Regulatory Aspects of Spent Fuel Storage at Paks MVDS Facility

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Content

1. **Introduction**
   - **History**
   - **Facility layout,**
   - **Licensee,**
   - **Operator**
2. **Regulatory oversight of the facility**
   - **Licensing procedures**
   - **Inspections**
   - **Evaluation of safety performance**
3. **Unified operation license for the facility**

Introduction: The History

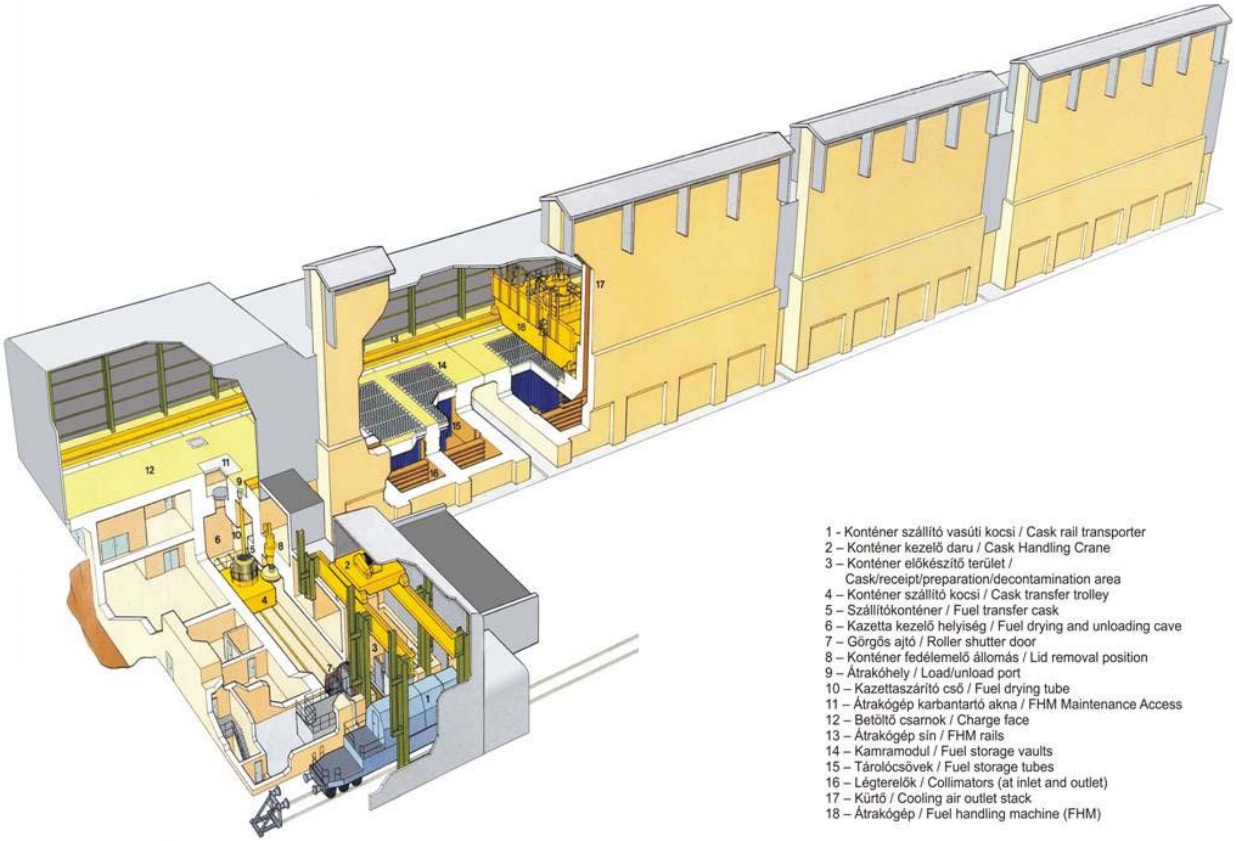
- Paks NPP has **four VVER-440** type units,
- Commissioned between **1982-198**7,
- **40% of domestic electri**city production is nuclear,
- 20 years of **life extension** preparation is in progress,
- Spent fuel of NPP was shipped **back to Russia** between **1989-1998,**
- From beginning of **90's delayed shipments,**
- Decision was made **to build an interim store,**
- GEC-Alsthom's **MVDS type** was selected,
- **First vault** loaded in **1997.**

