a). The guidance for identifying the systems and structures within the scope of LR is provided under NEI 95-10, § 3.1.

2.2.1.1 Observations

The site-visit teams observed that the participants typically provided a proceduralized approach for scoping. The approaches presented by the participants appeared to follow the basic guidance under NEI 95-10, § 3.1 and appeared to be consistent with the criteria under 10 CFR 54.4.

For those participants that implemented NEI 95-10, § 3.1, with the intent to identify all plant systems and structures within the scope of LR, the site-visit teams performed a cursory review of their LR scoping efforts, and did not identify any obvious omissions. The site-visit teams also observed that the participants' scoping processes included steps to evaluate safety-related systems, that did not meet the 10 CFR 54.4(a)(1) criteria, under 10 CFR 54.4(a)(2) and 54.4(a)(3) as described under NEI 95-10, § 3.1.1. In addition, the site-visit teams observed that two participants assessed systems and structures that had been determined to be within the

scope of LR under 10 CFR 54.4(a)(1) (safety-related criteria) for inclusion in the scope of LR under 10 CFR 54.4(a)(2) and 54.(a)(3) (nonsafety-related and specified Commission regulation criteria) as well. Because this additional review of safety-related systems under 10 CFR 54.(a)(2) and 54.(a)(3) was observed only during two site visits, some additional description and/or clarification under NEI 95-10, § 3.1, may be needed to meet the intent of 10 CFR 54.4.

2.2.1.2 Lessons Learned

Two participants included steps in their scoping process to evaluate those systems and structures, that met the safety-related criteria (10 CFR 54.4[a][1]), for inclusion within the scope of LR under scoping criteria 10 CFR 54.4(a)(2) and 54.4(a)(3) to ensure all system-/structural-level intended functions and appropriate evaluation boundaries were identified.

A review of the guidance under NEI 95-10, § 3.1, identified the guidance for assessing each system under each of the three scoping criteria in the flow-diagram, Figure 3-1. However, the text under NEI 95-10, § 3.1, does not contain a description of the review performed by the last two participants. The staff will recommend that additional description and/or clarification be added to NEI 95-10 to ensure all system-/structural-level intended functions and appropriate evaluation boundaries are identified.

2.2.2 Identifying System-/Structural-Level Intended Function

The need to identify system-/structural-level intended functions is delineated under 10 CFR 54.4(b). The guidance for identifying these intended functions is provided under NEI 95-10, § 3.2.

2.2.2.1 Observations

In general, the site-visit teams observed that the participants appeared to have implemented the guidance for identifying system-level intended function that appeared to be consistent with NEI 95-10, § 3.2. Although the site-visit reviews did not assess the completeness of the results presented, no specific concerns were noted with the intended functions identified by the participants, and they appeared to meet the intent of the rule. However, a site-visit team observed that one participant identified the system-level intended functions from multiple plant documents such as design-basis documents, training handbooks, scoping determination handbooks, etc. This approach resulted in a more detailed, descriptive list of system-/structural-level intended functions that appeared to better meet the intent of the guideline. Some additional description and/or clarification may be needed to meet the intent of 10 CFR 54.4(b).

2.2.2.2 Lessons Learned

One participant used more descriptive onsite documentation to develop a more detailed, descriptive list of system-/structural-level intended functions. From this improved list, the participant appeared to develop a more complete and descriptive list of the structure-/component-level intended functions. The staff may recommend that additional description and/or clarification be added to the existing guidance to include the development of a more detailed, descriptive list of system-/component-level intended functions.

2.3 Screening Process

The LR screening process described in NEI 95-10 includes establishing evaluation boundaries, determining the intended functions of the structures and components within the evaluation boundary, and identifying which of those structures and components need to be included in the AMR. In general, the screening methodologies presented during the LRDP were consistent with NEI 95-10 and the intent of the rule with few exceptions as described below.

2.3.1 Evaluation Boundaries

NEI 95-10 describes evaluation boundaries as "those portions of the systems and structures that are necessary for ensuring the intended functions of the system or structure will be performed." Identifying evaluation boundaries has been recognized as a basic step of the screening process presented under NEI 95-10, § 4.1.1, for determining the structures and components within the scope of LR as intended by the rule.

