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# NRC Research to Support Potential Subsequent License Renewal

*Presented at the Joint NEI/EPRI/DOE/NRC Quarterly Meeting On R&D Related to Long Term Operation*

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# List of Abbreviations

| Abbreviation | Full Text |
|---|---|
| ACI | American Concrete Institute |
| AMP | Aging Management Program |
| ASME | American Society for Mechanical Engineers |
| C&S | Codes and Standards |
| DOE | U.S. Department of Energy |
| EMDA | Expanded Materials Degradation Analysis/Assessment |
| EPRI | Electric Power Research Institute |
| GALL | Generic Aging Lessons Learned (NUREG-1801 Report) |
| GL | Generic Letter |
| IAEA | International Atomic Energy Agency |
| IFRAM | International Forum for Reactor Aging Research Management |
| IN | Information Notice |
| LR | License Renewal |
| LRA | License Renewal Application |
| LWRSP | Light Water Reactor Sustainability Program |
| NEA/OECD | Nuclear Energy Agency/Organization for Economic Co-operation and Development |
| NEI | Nuclear Energy Institute |
| OpE | Operational Experience |
| PEO | Period of Extended Operation (40 to 60 years) |
| PLiM | Plant Life Management (Plant Integrity Management) |
| PSR | Periodic Safety Review |
| RG | Regulatory Guide |
| RIS | Regulatory Issue Summary |
| SLR | Subsequent License Renewal (Renewal after 1st License Renewal |
| SSC | Structure, System, and Components |

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# NRC – Office of Nuclear Regulatory Research

## Some of the Staff Conducting Research Related to Materials Degradation

| Staff | Division |
|---|---|
| J. Burke | Corrosion and Metallurgy |
| H. Graves | Structural & Seismic Engineering |
| A. Hull | Corrosion and Metallurgy |
| M. Kirk | Component Integrity |
| G. Oberson | Corrosion and Metallurgy |
| S. Rao | Corrosion and Metallurgy |
| S. Ray | Instrumentation & Control and Electrical Eng. |
| M. Srinivasan | Corrosion and Metallurgy |
| R. Tregoning | Senior Level Advisor |

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# Current NRC Efforts on Subsequent Renewal†

- Technical
  - Aging management program effectiveness reviews
  - Expanded materials degradation assessment
  - Workshops with industry and international colleagues
  - Review relevant domestic and international operating experience
  - Future guidance document updates (e.g., GALL Report)

†Ref: "Considerations for Subsequent License Renewal", M. Galloway, ANS Utility Working Group Meeting, 8/8/2012. ADAMS ML12228A463.

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# Importance of Operating Experience

- NRC guidance has evolved to address new aging issues
- Examples
  - Buried piping and tanks
  - Inaccessible non-environmentally qualified cables
  - Spent fuel pool neutron-absorbing materials
  - Pressurized water reactor vessel internals
- Enhancing aging management programs through the ongoing review of operating experience is paramount
- How have licensees enhanced their aging management programs?

# Current NRC Research To Support Potential SLR

- Extended Material Degradation Analysis/Assessment (EMDA)
- Aging Management Program (AMP) effectiveness pilot audits
- Assessment of International Periodic Safety Reviews (PSR)

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# Expected Outcome And Use of NRC Research

- Based on research data and operating experience during the PEO:
  - Exchange Information with U.S. Department of Energy (DOE) (LWRSP), industry (NEI, EPRI), and international community (IFRAM, IAEA's PLiM, and OECD/NEA's LTO)
  - NRC will work with codes and standards organizations (ASME , ANS, IEEE, ACI) to incorporate/update aging-related information in existing codes and/or encourage the development of code cases, especially applicable to reactor operation during later stages of PEO and SLR
  - NRC may develop analysis tools necessary to support technical review of applicant's SLR application, and independently confirm the adequacy of applicant's technical bases for SLR
  - NRC will update license renewal guidance documents (such as GALL and SRP-LR) and/or revise existing regulatory guides and/or issue new interim staff guidance documents

