

Storage Aging Management Guidance Update & Development

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NEI Used Fuel Management Conference

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Path Forward

Operations-Focused Approach



- Guidance in NUREG-1927 may need enhancements
- Learning, Proactive, & Responsive Aging Management
- Based on achievable operational methodologies:
 - Condition based monitoring and/or in-service inspections (ISI)
- Assessment of monitoring and/or ISI findings and data
- Report, aggregate, & trend operational experiences
- Criteria for actions/decisions:
 - Prevention, repair, replacement, or mitigation measures
- Learning Aging Management Programs (AMPs) that consider and respond to operating experience and incorporate results of long term confirmatory research

Path Forward

Storage Renewal Strategy Team



- Established Storage Renewal Strategy Team
- Members from across NRC – Kickoff 12/18/13
- Mission:
 - Reflect on storage/reactor operational experiences, staff's storage renewal review experiences, reactor license renewal experience, and existing guidance
 - Assess current storage renewal regulatory framework to determine if changes (e.g., guidance updates and/or guidance development) are needed
 - Develop learning, proactive, & responsive approach

NUREG-1927 Update

Topics for Guidance Update Consideration



- Storage Renewal Team working to discuss and address questions and issues related to storage renewal applications and staff reviews
- Potential NUREG-1927 guidance updates under consideration include the following:
 - “Lead canister inspection”
 - CoC renewals
 - More detailed guidance on AMPs
 - AMP examples
 - Reporting requirements and procedures
 - Fuel performance and cask/canister internals
 - Renewal considerations for standalone ISFSIs

NUREG-1927 Update

Topic: Lead Canister Inspection

- Inspection of canister only vs. other SSCs within the license renewal scope of review
- Inspection of SSCs in different storage systems dependent on operable degradation mechanism
- Sampling vs. “Lead” canister inspections
- Key for operations-focused aging management
 - Operational experience input into TLAAAs and AMPs
- Recognize challenge to CoC renewal applications
 - General licensees vs. CoC responsibilities

NUREG-1927 Update

Topic: CoC Considerations

- Different AMPs or AMAs for various amendments:
 - Different materials
 - Possible indeterminate environments
 - Above ground vs. underground environments
- Amending CoC after it's been renewed – consideration of aging management for subsequent amendments
- Format of renewal application and submittal of design bases information as documented in the most recently updated final safety analysis report

NUREG-1927 Update

Topic: Other Considerations

- More detailed guidance on AMPs
- Include examples of AMPs:
 - Stress Corrosion Cracking of Austenitic Stainless Steel
 - Other Corrosion Mechanisms
 - Concrete Degradation
 - Fuel Performance
- Include guidance on fuel performance and cask/canister internals
- Renewal considerations for standalone ISFSIs

Storage Aging Management (SAM)

