European Nuclear Safety Regulators Group
ENSREG

2nd Topical Peer Review – 'Fire Protection'

Country Review Report

Denmark

January 2025

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1. Brief overview of the candidate installations

The following installations were finally selected and included in the national assessment report (NAR).

Installation category	Number of installations	Name of candidate installations
Nuclear power plant		-
Research reactor		-
Fuel reprocessing facility		-
Fuel fabrication facility		-
Fuel enrichment facility		-
Dedicated spent fuel storage		-
Installations under decommissioning	1	Hot Cell facility - Risø site
On-site radioactive waste storage	1	Drum storage facility - Risø site
Total	**2**	

2. Regulatory framework

The NAR mentions that "*The legal and regulatory framework concerning fire safety of nuclear installations is a composite of provisions from four bodies of law covering nuclear installations, radiation protection, fire safety and emergency management […] Many issues relating to fire safety in buildings are regulated by The Building Act*".

The NAR indicates that as" *the requirements in the Building Regulations does not contain any specific regulation or guidance regarding especially fire hazardous storage or use of dangerous substances, […] this is regulated in the Emergency Management Act*."

Concerning Risø site, the NAR mentions that the installations at the Risø site have to comply with the requirements for fire safety in the Building Regulations (BR). The nuclear installations are regulated by the building regulation requirements that existed at the time of its construction. Furthermore, "*The Nuclear Regulatory Authorities have established Operational Limits and Conditions concerning the safety of operation and decommissioning of the nuclear installations and facilities at the Risø site. The specific provisions to ensure nuclear safety in relation to fire, are detailed in the OLC for the activities of DD"*, the licensee of Risø site. According to the NAR, the Emergency Management Act issued by the Ministry of Defence inter alia defines the purpose and competences of fire and rescue services in Denmark and hence contains elements of relevance to fire safety and nuclear installations.

Denmark did not reply to the question of the TPR Team[1] about whether or not the SRLs are binding.

[1] 'The NAR in §1.2 presents the regulatory framework. If not yet clearly mentioned in the NAR, could you indicate whether the WENRA SRLs for NPPs, and RRs (if relevant for your country), which are used as reference for this topical peer review on 'fire protection' (as per the Technical specification) are binding or not in your country? If they are not binding, what is the status of the SRLs (non-binding, guidance, advisory..)?'

The NAR indicates that IAEA "*standards are listed in OLC as guidelines for the planning, preparation and conduct of decommissioning activities as well as operational activities related management of radioactive waste. […] The standards present aspects related to fire safety relevant for decommissioning, predisposal management and documentation of decommissioning activities, which Danish Decommissioning through the provisions of the OLC is obliged to take into consideration.*"

3. Findings and significant improvements of approaches on the installations from the national self-assessment

The following **strengths** related to fire protection were reported in the NAR **as generic** for **Danish nuclear installations**:

- Procedures are identical to those used for all other (dangerous activities) buildings in the country. Practical experience has proven the approach fit for purpose, considering a graded approach in a setting where the radiological risks are continuously being reduced.
- Danish Decommissioning (DD) has good experience of using external experts to carry out the necessary fire technical assessments, analyses and inspections. This ensures an objective impartial assessment by experienced accredited experts and ensures a high standard for fire safety.

The following **weaknesses** related to fire protection were reported in the NAR **as generic** for **Danish nuclear installations**:

- Fire safety at nuclear facilities is regulated according to several legislative instruments and is subject to regulatory oversight by several regulatory authorities. This necessitates coordination across ministerial areas and at different hierarchical administrative levels and thus introduces risks of omissions or inaccuracies in the identification of applicable regulatory requirements and of inconsistencies in enforcement actions.
- Danish Decommissioning itself does not have competences in fire safety, but as DD is a relatively small organisation, it will be very difficult to maintain internal accredited and experienced competences. Therefore, DD has chosen to outsource this task.

The following **lesson learned** related to fire protection was reported in the NAR **as generic** for **Danish nuclear installations**:

- The biannual fire safety inspections from the local fire authorities with the presence of the nuclear regulatory authorities provide for a dedicated walk down of all rooms of buildings at each nuclear facility or installation. This has, in a few cases, led to identification of (generally minor) non-compliances with fire safety provisions in the Operational Limits and Conditions (OLC) and fire safety requirements specified in Danish BR (Building Regulations).

<u>Installations under decommissioning</u>

Hot Cell facility - Risø site

The following **strength** related to fire protection was reported in the NAR for **Hot Cell facility - Risø site**

- Structural and layout features: the risk of start of a fire inside the now vacated cells is limited, as is the risk of spread of a fire from the surrounding areas to the cell blocks.

The following **weaknesses** related to fire protection were reported in the NAR **Hot Cell facility - Risø site:**

- Fire preventive measures in the Hot Cell facility rely to a higher degree on the adherence to operational procedures specified in the OLC etc. than on the structural and layout features of the building itself.
- The ventilation system may act as a conduit for fire spread through the system of air ducts.

The following **lessons learned** related to fire protection were reported in the NAR for **Hot Cell facility - Risø site:**

- DD has not had any fire-related incidents at the Hot Cells since beginning of the decommissioning. Over the years a few false alarms related to e.g. dusty work have shown that fire preparedness works effectively.
- Inspection activities focus on adherence to operational procedures concerning fire safety, in particular in relation to initiation of new work activities or when changes to the structures surrounding the block of hot cells are carried out. The continually changing layout of the surrounding (gypsum wall) structures affects access points and routes and may change the number and types of potential ignition sources, conduits for fire spread and fire loads in general, if not registered and monitored carefully.

