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Status of License Renewal Guidance Updates (GALL and SRP)

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LICENSE RENEWAL REGULATION – 10 CFR PART 54

- Focus is on managing the effects of aging of long-lived, passive structures and components important to plant safety
- Items cannot be scoped out of license renewal consideration based on risk
- Per SRP, "a program based solely on detecting structure and component failures is not considered an effective aging management program" (A.1.2.3.4.4)

WORKSHOP ON THE UPDATED LICENSE RENEWAL GUIDANCE DOCUMENTS

Division of License Renewal, NRR

5/26/10 – 5/28/10

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Purpose of the Workshop

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- Opportunity for the staff to provide information about the draft GALL and SRP-LR NUREGs
- Open exchange of information about the draft NUREGs
- Opportunity for stakeholders to ask questions about the draft NUREGs
- Forum for stakeholders to provide <u>informal</u> feedback on the drafts

License Renewal Guidance Update: Capture Lessons Learned

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- Domestic and foreign operating experience (2004-2009)
- Lessons learned from recent LR applications/SERs
- NEI and industry comments on GALL Report and SRP-LR
- Interim Staff Guidance
- New industry guidance and change of regulations

- Added relevant information from recent license renewal applications and precedents

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M41, Buried, Underground and Limited Access Piping and Tank

- New AMP
- Replaces Existing AMPs
  - XI.M28 Buried Piping and Tanks Surveillance
  - XI.M34 Buried Piping and Tanks Inspection
- Incorporates aspects of both programs
- Adds additional features
- Considers Industry Initiative

Differences between 2005 and draft 2010 GALL AMPs

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Why a new AMP?

- Recent operating experience
  - To date no loss of safety function
  - Most due to external corrosion
  - Most due to localized coating failure
    - Limits size of leak and probability to affect safety function
  - Some due to absence of coating or larger coating failure
    - Lack of effect on safety function cannot be assumed
  - Some indicates significant difference between “as buried” pipe and records
- Conclusions
  - Additional direct assessment of piping necessary

Differences between 2005 and draft 2010 GALL AMPs

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Focus of XI.M41, Buried, Underground, and Limited Access Piping and Tanks

- Environments
  - Buried – in contact with soil or concrete
  - Underground – below grade, in contact with air, limited access
    - Piping in chases, vaults or trenches
  - Limited access – above grade, in contact with air, limited access
    - Piping in confined spaces
- Materials
  - All metallic
  - All polymeric
  - All cementitious

Differences between 2005 and draft 2010 GALL AMPs

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Focus of XI.M41, Buried, Underground, and Limited Access Piping and Tanks

- Preventive actions
  - Depend on material/environment
    - Inherently resistant materials (Ti, super austenitic)
      - None required
    - Not resistant (steel)
      - Coatings
        - Type varies with environment
        - High quality backfill for buried
    - Resistant in some environments (stainless steels and others)
      - Coat as appropriate
    - Buried steel, copper, aluminum
      - Coatings
      - Cathodic protection

Differences between 2005 and draft 2010 GALL AMPs

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Focus of XI.M41, Buried, Underground, and Limited Access Piping and Tanks

- Inspections (pipe and tanks)
  - Opportunistic visual
  - Inherently resistant materials (Ti, super austenitic)
    - None required
  - Directed inspections (pipe)
    - Not inherently resistant and not cathodically protected
      - 5% of linear length; one inspection per material type
    - Cathodically protected (90% prior availability)
      - 2 visual inspections; minimum 10' per excavation
    - Cathodically protected (low availability)
  - Directed inspections (tanks)
    - Not inherently resistant and not cathodically protected
    - Cathodically protected
  - Frequency
    - Once in 10 years prior to PEO
    - Once in 10 years after entering PEO

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M36, External Surfaces Monitoring of Mechanical Components