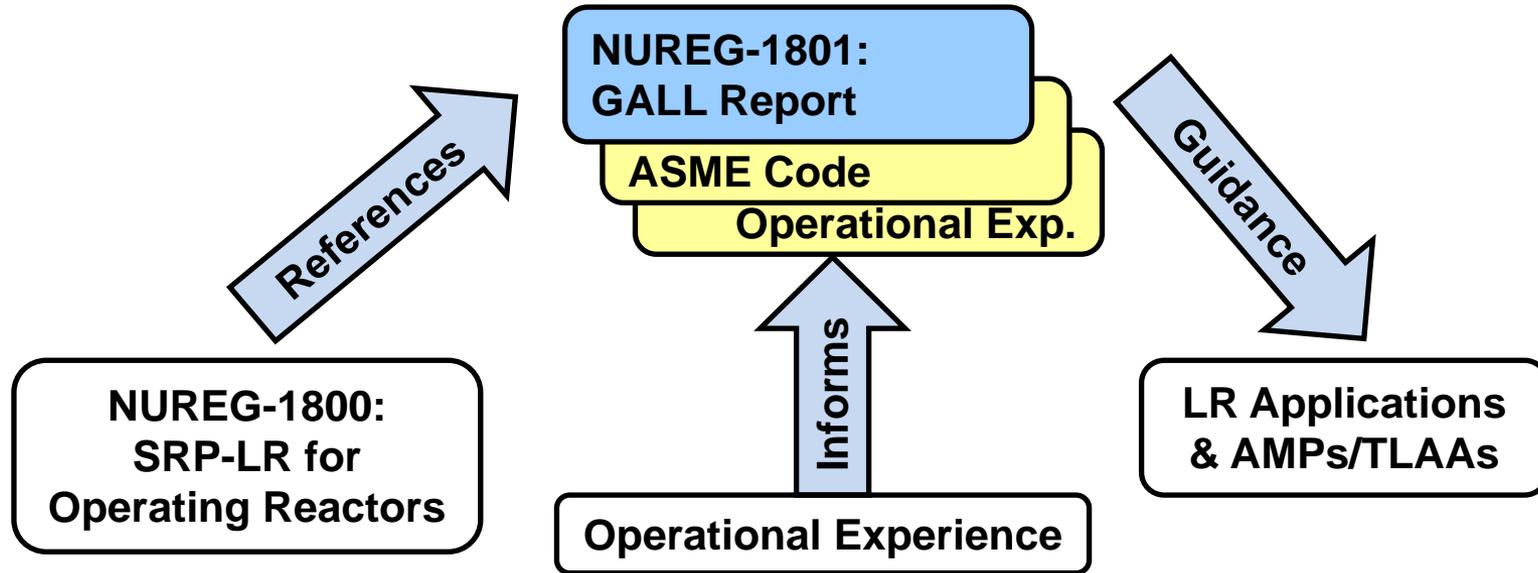
DCSS GALL-like NUREG Report



- Storage Renewal Strategy Team identified supplementary guidance development needed in addition to NUREG-1927 update
- GALL-like guidance key for clear expectations, consistent License Renewal Applications, and streamlining License Renewal reviews while minimizing RSIs and RAIs
- Reactor license renewal framework was key to determining path forward on Storage Aging Management (SAM) NUREG

Reactor License Renewals

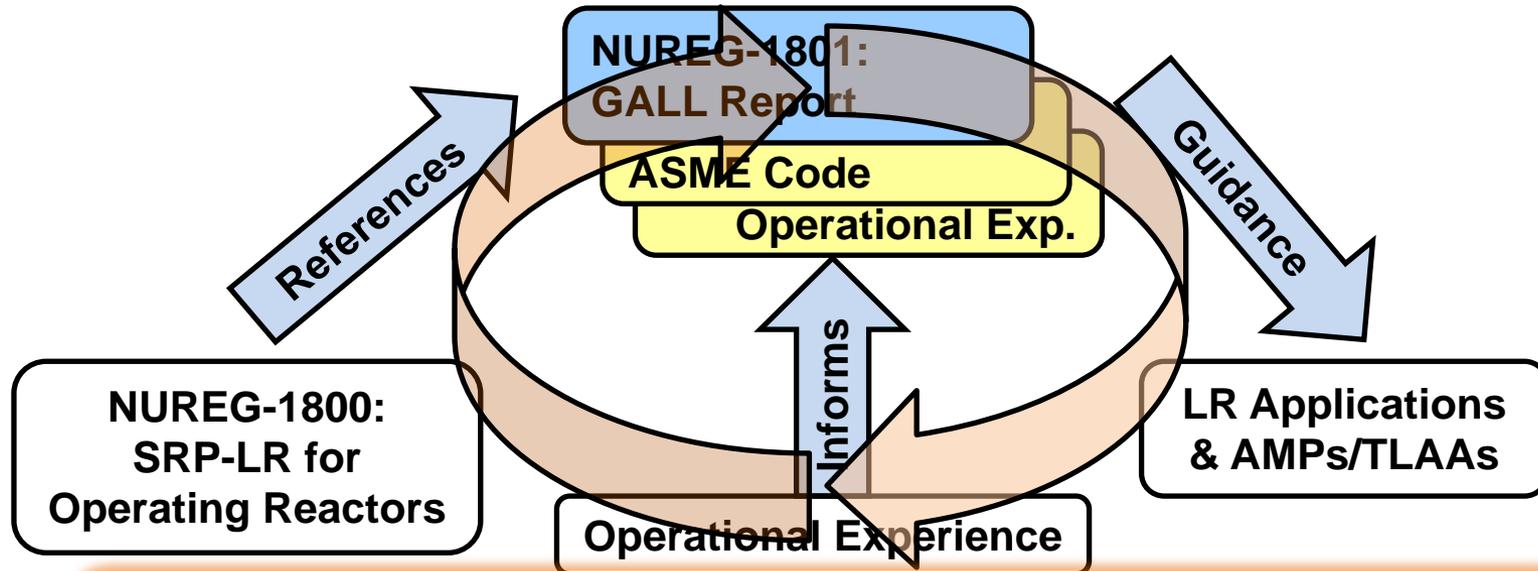
SRP, GALL, ASME Code, & Operational Exp.