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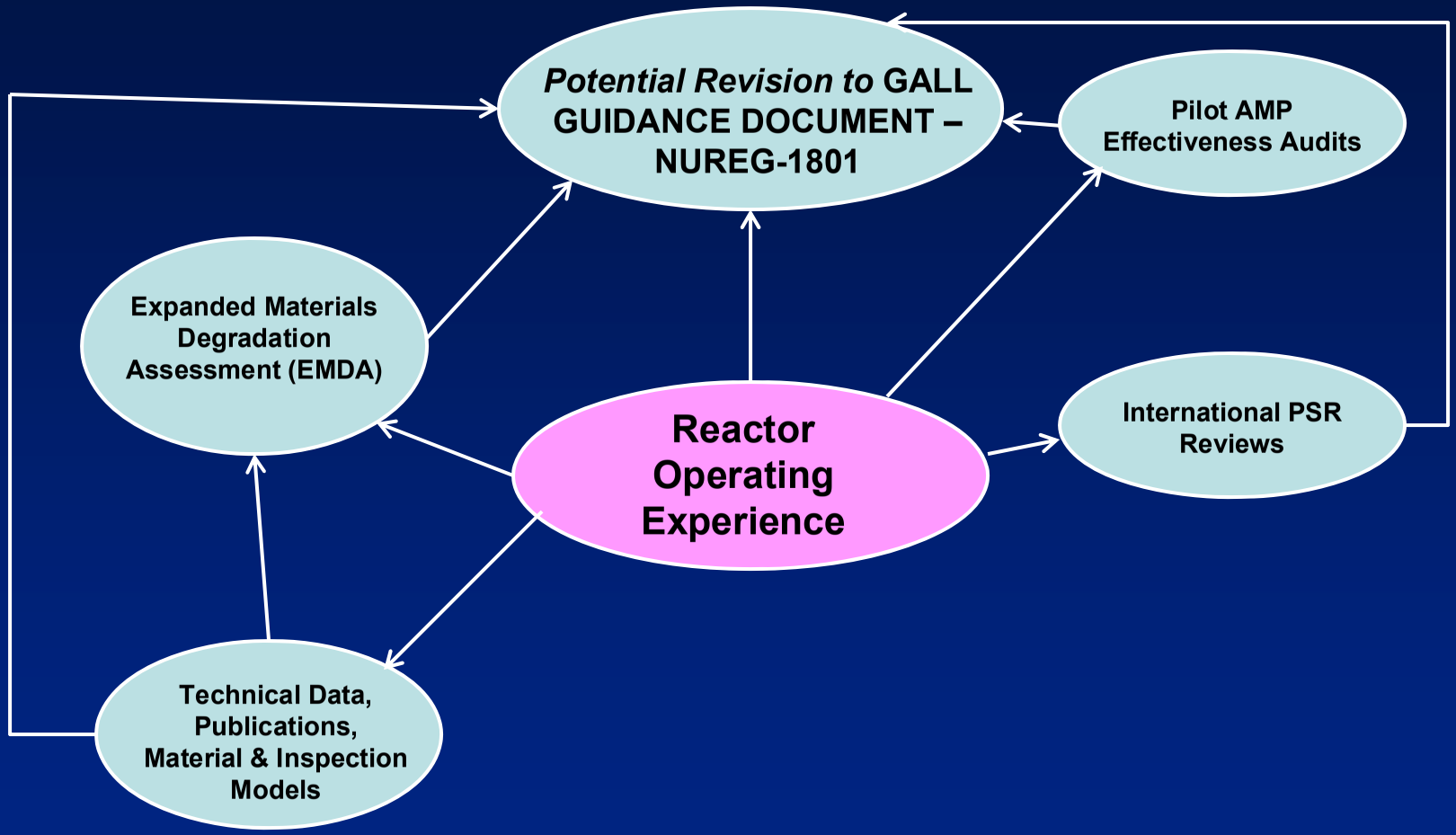
# Significance of Operating Experience for License Renewal



