

2024-02-11

Submitted by the “Joint Project – Nuclear Risk & Public Control”

Contact : Gabriele Mraz, mraz@ecology.at

Topic	Page	Quote and questions
Czech Republic		
1.1.2	9	<p><i>“From the candidate nuclear installations, the SÚJB selected those with the potential for significant radiological risks to the environment and the population caused or affected by fire, to enable a meaningful comparison of the level of fire protection provision and the feasibility and quality of the assessment.”</i></p> <p>-Why was the newer SFS Temelin selected for the assessment and not the older SFS Dukovany?</p>
1.1.3	12	<p><i>“The LVR-15 is a tank-type light water research reactor housed in a non-pressurized stainless steel vessel under a shielding lid with forced cooling. The reactor uses IRT-4M type fuel with 19.7% 235U enrichment and an operating thermal power of up to 10 MW.”</i></p> <p>-What beyond-design-basis accidents are possible for this reactor? It should be taken into account that it uses fuel with relatively high enrichment and therefore the radiological consequences could be comparatively high.</p>
1.2.2	16	<p>Are the current valid WENRA Safety Reference Levels for a) Existing Reactors, for b) Existing Research Reactors, for c) Waste and Spent Fuel Storage and for d) Decommissioning Safety included in the national regulations? And are they already applied in the safety assessment of all nuclear facilities, if not, when will they be applied?</p>
1.2.2	17	<p><i>“Internal feedback system provides inspectors involved in inspections by information of operational events and the results of their investigations in their area of expertise. In addition to the inspection of the actual feedback process, inspectors review the progress and analysis of the checked events. “</i></p> <p>-What are the main results of these inspections?</p>
1.2.3	19	<p><i>“The scope of the state fire supervision enforcement:Identifying the causes of fires.”</i></p> <p>-What are the main causes of fire events?</p>
2	20	<p><i>“The assessment presented in the Operational Safety Analysis Report includes a set of postulated initiating events, which take into account the nature of the event, the type of occurrence and the frequency of the event occurrence. Initiating events include internal and external fire events.”</i></p> <p>-Is an aircraft crash included in the external events considered for all nuclear facilities in the Czech Republic?</p>
2.1	20	<p>Are beyond-design-basis fires for the NPPs possible? What would be the radiological consequences, if any?</p>

Topic	Page	Quote and questions
2.1.A.3	25	<p><i>"The overall contribution to the unit operating risk (CDF risk measurement) to internal initiation events from internal fires is at 13.6% level."</i></p> <p>-What are the CDF results for Temelin 1 and 2 according to the latest PSA? What is the date of the most recent calculation? What contribution is made by fire events to the frequency of beyond design-basis accidents or accidents involving the release of radioactive substances?</p>
2.1.A.4	25	<p>How many and which kind of events/failures per year of the fire protection equipment have been occurred?</p>
2.1.A.4	26	<p><i>"A. The measures to eliminate the most dangerous fire scenario in the area of sufficient forces and resources compared to the guaranteed 1st level of fire alarm for the given area confirms the necessity to establish the Fire Rescue Service Unit in the Temelín NPP (FRSU). B. The minimum member of this unit shall not be less than 12 personnel per shift continuously ready to respond to an emergency."</i></p> <p>-This requirement applies to Temelin, is there a comparable requirement for Dukovany?</p>
2.1.B.3	30	<p>Dukovany NPP: <i>"The contributions of internal fires to the overall risk of unit operation are generally of little importance. The overall contribution to the unit operating risk (CDF risk measurement) to internal initiation events from internal fires is at 20.3% level."</i></p> <p>-What are the current CDF results for the 4 units of the Dukovany NPP?</p> <p>-When was the last PSA carried out?</p> <p>-What contribution is made by fire events to the frequency of beyond design-basis accidents or accidents involving the release of radioactive substances?</p>
2.1.B.4	31	<p>How many and which kind of events/failures per year of the fire protection equipment have occurred?</p>
2.1.7.1	34	<p><i>"In accordance with the requirements of the SÚJB, a basic set of operational safety indicators is defined, including:</i></p> <ul style="list-style-type: none"> -Unit availability factor - Fuel reliability - Number of INES events - Number and severity of failure events - Unplanned loss of power factor - Containment tightness - Number of fires in the NPP area" <p>-Since when are these indicators determined? What are the results and trends of the indicators for the 6 reactors in the Czech Republic?</p>
2.2	36	<p>Are beyond-design-basis fires possible? What would be the radiological consequences, if any?</p>
2.2.6.2	40	<p>LVR-15: <i>"The last documented fire was in the reactor hall in the cable line, which was extinguished without limiting the operability of safety-significant equipment and the affected portion of the cable line was repaired."</i></p> <p>-What was the reason for the last fire mentioned and when did it happen? How many fires have occurred since the start of operations?</p>

