Radioactive Waste Management Program in Ukraine

Yuliya Balashevska
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Chornobyl
- Why can Ukrainian RAW experience be useful for Japan?
- What is a national RWM program?
- Why good policies are sometimes not very effective?
Radioactive Waste

waste, radioactive
Material, whatever its physical form, remaining from practices or interventions and for which no further use is foreseen that contains or is contaminated with radioactive substances and has an activity or activity concentration higher than the level for clearance from regulatory requirements.
Radioactive Waste Management Program

A system/plan offering decision-makers and waste handlers specific solutions for the systematic management of radioactive waste and to reduce their amounts in a country.

Successful RWMP = RAW disposed of safely

Elements:
- Policy
- Inventory & Classification
- Responsibilities
- Financing scheme
- Research
Ukraine

Nuclear Share by country in 2014, % of total

Nuclear reactors in Ukraine

UKRAINE’S HEAT AND ELECTRICITY

Prior to Russia’s June 2014 shut-off, 92% of Ukraine’s natural gas came from Russia

Source: IBA

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Sources of RAW in Ukraine

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Element 1 - Policy
Element 1 - Policy

- Law on Use of Nuclear Energy and Radiation Protection
  #40/95-BP, 08 February 1995

- Law on Radioactive Waste Management
  #256/95-BP, 30 June 1995

- Radioactive Waste Management Strategy of Ukraine
  #990, 19 August 2009

- National Targeted Ecological Program for Radioactive Waste Management
  #516-VI, 17 September 2008

- National Program for Chornobyl NPP Decommissioning and Shelter Transformation into an Environmentally Safe System
  #886-VI, 15 January 2009
National Targeted Ecological Program for RAW Management, 2008-2017

- Waste from Nuclear power production (by NNEGC ‘Energoatom’)
- Legacy waste from Chornobyl accident
- Waste from small generators managed by Ukrainian NC RADON
- Legacy waste from military programs of former Soviet Union
RAW Management Strategy of Ukraine

Aim: ensuring development of an effective RAW management system for the arising, legacy and future waste, including:

- Effective regulations;
- State regulatory and state administration bodies;
- Specialized enterprises for RAW transportation, conditioning, storage and disposal;
- Technologies and facilities for RAW handling and treatment;
- Storage and disposal facilities;
- Funding and financing mechanisms.
National Program for Chornobyl NPP Decommissioning and Shelter Transformation into an Environmentally Safe System

20+ objectives:

- Removal of NF
- Construction and commissioning of SFS, LRWT Plant
- re-construction of existing SFS
- decommissioning of cooling pond
- Dismantling of equipment
- Social Guarantees
- Preservation, modernization, investigation…
Element 2 – Inventory and Classification
Element 2 – Inventory and Classification

- Accident RAW
- ChNPP Unit 4
- ChNPP Decommissioning
- Operating NPPs
- Radon
Element 2 – Inventory and Classification
Element 2 – Inventory and Classification

- 10 kBq/kg: Low-level waste
- 10 MBq/kg: Intermediate-level waste
- 100 GBq/kg: High-level waste

What you need to do to protect yourself when handling the waste.
Element 3 – Responsibilities
Element 3 – Responsibilities

- Integrated approach to RAW management
- Organization of RAW management process (transportation, conditioning, long-term storage, disposal)
- RAW Inventory

ME&CM

- Safe operation of RAW treatment facilities at its subordinate enterprises
- Physical protection of RAW
- Pre-disposal RAW management

SNRI-U, MH

- Development of norms and standards
- Licensing
- Inspections and supervising
Element 4 – Finance
Element 4 – Finance

- State Fund for RAW Management (within the State Budget of Ukraine) – “Polluter Pays” principle
- Present waste producers pay a fee to the State Fund that should cover the future costs for the RWM Program
- Largest payer – NNEGC “Energoatom”
- Legacy RAW - paid for directly from the national budget
Element 5 – Research
Element 5 – Research

INSTITUTE FOR SAFETY PROBLEMS OF NUCLEAR POWER PLANTS
NATIONAL ACADEMY OF SCIENCES OF UKRAINE

National Science Center
Kharkov Institute of Physics and Technology

National Academy of Sciences of Ukraine

Institute for Nuclear Research

The National Academy of Sciences of Ukraine

UKRAINIAN INSTITUTE OF AGRICULTURAL RADIOLOGY

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So, how effective the Program is?