- GALL identifies acceptable AMPs for managing aging effects
- GALL is the basis for NRC reviews consistent with the Standard Review Plan for License Renewals (SRP-LR)
- GALL intended as NRR staff guidance to ensure:
 - Stable, predictable, & efficient renewal regulatory framework
 - Clear, open, transparent, & reliable regulatory expectations
 - Knowledge management and consistency for NRC staff reviews

Reactor License Renewals

SRP, GALL, ASME Code, & Operational Exp.

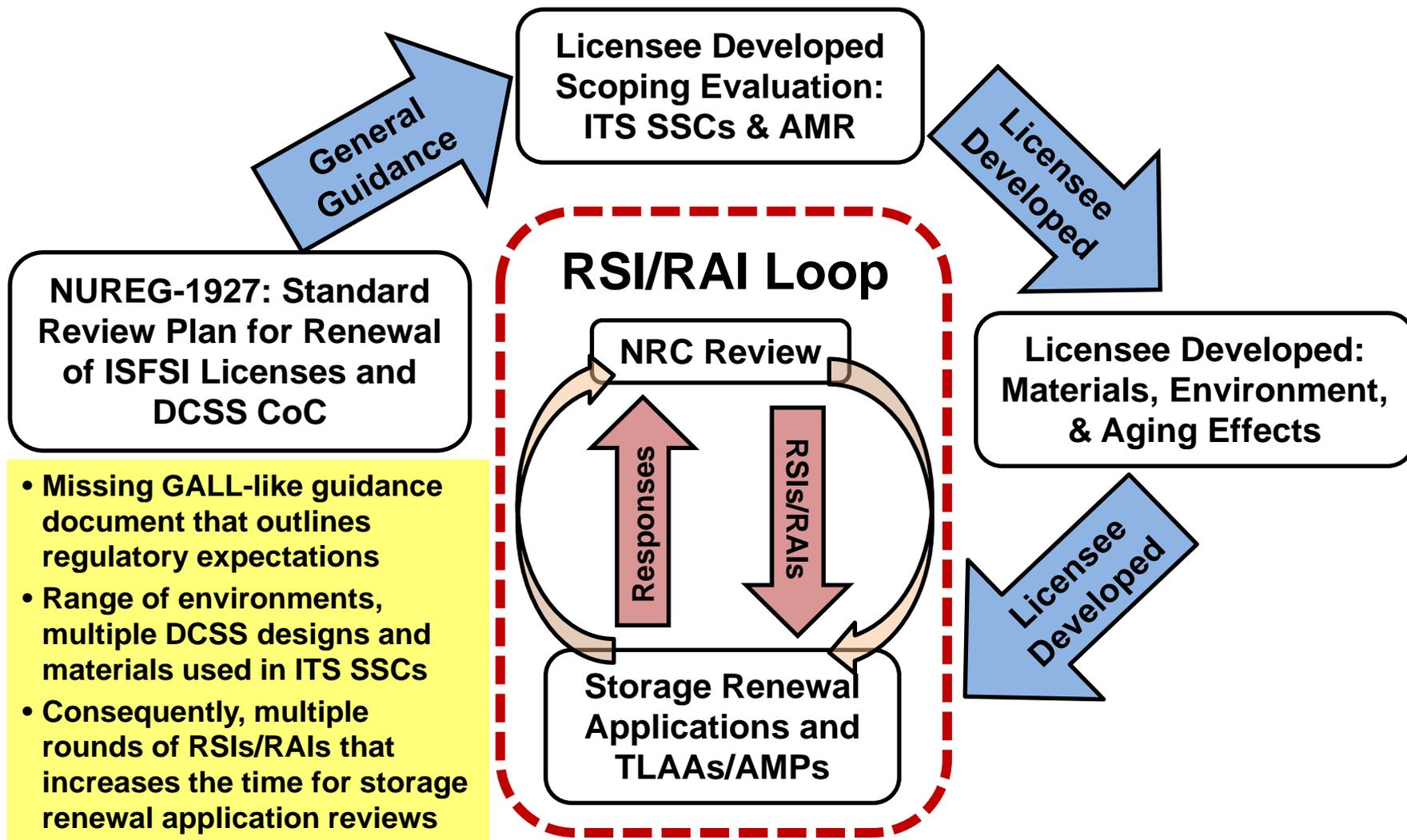


Learning, Proactive, and Responsive Aging Management

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Current Storage Renewal Process

Missing Link: GALL-like Specific Guidance



Storage Aging Management (SAM)

DCSS GALL-like NUREG Report



- Limited DCSS-specific operational experience/inspections
 - Robust designs with a record of safe operation for >25 years
 - Combination of site specific environments and materials used for ITS SSCs needs to be considered for inservice inspections and aging management activities
- Develop DCSS AMPs/TLAAs analogous to those in the GALL report based on reactor OpE
- Analog material, environment, aging effects, inspection, monitoring, and acceptance criteria from various sources:
 - Stress Corrosion Cracking
 - Other Degradation Mechanisms
 - Concrete Degradation

SAM NUREG Inputs

Existing Information Sources & References

