December 19, 2000

SFEN/ICONE9 - 67
Rue Blomet
75015 Paris - France

SUBJECT: SUBMITTAL OF PAPER TO ICONE 9 CONFERENCE

Gentlemen:

Attached is the paper “Streamlining the License Renewal Review Process” for Track 4 of the ICONE 9 conference for your review. If there are any questions, please contact me by e-mail at jxd@nrc.gov or by telephone at (301) 415-1014.

Sincerely,

/RA/

Jerry Dozier, General Engineer
License Renewal and Standardization Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Attachment: As stated

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STREAMLINING THE LICENSE RENEWAL REVIEW PROCESS

BY
Jerry Dozier, Sam Lee, P. T. Kuo
United States Nuclear Regulatory Commission (NRC)

Abstract

The staff of the NRC has been developing three regulatory guidance documents for license renewal: the Generic Aging Lessons Learned (GALL) report, Standard Review Plan for License Renewal (SRP-LR), and Regulatory Guide (RG) for Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses. These documents are designed to streamline the license renewal review process by providing clear guidance for license renewal applicants and the NRC staff in preparing and reviewing license renewal applications. The GALL report systematically catalogs aging effects on structures and components; identifies the relevant existing plant programs; and evaluates the existing programs against the attributes considered necessary for an aging management program to be acceptable for license renewal. The GALL report also provides guidance for the augmentation of existing plant programs for license renewal. The revised SRP-LR allows an applicant to reference the GALL report to preclude further NRC staff evaluation if the plant's existing programs meet the criteria described in the GALL report. During the review process, the NRC staff will focus primarily on existing programs that should be augmented or new programs developed specifically for license renewal. The Regulatory Guide is expected to endorse the Nuclear Energy Institute (NEI) guideline, NEI 95-10, Revision 2, entitled "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," which provides guidance for preparing a license renewal application. This paper will provide an introduction to the GALL report, SRP-LR, Regulatory Guide, and NEI 95-10 to show how these documents are interrelated and how they will be used to streamline the license renewal review process. This topic will be of interest to domestic power utilities considering license renewal and international ICONE participants seeking state-of-the-art information about license renewal in the United States.

Introduction and Background

Calvert Cliffs Nuclear Power Plant and Oconee Nuclear Station have received regulatory approval to extend their operating licenses from 40 to 60 years. The NRC staff is currently reviewing three additional license renewal applications and anticipates that many additional applications for renewal will be submitted in the near future. During the development and NRC staff review of the initial license renewal applications, many lessons were learned by both the industry and the NRC staff. One important lesson learned by both the NRC and the industry was that many of the existing programs at the nuclear power plants were effectively managing aging under the current operating licenses and would be adequate to manage aging effects for license renewal without change. It was not necessary to develop many new and unique programs or provide extensive program additions to support license renewal. Nuclear power plants (NPPs) have numerous existing programs currently required by regulations, such as the Code of Federal Regulations (CFR). In addition, they have, over time, developed reactive programs (e.g., programs evolved from plant operating experience) and general practice programs (e.g., preventive maintenance). Existing programs used to maintain compliance with current requirements also manage aging to varying degrees such as inservice inspection (10 CFR 50.55a) and reactor vessel integrity (10 CFR 50, Appendices G and H). Reactive programs developed as a result of operating experience are typically described in NRC Bulletins and Generic Letters (GL). Examples include the boric acid corrosion inspection program (GL 88-05), service water program (GL 89-13), erosion/corrosion program (Bulletin 87-01, GL 89-08), bolting program (Bulletin 82-02), and coating program (GL 98-04). Also,

there are existing general practice programs that could be credited for aging management such as preventive maintenance and condition monitoring.

The programs mentioned above and numerous other existing plant programs have been implemented at most US nuclear power plants (NPPs). The NRC staff review would be to generically determine where credit for the existing programs to manage detrimental effects of aging should be recognized, and where the existing programs should be augmented to establish confidence that the program would effectively manage age-related degradation during the period of extended operation. This philosophy set the fundamental framework for streamlining the license renewal process in the improved license renewal guidance.

An ambitious effort that performed generic evaluation of plant existing programs was carried out and involved the generation of more than 1500 pages of regulatory guidance. This included development of the Generic Aging Lessons Learned (GALL) Report, Standard Review Plan for License Renewal (SRP-LR), and Regulatory Guide (DG-1104) which proposed to endorse the industry guidance provided in NEI 95-10, Rev. 2. The full titles of these documents are provided in the reference section. Collectively, these documents are called the Improved License Renewal Guidance. This paper highlights the purpose and provides a general description of these documents. The entire text for the Improved Licence Renewal Guidance may be obtained free of charge from the NRC home page at www.nrc.gov/NRC/REACTOR/LR/index.html.

