Regulatory framework on DPC licensing in the Czech Republic

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Regulatory Framework – I.

• Storage of SF in AFR storage facilities is regulated in 4 main steps:
  – Licensing of NPP
  – Licensing of AFR storage facility
  – Type (design) approval of DPC (licence)

• NPPs and AFR storage facilities are under Czech law considered to be nuclear installations → same legal framework (Atomic Act + decrees on siting, construction, commissioning, operation and decommissioning of nuclear installations)

• Legal framework for type approval of DPCs has the same basis (Atomic Act), but then it differs (Decree on Type Approval and Transport)
Regulatory Framework – II.

• Licensing processes is based on the regulatory review of safety cases

• Design of AFR storage facilities (siting/design phase) has to:
  – take into account the SFSF expected lifetime;
  – incorporate passive safety features;
  – be designed in such a way that all SF can be retrieved within an appropriate time;
  – be designed so that individual casks (or unpacked SF elements – wet SFSF only) can be inspected and retrieved

• Content of the siting/design safety case (excluding formal documents as proof of site ownership, financial liability in case of nuclear accident, …):
Regulatory Framework – III.

- EIA report or results of EIA process;
- QA program for siting/design process;
- (initial) safety assessment;
- assessment of needs for safeguards and security

• Construction safety case:
  - main safety objective of construction phase - construct the SFSF so that all its safety functions are guaranteed;
  - content of construction safety case:
    • MS for SF store construction;
    • (preliminary) safety assessment;
    • proposed safeguards and security system
Regulatory Framework – IV.

• Commissioning safety case:
  – main safety objective of commissioning phase -
    demonstration that the SF storage facility and its future
    operation meets the design objectives and the performance
    criteria
  – commissioning is usually completed in several stages:
    • construction completion;
    • equipment testing;
    • performance demonstration;
    • inactive commissioning;
    • active commissioning
Regulatory Framework – V.

- Commissioning programme agreed as appropriate with the regulatory body, shall in general include:
  - the organization and responsibilities for commissioning;
  - the commissioning stages;
  - the suitable testing of SSCs based on their importance to safety, the test schedule;
  - the commissioning procedures and reports;
  - the methods of reviewing and verification;
  - the treatment of deficiencies and deviations the documentation requirements.
Regulatory Framework – VI.

• Operational safety case:
  – main safety objective of operation phase - achieve and maintain high standards of safety in terms of protecting operating staff, the environment and members of the public;
  – specific requirements for SF store operation:
    • preparation of the final set of OLCs and their periodical review and update;
    • maintenance, periodic testing and inspection;
    • modification control;
    • radiation protection;
    • ...
Regulatory Framework – VII.

• Cask type approval documentation - for dry cask SFSF can be considered as additional safety case;

• Content of cask safety case (B(U)F and S type):
  – Introduction
    • Purpose
    • Regulatory framework
    • Assessment endpoints and philosophy
    • Brief description and utilisation of cask
    • Inventory cask is designed for
  – Detailed cask description
    • Design criteria
    • Description of cask design
Regulatory Framework – VIII.

- Containment system
- Radiation shielding
- Confinement system
- Lifting devices
- Shock absorber
- Corrosion protection
- Contamination protection
  - Technical drawings
  - Cask components and material specification
  - Special features
  - Management system
  - Technological and manufacturing documentation
Regulatory Framework – IX.

- Safety assessments
  - Criticality evaluation
  - Radiation protection
  - Thermal evaluation
  - Cask containment system evaluation
  - Stress analysis of cask and its components
- Documentation of cask tests
- Operating procedures and maintenance programme
- Proposal for proof about the compliance of cask properties and parameters with design
Interfaces – I.

- Safety case for NPP considers the links to AFR SFSF in both conceptual and technical way
- Conceptual way – storage of SF in reactor pools (safety assessment a part of NPP’s safety case) and transport to AFR SFSF
- Technical details – used SSC and tools for SF handling between reactor pool and DPC in reactor building (transfer, decontamination, drying, He leakage tests, …)
- Operating procedures for SF and DPC handling in reactor building – part of cask safety case
- OLCs – only water level and \( \text{H}_3\text{BO}_3 \) concentration in reactor pool and handling shaft
Interfaces – II.