Bird’s-eye view

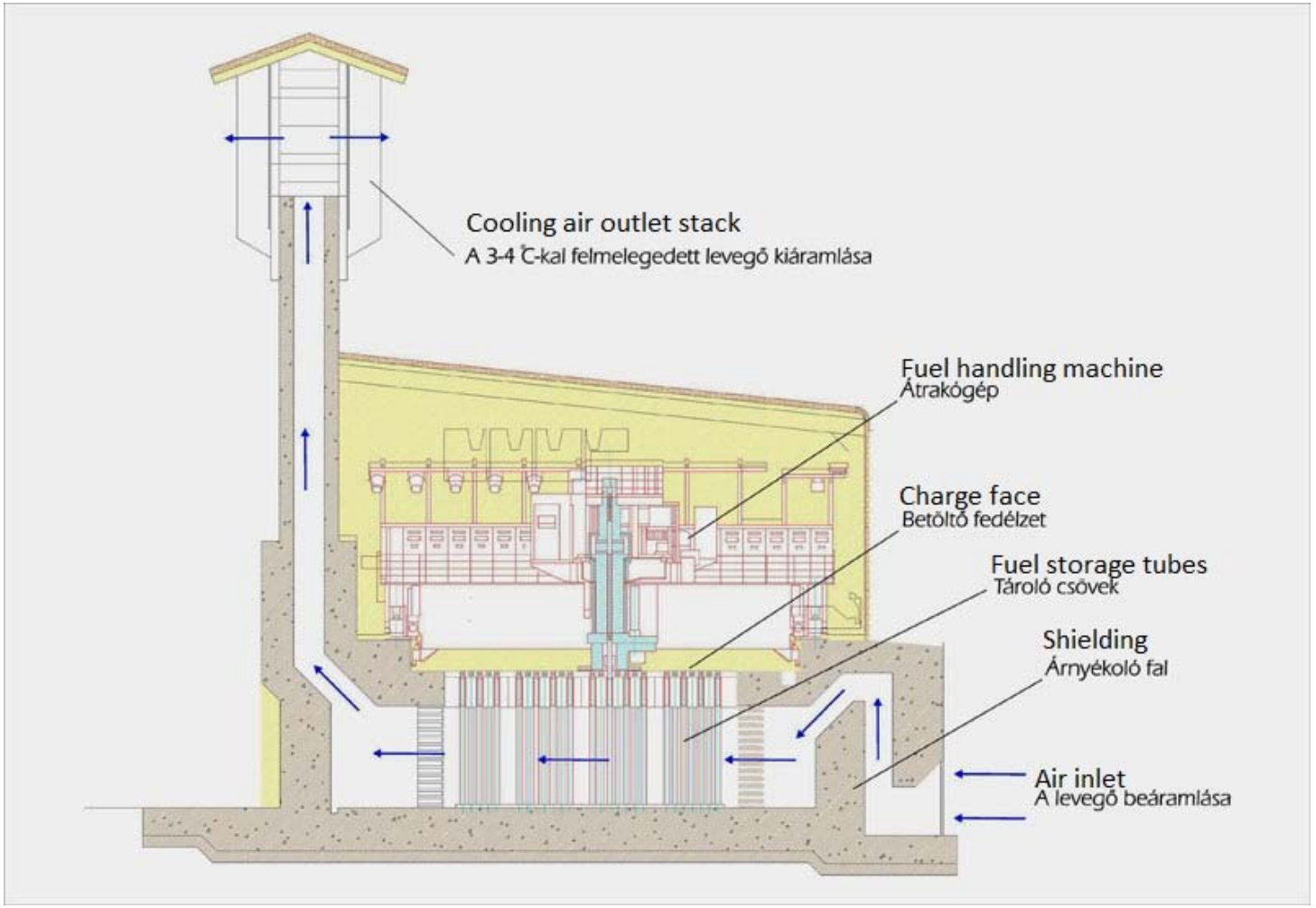
Introduction: The Layout

1. **The Spent Fuel Interim Storage Facility (SFISF) is a Modular Vault Dry Store (MVDS) facility.**
2. **SFISF has three structural units:**

- **Transfer Cask Reception Building (for cask and spent fuel preparation)**
- **Storage Vault is 450 Fuel Storage Tubes shielded by concrete walls**
- **Charge Hall for the Fuel Handling Machine to load and unload the fuel assemblies from Transfer Cask Reception Building to the Fuel Storage Tube**