GALL Report

The GALL report provides a generic evaluation of existing programs for the purposes of aging management required for license renewal. The NRC staff used this report to document the basis for determining when existing programs are adequate without change and when existing programs should be augmented for license renewal. The GALL report systematically catalogs aging effects on structures and components, identifies the relevant existing plant programs, and evaluates the existing programs against the attributes considered necessary for an aging management program to be acceptable for license renewal. The GALL report presents the results in a table format and an example is provided in Figure 1.

Item	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation
C2.5 C2.5.8	Pressurizer Manway and flange	Low-alloy steel with types 308, 308L, or 309 stainless steel; or alloy 600 cladding	Chemically treated borated water or saturated steam (290-343°C 554-650°F)	Crack initiation and growth/ Stress corrosion cracking (SCC), primary water stress corrosion cracking	Chapter XI.M1, "ASME Section XI, Inservice Inspection" and Chapter XI.M2, "Water Chemistry	No
C2.5 C.2.5.3	Pressurizer Surge line nozzle	Cast austenitic stainless steel (CASS)	Chemically treated borated water up to 340°C (644°F)	Crack initiation and growth/ Stress corrosion cracking	Monitoring and control of primary water chemistry in accordance with the Electric Power Research Institute guidelines in TR-105714 (Rev. 3 or later revisions or update) minimize the potential of SCC, and material selection according to the NUREG-0313, Rev. 2 guidelines of ≤0.035% Carbon and ≥7.5% ferrite has reduced susceptibility to SCC. For CASS components that do not meet either one of the above guidelines, a plant-specific aging management program needs to be evaluated.	Yes, plant specific

Figure 1. Example component evaluations from the draft GALL report.

If the NRC staff determines that a program is adequate to manage certain aging effects for particular structures and components without change, the GALL report indicates that no further NRC staff evaluation is recommended for license renewal. Otherwise, it recommends areas in

which the NRC staff should focus its review. As provided in the first row of figure 1, the pressurizer manway and flange are listed with the specific material that it is made from with the environment. The pressurizer manway and flange could experience crack initiation and growth due to stress corrosion cracking. However, an effective water chemistry program can prevent crack initiation and growth from occurring and ASME section XI inservice inspection can provide detection if it was to occur. Generally, if the license renewal applicant has an effective chemistry program and inservice program, as described in the GALL report, there is no further NRC staff evaluation required for that plant. The second row lists a pressurizer surge line nozzle made from cast austenitic stainless steel (CASS) that may also experience stress corrosion cracking. For this component, the chemistry program and specific material requirements are listed. If the license renewal applicant does not have an effective chemistry program and the specific material requirements listed, then the applicant must describe the method for managing aging during the license renewal term. In this case, the effectiveness of the aging management program is evaluated on a plant-specific basis for review of the following 10 program attributes: scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience.

The GALL report provides one acceptable way to manage aging effects for license renewal. However, the GALL report does not limit the applicant's creativity or use of new technology to meet their aging management program needs. An applicant may propose alternatives for NRC staff review in its plant-specific license renewal application provided that the alternative program is fully described in the license renewal application and evaluated against the 10 program attributes. If the applicant wants to credit a program as described in the GALL report, then the applicant needs only to reference the particular item in GALL in its application and the NRC staff will not review it. However, the applicant will maintain the supporting documents on-site ready for future inspection.

Standard Review Plan for License Renewal (SRP-LR)

The Standard Review Plan for License Renewal (SRP-LR) provides guidance to NRC staff reviewers for performing safety reviews of applications to renew licenses of nuclear power plants in accordance with the License Renewal Rule (10 CFR Part 54). The principal purposes of the SRP-LR are to ensure the quality and uniformity of NRC staff reviews and to present a well-defined methodology for evaluating applicant programs and activities for the period of extended operation. The SRP-LR is also intended to make information about the regulatory process for license renewal widely available to the public and the nuclear power industry. The individual SRP-LR sections address who performs the review, the matters that are reviewed, the basis for review, how the review is accomplished, and the conclusions that are sought. The SRP-LR references the GALL report as a technical basis document for providing credit for existing programs and provides guidance to the NRC staff reviewers to focus their reviews on areas where existing programs should be augmented for license renewal or new programs proposed by an applicant.

