

Information Meeting

GALL-SLR REPORT ELECTRICAL SLR-AMPS

Division of License Renewal, NRR

11-19-2014

Cliff Doutt

NRR/DLR/RASB

Clifford.Doutt@nrc.gov

Agenda for Meeting

Time

Topic

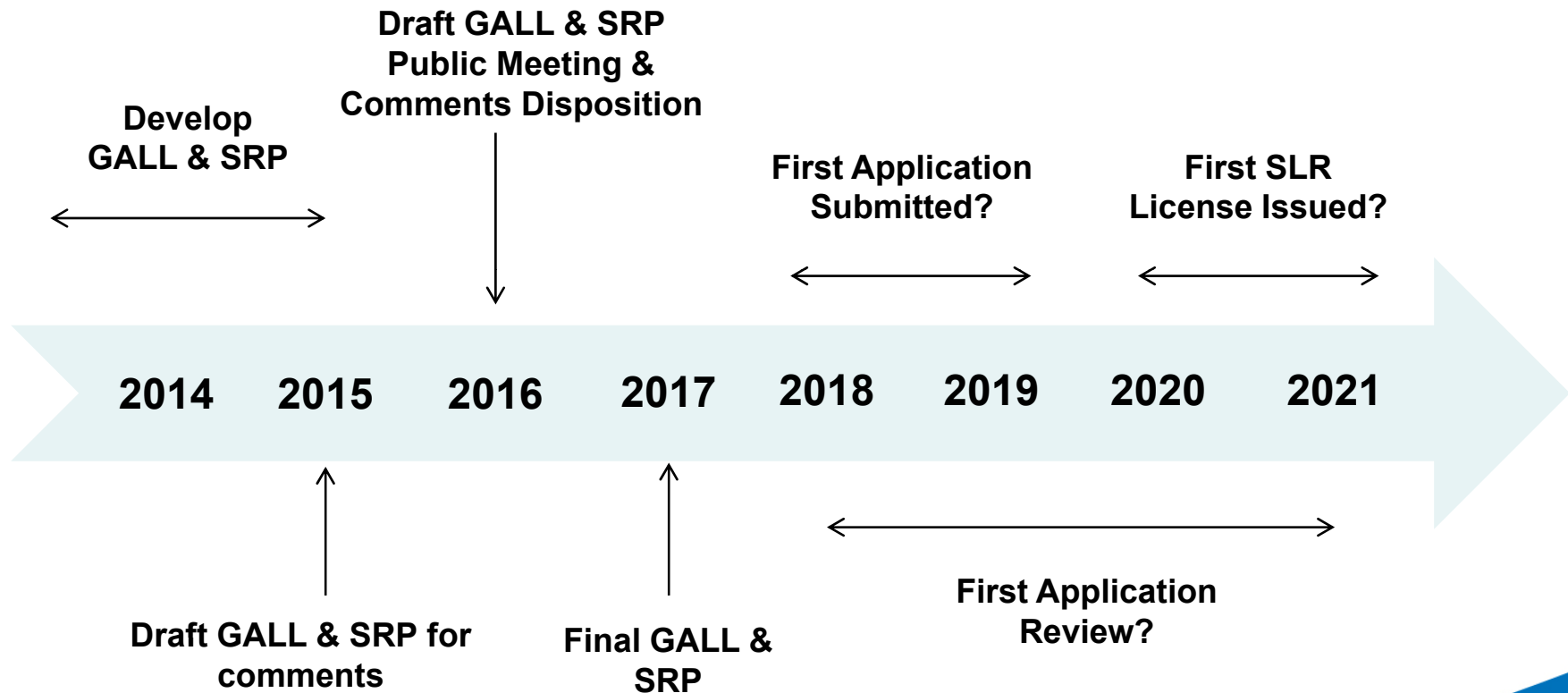
10:00a	Opening
10:10a	XI.E7 High Voltage Insulators
10:25a	XI.E4 Metal Enclosed Bus
10:55a	XI.E5 Fuse Holders
11:25a	XI.E6 Electrical Cable Connections
11:40a	Public Participation
12:00p	Break
1:00p	XI.E1 Insulation Material - Cable and Connections
1:30p	XI.E2 Insulation Material - Cable and Connections (Instrumentation)
1:45p	XI.E3 Insulation Material – Inaccessible Cables
2:15p	Break
2:30p	X.E1 and TLAA 4.4 Environmental Qualification of Electrical Components
3:30p	Public Participation
4:00p	Closing