Topic	Page	Quote and questions
2.4	40/41	<p><i>"The analysis of a deliberate attack by a large transport aircraft on a SFS falls into the category of extended design conditions and meets the requirements of a realistic approach. Application of a conservative approach in the form of "largest existing aircraft" is not required. The analyses performed indicate that the mechanical effects of the accident are not of such magnitude as to cause the spent fuel package leakage."</i></p> <p>-What assumptions are made for this aircraft crash with regard to the type of aircraft, the fire temperature and the duration of the fire? What are the radiological results of this analysis?</p> <p>-Can radiological effects due to the thermal effects of the fire be completely ruled out?</p> <p>-Are the results for both SFS facilities in Dukovany the same?</p>
3.1	44	-What experiences have been made since the start of operation, when and where have fires occurred and what was the cause in each case?
3.1.A	44	A typical cause of internal fires in NPPs is a short circuit in an electrical component or due to ageing cable insulation. Have fires already occurred due to this cause? How are fires from this cause prevented?
3.1.A.3.2.	47	-Have all recommendations and suggestions from the last OSART mission been fully implemented for Temelin? How many recommendations have been given?
3.2.A.2	65	Are the fire extinguishing systems of Temelin designed to withstand earthquakes?
3.1.B	48	A typical cause of internal fires in NPPs is a short circuit in an electrical component or due to ageing cable insulation. Have fires already occurred due to this cause? How are fires from this cause prevented?
3.1.B	49	<p>Dukovany <i>"When it is not possible to locate redundant equipment and components of safety systems or safety-related systems in separate fire sections (containment, control room, emergency control room, cable space under control room, etc.), fire protection systems shall be designed to limit the spread of fire in these fire sections and to eliminate unacceptable effects of fire or the fire protection systems themselves on the redundant safety systems."</i></p> <p>-Which redundant safety system equipment and components are not located in separate fire sections?</p>
3.1.B.2	50	<p>Dukovany: <i>"In all nuclear safety-relevant buildings, power cables and most low-current cables are of a design with increased resistance to the spread of fire, complying with IEC 332.3 category A, or IEC 331.</i></p> <p><i>c) In the case of special cables (optic cables, coaxial cables) which could not be manufactured to meet the test according to IEC 332.3 category A in order to ensure their functionality, their resistance to the spread of fire is ensured by covering their entire length in steel tubes."</i></p> <p>-Which low-current cables are not of a design with increased resistance to the spread of fire, complying with IEC 332.3 category A, or IEC 331?</p>
3.1.B.3.2	51	Have all recommendations and suggestions from the last OSART mission been fully implemented for Dukovany? How many recommendations have been given?
3.2.B.2	89	Are the fire extinguishing systems of Dukovany designed to withstand earthquakes?
3.2.C.2	106	Are the fire extinguishing systems designed to withstand earthquakes?
3.2.D.2	111	Are the fire extinguishing systems designed to withstand earthquakes?

Topic	Page	Quote and questions
3.4	124	Are the components of fire extinguishing systems, fire alarm systems and fire dampers in the aging management program included? If yes, since when? What are the results, how many ageing effects have occurred in these components? Are there any trends to be observed?
3.4	124	How many incidents/failures of fire detection and alarm components, fire extinguishing systems, fire barriers and ventilation systems have occurred in the different nuclear facilities to date? Can trends be observed over the last two decades?
4	126	Is the safety culture evaluated with regard to fire protection in nuclear facilities? If so, how is this assessed in the respective facilities?

