



# NPP License Renewal and Aging Management: Revised Guidance

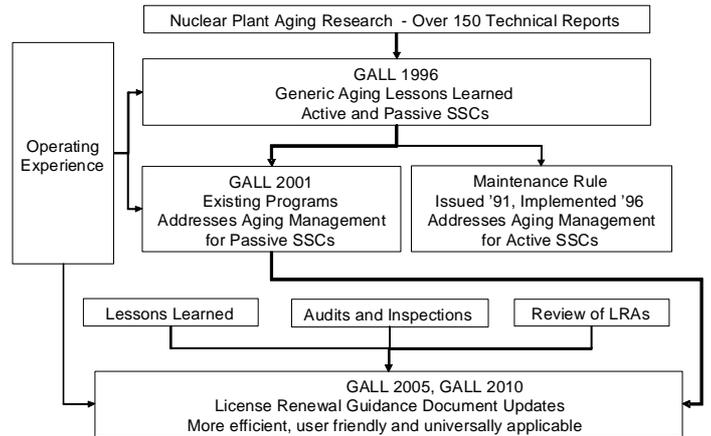
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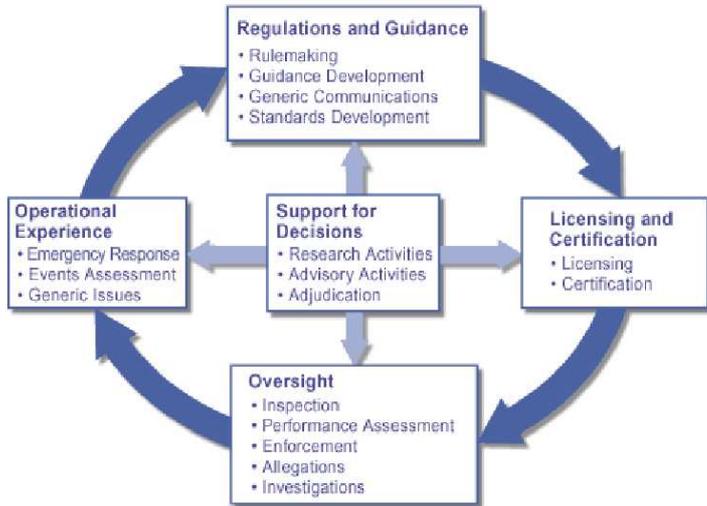
**Abstract.** Based on the Atomic Energy Act, the NRC issues licenses for commercial power reactors to operate for up to 40 years and allows these licenses to be renewed for up to another 20 years. NRC has approved license renewal (LR) for well over 50% of U.S. located reactors originally licensed to operate for 40 years. Of these 104 reactors (69 PWRs, 35 BWRs), the NRC has issued renewed licenses for 71 units and is currently reviewing applications for another 15 units. As of May 1, 2012, ten plants at nine sites had entered their 41<sup>st</sup> year of operation and thus are in their first period of extended operation (PEO). Five more plants will enter the PEO by the end of 2012. One foundation of the license renewal process has been license renewal guidance documents (LRGDs). The U.S. Nuclear Regulatory Commission (NRC) revised key guidance documents used for nuclear power LR in 2010 and 2011. These include NUREG-1800, "Standard Review Plan for Review of License Renewal Applications," revision 2 (SRP-LR), and NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," revision 2 (GALL Report). The guidance documents were updated to reflect lessons learned and operating experience gained since the guidance documents were last issued in 2005.

The reactor LRGDs referenced in this poster can all be accessed at <http://www.nrc.gov/reactors/operating/licensing/renewal/guidance.html>



## Background

- NRC's regulatory process provides a robust foundation for ongoing assessments, evaluations, and when appropriate, imposition of new requirements. NRC and the U.S. nuclear industry have a 35-year history of implementing broad-based plant assessments. As shown in Fig. 1, the US regulatory and oversight process is based upon a cycle of operational experience, regulations & guidance, licensing & certification, and oversight with advisory adjudication, research, and advisory activities as the hub.
- The LRGDs are used by nuclear power plant (NPP) applicants to prepare their applications for LR, and provide associated guidance that the NRC staff uses to review the applications and to judge their acceptability.



