Seismic Margin Assessment

Assess the safety of the plant and the margins in case of earthquake

The challenge
In many countries, the Safety Authorities have reviewed their requirements with respect to seismic assumptions, either to reevaluate the design requirements or to request analysis of the consequences of beyond design basis seismic conditions. In particular, utilities are requested to provide margin assessments taking into consideration possible cliff-edge effects.

The solution
The seismic margin methodology is designed to demonstrate sufficient margin over the safe shutdown earthquake (SSE) to ensure plant safety and to find any “weak links” that might limit the plant’s capability to safely withstand a seismic event larger than the SSE. Based on the fragility of seismic structures and components and fault trees/event trees approach, the High Confidence of Low Probability of Failure (HCLPF) value can be assessed. AREVA’s experience combines expertise in nuclear industry and capability to use state of the art probabilistic approach.

Key features
- Probabilistic safety assessment for key structures, systems and components:
  - Civil works
  - Primary circuit
  - Safeguard system
  - Pumps
  - Tanks
  - Spent fuel pool
  - Electric and I&C systems
  - Fire fighting equipment
  - Internals and fuel
- Margin assessment demonstrating robustness against beyond design earthquakes
- Key systems strength and weakness analysis
- Specific tools: calculations are performed with SASSI, ANSYS, SOFISTIK, SYSTUS, SYSPipe
- Option: a full seismic Probabilistic Safety Assessment can also be used to assess the core damage frequency calculation based on existing probabilistic hazard curves
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Strong Expertise and solid references

References:

• Nuclear power plants: Grohnde, Neckarwestheim 1
• New build: Olkiluoto, Taishan, UK EPR™ Generic Design Assessment
• Fast Breeder Reactor: Phenix
• Enrichment plant: Georges Besse 1

Our core expertise in seismic design

Dedicated teams for:

• System and heavy equipment
• Piping and auxiliary components
• Civil work
• Seismic reassessment
• Fuel assemblies

Methods:

• Compliance with international codes and standards: ASME, IAEA

Your benefits at a glance

• Accurate assessment of the margins required to document safety authorities expectations
• Identification of strengths and weaknesses for the key systems
• Combination of nuclear and seismic expertise required to perform state-of-the-art evaluation for NPPs
• Experience in relevant data collection and analyses

Structural fragility evaluation: Identification of critically loaded structural members by nonlinear (static and dynamic) analysis

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