Regulatory Guide

Regulatory Guides are issued to describe and make available to the public such information as methods acceptable to the NRC staff for implementing specific parts of the Commission's regulations, techniques used by the NRC staff in evaluating specific problems or postulated accidents, and guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with Regulatory Guides is not required. Draft Regulatory Guide DG-1104, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating

Licenses," proposes to endorse the Nuclear Energy Institute (NEI) guidance in NEI 95-10, Rev. 2, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule.” The purpose of this Regulatory Guide is to provide guidance on the information to be submitted in an application for renewal of a nuclear power plant operating license in a uniform format that is acceptable to the NRC staff for structuring and presenting this information. Conformance with this Regulatory Guide is not required, but its use facilitates both preparation of a license renewal application by a licensee and timely, uniform review by the NRC staff. A different format is acceptable to the NRC staff if it provides an adequate basis for approval of the application for license renewal. This Regulatory Guide also ensures that information will be provided with respect to (1) managing the effects of aging during the extended period of operation on the functionality of structures and components that have been identified to require review and (2) evaluating time-limited aging analyses that have been identified to require review, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis (CLB). The information developed and submitted or retained by an applicant for license renewal should permit the NRC staff to make the determination that the requirements of the License Renewal Rule have been met. The format in which this information is presented should provide for optimum utilization of the applicant's resources and should facilitate the NRC staff review of the license renewal application. The technical content of a license renewal application should be sufficient to allow an NRC reviewer to understand the methodologies used to determine the structures and components subject to an aging management review, and the actions taken or to be taken to manage the effects of aging during the period of extended operation and to ensure that TLAAs remain valid for the period of extended operation. The NRC staff will review these areas to (1) determine whether the methodology is acceptable and whether the resultant lists of systems, structures, or components and TLAAs are comprehensive, (2) assess the effectiveness of actions taken or to be taken to manage aging during the period of extended operation, and (3) determine that TLAAs will remain valid for the period of extended operation or have been acceptably dispositioned for the purposes of license renewal.

NEI 95-10

This guideline was developed and issued by the NEI. It provides an acceptable approach for implementing the requirements of 10 CFR Part 54, the License Renewal Rule. It is expected that following this guideline will offer a stable and efficient process, resulting in the issuance of a renewed license. The major elements of the guideline include:

- Identifying the systems, structures, and components within the scope of the License Renewal Rule;
- Identifying the intended functions of systems, structures, and components within the scope of the License Renewal Rule;
- Identifying the structures and components subject to aging management review;
- Assuring that effects of aging are managed;
- Identifying and resolving time-limited aging analyses;
- Identifying and evaluating exemptions containing time-limited aging analyses; and
- Identifying a standard format and content of a license renewal application.

Applicants interested in license renewal are responsible for preparing a plant-specific license renewal application which contains the information as described above.

Conclusions

License renewal has evolved from a theoretical concept in the early 1990s to a viable option in the new millennium. This option has been successfully exercised in the United States. As global energy needs continue to grow, nuclear power generation will remain in the mix of energy production. Extending the operating life of existing nuclear power stations is, for some utilities, an economically feasible way to meet future energy demands. The responsibility of the US Nuclear Regulatory Commission is to ensure that plant life extension is safe - that it does not pose additional risk to public health and safety or to the environment. Augmented maintenance, inspection and testing activities to monitor and manage plant aging, in accordance with the requirements set forth in the License Renewal Rule, constitute aging management programs that utilities can implement to demonstrate their ability to operate safely in the extended period. The NRC's process for concluding that a renewed operating license can be issued involves rigorous safety and environmental reviews to verify that regulatory requirements will continue to be met in the renewal term. The license renewal guidance documents that have been described in this paper were developed as a result of equally rigorous research and evaluation. The return on this investment is an efficient methodology for developing and reviewing applications for license renewal in less time, more consistently, and with fewer resources for the NRC staff as well as future license renewal applicants.

Acknowledgments

The Improved Licence Renewal Guidance is being developed by the US Nuclear Regulatory Commission staff with the assistance of the Argonne National Laboratory and the Brookhaven National Laboratory. The publication of the improved regulatory guidance is scheduled for March 2001. This paper was developed based on the August 2000 draft version. Public participation (including industry and concerned citizens) is a contributing factor to the success of the improved license renewal guidance. Rani Franovich of the Region II Office of the NRC, Division of Reactor Projects, provided technical editing and numerous suggestions for this paper.

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Other items to do:

place in ASME format