Strategic Approaches and Regulatory Infrastructure for Radioactive Waste Management in the Republic of Belarus

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Strategic Approaches and Regulatory Infrastructure for RW Management in Belarus

INTRODUCTION

Three major types of RW, each requiring special consideration:

- Institutional RW buried and disposed for long-term storage at the national centralized RW management facility Ekores;
- Waste generated in the process of clean-up activity in the Chernobyl contaminated areas; and
- RW to be generated during operation of the first Belorussian NPP after its commissioning in 2018.

The paper presents strategic approaches exercised for managing the RW in past and expected developments and options for RW management in Belarus in future.
Managing institutional RW (1)

Centralized RW management FACILITY Ekores

HISTORY

- Commissioned in 1963
- Typical Radon-type disposal facility:
  - two “first generation” trenches (1963-1979);
  - two “second generation” near-surface repositories (1977-2013)
  - a laundry;
  - four “S-shaped” wells for disposal of disused radioactive sources;
  - garage.

After 1990s

- A new regulatory regime and a need to bring RW management infrastructure in consistence with the IAEA requirements
- National project for upgrading the Ekores facility (1997) bumped negative stakeholders reaction
- An advanced strategy for managing RW at the Ekores site changed the public perception of the project
Managing institutional RW (2)

An advanced strategic approach (1999)

• The statute of the Ekores facility was changed from the burial (final disposal site) to long-term storage facility

• The main goal of upgrading the Ekores facility declared as creating capacities for a flexible relocation of long-lived RW from the Ekores site to a new disposal/storage facility

• New equipment and modern technologies to be used inter alia for retrieval of waste from the existing repositories, its segregation and conditioning into packages suitable for transportation to a new facility.
## Stages of Ekores facility reconstruction

<table>
<thead>
<tr>
<th>Stage</th>
<th>Facilities commissioned</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Storage facility for DRSs with 11 retrievable bore hole repositories</td>
<td>2003</td>
</tr>
<tr>
<td>2</td>
<td>Laboratory engineering building</td>
<td>2013</td>
</tr>
<tr>
<td>3</td>
<td>Storage facility for conditioned RW (3060 m³)</td>
<td>2013</td>
</tr>
<tr>
<td>4</td>
<td>Arrangements for retrieval of waste from the existing repositories.</td>
<td></td>
</tr>
</tbody>
</table>

### Old repositories

### New storage facility
Laboratory engineering building for waste processing and testing

- Treatment and conditioning of solid and liquid RW.
- Sector for fragmentation
- Sector for cementation
- Sector for processing of liquid RW:
- Laboratory for testing and analysis

Set of hydraulic tools for fragmentation
Mixer for solidification of liquid RW and vibrotable
Module installation Aqua-Express
Managing the decontamination waste of Chernobyl origin (1)

Substances which are formed as a result of work to eliminate the consequences of the Chernobyl accident with a view to bring the state of environment in industrial and civil facilities in the contaminated areas to an acceptable radioecological level and which contain more than 0.96 kBq/kg of Cs-137 (for solid waste).

88 Decontamination Waste Disposal Facilities (DWDF)

- Low activity concentration
- Huge volumes
- Lack of engineering barriers in most of DWDF
Managing the decontamination waste of Chernobyl origin (2)

Strategic approach

Based on the detailed field investigations:

The Law ‘On legal treatment of territories contaminated as a result of the Chernobyl NPP catastrophe’ was amended

Special regulatory requirements (SPOOD) were justified and established

The management strategy in respect of DW was revised and previously assigned task on the DW re-entombment into concrete vaults was abandoned.

Three specialized enterprises are assigned to perform maintenance and monitoring of the DW sites in accordance with the SPOOD requirements
First Belarus NPP

Type: NPP-2006;
Reactor: WWR (PWR)-1200;
2 power units;
Lifetime at 90% capacity factor: expected 50 years;
The WWR 1200 unit will produce: 1200 MW(e) electric power and 3200 MW(th) heat power;
Site: Ostrovets area, Grodno region;
Strategy for managing the NPP operational waste (2)

Waste inventory

The expected annual volume of operational RW per one NPP unit is 83.5 m³.

<table>
<thead>
<tr>
<th>RW category</th>
<th>Volume %</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLLW</td>
<td>17,6</td>
</tr>
<tr>
<td>LLW solid</td>
<td>70,4</td>
</tr>
<tr>
<td>ILW solid</td>
<td>11</td>
</tr>
<tr>
<td>HLW solid</td>
<td>1</td>
</tr>
</tbody>
</table>

According to the design:
Drums with solid RW and containers with solidified RW will be stored in the storages at the NPP site within 10 years.
Capsules with HLW - during all NPP lifetime.
Strategy for management of NPP operational waste (3)

After 10 years of NPP operation the LLW and ILW will be relocated from the NPP site to a new near-surface RW disposal facility

CONSTRUCTION OF NEW RW DISPOSAL/STORAGE FACILITY.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Work</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Research and development on the site selection</td>
<td>Before 2023</td>
</tr>
<tr>
<td>2</td>
<td>A petition (declaration) to the local authorities of the intent to design and construct RW disposal facility</td>
<td>2023</td>
</tr>
<tr>
<td>3</td>
<td>Elaboration of design documentation</td>
<td>2023 -2026</td>
</tr>
<tr>
<td>4</td>
<td>Commissioning of the first facility unit designed for LLW and ILW generated by the NPP over 10 years</td>
<td>2028</td>
</tr>
<tr>
<td>5</td>
<td>Construction and commissioning of other units in accordance with the NPP needs</td>
<td>To be identified</td>
</tr>
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</table>
Upgrading of RW management regulatory framework

Upgraded RW management regulatory framework:

- Revised objectives, principles and general requirements for ensuring safety of RW management;
- Basic safety requirements for disposal of RW in near-surface disposal facilities and in geological formations;
- Requirements to a structure and content of a safety assessment report for a RW management facility;
- Modernized RW classification, consistent with GSG-1 recommendations;
- Criteria and procedure for clearance of RW from regulatory control;
- New regulation for management of NPP operational waste;
- Others
Instead of Conclusion:

IRRS mission preliminary report observations (October 2016):

• A Strategy for Radioactive Waste Management of the Belarusian NPP documents the preferred disposal options, but there are some gaps in this strategy. Specifically, the strategy does not consider societal factors and does not assign clear responsibility for the implementation of the strategy.

• No financial estimations for radioactive waste management of activities other than the NPP have been developed. Finally, there is no strategy for other potential sources of radioactive waste in use in the country.

• The action plan stemming from the self-assessment recognizes this gap. The Republic of Belarus could consider establishing a single strategy for all radioactive waste in the country, which is consistent with international practice.
MANY THANKS FOR YOUR ATTENTION