Purpose of Meeting



- **Inform external stakeholders:**
 - SLR - topics related to the electrical portion of the proposed GALL-SLR Report AMPs/TLAA
 - Describe electrical GALL SLR AMP proposed changes

SLR Timeline



GALL-SLR Electrical AMPS



■ **Basis for Changes**

- Domestic and foreign operating experience (2010 – 2014)
- AMP audits
- AMP effectiveness audits
- Implementation of GALL Report and SRP
- Interim staff guidance
- Updated or new NRC and industry guidance and research

Overview of Proposed Changes

- **Added one new AMP**
 - XI.E7 High Voltage Insulators
- **Revised existing AMPS**
 - XI.E4 MEB
 - XI.E5 Fuse Holders
 - XI.E6 Electrical Cable Connections
 - XI.E1 Insulation Material - Cable and Connections
 - XI.E2 Insulation Material - Cable and Connections (Instrumentation)
 - XI.E3 Insulation Material – Inaccessible Cables
 - X.E1 EQ of Electrical Components
- **Revised one TLAA**
 - TLAA 4.4 Environmental Qualification (EQ) of Electrical Components

New Electrical SLR AMP



Why a new High Voltage Insulator AMP?

- Operating experience
 - Loss of safety function
 - Corrosion
 - Coating failure
 - Lack of effect on safety function cannot be assumed

- AMP audits

New Electrical SLR AMP XI.E7



■ **Proposed AMP XI.E7 (High Voltage Insulators)**

- The purpose of the aging management program (AMP) is to provide reasonable assurance that the intended functions of high voltage insulators in scope of subsequent license renewal and credited for recovery of offsite power are adequately age managed during the subsequent period of extended operation.
- This aging management program is designed to periodically visually inspect high voltage insulators susceptible to adverse environments (e.g., insulator, conductor, connector, and physical aging effects including support degradation and surface contamination caused by salt, dust, fog, cooling tower plume, industrial effluent) such that they are maintained consistent with the current licensing basis through the subsequent period of extended operation.

Electrical SLR AMP – XI.E4

- **Proposed Changes: AMP XI.E4 (Metal Enclosed Bus)**
 - Update operating experience – in discussion
 - Reference MEB specifically in associated AMPs (e.g., XI.M38 and XI.S6)
 - Removed sampling of bolted connection (accessible)
 - Parameters monitored/inspected program element revised/updated aging effects
 - Detection of aging effects program element revised to eliminate sampling
 - Thermography clarification - demonstrated effective in identifying MEB increased resistance of connection
 - Cable Bus - add elements to accommodate cable bus
 - OPE element revised (continuous review)
 - Update references

Electrical SLR AMPs – XI.E5

■ **Proposed Changes: AMP XI.E5 (Fuse Holders)**

- Add fuse holder insulation material (Fuse Holder Insulation relocated from AMP XI.E1)
- Adds aging management for in-scope fuse holders located in active components that are subjected to frequent removal and reinsertion during maintenance or surveillance activities
- Clarifies that both visual inspection and testing are applicable (fuse holder metallic and insulation portions)
- Program elements: scope of program, parameters monitored/inspected, detection of aging effects, monitoring and trending, acceptance criteria, and corrective actions revised per the proposed change above.
- OPE element revised (continuous review)
- Updated references

Electrical SLR AMPs – XI.E6

■ **Proposed Changes: AMP XI.E6 (Connections)**

- Replace the one-time inspection with periodic (once ever 10 years or once every 5 years for visual inspection)
- AMP program elements: parameters monitored/inspected, detection of aging effects, monitoring and trending per the above proposed change
- Clarify sampling program – sample population and scope
- Provide additional guidance on connection types and sampling
- OPE element revised (continuous review)
- Update references

Electrical SLR AMPs – XI.E1

- **Proposed Changes: AMP XI.E1 Insulated Cable/Connections**
 - Clarified general in-scope cable and insulation material –power, control, instrumentation (cable jacket and connection)
 - Clarified environment (operating environment)
 - Expand the integrated review and identification of an adverse localized environment (e.g., OPE)
 - Add environmental monitoring (e.g., long-term temperature monitoring) when evaluating conservatism in the aging evaluation
 - Added testing (condition monitoring) in addition to visual inspection for accessible cables
 - Moved insulated portion of fuse holders to XI.E5
 - Clarification of program elements - added testing (condition monitoring) and revised OPE element (continuous review)
 - Updated references

Electrical SLR AMP – XI.E2

- **Proposed Changes: AMP XI.E2 (Instrumentation)**
 - No major changes
 - Clarified that cable and connection insulation material is what is age-managed
 - Clarified environment (operating environment)
 - Expand the review and identification of an adverse localized environment
 - OPE element revised (continuous review)
 - Updated references

