

Resolution of Equipment Qualification (EQ) Questions

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Agenda

- **Purpose**
- **Resolution of EQ Questions**
- **Next Steps**
- **Public Questions**



EQ Inspections Objectives

- **Review the licensee's implementation of the electrical equipment EQ program, as required by their license**
- **Verify that the licensee is maintaining the qualified status of equipment during the life of the plant.**
- **Review the EQ record maintained in accordance with applicable requirements in order to verify that electric equipment important-to-safety and located in harsh environment meets their license.**



Question 1

What is the Arrhenius methodology?



Question 1 Response

- **Simulation of accelerated aging.**
- **Based on the premise that deterioration of materials in service is due to chemical reactions that occur internally.**
- **Chemical reactions occur more rapidly at higher temperatures.**
- **Arrhenius showed that temperature dependence of chemical reactions follows an exponential equation.**



Question 2 (Former FAQ 1)

What is the regulatory guidance (i.e., Regulatory Guide (RG), Standard Review Plan (SRP), Interim Staff Guidance (ISG), Branch Technical Position (BTP), etc.) for applying the Arrhenius Methodology to establish the qualified life of EQ components?



Question 2 Response

- There is no specific regulatory guidance for how to apply the Arrhenius Methodology for determining the qualified life of components.
- Requirements and Guidance for addressing thermal aging are included in:
 - 10 CFR 50.49(e)(5)
 - DOR Guidelines
 - NUREG 0588, Rev. 1
 - RG 1.89, Rev. 1
 - IEEE Std. 323-1974
 - NUREG-1800, Rev. 2 (SRP for License Renewal)
 - NUREG-1801, Rev. 2 (GALL Report)



Questions 3 and 5 (Former FAQs 2 and 4)

- 3) Are licensees required to validate the information contained in the EQ reports (e.g., activation energy) provided by Appendix B vendors? If so, what are the requirements?**
- 5) What are the governing requirements for licensees to accept and verify activation energies from Appendix B vendors are technically justified for the application and/or applicable to the service conditions.**



Questions 3 and 5 Response

- Equipment qualification is governed by 10 CFR Part 50, Appendix B and the regulation for environmental qualification of electric equipment important to safety is 10 CFR 50.49.
- Beyond ensuring that vendor programs satisfy the 10 CFR Part 50, Appendix B, requirements and confirming that the EQ equipment is received as procured, no.
 - Changes made by the licensee to materials or manufacturing processes between the original and the replacement parts should be evaluated for their impact on qualification.
 - Selection of activation energy must be defined, justified and documented.



Questions 4 and 8 (Former FAQs 3 and 7)

- 4) Are licensees that were licensed to meet the DOR Guidelines for EQ required to upgrade the qualification of EQ components to the CAT I criteria of NUREG-0588, Rev. 1, when they enter the period of operation beyond the original 40-year license?**

- 8) Do licensees have to apply the methodology described in IEEE standards used for the original EQ qualification for extending the qualified life of EQ components past 40 years?**



Questions 4 and 8 Response

- **No**, unless the renewed license contains specific license conditions that require them to.
 - Per 10 CFR 54.21(c), “Contents of Application – Technical Information,” each application for a renewed operating license must contain an evaluation of time-limited aging analyses.
 - Section VI B of NUREG-1801, Rev. 2, addresses electrical equipment subject to 10 CFR 50.49 EQ requirements.
 - SRP Section 4.4 and Chapter X.E1 of NUREG-1801, Rev. 2, provide acceptable methods for meeting the requirements of 10 CFR 54.21(c)(1)(i), (ii), and (iii).



Question 6 (Former FAQ 5)

What are the requirements for replacing EQ components?



Question 6 Response

- **Per 10 CFR 50.49(I), replacement equipment must be qualified in accordance with the provisions of this section unless there are sound reasons to the contrary.**



Question 7 (Former FAQ 6)

What are the requirements that specify what must be done if the DOR Guidelines do not address a particular area of EQ (i.e., Did the commission state what to do if the DOR Guidelines are unclear?)?



Question 7 Response

- There are no requirements that specify what must be done if the DOR Guidelines do not address a particular area of EQ.
 - The NRC staff provided the following clarification in response to comments received on the For Comment version of NUREG 0588:

“In cases where the DOR guidelines do not provide sufficient detail but NUREG-0588 Category II does, NUREG-0588 will be used.”



Question 9 (Former FAQ 8)

What are the requirements or guidance for determining the activation energy for materials in EQ components?



Question 9 Response

- There is no requirement establishing a level of technical basis for acceptable activation energy.
 - RG 1.89, Rev. 1, Section C.5 states:
“Section 6.3.3, ‘Aging’ of IEEE Std. 323-1974; and paragraph 10 CFR 50.49(e)(5) should be supplemented with the following:
...
c. The aging acceleration rate and activation energies used during qualification testing and the basis upon which the rate and activation energy were established should be defined, justified, and documented.”



Question 10 (Former FAQ 9)

- a) What are the regulatory requirements associated with the EQ files and what information must be contained in the EQ files?**
- b) What is the purpose of the EQ files?**
- c) Has the NRC staff reviewed and approved the EQ files and/or established staff positions on EQ files?**



Question 10 Response

- a) EQ files are required by 10 CFR 50.49(d) and (j).**
- b) EQ files are considered supporting documents relied on for demonstrating compliance with 10 CFR 50.49.**
- c) In the 80's, the NRC contracted Franklin Research to review each licensee's EQ program including the EQ files.**
 - The resultant Technical Evaluation Reports and Safety Evaluation Reports may contain staff positions and state what the NRC has accepted as part of each licensee's EQ program.**



Next Steps

- **Staff plans to incorporate these questions and answers into the DBA EQ Program Inspection Procedure and EQ training.**
- **Staff will continue to closely assess inspection findings and URIs through the use of the HQ/Cross-Regional EQ Panel.**

Questions?