HIGH ENERGY LINE BREAK

Computer Based Training Module Available on NANTeL

ABSTRACT

This CBT is a self-paced, detailed, comprehensive, nuclear industry generic overview of HELB/MELB fundamentals for engineering evaluations and analysis. It introduces the student to the regulatory design requirements for HELB/MELB, explains the pipe rupture evaluation process and describes how to perform compartment heat-up and pressurization analysis. The module has undergone one round of revision to address ownership issues and feedback via NANTeL and other sources to make it more effective and seamless for the learners. The final exam was revised to add the open book resource documents link and reformat selected questions to improve clarity based on exam analysis and feedback.

INTENDED AUDIENCE

1. Experienced nuclear plant mechanical engineers who are developing expertise in High Energy Line Break
2. Site engineering Managers or Supervisors

DURATION

- 2 hours
- An additional 8-12 hours for reading materials provided within the CBT

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TERMINAL LEARNING OBJECTIVES

1. Identify the regulatory documents that provide the Design Criteria and guidance for HELB/MELB evaluations.
2. Describe the major regulatory guidance document changes that impacted HELB/MELB evaluation.
3. Define key terms used for HELB/MELB as provided in ANS 58.2 and other documents.
4. Identify the SRPs and BTPs that are applicable to HELB/MELB and the key criteria from each.
5. Identify the process for evaluating HELB/MELB consequences on safety related systems.
6. Identify how to protect against HELB/MELB consequences.
7. Identify the unique design criteria applicable for Containment Penetration Areas (Break Exclusion Zone).
8. Describe the alternative design and licensing requirements applicable to Leak-Before-Break.
9. Describe key regulatory guidance related to compartment heat-up and pressurization analysis.
10. Explain the mass and energy release models associated with HELB and approved regulatory guidance on mass and energy releases.
11. Describe the key parameters associated with a compartment heat-up and pressurization analysis.
12. Identify methodology and computer codes that are utilized for compartment heat-up and pressurization analysis such as Gothic, Relap etc.

KEY INDUSTRY DOCUMENTS

1. 10CFR50 Appendix A General Design Criteria
2. NRC SRP 3.6.1 Rev 1 Protection Against Pipe Failures Outside Containment
3. NRC SRP 3.6.2 Rev 1 MEB 3-1 Postulated Rupture Locations in Piping Inside and Outside Containment
4. NRC SRP 3.6.1 Rev 3 Protection Against Pipe Failures Outside Containment
5. ANSI/ANS 58.2-1988 Protection Against Postulated Pipe Rupture
6. NRC SRP 3.6.2 Draft Rev 2 EMEB 3-1 Postulated Rupture Locations in Piping Inside and Outside Containment
7. NRC SRP 3.6.1 Rev 2 Protection Against Pipe Failures Outside Containment
8. NRC GL 87-11 SRP 3.6.2 MEB 3-1 Revision
9. NRC SRP 3.6.3 Rev 1 Leak Before Break Evaluation
10. ANSI/ANS 58.2-1980 Protection Against Postulated Pipe Rupture
11. ANSI/ANS 56.10-1982 Subcompartment Pressure and Temperature Transient Analysis
12. ANSI/ANS 56.11 Protection Against The Effects of Compartment Flooding
13. NRC SRP BTP 3-3 Protection Against Postulated Piping Failure Outside Containment
14. NRC SRP BTP 3-4 Postulated Rupture Locations in Piping
15. NRC SRP 3.4.1 Rev 3 Internal Flood Protection
16. NRC SRP 3.6.2 Rev 0 MEB 3-1 1975 Postulated Rupture Locations in Piping Inside Outside Containment
17. NRC SRP 3.6.2 Rev 2 Postulated Rupture Locations in Piping Inside and Outside Containment
18. NRC SRP 3.11 Rev 2 Environmental Qualification of Equipment
19. NRC SRP 15.6.4 Rev 2 BWR Main Steam Line Break Outside Containment

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