GENERAL QUESTIONS TO THE COUNTRIES

Thematic: FIRE SAFETY ANALYSIS (FSA)

For reasons explained in §1.1.3.2 the NPPs under decommissioning are treated as part of the NPPs in operation. Any specific differences or points of attention related to decommissioning are highlights in the text. Hence, for questions below that were not answered: see the generic questions for NPPs.

Type of installation: Facilities under decommissioning

General questions: The experts of the Fire Safety Analysis group, after their analysis of the National Assessment Reports, consider necessary to transfer to all countries the following questions. If this information has already been provided somewhere in the NAR, the country may simply answer providing the section and the page number(s) of the NAR where the answer is found.

1. *Defence in Depth (DiD)*: Regarding the level of fire DiD and the assumptions in the Fire Safety Analyses (FSA) the following questions arise:
    a) Has the failure of the fire protection means (features such as structures, systems and equipment, but also human failures in active fire protection) been taken into account in the fire analysis for the safety demonstration of the Fire Protection structures, systems and components (SSCs)?
    b) Is the single failure criterion considered in the fire analysis? If it is, on which regulatory basis and how is it considered?
    c) Provide information on which combinations of fires and other events have been included in the fire analysis with their justification. Please refer to Appendix I of the IAEA SSG-64 to address possible combinations of events.
    d) With regard to these combinations of fires with other events in the analysis, is the failure of the fire protection features (for detection or suppression) caused by combined hazards – such as earthquake and consequential fire or a fire occurring coincidentally with a long-lasting external flooding – considered? What are the qualification requirements ensuring their required function during and after these events?

2. *Applicability of PSA*: According to the Technical Specifications of the TPR II, performance of Fire Probabilistic Safety Assessment is considered mandatory for NPPs. However, it would be useful to know if Fire PSA have been performed or are intended to be performed for the decommissioning facilities.
   PSA is not required for installation in decommissioning as there are no significant radiological risks remaining in that state.

3. *Fire resistance/fire hazard rating*: The fire resistance rating of fire compartments, or fire hazard level, is often determined based on the fire load density (MJ/m²) in every fire area or compartment accounting for both permanent and transient fire loads and potential ignition sources.
    a) Provide details on the rationale followed.
    b) Fire load criteria values may differ amongst facilities and countries depending on the regulatory framework. How are these respective criteria justified?
    c) Are they justified knowing that fires in nuclear facilities are generally under-ventilated?

4. *Qualification of cables*: As far as qualified cables are available, in how far are they taken into account as fire load and fire source? How is the qualification of those cables been considered in the fire analysis and for what objective? In how far are protected cables (e.g., protected by protective coatings) considered as contributors to fire propagation in the analysis?

5. *Transient combustibles and decommissioning activities*: In how far and how have risks from transient combustibles and decommissioning activities (ignition sources by e.g. hot works) been included in the fire analysis and what are the hypotheses related to their inclusion?

6. *Direct fire effects*: Are direct fire effects (by smoke, pressure, temperature, soot, etc.) onto SSC important to safety considered in fire the analysis? Some detailed information about the regulatory requirements applicable and the way such effects are taken into account regarding design/conception/construction/modifications would be appreciated.

7. *Electrical fires*: Have electrically induced fires (including fires by high-energy arcing faults, HEAF) been considered in the fire analyses*?*

8. *Fire Brigade*: How have the response times of the fire brigade (onsite, offsite brigades) been taken into account in the fire analysis? This question is more relevant in those installations that do not have a dedicated onsite fire brigade.

9. *Radiological consequences*: Please provide description for:
    a) Methodology of assessment of the radiological consequences of a fire in the analysis and criteria and corresponding threshold values applicable in the success criteria.
    b) Radiological confinement measures during a fire.

10. *Analytical methods:*
    a) For the installations that do not provide enough detail on the tools and models used in the fire analysis, please provide a more detailed description.
    b) In cases where computational tools have been used within fire safety analyses, provide information on the sensitivity and uncertainty analyses carried out.

11. *Operating Experience*: Provide a detailed description on if and how the operating experience from both (i) fires and (ii) other events (whether reportable or not) with degradation or failure of fire protection features in the installation analysed – and, as far as available, also from other nuclear installations – is considered in the analysis.

12. *Results and revisions of the Fire Safety Analyses and additional analyses*: Please provide details about:
    a) The process carried out to update the fire analysis.
    b) Following the accident at the Fukushima NPP, stress tests were defined for European NPP. Has there been followed a similar approach regarding beyond-design-basis fire events for facilities under decommissioning in your country?
    c) Some countries mention that a periodic safety review is performed for decommissioning facilities. It would be good to know more on the applicability and periods of performance of PSR for such facilities in your country in order to identify potential strengths.

13. *Strengths/weaknesses*: In cases that no strengths and weaknesses have been explicitly mentioned in the NAR, please confirm that neither strengths nor weaknesses have been identified.