Safety Review for the Chernobyl Spent Fuel Storage Facility ISF-1
Content

- Contractual Base for Work of Western European TSOs
- ISF-1 in Chernobyl Decommissioning Activities
- Main Characteristics of ISF-1
- Results of the Expertise
The Chernobyl Shelter Site
Contractual Situation (1)

- NSA
- EBRD
- European Community
- SNRCU
- Chernobyl Site Decommissioning
- West. Europ. TSOs
- Ukrainian TSOs
- Tacis Project
Contractual Situation (2)

European Community

Riskaudit International

GRS  IRSN  SSTC

Tender

TPL

Additional TSOs

Contractor

Subcontractors
Chernobyl Decommissioning TACIS Projects, main Objectives

- Provide technical support to the licensing activities related to decommissioning facilities of Chernobyl NPP Site,

- Develop capabilities of the Eastern European authorities and their TSOs on the basis of transferred Western European safety principles and practices,

- Ensure, that in the implementation of the financially supported decommissioning activities the internationally accepted safety criteria and standards are met.
Spent Fuel Management Concept for Chernobyl NPP

- Unload spent fuel from Units 1, 2 and 3
- Use of existing wet storage facility ISF-1 for short term interim storage
- Construction of a dry storage facility ISF-2 (NUHOMS ® concept) for long term interim storage (~ 100 a)

- Planning, design, start of construction
- Project faced technical problems related to
  - Fuel specification (e.g. ERU fuel)
  - Drying process of leaking fuel rods
  - Double barrier system of container
  - Treatment of damaged fuel assemblies
  → Interrupt of the Project
Dry Storage Facility ISF-2 Phase 2 (2006 - ?)

- New contractor to provide a modified concept
- Modification of canister design, drying process, handling equipment etc.
- Significant delay for construction

→ Need for extending operation time of ISF-1 (until 2016 or beyond)
Tasks for SNRCU and the consulting experts

- How is the current safety status of the ISF-1 to be characterized?
- If necessary, which measures for back-fitting, improvement of safety functions and monitoring are to be recommended?
- What could additionally be done to enable safe operation of the facility if necessary beyond the design life time of the facility?
ISF – 1  main Characteristics

- In operation since September 1986
- Wet storage of RBMK type fuel (full length) in separate cartridges
- Rectangular pitch of 230 x 110 mm
- Five storage compartments 26,4 x 5,6 x 10,5 m
- Total capacity 21900 SFA
- Cartridges 10,9 m Ø 0,1 m x 2 mm
RBMK-1000 Fuel Assembly

- Two bundles of 18 fuel rods + extension rod
- Total length 10 m, outer diameter 79 mm
- Initial enrichments of 1.8, 2.0 and 2.4 wt % $^{235}$U
- Maximum average burn-up of 23,5 MWd/kg
- Transport cask TK-8 for 9 FAs
Safety Assessment - Spent Fuel storage Facility (ISF-1)
Spent Fuel Storage Facility (ISF-1) - Wet Storage of Fuel Assemblies
Chernobyl NPP Site - Schematic View

ISF-1
Spent fuel assemblies (SF) and absorber rods (AR) to be stored at Chernobyl NPP (July 2007)

<table>
<thead>
<tr>
<th>SF stored in</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
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<tr>
<td>Reactor core</td>
<td>0</td>
<td>0</td>
<td>588</td>
</tr>
<tr>
<td>Cooling ponds</td>
<td>1275</td>
<td>1057</td>
<td>949</td>
</tr>
<tr>
<td>ISF-1</td>
<td></td>
<td></td>
<td>17415</td>
</tr>
<tr>
<td>Total SF + AR</td>
<td></td>
<td></td>
<td>21284 + 1700</td>
</tr>
</tbody>
</table>
Expertise on the Safety Status of ISF-1 (1)

Safety Assessment Report (17 Ch.), main important issues:

- Site characteristics
- Strength analysis and civil structures
- Decay heat removal
- Radiation protection and monitoring
- Criticality safety
- Operation limits and conditions
- Accident analysis
- Radioactive waste management
- Quality assurance
- Decommissioning
Expertise on the Safety Status of ISF-1 (2)

- Independent reviews of the SAR by the participating TSOs
- Major contributions from IRSN experts!
- Coordination Meeting in Kiev (Jan. 08)
- Visit of the plant
- Common assessment report of GRS, IRSN, SSTC to RISKAUDIT 31 Jan. 2008
Comments and recommendations

- Lack of information on the actual technical state of the facility
- Compliance with requirements of normative documents in force in Ukraine
- Quality assurance during construction
- Design deficits such as back-up power supply, technical means of appropriate dealing with defected or damaged FA
- Demonstration of implementation of a defence in depth concept for radiation protection
- Documentation of operational feedback for 20 years of operation
- Demonstration of sub-criticality for certain design-base events
- Demonstration of stability of the storage building and the storage pools in case of special external loads, such as earthquake or external explosion.
Conclusions

- Continuation of operation requires significant safety upgrade
- More extensive measures than those provided so far are necessary
- Accelerate construction of the new storage facility to limit the lifetime of ISF-1

- Recommendations accepted by the operator
- License for operation issued by SNRCU
- Reassessment of the safety of the facility before December 2012