2.3.1.1 Observations

The site-visit team observed that all but one participant identified evaluation boundaries using marked-up, site-approved drawings consistent with the guidance under NEI 95-10, § 4.1.1. One participant used an alternate approach to identify the structures and components within the scope of LR that appeared to be consistent with NEI 95-10, § 4.1, and the intent of the rule. NEI 95-10, § 4.1.1, appeared to contain sufficient guidance for determining evaluation boundaries that supports the screening process consistent with the intent of the rule.

2.3.1.2 Lessons Learned

The industry guideline allows applicants to use different approaches to identify the structures and components within the scope of LR and to meet the intent of the rule. The site-visit team reviewed the process and the structures and components selected by the one participant who did not use evaluation boundaries. The site-visit team verified that this participant's approach and list of selected structures and components appeared to be consistent with the intended results from implementing the guidance under NEI 95-10, § 4.1, and the intent of the rule. No additional guidance appeared necessary for identifying evaluation boundaries.

2.3.2 Identifying Structural-/Component-Level Intended Functions

Structural-/component-level intended functions are defined under 10 CFR 54.4(b). The guidance for identifying these intended functions is provided under NEI 95-10, § 4.1.2.

2.3.2.1 Observations

The site-visit teams observed that the structural-/component-level intended functions identified by the participants appeared to be consistent with NEI 95-10, § 4.1.2 and the intent of the rule. Although the site-visit reviews did not assess the completeness of the results developed for the LRDP, no specific concerns were identified with the intended functions presented by the participants. However, as discussed previously, the site-visit team also observed that the participant that developed a more detailed, descriptive list of system-/structural-level intended functions also

developed a more detailed, descriptive list of structural-/component-level intended functions than was observed during other site visits. This more descriptive list of structural-/component-level intended functions appeared to better meet the intent of 10 CFR 54.4(b). Some additional description and/or clarification may be needed to meet the intent of 10 CFR 54.4(b).

2.3.2.2 Lessons Learned

The participant that developed the more detailed, descriptive list of system-/structural-level intended functions appeared to develop a more complete and descriptive list of the structure-/component-level intended functions that appeared to better meet the intent of the rule. The staff may recommend that additional description and/or clarification be added to the existing guidance to include the development of a more complete and descriptive list of structural-/component-level intended functions.

2.3.3 Identifying Component Passive Functions

To identify a component passive function, an applicant has to determine if the component performs its intended function without moving parts or change in configuration or property as required under 10 CFR 54.21(a). The guidance for determining which components are passive is provided under NEI 95-10, § 4.1.2.

2.3.3.1 Observations

The site-visit team observed that some component passive functions were not determined based on its use of moving parts or change in configuration or properties of the structures and components in performing the intended functions. Some additional description and/or clarification may be needed.

2.3.3.2 Lessons Learned

Although NEI 95-10 appears to contain the necessary guidance and has a list of active/passive structures, components and commodity groups in Appendix B, concerns with the implementation of NEI 95-10, § 4.1.2, were noted during the site visits.

The incorrect determination of component passive functions can result in an incorrect list of structures and components requiring an AMR and the subsequent failure to identify applicable aging affects. For example, the participants considered the heat transfer function of a heat exchanger to be active. The transfer of heat is performed by heat exchangers without moving parts or a change in configuration or properties making the component passive.

The failure to recognize that a heat exchanger is a passive component with respect to the heat transfer function, will eliminate the need to consider scaling, obstructions and other aging effects that can effect the transfer of heat. The staff will consider recommendations to provide additional description and/or clarification to NEI 95-10, § 4.1.2, to address this concern.

2.3.4 Identifying Long-Lived Characteristics

To determine the long-lived characteristics of a component, an applicant has to determine if the component is subject to replacement based on a qualified life or specified time period as required under 10 CFR 54.21(a)(1)(ii). The guidance for determining the long-lived characteristics of a component is provided under NEI 95-10, § 4.1.2.

2.3.4.1 Observations

The site-visit teams observed that the participants identified the long-lived characteristics of structures and components consistent with NEI 95-10, § 4.1.2, without any noted concerns for those structures and components within the scope of the LRDP. However, the site-visit teams did observe some inconsistencies between the intent of the guidance under NEI 95-10, § 4.1.2, and the assessment of the long-lived characteristics for components sometimes referred to as consumables; e.g., seals gaskets, and packing. Additional description and/or clarification of NEI 95-10, § 4.1.2, may be needed for these items.