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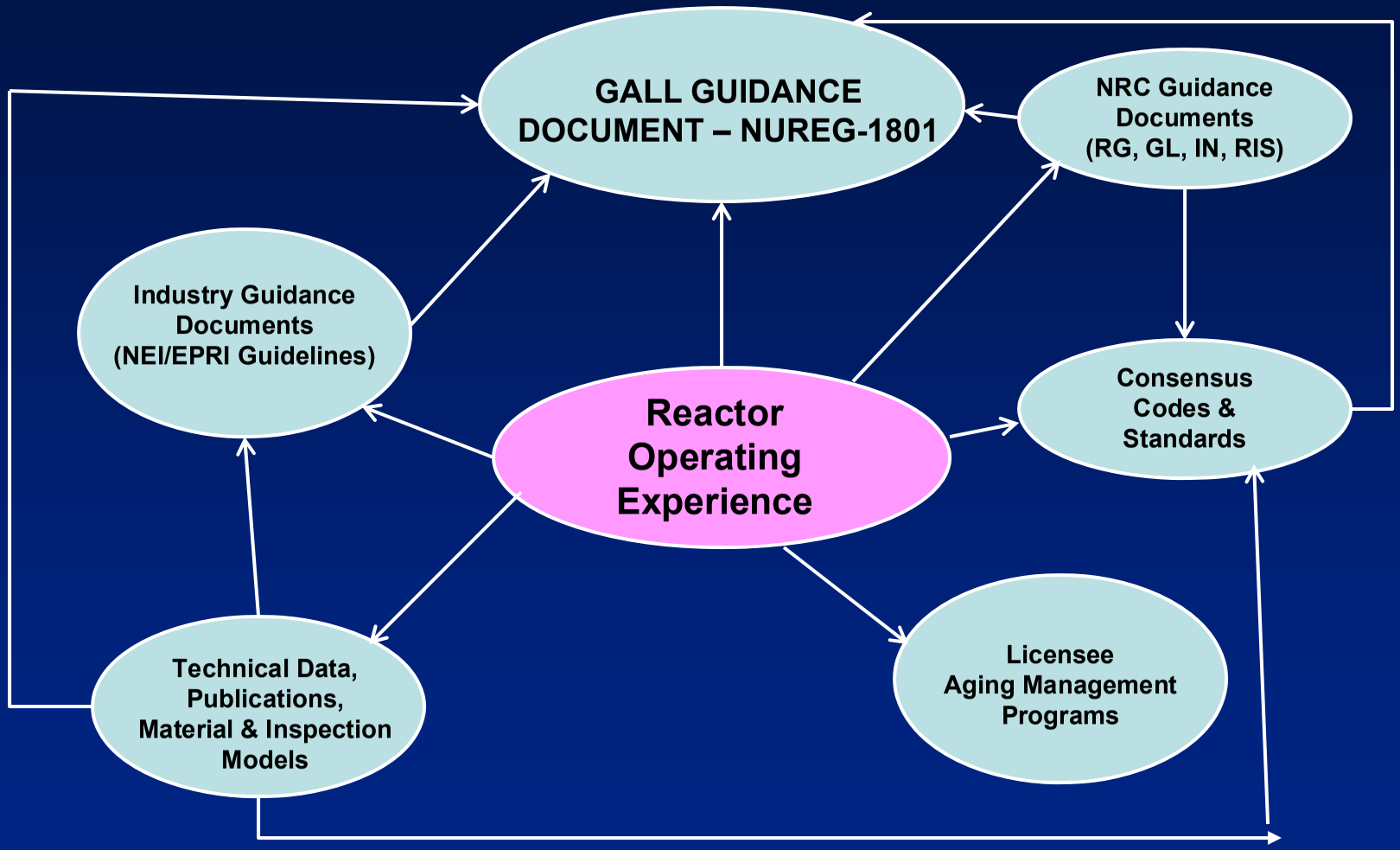