Topic	Page	Quote and questions
Hungary		
1.1.3	9	BKR "Year of operational license expiring date: 15.12.2023" -Has the operating licence for the BKR been extended?
1.3.1	13	Experience feedback Nuclear Power Plants: -What experiences have been made since the start of operation, when and where have fires occurred and what was the cause in each case?
1.3.4	21	KKÁT: "Considered factors leading to occurrence of external fires:..... · During air traffic, fire event originated from aircraft crash onto the KKAT." -What assumptions are made for this aircraft crash with regard to the type of aircraft, the fire temperature and the duration of the fire? -What are the radiological results of this analysis?
1.4.1	23	NPP: "A set of technical and administrative measures have been taken to prevent fires. It is a specific requirement, for example, that when furniture in the process-related rooms is being replaced, only pieces of furniture made of certified "flame retardant" materials may be purchased." -What has been done so far? What percentage of furniture has already been replaced at Dukovany and Temelin?
1.4.2	24	BKR: "new requirement that is being introduced is that only superstructures or furniture made of 'non-combustible' materials may be procured when replacing installed equipment or furniture in the reactor hall;" -What has been done so far? What percentage of furniture has already been replaced at the BKR? Which equipment has to be replaced? What percentage of the equipment is already replaced?
2	30	-Is an aircraft crash included in the external events considered for all nuclear facilities in Hungary?
2.1	30	Are beyond-design-basis fires possible? What would be the radiological consequences, if any?
2.1.3	37/38	"According to the calculation results, the expected value of the CDF resulting from fires that can be assumed to occur during power operation of the units at their rated capacity is: · for Unit 1: 2.30E-06/year, · for Unit 2: 1.93E-06/year, · for Unit 3: 3.01E-06/year, · for Unit 4: 4.71E-06/year." -What are the current CDF results for the 4 units? -When was the last PSA carried out? -What contribution is made by fire events to the frequency of beyond design-basis accidents or accidents involving the release of radioactive substances?
2.1.3	38	"The differences between the results obtained for different units can be explained by differences in the spatial arrangement of system components, in particular by differences in cabling." -Was it considered to change the spatial arrangement of the system components, in particular the different cabling in unit 4, in order to achieve a comparable and by a factor of 2.5 lower calculated probability than in unit 2?
2.1.4	38	"No major fire ever occurred in the Paks Nuclear Power Plant." How many other fire events have been occurred?
2.1.6.2	41	How many and which kind of events/failures per year of the fire protection equipment have been occurred?
2.1.7	41	in the Czech Republic, in accordance with the requirements of the SÚJB, a basic set of operational safety indicators is defined, including:

Topic	Page	Quote and questions
		<ul style="list-style-type: none"> -Unit availability factor - Fuel reliability - Number of INES events - Number and severity of failure events - Unplanned loss of power factor - Containment tightness - Number of fires in the NPP area" <p>-Are there comparable indicators defined in Hungary? And if yes, what are the results and trends of the indicators for the for Paks 1-4 ?</p>
2.2	44	Are beyond-design-basis fires possible? What would be the radiological consequences, if any?
2.2.2	45	<p>BKR: "<i>The simultaneous occurrence of several independent fires and the combined effects are excluded from the assessment. However, the effects on the nuclear safety of the reactor induced by a particular fire are investigated.</i>"</p> <p>-Which kind of event combinations are considered in the FHA?</p>
2.2.6.2	51	<p>BKR: "<i>However regardless of lack of severe fire cases it is necessary to improve the Safety Culture due to the complexity of the site and the staff.</i>"</p> <p>-What measures have already been implemented and what measures are planned to improve the safety culture?</p>
2.2.7.1	52	<p>BKR: "<i>Identified weaknesses can be considered as the following:</i></p> <ul style="list-style-type: none"> · <i>The responsibilities and authorities in the facility are underdeveloped and in many cases conflicting. This results in a situation when it is unclear who should remove unnecessary flammable materials, potential sources of fire, etc.</i> · <i>An additional weakness that was identified during the site visit is the lack of personnel specifically focusing on the changes in laws and regulations, which would ensure that both the fire risk analyses and the internal Fire Protection Regulation is kept up to date.</i>" <p>-When and how are these weaknesses solved or when and how they will be solved ?</p>
2.2.7.3	52	<p>BKR: "<i>Conclusions drawn on the adequacy of the licensee's fire safety analyses</i></p> <p><i>The fire safety analysis itself was reviewed and was found partly satisfactory. The new version of the analysis has not yet been officially submitted, but is under internal review at the Licensee. The preliminary review of the new "not-yet-submitted" version of the document was found to be adequate based on the limited amount of time and access to the document, but final conclusions can only be drawn once the new version is submitted to the co-authorities.</i>"</p> <p>-When the fire safety analysis has to be provided?</p>
2.4.3	57	<p>KKAT: "<i>Except for cables located in switchboards and on cable trays, the technological system installed in the facility contains limited quantities of combustible material.</i>"</p> <p>-What is the fire load of these cables?</p>
2.8	62	" <i>Regarding the fire risk assessment of the BME OR training reactor facility the issue of the lack of submitted and approved fire risk assessment is persistent, therefore in-depth regulatory review or evaluation of assessment cannot be carried out at this point, hence no regulatory conclusions can be drawn.</i> "