2.3.4.2 Lessons Learned

Gaskets, packing, and seals are replaced relatively frequently but are not replaced on the basis of qualified life or a specified time period. However, some remain in use for many years and others are replaced on a periodic basis or single-use application (e.g., single crush of a gasket). These diverse applications make it difficult to implement the guidance under NEI 95-10, § 4.1.2, that appears to work well in other applications presented during the LRDP. The staff is considering a recommendation that guidance be added to NEI 95-10, § 4.1.2, to address such items.

2.3.5 Identifying and Listing of Structures and Components

Upon determining the structures and components requiring an AMR, an applicant is required to identify and list those structures and components consistent with 10 CFR 54.21(a)(1). The guidance for identifying and listing of structures and components is provided in NEI 95-10, § 4.1.2.

2.3.5.1 Observations

In general, the site-visit team observed that the participants interpreted 10 CFR 54.21(a)(1) to mean that they only needed to provide a listing of commodity groups to fulfill the requirement to identify and list the structures and components requiring an AMR. Some additional description and/or clarification may be needed under NEI 95-10, § 4.2.1, to meet the intent of 10 CFR 54.21(a)(1).

2.3.5.2 Lessons Learned

The rule, 10 CFR 54.21(a)(1), states that an applicant is to "identify and list the structures and components requiring an aging management review." Although not adequately described under NEI 95-10, § 4.2.1, the participants only provided a list of individual components (not included in any commodity groups) and/or commodity groups.

The site-visit teams concluded that the participants should have provided a description of each commodity group that bounded and identified the structures and components intended to be included in that commodity group to fulfill the requirement for "identifying" the structures/components requiring an AMR. The staff may make recommendations to add additional description and/or clarification for "identifying" the structures and components within a commodity group to meet the intent of 10 CFR 54.21(a)(1).

2.4 Aging Management Review

The AMR process for LR includes identifying aging effects, and developing and/or maintaining

programs that manage these effects of aging so that the structures and components will perform their intended functions under current licensing-basis (CLB) design conditions during the period of extended operation. In general, NEI 95-10, § 4.2.1.1 and § 4.2.1.2 appear to provide the necessary guidance to perform an AMR consistent with 10 CFR 54.21(a), but inconsistent implementation of this guidance indicated that additional guidance may be needed.

2.4.1 Identifying Aging Effects

The identification of aging effects for the structures and components within the scope of LR is required under 10 CFR 54.21(a). The guidance for identifying aging effects is described under NEI 95-10, § 4.2.1.

2.4.1.1 Observations

In general, the site-visit teams observed that the aging effects identified by the participants to be "plausible" appeared to be consistent with NEI 95-10, § 4.2.1.1 and the intent of the rule. However, some of the aging effects that were determined to be "not plausible" were not consistent with the intent of the rule. Some additional guidance may be needed to correctly determine the aging effects applicable to a particular structure or component consistent with 10 CFR 54.21(a).

2.4.1.2 Lessons Learned

Although the intent of the site visits was not to assess the completeness of the aging effects presented by the participants, the site-visit teams did observe some concerns with the determination of "not plausible" aging effects. The use of existing aging management programs (AMPs) as the basis for determining an aging effect as being "not plausible" was the most common concern observed with the identification of aging effects during the LRDP. For example, corrosion in a closed fluid system containing carbon steel pipe was determined to be a "not plausible" aging effect. This determination was based on the fact that corrosion of the carbon steel had not occurred over the previous 20 years of operation due to an existing chemistry control program. Using an existing AMP, such as chemistry control, to determine an aging effect to be "not plausible" is not consistent with the intent of the rule. The staff will recommend additional description and/or clarification to better identify aging effects.

2.4.2 Use of Operating Experience

The background information (60 FR 22467) that accompanied the rule discusses the use of operating experience applicable to LR as it may apply to applicants being considered for a renewed license. NEI 95-10, § 4.2.1.1, provides the guidance for considering operating experience during the AMR process.

2.4.2.1 Observations

In general, the participants used operating experience to help identify aging effects consistent with NEI 95-10, § 4.2.1.1, but some concerns with the source documents used to perform the operating-experience reviews were identified.