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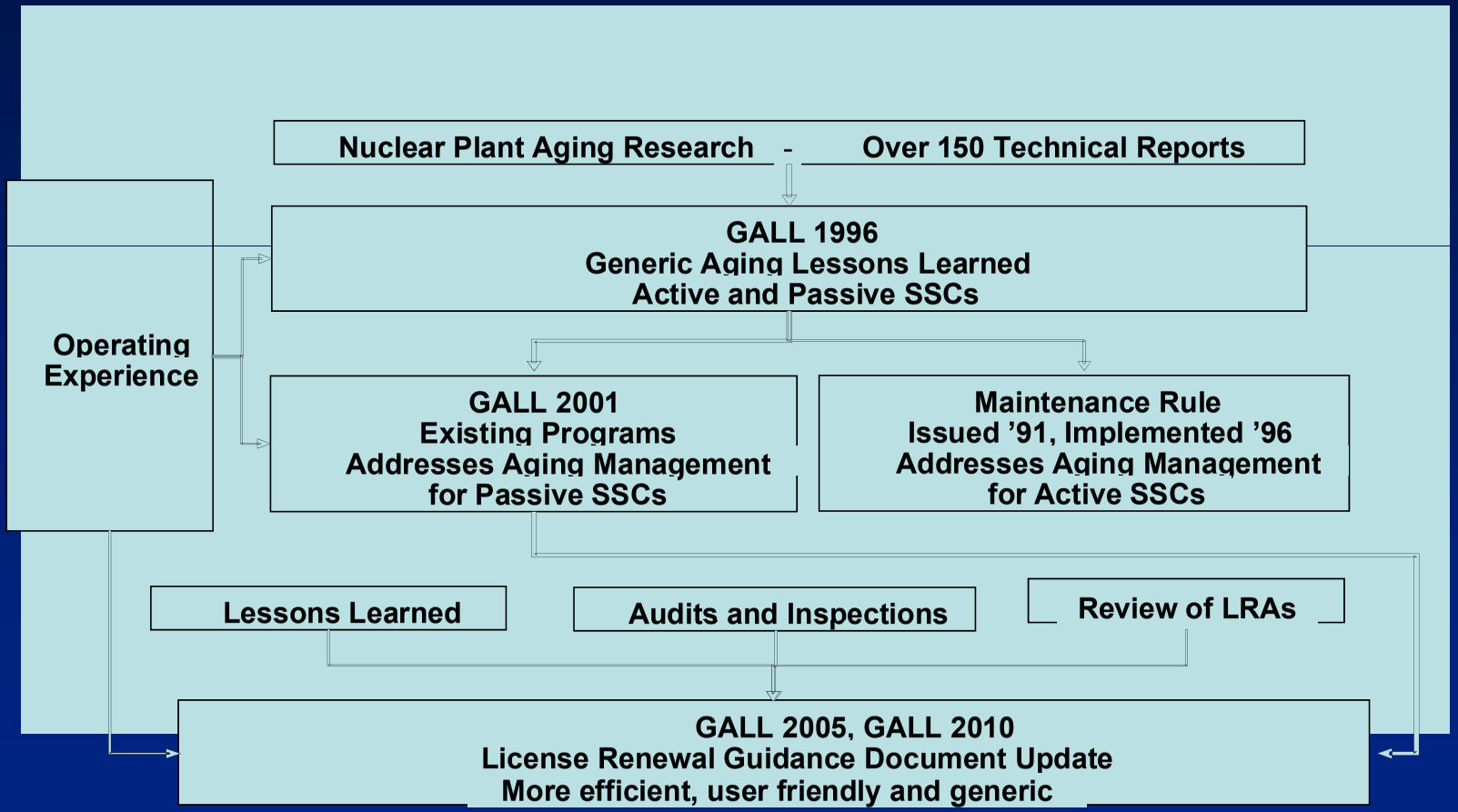
# History of GALL Development



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# Summary

- Aging management is a living process; review and incorporation of operating experience is a part of the process
- Licensee must demonstrate that the aging management programs approved for first license renewal have been effective in managing aging
- Research is necessary to establish the technical basis for long-term operation beyond 60 years
- Industry has lead role to drive the process and identify issue resolutions
- NRC will continue to cooperate/collaborate with U.S. Department of Energy, domestic industry, and international partners in research related to subsequent license renewal.