- Scope expanded to include external surfaces of all metallic and polymeric materials
  - Old scope just steel
- Scope expanded to include additional aging effects
  - Loss of material (metallic materials)
  - Cracking (metallic and polymeric materials)
  - Change in material properties (polymeric materials)
- Addresses manual manipulation of polymeric materials
- Includes acceptance criteria for non-metallic materials
- Better defines acceptance criteria for metallic materials

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M1, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

- Updated to reference use of ASME Code Section XI, 2004 edition and clarifies use of alternative editions and addenda
- *Detection of Aging Effects* was revised to refer to ASME Section XI Examination Categories and not repeat detailed information contained in the code

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M35, One-time Inspection of ASME Code Class 1 Small Bore Piping

- *Program Description:*
  - explicitly identify that socket welds are included
  - clarified program applicability to plants that have not experienced cracking or have effectively mitigated cracking from vibratory loading through design changes – otherwise a plant specific program is needed
- *Detection of Aging Effects:*
  - revised for socket welds to perform an opportunistic destructive examination as an alternative to volumetric examinations.
  - clarified for full penetration welds that only volumetric examination is recommended
  - clarified that volumetric examinations are performed using demonstrated techniques

Differences between 2005 and draft 2010 GALL AMPs

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XI.M9, BWR Vessel Internals

- Program Description:
  - revised to include AMP XI.M13, Thermal Aging and Neutron Irradiation Embrittlement of CASS
  - also added Alloy X-750, Precipitation Hardened Martensitic and Martensitic Stainless Steel materials used in BWR vessel internals
- *Scope of Program*, *Parameters Monitored and Inspected*, *Detection of Aging Effects*, *Monitoring and Trending*, and *Acceptance Criteria* revised to include information as appropriate for the added materials
- *Scope of Program* added steam dryers and BWRVIP-139

Differences between 2005 and draft 2010 GALL AMPs

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XI.M9, contd.

- *Detection of Aging Effects* clarified that for non-ASME Code internals, cracking is detected by using enhanced visual VT-1 (EVT-1), VT-1 or VT-3 consistent with the approved BWRVIP reports
- *Corrective Actions* added that for top guides where cracking is observed, sample size and inspection frequencies are increased

XI.M9 associated AMR line items

- Revised line for steam dryers with aging effect of cracking due to flow-induced vibration change from plant-specific program to XI.M9
- Added new lines for X-750, PH martensitic, and martensitic stainless steel reactor vessel internals with an aging effect of loss of fracture toughness

Differences between 2005 and draft 2010 GALL AMPs

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X.M1, Metal Fatigue of Reactor Coolant Pressure Boundary

- *Program Description:*
  - updated relative to background basis, assumptions, background information on how the program is applied, and basis for environmental fatigue calculations
  - now includes use of NUREG/CR-6909 for environmental fatigue calculations
- *Preventive Actions* clarified that tracking of design basis transients are considered to be preventive activities for the AMP
- *Detection of Aging Effects* clarified to provide a clear basis on how the tracking of the cycles (the preventive parameter) would be used to ensure the validity of current design basis CUF fatigue analysis values.

Differences between 2005 and draft 2010 GALL AMPs

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X.M1, contd.

- *Monitoring and Trending* clarifies how the program trends the CUF values for ASME Code Class 1 reactor coolant pressure boundary components
- *Operating Experience* updated the criteria to include recommendations for fatigue analyses in NRC RIS 2008-30

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M16A, PWR Vessel Internals

- AMP is based on guidelines for examination of vessel internals in EPRI report, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0)"
- MRP-227-Rev.0 is currently being reviewed by the NRC staff
- GALL 2005 did not contain a generic AMP for PWR vessel internals:
  - GALL 2005 recommended applicants to commit to participate, evaluate and implement an industry program for vessel internals and to provide an inspection plan no less than 24 months before entering the period of extended operation
- MRP submitted proposed AMR line items for Westinghouse, Combustion Engineering, and Babcock and Wilcox designed vessel internals, based on MRP-227-Rev.0

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M16A, contd.