1 - Konténer szállító vasúti kocsi / Cask rail transporter
2 – Konténer kezelő daru / Cask Handling Crane
3 – Konténer előkészítő terület /
Cask/receipt/preparation/decontamination area
4 – Konténer szállító kocsi / Cask transfer trolley
5 – Szállítókonténer / Fuel transfer cask
6 – Kazetta kezelő helyiség / Fuel drying and unloading cave
7 – Görgős ajtó / Roller shutter door
8 – Konténer fedélemelő állomás / Lid removal position
9 – Átrakóhely / Load/unload port
10 – Kazettaszárító cső / Fuel drying tube
11 – Átrakógép karbantartó akna / FHM Maintenance Access
12 – Betöltő csarnok / Charge face
13 – Átrakógép sín / FHM rails
14 – Kamramodul / Fuel storage vaults
15 – Tárolócsövek / Fuel storage tubes
16 – Légterelők / Collimators (at inlet and outlet)
17 – Kürtő / Cooling air outlet stack
18 – Átrakógép / Fuel handling machine (FHM)


Cooling air outlet stack
A 3-4 °C-kal felmelegedett levegő kiáramlása
Fuel handling machine
Átrakógép
Charge face
Betöltő fedélzet
Fuel storage tubes
Tároló csövek
Shielding
Árnyékoló fal
Air inlet
A levegő beáramlása

The Fuel Handling Machine in the Storage Vaults No.1-16

Introduction: The Licensee

Changing the Licensee

- The **first license** to operate the SFISF was issued to the **Paks NPP** (as the owner of the facility)
- According to the modified Act on Atomic Energy**, a new agency** called Public Agency for Radioactive Waste Management (**PURAM**) was established in 1998.
- PURAM was designated to carry out the **multilevel tasks** in the field of the radioactive waste management including the interim storage of the spent fuel. The **second license** was issued to the **PURAM**.
- PURAM is responsible for the safety of the facility

Operation

- The **NPP staff operates the SFISF** in a contractual arrangement with the PURAM.

2. Regulatory oversight of the facility

The Authority

According to the **Act on Atomic Energy**, the relevant authority regarding nuclear facilities and thus regarding the spent fuel management facilities is the

Hungarian Atomic Energy Authority (HAEA)

Licensing Procedures

- The licensing **procedure for the SFISF are analogous** to those of all other nuclear facilities.
- A nuclear safety license should be obtained for **all periods during the lifecycle** of the facility (siting, construction, commissioning, operation; within and beyond the planned life-time, respectively), decommissioning (final shutdown and dismantling).
- Moreover, **separate licenses** must be obtained **for all changes of construction** to a given facility **or modifications to its components/constructions** should they belong to safety classes.
- **In addition** to this, the HAEA grants **building and occupancy licenses** for buildings and structures.

Licensing Procedures (Cont'd)

Specific aspects

- Within the licensing procedures, the specific aspects are dealt with by the **special authorities** designated by law. The HAEA has to take into consideration the additional requirements (stipulations and conditions) of these specialized authorities.

Validity

- Licenses are valid for a given period of time, and may be extended upon request of the licensee if all requirements are met.

Licensing Procedures (Cont'd)

Statistics from 2009

- HAEA issued **192 decisions**, out of which **168 are resolutions** and 24 are procedural orders. 153 of the decisions were connected to the Paks NPP, **15 to the SFISF**, and 14 to the two research reactors.

Most important decisions for the SFISF

- **Renewal of the operation license** for modules 1-16,
- **Approval of corrective actions** (according to the comprehensive inspections made in 2008),
- Approval of **modified OLCs**,
- Approval of **Standard for Environment Monitoring**,
- Significant modifications (e.g.: new safeguard camera system).

Inspections

1. The HAEA is entitled to perform inspections both **with advance notice, or without notice** should the latter be considered justified.
2. In addition to this, the authority performs **comprehensive inspections in every third year, covering** the following areas:

- Realization of actions decided after the PSR,
- Emergency preparedness,
- Operation of RP equipment, including certification and calibration,
- Maintenance, ageing management,
- Management of contractors,
- Feedback of operating experience,
- Execution of technical reviews, status of service manuals;

.

Inspections (Cont'd)

- **HAEA** summarizes the deficiencies and deviations requiring improvement measures in an itemized and summary report.
- **PURAM** (licensee) is to submit an action plan to schedule the required corrective actions.
- The **last comprehensive inspection** for the SFISF has been performed in **2008**.