## 1. Overview of US regulatory and oversight process

### Beta-Version of Generic Aging Lessons Learned Report in 1996

The GALL approach to LR was initiated in 1996 with the publication of NUREG-1568, NUREG-1557 and NUREG/CR-6490. Literature on mechanical, structural, and thermal-hydraulic components and systems reviewed consisted of Nuclear Plant Aging Research (NPAR) reports, NRC Generic Letters, Information Notices, Licensee Event Reports (LERs), Bulletins, Nuclear Management and Resources Council Industry Reports (NUMARC IRs) and literature on electrical components and systems.

### Revision 0 of License Renewal Guidance Documents in 2001

The knowledge base provided by the NPAR studies was expanded upon to provide credit for existing plant aging management programs (AMPs) and further systematized to increase the LR review process effectiveness and efficiency. GALL Rev. 0 was used as a reference by license renewal applicants and regulators. This first GALL Report and the SRP-LR included all aging related events reported in the LERs up to 1998 and expanded the scope to include evaluation of existing NPP programs to determine their acceptability as adequate AMPs for the identified aging effects.

In the aging management review (AMR) line items, GALL evaluates several thousand NPP systems, structures, and components (SSCs); lists the materials, and environments, identifies the significant aging effects and mechanisms; and provides an acceptable AMP for the component, generally documenting how existing commonly used plant AMPs can be used or modified to mitigate or manage these aging effects.

Concurrently in 2001, NRC published RG 1.188 which endorsed NEI 95-10, Rev. 3.

## 2. Summary of the Evolution of LRGDs

### Revision 1 of License Renewal Guidance Documents in 2005

By May 2004, when a decision was made to revise the LRGDs, to incorporate lessons learned from operating experience and the previous seven years of reviewing license renewal applications (LRAs), NRC staff had the experience of reviewing and relicensing thirteen NPPs (26 units). New material, environment, aging effect and aging management program (MEAP) combinations, common to LRAs, were added. GALL Chapter IX was added to standardize and define terminology. In addition to the roll-up changes, GALL Rev.1 incorporated specific technical changes based on the incorporation of staff positions approved in previous SERs and Interim Staff Guidance (ISGs) that could be accepted generically. To clarify the process and the changes, a Bases document and an analysis of public comments accompanied the revised LRGDs. RG 1.188 was revised. Together these five documents contained more than 2,500 pages of tightly interrelated technical and programmatic information.

### Revision 2 of License Renewal Guidance Documents in 2010-2011

In early 2009, the NRC staff embarked on the initiative to update the SRP-LR and the GALL Report. The primary forcing functions for performing the update included the desire to: 1) capture operating experience gained since 2005, 2) integrate license renewal precedents since 2005, 3) account for changes in the NRC regulatory framework since 2005, 4) consider proposed changes identified by the nuclear industry, 5) incorporate content from ISGs, and 6) account for changes in industry codes and standards since 2005. During the 2005 update, the focus of the staff efforts was on the AMR line items in the GALL Report. For the 2010 update, the staff shifted their focus to the content of the AMPs.

Nuclear Power Plant & Unit	Entry into Extended Operation	Plant Type
Oyster Creek 1	04/09/2009	BWR-Mark 1-GE2
Nine Mile Point 1	08/22/2009	BWR-Mark 1-GE2
Ginna 1	09/19/2009	PWR-West 2LP
Dresden 2	12/22/2009	BWR-Mark 1-GE3
Robinson 2	07/31/2010	PWR-West 3LP
Monticello 1	09/08/2010	BWR-Mark1 -GE3
Point Beach 1	10/05/2010	PWR-West 2LP
Dresden 3	01/12/2011	BWR-Mark 1-GE3
Palisades 1	03/24/2011	PWR-CE
Vermont Yankee 1	03/21/2012	BWR-Mark 1
Surry 1	05/25/2012	PWR-West 3LP
Pilgrim 1	06/08/2012	BWR-Mark1 -GE3
Turkey Point 3	07/09/2012	PWR-West 3LP
Quad Cities 1	12/14/2012	BWR-Mark1 -GE3
Quad Cities 2	12/14/2012	BWR-Mark1 -GE3

### Conclusion -- Going into the Period of Extended Operation (PEO)

As global energy needs continue to grow, nuclear power generation will remain in the mix of energy production. There is increasing industry interest in subsequent license renewal and NPP long-term operation (LTO) beyond the first period of extended operation. The responsibility of the NRC 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. 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.