Topic	Page	Quote and questions
		-When will this situation be over or when will fire risk assessment be provided and assessed? Has the supervisory authority considered suspending operations until that time?
3.1	63	A typical cause of internal fires in NPPs is a short circuit in an electrical component or due to ageing cable insulation. Have fires already occurred due to this cause? How are fires from this cause prevented?
3.1.1	64	-Which redundant safety system equipment and components are not located in separate fire sections?
3.1.2.1	67	NPP <i>"The standard fire load parameters are constant values, but they may vary in cases where new cables are being installed or old cables are being removed. If an equipment is being replaced with one which contains more combustible materials, the fire load parameter changes are tracked the same way. In such cases the fire load changes are included in the design documentation for the planned modifications."</i> -Have cables or equipment been deliberately replaced in order to significantly reduce the fire load?
3.1.3.2.1	71	Have all recommendations and suggestions from the last OSART mission been fully implemented? How many recommendations have been given?
3.1.3.3	72	<i>"The PAE's operational life time has been extended by 20 years with the condition to carry out a comprehensive PSR after 10 year of extended operation. As of today further life time extension possibilities are under investigation. Consequently the subject of implementation is not actual."</i> -What is specifically meant by the last statement?
3.2.2	85	Are the fire extinguishing systems of all nuclear facilities considered here designed to withstand earthquakes?
3.3.1	100	Do the power cables in all buildings relevant to nuclear safety have an increased resistance to the spread of fire (e.g. in accordance with IEC 332.3 Category A or IEC 331 or higher)? Do the special cables (optical cables, coaxial cables), which could not be manufactured in such a way that they fulfil the test according to IEC 332.3 category A to ensure their functionality, have an unsheathing with steel tubes?
3.3.1.2.1.	106	<i>"Fire cells have been designed and implemented where cables from one safety system have been routed through a room belonging to another safety system in a fire-retardant manner as required."</i> -The cables of which safety systems pass through a room of another safety system.
3.4	114	How many incidents/failures of fire detection and alarm components, fire extinguishing systems, fire barriers and ventilation systems have occurred in the considered nuclear facilities to date? Can trends be observed over the last two decades?
3.4	114	Are the components of fire extinguishing systems, fire alarm systems and fire dampers in the aging management program included? If yes, since when? What are the results, how many ageing effects have occurred in these components? Are there any trends to be observed?
3.5	116	Is the safety culture evaluated with regard to fire protection in nuclear facilities? If so, how is this assessed in the respective facilities?
4.1.2	119	<i>"In the case of research reactors it was identified both by the Licensees and the regulators that there is a persisting issue regarding the staffing of these facilities which pose a continuous obstacle on carrying out scheduled tasks on time. The issue arises from the size of the nuclear expert community and strict requirements on the qualifications of these experts, which significantly limits the number of available experts."</i> -How did the supervisory authority react to this situation? Has the supervisory authority considered suspending operations?