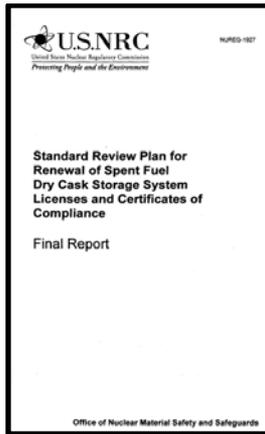


- **DCSS Storage sources:**
 - NRC: Identification & Prioritization of the Technical Information Needs Affecting Potential Regulation of EST of SNF, (TIN Report) ML120580143
 - SRNL: Materials Aging Issues and Aging Management for Extended Storage and Transportation of Spent Nuclear Fuel, NUREG/CR-7116
 - NWTRB: Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel, U.S. Nuclear Waste Technical Review Board.
 - PNNL: Gap Analysis to Support Extended Storage of UNF, PNNL-20509
 - EPRI: Extended Storage Collaboration Program (ESCP)—Progress Report and Review of Gap Analyses, TR-1022914
 - ANL: Managing Aging Effects on Dry Cask Storage Systems for Extended Long-Term Storage and Transportation of Used Fuel Rev. 1 FCRD-UFD-2013-000294
 - EPRI: Failure Modes and Effects Analysis (FMEA) of Welded Stainless Steel Canisters for Dry Cask Storage Systems, 3002000815
- **Reactor sources:**
 - NRC: Generic Aging Lessons Learned (GALL) Report, NUREG-1801
 - EPRI: Pressurized Water Reactor Issue Management Tables, MRP-205 Revision 2
 - EPRI: Boiling Water Reactor Issue Management Tables, BWRVIP-167 Revision 2
 - EPRI: Materials Degradation Matrix Revision 3, 3002000628
- **Consensus Codes & Standards:**
 - ASME Boiler & Pressure Vessel Code Sections III, V, and XI
 - American Concrete Institute Codes and Reports

