Recent Cable and Connection Walkdown Experience

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IEPSON CONSULTING ENTERPRISES, INC.
INSPECTION INTENT

- Input to cable aging management program including Non-EQ cables and connections within the scope of license renewal (LR)
- Used a “Spaces” or “Grand Tour” approach that included all LR structures
- Identify potential adverse localized equipment environments (ALEEs)
- Inspect cables and connections in ALEEs for signs of degradation
INSPECTION SCOPE

- Inspections were **visual only**
- Inspections were “area focused” versus “equipment focused” FIRST identify ALEEs and SECOND identify affected cables and connectors
- **NO** touching or manipulating equipment in any way (i.e., use infrared temperature sensors, cameras, flashlights)
INSPECTION SCOPE

- Accessible cables and connections must be easily approached and readily accessible (no scaffolding, ladders, extraordinary climbing, no heavy lifts)
INSPECTION GUIDANCE

- Procedure meets 10CFR54 – License Renewal
- Procedure conforms with INPO EPG-16
- Procedure meets intent of EPRI Report Nos. 1020804 and 1020805
- Procedure addresses plant-specific USAR, LR, and other licensing commitments
DEGRADATION MECHANISMS AND OBSERVABLE EFFECTS

- Temperature: Charring, melting, discoloration, off-gassing, softening, hardening, cracking, crazing, weeping
- Radiation: softening, cracking, off-gassing, hardening
- Moisture: softening, swelling, corrosion
- Chemicals: softening, swelling
- Ultraviolet light: weeping (PVC in particular)
- Vibration: loosening of connections
OBSERVATIONS THAT INDICATE OR MAY BE THE RESULT OF AN ALEE

- Unusual odors (smell of burning or chemicals)
- Unusual noises (clicking, banging, humming)
- Surface contamination
- Equipment maintenance issues (drip catches, evidence of leakage).
STRESSOR THRESHOLDS

- Each stressor considered
- Conservative values selected based on stressor
- Applied throughout all plant locations
IEPSON has completed or is in the process of performing cable and connections inspections on thirty-five (35) units.

The inspections include nine utilities.

The inspections cover both BWRs and PWRs, including both older and newer vintages.
SUMMARY OF RESULTS
(Cont’d)

- All plants had identified some ALEEs through their operating experience or corrective action processes.
- “Spaces Approach” and using plant-specific OE has resulted in no additional inspection locations.
SUMMARY OF RESULTS (Cont’d)

- Very few cables exhibited signs of degradation.
- Inspections have not identified evidence of cable aging or degradation in areas where environmental conditions are within design values.
SUMMARY OF RESULTS (Cont’d)

- The inspections also noted non-ALEE issues
  - Cable design and installation issues
  - Minor maintenance issues
  - Housekeeping issues
BREAKDOWN OF OBSERVATIONS BY TYPE*

- ALEEs noted – 10%
- Cable/connector signs of aging – ~5%
- Design/installation – 25%
- Maintenance – 25%
- Housekeeping – 25%
- Other – 10%

* estimated
STRATEGIES TO MANAGE AGING EFFECTS IN ALEEs

- Temperature is the biggest concern
- Using fans to mitigate stratification or provide local cooling
  - Re-insulating pipes to mitigate heat source
STRATEGIES TO MANAGE AGING EFFECTS IN ALEEs

- Periodic inspections are appropriate
- Maintain thorough and up-to-date documentation reflecting known conditions
- Set thresholds for inspection triggers
- Coordinate with other plant programs