Electrical SLR AMP – XI.E3

- Proposed Changes: AMP XI.E3 (Inaccessible Cables)
 - Cable submergence
 - Propose to replace XI.E3 with 3 AMPs or 3 XI.E3 sections
 - Instrument and Control Cables,
 - Medium Voltage Cables, and
 - Low Voltage Power Cables (both AC and DC)
 - Update inaccessible cable inspection and test methods as applicable to each of 3 AMPs – include physical tests
 - Considers developing a cable test methodology adapter table (e.g., test applicability vs cable rating/service voltage, insulation material, construction and environment)
 - Update AMP XI.E3 test criterion statement (e.g., other testing that is proven and shown to be applicable to the cable type (i.e., voltage, insulation and construction))

Electrical SLR AMP – XI.E3 Cont.

- Remove the 400V limitation
- Revised detection of aging effects “more than one test”
- Separate event driven from periodic inspections (editorial)
- OPE element revised - continuous review
- Update post GL-2007-01 cable operating experience (SLR-LRA)
- Consider including submarine or other cable designed for continuous submerged service
- OPE element revised (continuous review)
- Update References

Electrical SLR AMPs – X.EI and TLAA 4.4

- TLAA reanalysis
- 10 CFR 54.21(c)(i) or (ii)
 - Will EQ margins/conservatisms support SLR TLAA reanalysis such that EQ component (cable) will continue to be qualified for its application and remain functional during and following a design basis event (for the subsequent period of extended operation)
- 10 CFR 54.21(c)(iii)
 - An aging management program in accordance with 10 CFR 54.21(c)(iii) may not be supported with available methodologies

Electrical SLR AMPs – X.EI and TLAA 4.4 Cont.

- Cable condition monitoring and ongoing qualification
 - Confirmatory testing and/or inspection of EQ electrical components to demonstrate that service life and qualified life are maintained during the subsequent period of extended operation may not be supported with currently available inspection and test methods.
- Cable EQ research activities (NRC and industry)
 - Cable insulation degradation
 - Condition monitoring
 - Ongoing qualification
 - End of life determination
 - Schedule support SLR implementation

Electrical SLR AMPs – X.EI and TLAA 4.4 Cont.

- **Proposed Changes: AMP X.E1 (EQ)**
 - Added mild environment clarification (not part of 10 CFR 50.49 – editorial)
 - Added 10 CFR 50.49 discussion on the application and maintenance of margin (e.g. conservatisms applied for unquantified uncertainties, production variations and test instrumentation). Margin that must be applied to account for unquantified uncertainties, including production variations, and inaccuracies in test instruments. These margins are in addition to any conservatism applied in derivation of local environment conditions of the equipment unless these conservatisms can be quantified and shown to contain the appropriate margins.

Electrical SLR AMPs – X.EI and TLAA 4.4 Cont.

- **Proposed Changes: AMP X.E1 (EQ) Cont.**
 - Added discussion - extension of a component's environmental qualification (qualified life) for the subsequent period of extended operation may be accomplished through the following:
 - Reanalysis - evaluate original attributes, assumptions, margins, and conservatisms for environmental conditions and other factors) that allow the components qualified life to be revised
 - Extension of a components environmental qualification (qualified life) may be accomplished through the retention and continued aging of a test sample from the original EQ test program with subsequent demonstration that the qualified life is bounding for the subsequent period of extended operation

Electrical SLR AMPs – X.EI and TLAA 4.4 Cont.



- Extension of a component's environmental qualification (qualified life) for the subsequent period of extended operation may be accomplished through the following:
 - Additional EQ components installed in identical service conditions are removed prior to exceeding their qualified life and type tested to establish additional qualified life
 - Identify age sensitive components (e.g., qualified life of at least 60 years) and replace the component with a new qualified like component.

Electrical SLR AMPs – X.EI and TLAA 4.4 Cont.

- Environmental monitoring
- The methodology for environmental monitoring, data collection and the analysis of localized EQ component environmental data (including temperature, radiation, moisture) used in the reanalysis is justified in the record of the reanalysis qualification report.
- Environmental monitoring data used in the analysis that is collected one time or is of limited duration is justified with respect to the applicability of such data to the reanalysis.
- Proposed periodic visual Inspection component – similar to AMP XI.E1
- Propose adding a new section – ongoing qualification (10 CFR 50.49)
- OPE element revised (continuous review)

GALL-SLR AMPs - Electrical

Additional Comments
or
Questions?