**Successful RWMP = RAW disposed of safely**

<table>
<thead>
<tr>
<th>Waste Class</th>
<th>Storage Unprocessed (m³)</th>
<th>Storage Processed (m³)</th>
<th>Disposal Unprocessed (m³)</th>
<th>Disposal Processed (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLW*</td>
<td>870.0</td>
<td>0.0</td>
<td>3,960.0</td>
<td>0.0</td>
</tr>
<tr>
<td>ILW*</td>
<td>11,216.5</td>
<td>56.9</td>
<td>6,918.9</td>
<td>0.0</td>
</tr>
<tr>
<td>LLW*</td>
<td>1,110,430.4</td>
<td>5,637.4</td>
<td>684,969.6</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Note that Volume "as Dispo" includes Volume "as Is" if there is no data projection provided.
Data source: NEWMDB except for the Nuclear Power Production chart: PRIS
*) includes Estimate (data projections)

HLW = High Level Waste
ILW = Intermediate Level Waste
LLW = Low Level Waste
VLLW = Very Low Level Waste
Element 1 - Policy
RAW Management Strategy of Ukraine

PROBLEM 1: political sensitivity
Element 2 – Inventory and Classification
## RAW Inventory

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating NPPs</td>
<td>198000 m³</td>
<td></td>
</tr>
<tr>
<td>ChNPP</td>
<td>800 000 m³ (Units 1 – 3)</td>
<td>Solid Something</td>
</tr>
<tr>
<td></td>
<td>300 000 m³ (Unit 4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 000 (After NSC construction)</td>
<td></td>
</tr>
<tr>
<td>Accident Waste</td>
<td>2 500 000 m³</td>
<td></td>
</tr>
<tr>
<td>RADON facilities</td>
<td>45 000 sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13 RITEGs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5000 m³ (solid + liquid)</td>
<td></td>
</tr>
<tr>
<td>Military facilities</td>
<td>?</td>
<td>Unaccounted</td>
</tr>
</tbody>
</table>
Non-operated temporary storage facilities in ChEZ

Number of facilities: about 1000
Waste: short-lived LLW and ILW in the bulk form
Volume: 1 400 000 m³
Activity: $1.9 \times 10^{15}$ Bq

Ref = [Sobotovich,2005], [Antropov,2005], [NNC,2001]
Non-operated disposal facility in ChEZ (Pidlisny)

In operation: XII 1986 – XI 1988
Waste: HLW and LL-ILW, bulk
Volume: 11000 m³
Activity: 2,6×10¹⁵ Bq (?)

PROBLEM 2: Historical and legacy waste

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What **you** need to do to **protect** yourself when handling the waste

What **we** need to do to with **RAW** to **protect future generations**

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## RAW Classification – End-states

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<th>Class</th>
<th>Description</th>
<th>Disposal facility</th>
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<tr>
<td>VLLW</td>
<td>Release after 70…100 years. 50…70% of short-lived RAW</td>
<td>Type 1 - Buriakivka</td>
</tr>
<tr>
<td>LLW</td>
<td>Release after 300 years</td>
<td>Type 2 – Vector Complex</td>
</tr>
<tr>
<td>ILW</td>
<td>Long-lived waste</td>
<td>Type 3 – intermediate depth</td>
</tr>
</tbody>
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### PROBLEM 3: Waste Classification

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Element 4 – Finance
Finance & Funding

PROBLEM 4: Use of Fund

Use of Fund

PLanned
In fact

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Element 5 – Research

- Absence of a specialized educational program to cover the needs in RWM since 2014;
- Loss of expertise;
- Little practical use of scientific achievements

**PROBLEM 5: Weak link between science and practice in RWM**
So, what hinders the NRWMP?

- Political decisions;
- Lack of information about the RAW;
- Classification which doesn’t meet current needs in RWM;
- Inefficient use of the Fund;
- Absence of adequate training and practical use of research
All the above explains this

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WHAT TO DO?

See the next presentation