Each participant reviewed various source documents to perform an operating experience review, but in some cases NRC generic communications were not used. Some additional guidance may be needed to ensure a thorough operational review

is performed as intended by the rule.

2.4.2.2 Lessons Learned

Because the LRDP site visits were not intended to assess the completeness of the participants' results, the site-visit teams did not assess the completeness of the operating-experience reviews performed by the participants. However, because NRC generic communications are a good source of aging operating-history, the site-visit teams had expected that the participants would review these communications and other sources of industry experience in determining aging effects. A number of participants did not use NRC generic communications as a source for their operating experience review. This raised a concern as to the completeness of operating-experience reviews performed by the participants and the guidance provided under NEI 95-10, § 4.2.1.1.

NEI 95-10, § 4.2.1.1, does not specify the documents or document types that need to be reviewed. The staff may recommend that additional description and/or clarification be added to NEI 95-10, § 4.2.1.1, to ensure a thorough operational review is performed.

2.4.3 Aging Management Programs

An AMR is required under 10 CFR 54.21(a) to manage the effects of aging for all structures and components within scope of LR consistent with the CLB during the period of extended operation. The development of AMPs is described under NEI 95-10, § 4.2.1.2.

2.4.3.1 Observations

In general, the participants developed aging-management programs (AMPs) that contained the basic elements of NEI 95-10, § 4.2.1.2. However, the implementation of these programs sometimes produced results that were not consistent with the intent of this guidance or the rule. For example, the site-visit teams observed that some of the AMPs presented by the participants relied on the detection of a component failure to manage some aging effects. Other AMPs used inspection activities that were not documented or controlled by the site quality control program or site-approved procedures.

In addition, the guidance for developing the level of detail for AMRs provided in an LR application appeared to be adequately described under NEI 95-10, § 4.2.1.2, but inconsistencies in the level of detail observed during the LRDP was an indication that additional guidance may be needed.

2.4.3.2 Lessons Learned

A number of AMPs relied on the detection of a component failure to manage some aging effects. For example, one participant offered existing surveillance and inspection programs as AMPs for loss of material associated with radiation-monitoring tubing. The intent was to perform periodic pressurization of the tubing and subsequent inspection of the exterior of the tubing to detect interior wall thinning of the tubing.

This raised the concern that the tubing interior wall can degrade to the point where it could no longer sustain CLB design loads before through-wall flaws occur and the condition is detected. The use of failure detection as a means of managing the effects of aging is not consistent with NEI 95-10, § 4.2.1.

Other participants used inspection programs that were not documented or controlled by the site quality control program or site-approved procedures, which is not consistent with NEI 95-10, § 4.4. For the most part, this concern was based on the preliminary nature of the information prepared for the LRDP, but in some cases, credit was taken for routine, informal walkdowns by plant personnel. Although the staff recognizes the importance of plant walkdowns in identifying physical damage and other related problems, the use of informal walkdowns as an AMP was considered insufficient.

In addition, inconsistencies were observed during the LRDP relating to information included in the sample applications. Both the site-visit teams and the participants believed that there was a need for more description in LR applications and onsite information for new programs (a program not previously reviewed by the NRC) as compared to existing programs.

The staff reviewed NEI 95-10, § 4.2.1.2, and determined that guidance exists to address these concerns but will consider recommendations for additional description and/or clarification of existing guidance to address the use of failure detection and undocumented AMPs to manage the effects of aging. In addition, the staff will recommend that additional guidance be considered for new and existing AMPs, including further guidance on the level of detail needed in an LR application.

2.5 Demonstration

Consistent with 10 CFR 54.21(a)(3), applicants are required to provide a "demonstration" that "the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation," for each structure and component subject to an AMR. NEI 95-10, § 4.2.1.3, provides guidance for implementing this requirement and examples of "demonstrations" are provided in Appendix C of NEI 95-10.

2.5.1 Observations

Early in the LRDP, the site-visit teams observed that the participants interpreted the guideline to say that scoping, screening, identification of aging effects and implementing an AMP were sufficient to "demonstrate" reasonable assurance that the effects of aging will be managed under CLB design conditions during the period of extended operation. In addition, the "demonstrations" presented by the participants did not contain the information, in sufficient detail, consistent with guidance provided by NEI 95-10 or the intent of the rule. Some additional guidance may be needed for developing a "demonstration."