Topic	Page	Quote and questions
4.2	124	<p><i>"In general it was concluded that in the case of nuclear power plants the Hungarian regulations are practically fully in line with the WENRA RLs (although in some cases in a different structure). In the case of research reactors and interim spent fuel storages however several gaps were identified in the Hungarian regulations during and even prior the TPR II as part of a regulatory self-assessment."</i></p> <p>-When will be the current valid WENRA Safety Reference Levels for the Existing Research Reactors and interim spent fuel storages included in the national regulations? And when do they have to be used in safety assessments?</p>

Topic	Page	Quote and questions
Bulgaria		
1.1.4	9	Are the current valid WENRA Safety Reference Levels for a) Existing Reactors, for b) Existing Research Reactors, for c) Waste and Spent Fuel Storage and for d) Decommissioning Safety included in the national regulations? And are they already applied in the safety assessment of all nuclear facilities, if not, when will they be applied?
2	20	-Is an aircraft crash included in the external events considered for all nuclear facilities in Bulgaria?
2.1	20	-Are beyond-design-basis fires possible? What would be the radiological consequences, if any?
2.1.1	20	Kozloduy 5 and 6: <i>“The analyses carried out in the FHA take into account the possible external events that can lead to fire and its spread.... This includes both natural external events such as extreme weather conditions and human-induced events depending on the possible potential fire risks associated with the facility or activity.”</i> -Does it take in account an aircraft crash which can lead to a fire? If yes, what assumptions are made for this aircraft crash with regard to the type of aircraft, the fire temperature and the duration of the fire? -What are the radiological results of this analysis? If no, why not?
2.1.3	27,29	<i>“An update of the existing PSA level 1 in case of fire was carried out in 2020-2022. ... 4.54E-07 1/y for unit 5, 4.49E-07 1/y for unit 6. The total core damage frequency during operation of each of the units is determined as follows: 8.14E-7 1/y for unit 5; 8.03E-7 1/y for unit 6.”</i> <i>“The analysis of the results shows that, for both units, the contribution of the internal initiating events constitutes about 60% of the total frequency. Internal fire risk accounts for 10% of the total core damage frequency per unit, with turbine hall fires being the dominant factor.”</i> -What contribution is made by fire events to the frequency of beyond design-basis accidents or accidents involving the release of radioactive substances?
2.1.6.2	37	How many and which kind of events/failures per year of the fire protection equipment have been occurred?
2.1.7	38	in the Czech Republic, in accordance with the requirements of the SÚJB, a basic set of operational safety indicators is defined, including: -Unit availability factor - Fuel reliability - Number of INES events - Number and severity of failure events - Unplanned loss of power factor - Containment tightness - Number of fires in the NPP area” -Are there comparable indicators defined in Bulgaria? And if yes, what are the results and trends of the indicators for the for the Kozloduy 5 and 6?
2.2	41	Are beyond-design-basis fires possible? What would be the radiological consequences, if any?

Topic	Page	Quote and questions
2.2.6	50	How many and which kind of events/failures per year of the fire protection equipment have been occurred?
2.4.1	42	PSFSF "From an inspection of the insurance risk of "Kozloduy NPP" EAD in 2023, a Report on the study of nuclear insurance pools for "Civil liability for nuclear damage" insurance was received, in which a recommendation was made to revise the fire hazard analysis of PSFSF. The implementation of this recommendation is planned until 2025." -Could you explain why they ask for the revision of the fire hazard analysis?
2.5	43	What is the amount of flammable waste at the SFCRAW? What is the result of a beyond design accident of this facility?
2.6	45	What is the amount of flammable waste at Kozloduy 1-4? What is the result of a beyond design accident of this facility?
3.1	48	A typical cause of internal fires in NPPs is a short circuit in an electrical component or due to ageing cable insulation. Have fires already occurred due to this cause? How are fires from this cause prevented?
3.1.1	49	-Which redundant safety system equipment and components are not located in separate fire sections?
3.1.3	52	Experience feedback Nuclear Power Plants: -What experiences have been made since the start of operation, when and where have fires occurred and what was the cause in each case?
3.1.3.2	53	Have all recommendations and suggestions from the last OSART (2012/2014) mission been fully implemented? How many recommendations have been given?
3.1.3.2	53	"In connection with a registered defect of a pipeline from an automatic fire extinguishing system of the safety systems and a conducted analysis, decisions were made to replace the pipelines with corrosion-resistant austenitic steel. The developed design is in the process of implementation. In this regard, a long-term schedule for operational control (thickness measurement) of the pipelines has been developed." -Have more defective areas been discovered on the pipelines during follow-up inspections due to the registered defect? Have all pipelines of fire extinguishing systems in the NPP been replaced with corrosion-resistant austenitic steel pipelines?
3.2.1	70	Are the fire extinguishing systems of all nuclear facilities considered here designed to withstand earthquakes?
3.3.1	93	Do the power cables in all buildings relevant to nuclear safety have an increased resistance to the spread of fire (e.g. in accordance with IEC 332.3 Category A or IEC 331 or higher)? Do the special cables (optical cables, coaxial cables), which could not be manufactured in such a way that they fulfil the test according to IEC 332.3 category A to ensure their functionality, have an unsheathing with steel tubes?
3.3.2.1.	100	"MCR / ECR have a common air conditioning system." -Is there any plan to divide the air condition systems?
3.4	104	-How many incidents/failures of fire detection and alarm components, fire extinguishing systems, fire barriers and ventilation