- Much closer link is between safety cases of dry cask SFSF and DPC
- Interfaces are identified in OLCs for AFR SFSF and licence conditions for AFR SFSF and DPC (type approval)
- OLCs (example for SFSF Dukovany):
  - maximum number of casks in the storage hall (133 casks);
  - geometry of the cask positioning – axis distance (3,35 m);
  - maximal cask surface temperature (< 85°C / < 110°C);
  - leaktightness of casks – the He pressure (≥ 0.35 MPa),
  - max. allowable dose rate on the surface and in a 2 m distance + average surface contamination;
  - DPC loading – according to the type approval + total $^{85}$Kr activity measured during cask drying (< 20 GBq/cask);
Interfaces – III.

• Other operating conditions for AFR SFSF identified in the operating licence:
  – SF stored in SFSF and used DPCs (type approved);
  – operation of AFR SFSF in line with:
    • approved OLCs;
    • other licenses issued by the regulatory body (on RAW management, radiation protection, management of fissile materials, emergency preparedness);
    • security arrangements;
    • requirements on reserve storage capacity in reactor pool;
    • requirements on SF handling after reactor pools decommissioning;
  – decommissioning according to the approved decom. plan
Interfaces – IV.

- assessment of operation (annual report on operational experience feedback + submission of licence renewal prior to the expiration of valid licence)

- DPC loading conditions defined in cask type approval:
  - radioactive content (SF type, max. initial enrichment, total activity and heat output, min. cooling time in reactor pools, ...);
  - loading patterns;
  - cooling media;
  - drying limits;
  - equilibrium temperature;
  - leaktightness test;
  - decontamination/dosimetric control;
  - surface temperature; ...
Interfaces – V.

- No difference between on- and off-site transports
- Interfaces to transport licence are limited to the requirement:
  - on the use of licensed DPC (+ compliance of every single DPC with approved design);
  - use of operational procedures for cask handling reviewed by the regulatory body; and
  - achievement of equilibrium temperature conditions prior to the transport out of the reactor building
- Other requirements same as for any other transport of radioactive substances and fissile materials (dosimetric control of DPC and transport means, marking, security and emergency arrangements, …)
Re-licensing of DPC and AFR Storage Facilities – I.

- Licences for DPC and SFSF are issued for limited time (10 y) and periodically renewed before their expiration (licences condition);
- From legal point of view there are no differences between first licensing and re-licensing of DPC and SFSF
- For re-licensing purposes the only additional document is a detailed OEF report containing details on incidents, accidents and operator’s response to them and results of operator’s and regulator’s inspections;
Re-licensing of DPC and AFR Storage Facilities – II.

• Independently of the periodic safety reassessments, the safety case shall be updated particular if:
  – there are modifications and new regulatory requirements and relevant standards;
  – there has been significant unexpected deviations in the environment conditions in the storage facility;
  – a significant change in the cask and SF elements acceptance criteria is proposed;
  – the properties of casks or SF elements stored have changed unexpectedly beyond the storage limits
Regulatory guide on DPC and AFR SFSF licensing – I.

- To address all regulatory issues and interfaces when licensing an AFR SFSF, the SUJB has issued a comprehensive guide on Storage of Spent Fuel in Purpose Build Nuclear Installations (BN 02-2, March 2010 - [http://www.sujb.cz/fileadmin/sujb/docs/dokumenty/publikace/Skladovani_VJP_v_samostatnych_JZ_BN_02_2.pdf](http://www.sujb.cz/fileadmin/sujb/docs/dokumenty/publikace/Skladovani_VJP_v_samostatnych_JZ_BN_02_2.pdf))
Regulatory guide on DPC and AFR SFSF licensing – II.