2.5.2 Lessons Learned

Implementing the requirements for scoping, screening, identifying aging effects and performing AMRs is not consistent with NEI 95-10, § 4.2.1.3, in "demonstrating" reasonable assurrance that the effects of aging will be managed under CLB design conditions during the period of extended operation. NEI 95-10, § 4.2.1.3, states that an applicant needs to "collect and establish supporting information and objective evidence for the aging management demonstration."

The site-visit teams commented that a "demonstration" for an existing program should include a summary of "objective evidence" observed from

the implementation of an AMP. The site-visit teams also commented that a "demonstration" for a new program should include a schedule, methodology, acceptance criteria and corrective actions. A "demonstration" of the effectiveness of some new AMPs may be required prior to approval of an application.

NEI 95-10, § 4.2.1.3, § 4.4, § 6.2 and Appendix C does not contain separate guidance for a "demonstration" of a new AMP. In addition, the inconsistent implementation of the guidance contained in NEI 95-10, observed by the site-visit teams throughout the LRDP, is an indication that additional description and/or clarification of the existing guidance is needed. The staff will make recommendations to address these concerns.

2.6 TLAA

The TLAA evaluations required to be included in an LR application by 10 CFR 54.21(c) includes all calculations and analyses as defined under 10 CFR 54.3. Guidance for preparing TLAA evaluations is provided under NEI 95-10, § 5.1.

2.6.1 Observations

The content of TLAA evaluations presented during the site visits were generally consistent with the guidance under NEI 95-10, § 5.1, and the intent of the rule but a concern with the timing of TLAA evaluations was identified. The site-visit teams observed, that for the purpose of the LRDP, a number of the participants indicated they intended to defer evaluating many of the TLAAs until after (in some cases, many years) they submit their LR application which is not consistent with NEI 95-10 or the intent of the rule. Some additional guidance may be needed to ensure the timely submittal of TLAA evaluations.

2.6.2 Lessons Learned

The intent of 10 CFR 54.21(c) is for applicants to submit TLAA evaluations at the time of application. The staff emphasized its expectation that TLAA evaluations need to be completed and submitted at the time of application. NEI 95-10 indicates that there may be instances in which TLAAs can be deferred; however, no criteria are provided. The staff will recommend that additional guidance be added to NEI 95-10, § 5.1.4, to clarify and strengthen the guidance for submitting TLAA evaluations at the time of application.

2.7 FSAR Supplement

The rule, 10 CFR 54.21(d), requires that a supplement to the FSAR be submitted at the time of application which provides a summary description of LR program and activities used to manage the effects of aging and the evaluation of TLAAs. NEI 95-10, § 6.2.3 and § 6.3, contain the guidance for this requirement.

2.7.1 Observations

Although the site-visit teams observed that the sample FSAR supplements had improved over the LRDP, the supplements presented did not fully meet the requirements of 10 CFR 54.21(d). The most notable deficiency was the lack of detail in the description of the LR programs and activities. In addition, the site-visit team noted that the guidance under NEI 95-10, § 6.2.3 and § 6.3, allows applicants to submit descriptions that are consistent with the level of detail currently provided in some FSARs, which in some cases may not be consistent with the current NRC position on the

information required in an FSAR. Additional guidance may be needed to address these concerns.

2.7.2 Lessons Learned

NEI 95-10, § 6.3, states that "Summary descriptions of the programs and activities for managing the effects of aging shall be included in the FSAR supplement at the level of detail consistent with the current FSAR." This guidance implies that the current level of description in the applicant's FSAR, which may not include all the information required by 10 CFR 54.21(d), is adequate.

The Commission recently directed that this issue, for LR, be coordinated with FSAR concerns observed at operating reactors. The staff will recommend that the guidance under NEI 95-10, § 6.3, be revised and additional guidance be developed to provide the guidance necessary to develop an FSAR supplement that meets the intent of the rule.

3. CONCLUSIONS

In general, NEI 95-10, appeared to contain most of the guidance needed for scoping, screening, identifying aging effects, developing AMPs, and evaluating TLAAs. However, as expected, the LRDP site-visit reviews identified the need for some improvements to assist applicants in developing LR applications and supporting documentation.

