DECOMMISSIONING OF KOZLODUY NPP UNITS 1÷4
PROGRESS AND CHALLENGES

With care for the future…

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**SE RAW - Activity, Management, Structure**

**Activity:** Management of RAW and decommissioning of nuclear facilities

**Management:**
1. Minister of Energy;
2. Management Board of SERAW;
3. Executive Director – representative SE RAW.

**Structure:**
1. Head Office;
2. Four Specialized Divisions.

- SD “Radioactive Waste – Kozloduy” – management of RAW from NPP;
- SD “Permanent Repository for Radioactive Waste – Novi Han” – management of RAW from nuclear applications;
- SD “National Repository for Radioactive Waste” – construction, commissioning and operation of a repository for long-term storage of low- and intermediate-level RAW;
- SD “Decommissioning 1-4 Units” – decommissioning of nuclear facilities and management of RAW from decommissioning.
Decommissioning Kozloduy NPP Units 1÷4

Units 1 and 2, VVER-440
31.12.2002 - Operation shut down;
20.12.2008 - The Bulgarian government declared Units 1 and 2 as installations for RAW management and entrusted them to the SERAW;
18.10.2010 - SE RAW was granted licenses for operation of Units 1 and 2 as installations for management of radioactive waste;
27.10.2014 - SE RAW was granted licenses for decommissioning of units 1,2;

Units 3 and 4, VVER-440
31.12.2006 - Operation shut down;
19.12.2012 - The Council of Ministers declared Units 3 and 4 as installations for management of radioactive waste and entrusted their management to SEEAW;
25.02.2013 - SE RAW was granted licenses for operation of Units 3 and 4 as installations for management of radioactive waste.

State Enterprise Radioactive Waste
**Funding**

**Financial support from:**

- Radioactive Waste Fund (RWF) to the Minister of Energy;

- Fund for Decommissioning of Nuclear Facilities (FDNF) to the Minister of Energy;

- Kozloduy International Decommissioning Support Fund (KIDSF) – it was established by EC and is administered by the European Bank for Reconstruction and Development (EBRD).
Strategy for decommissioning of Units 1÷4 of Kozloduy NPP

- The strategy for decommissioning of Units 1-4 is “brown field“;
- Continuous dismantling of equipment;
- Completing the process of Decommissioning of Units 1-4 by 2030.
- Key Phases (Principal Activities):
  01. Pre-decommissioning activities;
  02. Facility shutdown activities;
  03. Procurement of equipment;
  04. Dismantling activities;
  05. Treatment of RAM and RAW and delivery for disposal;
  06. Site management and support;
  07. Project management and engineering;
  08. Management of SNF and activated materials.
Dismantling activities

- Almost all large equipment in the Turbine Hall is dismantled.

- Remaining for dismantling – pipelines, serving platforms, valves etc. The turbine foundations of Units 1 and 2 are also dismantled.
Dismantling activities

- Control area – All dummy assemblies and boron absorbers are removed from the reactors and put into the Spent Fuel Pond-3. Boron units 1 and 2 are dismantled. The intermediate circuit of Unit 1 are currently in the process of dismantling.
Free release of dismantling materials

- Radiological survey of Units 1 and 2 of Kozloduy NPP;
- Developed and approved free release procedures for units 1-4;
- Determining the specific activity of the radionuclides by the bodies accredited for testing or control;
- The released materials compliance with the levels and the criteria for free release is certified by accredited;
- Order of the BNRA chairman for Free release.
New facilities

- Sites for management of materials from the decommissioning activities;
- Size Reduction and Decontamination Workshop (SRDW);
- Free Release Measurement Facility (FRM);
- Facility for Retrieval and Processing of the Solidified Phase from Evaporator Concentrate Tanks;
- Facility for Retrieval and Stabilization of Spent Ion Exchange Resins;
- Plasma Melting Facility.
Deliveries of equipment

Delivered under implemented projects diamond rope cutting machines, machines for concrete structures demolishing, lifting equipment, multifunctional telescopic handler, mini-excavator and mini-loaders with various attaching devices, vertical and horizontal electric band-saws for cutting metal, crane *LIEBHERR 130 t*, richstaker, different types of containers etc.
Important steps till 2015

- Receipt of decommissioning licence for Units 1 & 2;
- Preparation of documentation for decommissioning licence for Units 3 & 4;
- Further development of an integrated waste management strategy;
- Develop and approve new free release procedures;
- Development of Risk management procedure for decommissioning;
- Dismantling about 18 000 tons of equipment (metal) in turbine halls of Units 1-4;
- Demolition of civil structures in Units 1 and 2 Turbine Hall or about 5000 tons.
Upcoming activities

- Receipt of decommissioning licence for Units 3 & 4;
- Commissioning of Size reduction and decontamination workshop;
- Commissioning of RAW treatment facilities;
- Commissioning of Plasma Melting Facility;
- Receipt of accreditation for SE RAW Control Body for testing or control;
- Decontamination of Spent Fuel Ponds and Emergency feed water Tanks;
- Dismantling of DGS-1 and reconstruction of the building for producing of reinforced concrete containers.

State Enterprise Radioactive Waste
The process of decommissioning of Units 1 to 4 is under implementation according to the approved schedule and dismantling work in the TH is expected to be completed in due time, i.e. the end of 2018. Management of dismantled materials is difficult due to the lack of licenced sites for management of materials from the decommissioning activities, as well as due to the long free release procedures. In order to solve the above mentioned issues, the following measures have been taken:

- Performance of a Project for Design and Construction of **Sites for Management of Materials** from the Decommissioning Activities at Kozloduy NPP Units 1-4, which is to be completed in the first quarter of 2017. Currently the construction activities are ongoing.
- In accordance with the current Ordinance on the Release of Materials from Regulatory Control, which contain more than one radionuclide, a software and hardware upgrade was implemented on the **FRM-02** and SERAW expects to receive an Inspection Body accreditation.
**Challenges & solutions**

- The preparation of the CA and auxiliary buildings for dismantling has started on schedule, as well as the dismantling of potentially contaminated equipment;
- Management and treatment of decommissioning RAM and RAW will be assisted by putting into operation of the Size Reduction and Decontamination Workshop (SRDW) and Plasma Melting Facility (PMF) which is scheduled for 2017;
- Management of RAW from the Mortuaries in the CA is another challenge for SERAW and in that regard a Feasibility Study for the Management of “Mogilnik” storages of KNPP Units 1-4 is first planned to be carried out and thereafter a management approach is to be selected;
- Regarding dismantling in the CA, SERAW is in the process of Elaboration of a Design for Dismantling of Equipment in the Controlled Areas of KNPP Units 1-4;
- Based on the selected option for dismantling, particularly the Reactor Pressure Vessel (RPV), reactor internals and the rest activated components, the Consultant shall justify by relevant analyses the requirement for temporary storage areas for activated equipment by complying with the best international practices.
Results

Dismantled materials - 22 972 t
Free released materials - 12 298 t
THANK YOU FOR YOUR ATTENTION!