Evaluation of safety performance

- HAEA authority operates a **reporting system**.
- Reports prepared for the regulatory body are detailed so as to enable independent review, evaluation and assessment of operating activities, and any noteworthy events that may have taken place.
- The investigation and assessment of any events affecting safety that have occurred during operation and the identification of the causes and the taking of corrective actions in order to prevent their repeated occurrence is primarily the task of the licensee.

Evaluation of safety performance (Cont'd)

- HAEA evaluates annually the safety performance of all licensees based on the results of a **Safety Performance Indicator System.**
- The aim of this evaluation is the regulatory assessment of the activities and safety performance of a licensee, and thus monitoring and assessing the safety indicators of the operation as well as identifying probable safety gaps in a timely manner.

Evaluation of safety performance (Cont'd)

Regular Reports

- The licensee PURAM submits **Quarterly Reports** and **Annual Reports** to the HAEA.
- The **detailed contents** of these regular reports are prescribed **in the operation license**.

Occupational exposures for the period of 2000-2009

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of loaded fuel assemblies	500	750	420	480	270	500	480	360	480	480
Highest individual dose [mSv]	**0.071**	**0.035**	**0.582**	**0.849**	**0.168**	**0.298**	**0.198**	**0.203**	**0.220**	**0.260**
Collective dose [man*mSV]	2.1	2.1	8.6	6.4	3.7	6.3	7.6	6.6	9.6	8.3

Public exposures for the period of 1998-2009

Year	Effective dose for the member of the public		
	Liquid releases [nSv/a]	Airborne releases [nSv/a]	Total [nSv/a]
1998	0.11	0.12	0.23
1999	0.04	0.06	0.10
2000	0.17	0.10	0.27
2001	0.10	0.11	0.21
2002	0.14	0.08	0.22
2003	0.08	0.09	0.17
2004	0.05	0.07	0.12
2005	0.13	0.20	0.33
2006	0.539	0.437	0.976
2007	0.276	0.683	0.960
2008	0.926	1.84	2.77
2009	0.902	1.38	2.28

Airborne releases, for selected nuclides (in 2009)

(For detailed data see the Paper)

Nuclide	Annual release [Bq]				Release limit [Bq/a]	Release limit criterion
	Outlet stack	**Charge face**	**Fuel handl. machine**	**Total**		
H-3	**6.12E+07**	-	-	**6.12E+07**	**2.10E+14**	2.92E-07
C-14	**7.36E+06**	-	-	**7.36E+06**	**2.60E+11**	2.83E-05
Mn-54	**2.23E+04**	3.48E+04	1.10E+02	**5.72E+04**	**1.10E+11**	5.20E-07
Co-60	**3.28E+04**	**4.91E+04**	**1.55E+02**	**8.20E+04**	**7.80E+09**	1.05E-05
Cs-137	2.46E+04	**3.69E+04**	1.17E+02	**6.17E+04**	**9.10E+09**	6.78E-06
Pu-239/240	**2.92E+01**	**1.45E+02**	**1.51E-01**	**1.74E+02**	**1.80E+09**	9.68E-08

Unified operation license for the SFISF

- In 2008, the extension and commissioning of the SFISF by the 12-16 storage chambers came to completion.
- The HAEA decided on issuing a **uniform operating** license for the formerly built 1-11 and the new 12-16 chambers constructed during the extension.
- The PURAM elaborated the uniform FSAR, which, besides being applicable to support the operating license of the second phase, was also applicable to support the uniform operating license.

Unified operation license (Cont'd)

- The HAEA compared the FSAR with the PSR (2007) of the 1-11 chambers. During the evaluation, the authority concluded that the document basically met the content and formal requirements.
- The safe operation of the facility is justified; however taking account of the improvement actions and supplements prescribed, the first renewal of the operating license of chamber 1-16 was valid until only December 31, 2009, since the HAEA in its decision closing the PSR specified improvement actions and determined modifications and supplementations in the operating license for the FSAR.

Unified operation license (Cont'd)

- In the first quarter of 2009 the PURAM elaborated the modified FSAR and a new operation license has been issued **(valid until November 30, 2018 (next PSR))**.
- According to the legal provisions, **the special authorities took part in the licensing procedures**.
  - The environmental authority required monitoring of the radioactive releases in the facility's environment,
  - the police contributed with security requirements,
  - while the fire protection authority has also set specific requirements regarding fire safety.

Thank you for your attention!