Recent Issues Identified During NRC EQ Inspections

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Presentation Overview

- NRC Vendor Inspection Program Overview
- Summary of Inspection Findings
- Operating Reactor EQ Trends
- EMI/RFI Testing Overview
- Other EQ Related Issues

NRC Vendor Inspection Program

- Covers manufacturers, test facilities, suppliers, and other service suppliers for both new and operating reactors
- About 30-40 inspections conducted per year
- Provides oversight of NUPIC effectiveness
- http://www.nrc.gov/reactors/new-reactors/oversight/quality-assurance/vendor-insp/insp-reports/2014/

Vendor Inspection Scope

- Inspections have become more technically focused
- Focused on documentation that demonstrates that the components or services meet technical requirements
  - Physical environment
  - Interface requirements (Input and output assumptions
  - Assumed lifetime and failure rates

NRC Vendor Inspection Selection Factors

- Prior NRC Inspection Experience
- NUPIC Results
- Scope of Supply
- Complexity of Product or Service
- Susceptibility to CFSI
- Operating Experience
- New or Advanced Technology
- Oversight by Other Entities
- Significance to Pending Regulatory Actions

Summary of Inspection Findings

- Claiming similarity so that previous qualification testing can be credited when similarity has not been adequately established
  - OEM not performing reviews and/or maintaining records of design change reviews and impact on qualification
  - Claiming similarity based upon limited visual/dimensional/electrical checks as part of dedication process
    - Not verifying whether any material changes were made that could impact EQ components
    - Not verifying design changes to internal parts have not invalidated previous qualification testing

Summary of Inspection Findings – (cont.)

- Improper lot formation when performing sample testing
  - Basis for assuming lot homogeneity not established
  - May not be applicable when purchasing components from unaudited distributors

Summary of Inspection Findings – (continued)

- Not understanding the test requirements
  - Invoking standards without really understanding what is required
  - Not addressing deviations from guidance contained in standards
  - Using different revisions of standards that may not be equivalent to what was specified
  - Not ensuring all aspects of the standards are met (e.g. justification for biaxial vs triaxial seismic testing).

Summary of Inspection Findings – (cont.)

- Not fully explaining (in the test report) test anomalies, deviations from test requirements, or apparent test failures
- Improperly or uncalibrated test equipment

Operating Reactor EQ Experience Trend

- A few recent findings/events concerning the transmission of a harsh environment to areas previously classified as a mild environment
  - Steam transmission from turbine area to switchgear rooms through ventilation systems (Diablo Canyon)
  - Gaps in HELB barriers –wall to ceiling interface (Millstone 2)

EMI/RFI Testing Overview

- Applicable NRC regulations:
  - Sections: 50.55a(h) and 50.49 of 10 CFR Part 50
  - Criterion III, “Design Control,” Criterion XI, “Test Control,” of Appendix B to 10 CFR Part 50

EMI/RFI Guidance Documents

- NRC Regulatory Guide 1.180, “Guidelines for Evaluating Electromagnetic and Radio-frequency Interference in Safety-related Instrumentation and Control Systems”
- Covers
  - Design and installation practices
  - Emissions testing
  - Susceptibility testing
  - Surge withstand capability
- References to Military and IEC Standards

EMI/RFI Guidance Documents (cont.)

- EPRI Utility Working Group Topical Report TR-102323, "Guidelines for Electromagnetic Interference Testing in Power Plants.“
  - Original 1994 revision was accepted by NRC in Safety Evaluation Report
  - Revision 2 was not accepted

EMI/RFI EQ Testing

- Purchase orders should specify the specific standards and revisions for performance of EMI/RFI testing.
- Licensees/vendors need to ensure test facilities perform an adequate evaluation if using different revisions of Military or IEC Standards

EMI/RFI EQ Testing

- When dedicating commercial EMI/RFI testing services, vendors/licensees need to ensure that adequate critical characteristics are evaluated (e.g. that the service provider really has the technical capability to perform and control the testing as specified)

Other EQ Related Issues

- Petition for rulemaking to expand 50.49 to include all safety-related cables and associated electrical equipment that could be submerged or subjected to moisture intrusion
  - Petition received from member of the public in June of 2012
  - Currently being evaluated by the NRC

Questions