Topic	Page	Quote and questions
		systems have occurred in the considered nuclear facilities to date? -- Can trends be observed over the last decades?
3.4	111	<i>"The scope of the aging management process also includes the components of fire extinguishing systems, fire alarm systems and fire dampers."</i> -How long has the ageing management process been in place for the components of fire extinguishing systems, fire alarm systems and fire dampers? What are the results, how many ageing effects have occurred in these components? Are there any trends to be observed?
3.6	113	<i>"The results of the inspections are reported in protocols and provided to the licensees. In case of established non-conformities with the existing requirements, the licensee must take actions to eliminate them in a timely manner."</i> -What time frame does "timely manner" mean in this context?
4.1	117	<i>"Activities that have not been fully completed at the time of the current peer review are the pending FHA updates (regarding PSFSF) commented on in the national report and the ongoing replacement of equipment associated with the obsolete equipment replacement programme (e.g. the replacement of detectors for the AlgoRex CS1140 modular fire detection system)."</i> Has the fire hazard analysis of the PSFSF been completed? Does this result in retrofitting measures? If so, which measures and by when must they be completed? Has the replacement of the outdated fire protection equipment in Kosloduy 5 and 6 been completed?
4.3	118	Is the safety culture evaluated with regard to fire protection in nuclear facilities? If so, how is this assessed in the respective facilities?

Topic	Page	Quote and questions
Poland		
1.2	16	Are the current valid WENRA Safety Reference Levels for Research Reactors included in the national regulations? And are they already applied in the safety assessment, if not, when will they be applied?
3.1	23	-How many incidents/failures of fire detection and alarm components, fire extinguishing systems, fire barriers and ventilation systems have occurred in the considered nuclear facilities to date? -- Can trends be observed over the last decades?
3.1	23	Are the components of fire extinguishing systems, fire alarm systems and fire dampers in the ageing management program included? If yes, since when? What are the results, how many ageing effects have occurred in these components? Are there any trends to be observed?
3.1.3	24	A typical cause of internal fires is a short circuit in an electrical component or due to ageing cable insulation. Have fires already occurred due to this cause? How are fires from this cause prevented?
3.5	40/41	<p><i>“The most important weaknesses of active fire protection were also identified:</i></p> <ul style="list-style-type: none"> • <i>lack of automatic extinguishing systems wherever there is a risk of fire that could threaten critical infrastructure for nuclear safety and radiological protection, and at the same time, the possible operation of automatic extinguishing systems would not affect the safety functions of SSCs (Structures, Systems, and Components),</i> • <i>the system of automatic fire detectors is unable to report the location of the fire,</i> • <i>lack of internal specialized fire brigade unit.”</i> <p>When will these major weaknesses be resolved?</p>
3.5	41	<p><i>“The most important weakness of passive fire protection was also identified:</i></p> <ul style="list-style-type: none"> • <i>the construction building and reactor installations were designed using old standards and technical solutions. Some improvements are possible but they need modernization efforts.”</i> <p>Are these modernisation efforts being made? If so, when?</p>