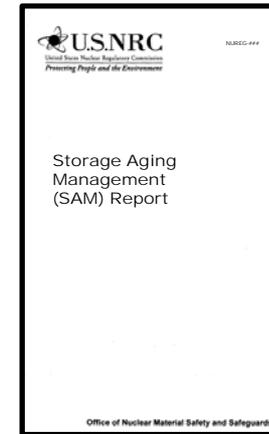
NUREG-1927 & SAM NUREG Inputs

Expected Information Sources & References

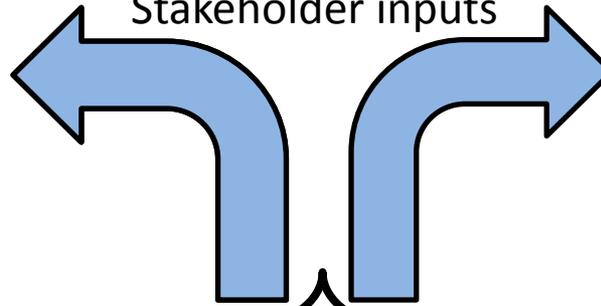
NUREG-1927



SAM Report



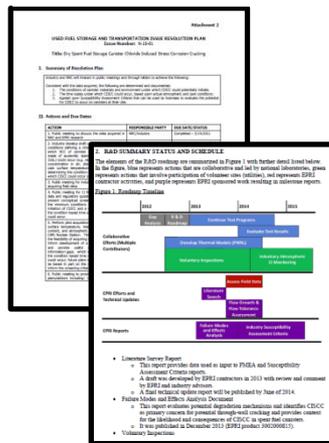
Staff consideration of Stakeholder inputs



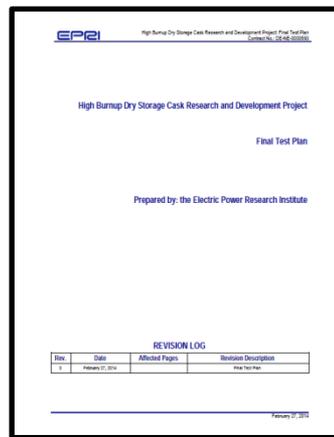
AMT & GAP Analyses



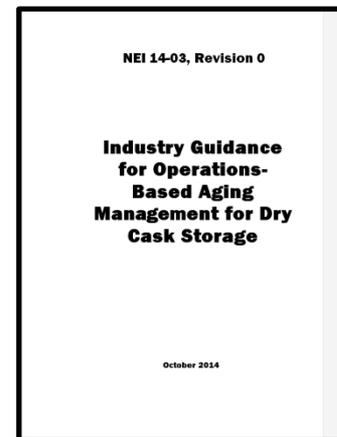
RIRP N-10-01 (CISCC)



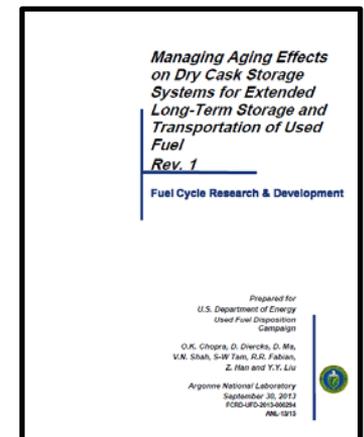
EPRI R&D CISCC Aging Mgmt.



NEI 14-03



ANL Report



NUREG-1927 & SAM NUREG

TLAA Criteria and AMP Elements

TLAA Criteria:

