EN S REG
European Nuclear Safety Regulators Group

Topical Peer Review II
Fire protection
at nuclear installations

Fire Safety Analysis

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TPR II - Second Stakeholder Meeting

1. Fire safety analysis
2. Topics of interest
3. Generic review findings
4. Conclusions for this thematic

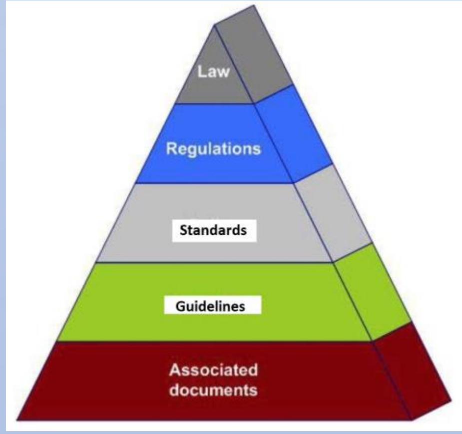
1. What is 'fire safety analysis' (FSA)

- The **primary objective** of fire safety analyses is to demonstrate **compliance** with nuclear fire protection goals—such as ensuring the plant can be safely shut down and maintained in a safe state during a fire—while also ensuring workers safety and assets.
- While for nuclear power plants due priority is given to nuclear safety, for other nuclear facilities the main focus is more on workers and asset protection.
- Fire safety analyses include:
  - ❑ **deterministic**: Various approaches, such as Fire Hazard Analysis (FHA) and Safe Shutdown Fire Analysis, are used to assess fire impacts on safety-critical systems.
  - ❑ **probabilistic**: Mainly Fire PSA, whose scope varies across countries, with some focusing only on core damage.

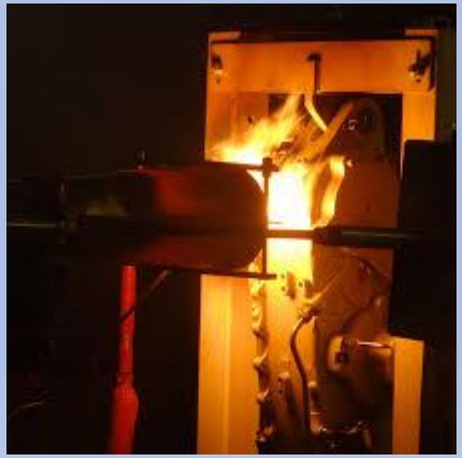
2. Topics of interest

- General **methodologies** for deterministic fire safety analyses
  - ❑ Objectives and Scope; Approaches reported in NARs; Standards and guidelines; Assumptions; Fire Phenomena
- Analysis of **radiological consequences**
  - ❑ Specific provisions to limit releases; State of knowledge on the phenomena
- Approach to **updating** the FSA (methodologies and data)
  - ❑ Sources to derive the need for FSA updates; FSA and their updates.
- Fire **PSA in NPPs**: Scope, criteria and level of conservatism
  - ❑ Scope of the Fire PSA in countries; Screening criteria for event combinations and fire scenarios; Level of conservatism in a Fire PSA; Sensitivity and uncertainty analyses; Contribution of fire events to the overall PSA results.
- Use and application of **PSA results**
  - ❑ Use of FSA to identify plant modifications; Approaches used to identify and prioritise plant modifications; Monitoring of the FSA input elements to identify potential deviations.

3. Generic review findings



- **Challenge**: development of guidelines to convert high-level objectives in the standards into detailed safety analysis requirements for certain installations or conditions of operation



- **Good practice**: extensive series of experimental tests on equipment, fire doors, cables, seals etc as credited in the safety analyses to confirm their assumed resistance

4. Conclusions

- Types of FSA
  - **deterministic**: approaches on standards with high-level objectives, on codes that simulate fire phenomena, supported by essential experimental tests, as well as on several assumptions;
  - **probabilistic**: their scope varies across countries, with some focusing only on core damage. The contribution of fire events to core damage also varies significantly, with fires accounting for a substantial percentage of core damage in some cases.
- Fire safety analysis **updates** are driven by regulatory changes, plant modifications, operational feedback, and new knowledge or in the periodic safety review framework.
- Participating countries highlighted the **key role of PSA** in identifying (NPPs) safety improvements and prioritising their implementation.

Key message: FSA has a key role to identifying and improving fire safety provisions

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Use the online chat

Short clarification question at the end of this session

Longer questions in the Q&A session