The LRDP identified the need for additional description and/or clarification for referencing topical reports, identifying intended functions, determining component passive functions, identifying commodity groups, determining aging effects, selecting AMPs, and providing a "demonstration" for AMPs.

The LRDP also identified that additional guidance may be needed for assessing GSIs/USIs, determining the long-lived characteristics for consumables (e.g.; gaskets and seals), providing a "demonstration" for AMPs, and providing timely submittal of TLAA evaluations.

Gaining experience with the level of detail for an LR application, onsite information, and an FSAR supplement was a key objective of the LRDP. The LRDP was beneficial in this regard and confirmed the need for some additional description and/or clarification of the guidance in these areas.

The improvements and additions to NEI 95-10, that are needed for developing an LR program consistent with the intent of the rule, will be included in NEI 95-10 or the RG. In addition, changes as approved by the staff from comments provided by the public and industry will be added prior to final publication of the RG.

REFERENCES

1. U.S. Nuclear Regulatory Commission, "License Renewal Demonstration Program Site Visit, Calvert Cliffs Nuclear Power Plant Trip Report," Project No. 690, Washington D.C., April 15, 1996.

2. U.S. Nuclear Regulatory Commission, "License Renewal Demonstration Program Site Visit, Oconee Nuclear Power Station Trip Report," Project No. 690, Washington D.C., May 21, 1996.

3. U.S. Nuclear Regulatory Commission, "License Renewal Demonstration Program Site Visit, Hatch Nuclear Power Plant Trip Report," Project No. 690, Washington D.C., July 9, 1996.

4. U.S. Nuclear Regulatory Commission, "License Renewal Demonstration Program Site Visit, Point Beach Nuclear Power Station Trip Report," Project No. 690, Washington D.C., July 30, 1996.

5. U.S. Nuclear Regulatory Commission, "License Renewal Demonstration Program Site Visit, Peach Bottom Atomic Power Plant Trip Report," Project No. 690, Washington D.C., September 16, 1996.

6. U.S. Nuclear Regulatory Commission, "Prioritization of Generic Safety Issues," NUREG-0933, June 30, 1995.

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER (Assigned by NRC, Add Vol., Supp., Rev., and Addendum Numbers, if any.)

NUREG-1568

2. TITLE AND SUBTITLE

License Renewal Demonstration Program: NRC Observations and Lessons Learned

3. DATE REPORT PUBLISHED

MONTH: December YEAR: 1996

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

R.J. Prato, P.T. Kuo, S.F. Newberry

6. TYPE OF REPORT

Regulatory

7. PERIOD COVERED *(Inclusive Dates)*

3/96 - 8/96

8. PERFORMING ORGANIZATION – NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

DRPM, NRR, U.S. Nuclear Regulatory Commission, Washington, DC 20555

9. SPONSORING ORGANIZATION – NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

DRPM, NRR, U.S. Nuclear Regulatory Commission, Washington, DC 20555

10. SUPPLEMENTARY NOTES

11. ABSTRACT *(200 words or less)*

This report summarizes the Nuclear Regulatory Commission staff's observations and lessons learned from the five License Renewal Demonstration Program (LRDP) site visits performed by the staff from March 25, 1996, through August 16, 1996. The LRDP was a Nuclear Energy Institute (NEI) program intended to assess the effectiveness of the guidance pro-vided by NEI 95-10, Revision 0, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," to implement the requirements of Title 10 of the *Code of Federal Regulations*, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants."

In general, NEI 95-10, appeared to contain most of the guidance needed for scoping, screening, identifying aging effects, developing aging managememt programs, and evaluating time-limited aging analysis. However, as expected, the LRDP site-visit reviews identified the need for some improvements to assist applicants in developing license renewal applications and supporting documentation. The improvements and additions to NEI 95-10, that are needed for developing an license renewal program consistent with the intent of the rule, will be included in NEI 95-10 or the applicable Regulatory Guide.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

NEI 95-10, license renewal demonstration program, LRDP, lessons learned

13. AVAILABILITY STATEMENT

14. SECURITY CLASSIFICATION

(This Page)

(This Report)

15. NUMBER OF PAGES

16. PRICE

NRC FORM 335 (2-89)