- NRC staff modifications to the proposed MRP AMR line items:
  - Require cracking to be managed by AMPs XI.M2,"Water Chemistry," and XI.M16A,"PWR Vessel Internals"
  - Require all other aging effects to be managed by AMP XI.M16A,"PWR Vessel Internals"
  - Require each component that is classified as a primary component, expansion component, or an existing program component in accordance with MRP-227-Rev.0 to be included in GALL
  - Cross reference primary and expansion component in accordance with MRP-227-Rev.0 - further evaluation of inaccessible locations if cross referenced accessible primary, expansion or existing program components have aging effects that need aging management

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M11B, Cracking of Ni-Alloy Components and Loss of Material Due to Boric Acid-Induced corrosion in Reactor Coolant Pressure Boundary Components (PWRs only)

- Combined lessons learned from and key strengths of:
  - XI.M11, “Nickel-Alloy Nozzles and Penetrations” (Rev.0)
  - XI.M11A, “Nickel-Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of PWRs” (Rev.1)
  - 2005 GALL Report recommended a license commitment for nickel alloy components
- AMP also manages effects of boric acid corrosion on reactor coolant pressure boundary materials in the vicinity of nickel alloy components (complements XI.M10)

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M11B, Cracking of Ni-Alloy Components…

- Revised program provides:
  - inspection requirements for the PWR vessel, steam generator, pressurizer components and piping if they contain the primary water stress corrosion cracking (PWSCC) susceptible materials designated alloys 600/82/182
  - inspection requirements for reactor pressure vessel upper heads

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M11B -contd

- *Scope of Program* revised beyond Ni-alloy vessel head penetrations
  - Cracking of susceptible Ni-alloy RCPB components (incl welds).
  - Loss of material due to BAC in susceptible components in the vicinity of Ni-alloy components.
    - (such as reactor vessel components (reactor pressure vessel upper head), steam generator components (nozzle-to-pipe connections, instrument connections, and drain tube penetrations), pressurizer components (nozzle-to-pipe connections, instrument connections, and heater penetrations), and reactor coolant system piping (instrument connections and full penetration welds).

- *Detection of Aging Effects* revised to stipulate that inspection methods, schedules, and frequencies for the susceptible components are implemented in accordance with 10 CFR 50.55a and industry guidelines (e.g., MRP-139).

Differences between 2005 and draft 2010 GALL AMPs

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AMP XI.M11B –contd

- *Acceptance Criteria* clarified the use of relevant codes and standards
  - 1) Includes Industry program MRP-139 for the inspection of Dissimilar Metal Welds in Primary Circuit
  - 2) Updated to reflect changes in Code of Federal Regulations
    - Mandated ASME Code Case N-729-1 replaces NRC Order EA-03-009 for upper head inspection
    - Mandated ASME Code Case N-722 (visual inspections of Ni-base components)
    - Upcoming ASME Code Case N-770 (inspections for dissimilar metal welds)

Differences between 2005 and draft 2010 GALL AMPs

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XI.M11B associated AMR line items

- New AMP replaced guidance to "comply with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines."
- Changed lines from F/E recommended "No, but licensee commitment needs to be confirmed" to "No" for aging effects of cracking due to PWSCC or SCC in Ni-alloy components, welds, or cladding.
- Revised AMP of much greater utility. 2005 GALL Report had two AMR line-items referencing XI.M11A; draft 2010 GALL Report has eleven line items referencing XI.M11B

Follow-on Activities

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- Formal public comment period closes on July 2, 2010
- Schedule focused technical meeting(s) if needed
- Staff evaluation of formal comments and revision of draft NUREGs as necessary
- Generation of Technical Bases NUREG that incorporates public comment resolution
- Internal NRC reviews of NUREGs
- ACRS subcommittee meeting on October 22, 2010 and ACRS full committee meeting on November 4, 2010
- Issue GALL and SRP-LR NUREGs for use by December 31, 2010