No **improvements** related to fire protection were reported in the NAR for **Hot Cell facility - Risø site**.

On-site radioactive waste storage

Drum storage facility - Risø site

The following **strengths** related to fire protection were reported in the NAR for **Drum storage facility - Risø site:**

- Structural and layout features: The building consists of concrete floors, concrete and brick wall and a concrete roof. As such, fire load of the building itself is low.
- Operational features: The storage area is not accessed by staff, and waste units are not routinely added or removed from the storage area.

The following **weaknesses** related to fire protection were reported in the NAR **Drum storage facility - Risø site:**

- Rooms are not everywhere separated by doors, in particular the storage area does not have a door.
- Fire preventive measures in the Drum Storage rely in part on the structural and layout features of the building itself, and partly on the adherence to operational procedures.
- Due to the level of radiation the Drum Storage itself is constructed in a way that it is difficult to access. Should a fire still occur, the area is very difficult to access for extinguishing due to the construction.

The following **lessons learned** related to fire protection were reported in the NAR for **Drum storage facility - Risø site:**

- Fire prevention could be strengthened through a higher degree of segmentation between parts of the building where different activities are carried out, or through stricter limitations on the types of activities allowed within the building.
- Inspection activities focus on operational means for preventing fires, as the structural features of the buildings leave few things to be inspected. The Drum Storage is located in a building, where other rooms are used for changing purposes. In some instances, rooms have been

found in use for other purposes than specified in OLC or by the nuclear regulatory authorities. In general, however, specified conditions are complied with.

- In 2019, the back passage to the west of the Drum Storage was emptied of various materials that could potentially pose a fire risk.

No **improvements** related to fire protection were reported in the NAR for **Drum storage facility - Risø site.**

4. Peer-review conclusions

4.1 Attributes of the NAR and the information provided

At the stage of the review of the national proposals, Denmark had no candidate installation. The recommendation of the Board to consider Risø storage facility was taken into account. Furthermore, Denmark proposed an additional facility (hot cell).

The information provided in the NAR allowed a meaningful peer review in particular, for the identification of peer review findings.

The document was reader-friendly and facilitated the finding of relevant information.

In general, the outcomes of the self-assessment were clearly mentioned.

In general, replies to the written questions allowed to clarify the identified issues.

Additional information and updates provided in reply to written questions and in the national presentations in the country review workshop were taken into account in the definition of the findings below in section 4.2.

4.2 Peer review findings

The self-assessment revealed some weaknesses in the fire protection of the nuclear installations. The findings in the table below were acknowledged as areas of improvement by the TPR Team.

Areas For Improvement mentioned in the NAR as weaknesses and acknowledged as such by the TPR Team	
AFI (1)	**Nuclear installation: Hot Cell facility - Risø site** Since there are no dampers installed in the ventilation system, the fire in the building can spread through the duct system.
AFI (2)	**Nuclear installation: Hot Cell facility and Drum Storage Facility - Risø site** Fire preventive measures rely to a higher degree on the adherence to operational procedures than on the structural and layout features of the building itself.
AFI (3)	**Nuclear installation: Drum Storage Facility - Risø site** The lack of compartmentation (rooms not everywhere separated by doors and absence of floor to ceiling wall) requires complementary analysis to verify and implement, if necessary, compensatory measures to ensure that fire does not spread from different activities.

The TPR team recommends that Denmark addresses these areas for improvement in the National Action plan.

During the country review workshop, the findings identified during the peer review phase have been discussed. Based on these discussions, the TPR team concluded on the following finding:

Areas For Improvement		
Nuclear installation: Drum Storage Facility		
AFI (4)	**Finding**	There is need to implement a system to document the inventory of fire loads (e.g. computer system).
	Justification	The activities in the drum storage building are not limited to the storage, but also to the management and treatment of radioactive waste, which may impact the risk of and consequences of a fire. Although no specific permissible limits for permanent or temporary fire loads are defined, the authorities require that the fire load be kept as low as possible. Implementation of a means of continuous monitoring of the inventory of fire loads in the rooms of building 212, that are used for both storage and radioactive waste management purposes (including sorting and compaction of received radioactive waste), would help managing the risk of a fire.

The TPR team recommends that Denmark addresses this area for improvement in the National Action plan.

The TPR team has also noted that Denmark has identified in its self-assessment a need for a review of the regulatory framework related to fire protection that necessitates a stronger coordination between the different regulatory authorities involved in order to avoid duplication or omission of fire protection requirements.

Definition of the types of findings

According to the TPR II Terms of Reference, the country group workshop discussions should lead to conclude on the findings categorised as an 'area of good performance' or 'area for improvement'. These are defined therein as follows:

A National area of good performance which should be understood as an arrangement, practice, policy or programme related to fire protection that is recognized by the TPR Review Team as a significant accomplishment for the country and has been undertaken and implemented effectively in the country and is worthwhile to commend.

A National area for improvement which should be understood as an aspect of fire protection identified by the TPR Peer Review Team where improvement is expected, considering the arrangement, practice, policy or programme generally observed in other participating countries. It may also be self-identified by the country itself (i.e. self-assessment) where improvement is appropriate.