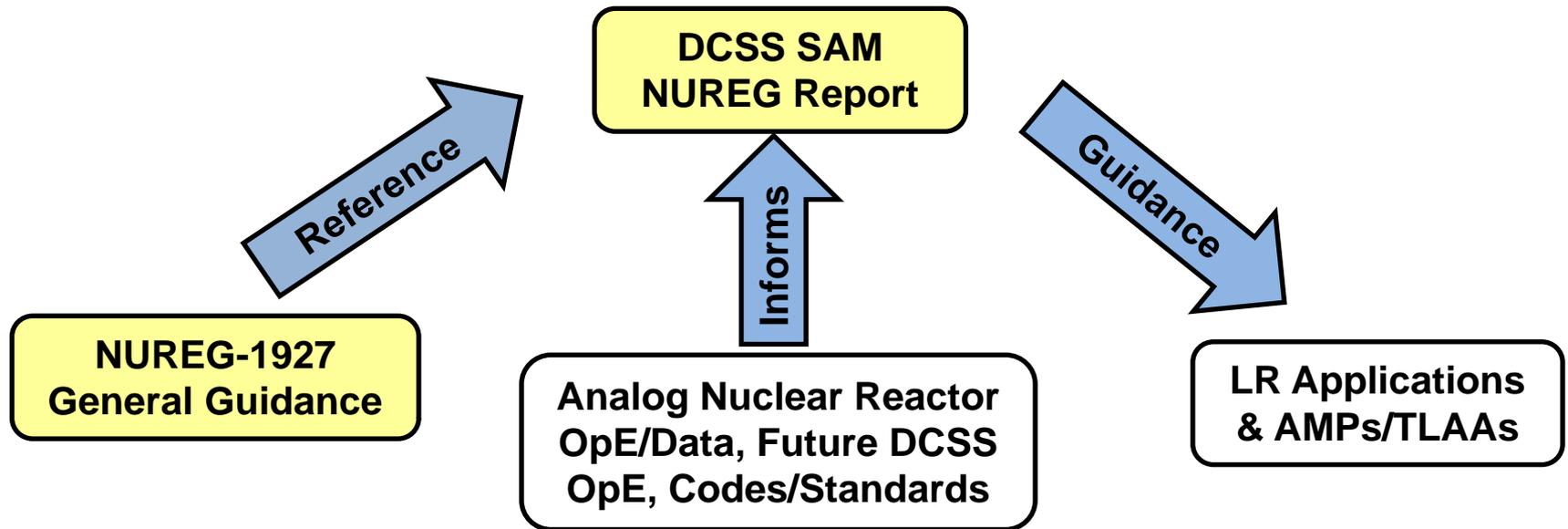
1. Time-limited assumptions defined by the current operating term
2. TLAA is already contained or incorporated by reference in the design documents
3. TLAA addresses SSCs that are within the scope of license renewal and have a predetermined lifespan
4. TLAA must consider the extended operational lifetime
5. TLAA should provide conclusions or a basis for conclusions regarding the capability of the SSC to perform its intended function through the license period of extended operation

AMP Elements:

1. Scope of the program
2. Preventive actions
3. Parameters monitored/inspected
4. Detection of aging effects
5. Monitoring and trending
6. Acceptance criteria
7. Corrective actions
8. Confirmation process
9. Administrative controls
10. Operating experience

Revised Storage Renewal Strategy

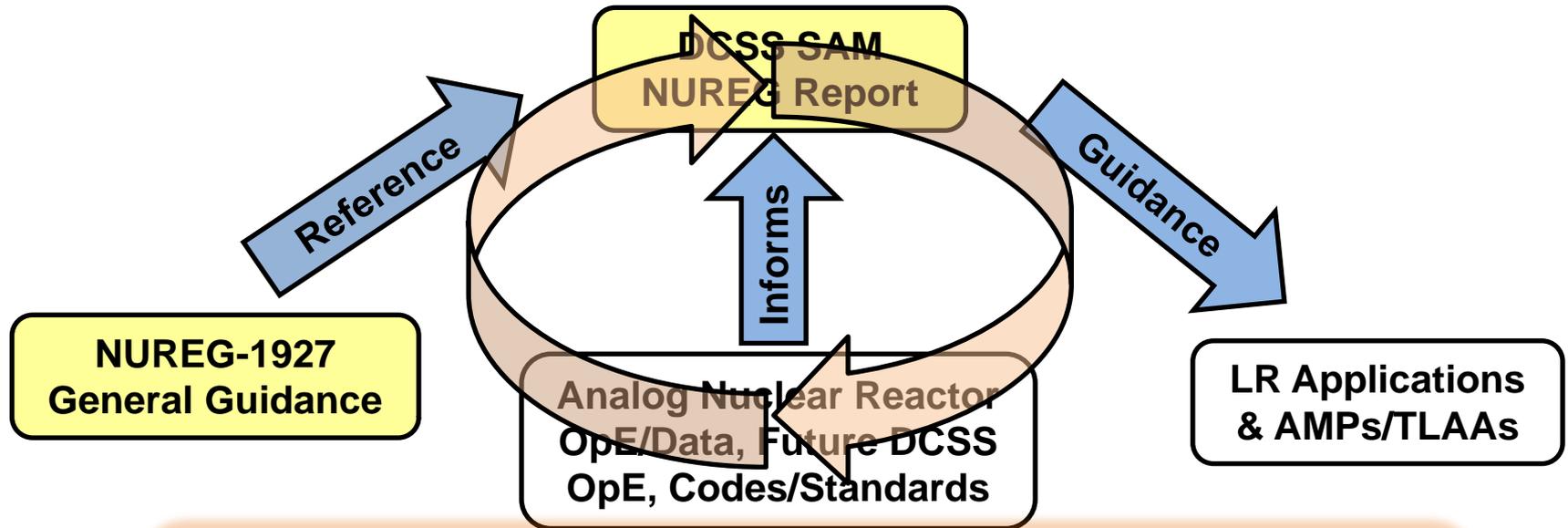
Role of SAM NUREG for Revised Strategy



- NUREG-1927 Update
- Storage Aging Management (SAM) NUREG identifies acceptable TLAAs and AMPs for managing aging effects
- SAM basis for NRC reviews consistent with NUREG-1927 to ensure:
 - Stable, predictable, & efficient renewal regulatory framework
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Revised Storage Renewal Strategy

Role of SAM NUREG for Revised Strategy



Learning, Proactive, & Responsive Aging Management

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Path Forward

Potential Guidance Updates or Development



- Current & Future Activities:
 - High-priority AMP Development (underway)
 - NUREG-1927 (updates)
 - SAM NUREG (develop)
 - Guidance for inspection of licensees' aging management activities for period of extended operation (develop)
 - Internal guidance for reviews of renewal applications (develop)
- Public Stakeholder Outreach:
 - NUREG-1927 Update (Summer – Fall 2014)
 - SAM NUREG Development (Fall 2014 – Summer 2015)
 - Several opportunities for public and stakeholder input for NRC consideration in the development of draft revised guidance

Path Forward: NUREG-1927 Update U.S.NRC

Proposed Targets

United States Nuclear Regulatory Commission
Protecting People and the Environment

- Public meeting(s) in Summer 2014:
 - Future public meeting(s) to discuss proposed changes to storage renewal guidance and solicit public/stakeholder feedback
- NRC staff plans to provide information in advance of public meeting(s) for productive discussion
- NRC staff to consider public/stakeholder input in development of draft revised guidance
- Draft revised guidance to be published for public comment
- Publish draft revised guidance for public comment before end of calendar year 2014 (dependent on public/stakeholder input)
- After consideration of public comments and internal reviews, publish final guidance in Spring/Summer 2015

Path Forward: SAM Development

Proposed Targets



Dates	Activity or Milestone
March-May 2014	Review relevant information and reports
May-October 2014	Development of Aging Management Tables for DCSS SSCs
November 2014	Workshop on Aging Management Tables
December 2014	Final Aging Management Tables for DCSS SSCs
January-May 2015	Draft SAM NUREG Report Development
June 2015	Draft SAM NUREG Report issued for public comment
December 2015	Issue Final SAM NUREG Report

Summary

Storage Renewal Guidance Improvement

- Predictable Flexible Efforts to Regulatory Stability with Stakeholder Engagement
- Storage Renewal Strategy Improvement
 - Operations-focused Aging Management
 - Learning, Proactive, & Responsive Aging Management Approach
- NUREG-1927 Update(s)
- SAM NUREG Development
 - GALL-like Generic AMP/TLAA Guidance