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## Implementation of a Partial Dismantling of the IRT-Sofia Research Reactor prior its Refurbishment

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### SHORT REACTOR SYSTEM DESCRIPTION

**Location** - 8 km east of the center of Sofia; **Constructed** - 1959 - 1961 by Kurchatov Institute - Moscow

**First Went critical** - 1961 with nominal power 1 MW, 1965 - 1.5 MW, 1970 - 2 MW

**Pool type**, up to 48 fuel and graphite assemblies in the core; **Fuel rods** - EK-10, C-36; **Reflector** - 13 graphite blocks


**Safety and control system** - 2 safety rods, 4 regulating rods and 1 automatic regulating rod


**Cooling system** - 3 pumps, special ejector pipe, 2 heat exchangers, 4 ion exchange and 2 mechanical filters

**Storage pool** - capacity - 108 fuel assemblies; **11 horizontal** and **12 vertical experimental channels**


**Permanently shut down** - since 1989


### LEGAL AND FINANCIAL FRAMEWORK


 Since 2004 the whole Bulgarian legislation concerning nuclear energy has been updated in accordance with European legislation:

 Act on the Safe Use of Nuclear Energy (ASUNE)

 Regulations in the field of nuclear energy use

 Radiation protection normative documents

 Normative documents associated with environmental protection

 The implementation of the Partial Dismantling activities started in August 2009 with the US DOE financial support and finished successfully with prepared Final Report in February 2010.



In 2001 the Bulgarian Government issued **Decree for refurbishment and conversion of the research reactor IRT - Sofia in low power reactor**. By reason of this decree it has been performed a Partial Dismantling of the IRT-Sofia prior its refurbishment.

**The Partial Dismantling activities** are part of the general process for reconstruction of the research reactor IRT-Sofia. The final stage of the research reactor after the Partial Dismantling will be the initial stage of mounting the new reactor systems and equipment.



### General Plan /GP/

- IAEA Expert Mission #1 (February 2004)
- IAEA Expert Mission #2 (March 2005)
- General Plan Submitted October 2005 ✓



### Detailed Plan /DP/ incl. RAW and personnel doses

- IAEA Expert Mission #3 (December 2007)
- Detailed Plan Submitted February 2009 ✓



### Safety Analysis Report for Dismantling /SAR/

- IAEA Expert Mission #4 (June 2008)
- Report Submitted February 2009 ✓

According to DP dismantling activities of IRT-Sofia has been planned and implemented in the following zones:

**Zone 1** - dismantling of reactor internal systems



**Zone 2** - dismantling of primary cooling loop equipment



**Zone 3** - dismantling at the reactor site



**Zone 4** - dismantling of the thermal column



**Zone 5** - secondary processing and decontamination of the dismantled equipment



**Zone 6** - packaging and measurement of RAW





**Obtained collective doses during the Partial Dismantling activities:**

➤ Dismantling of reactor internal systems	– 2,47 man mSv
➤ Dismantling of primary cooling loop equipment	– 123 man μSv
➤ Dismantling at the reactor site	– 80 man μSv
➤ Dismantling of the thermal column	– 2,41 man mSv
➤ On the site for secondary processing	– 271 man μSv



**Quantities of RAW as a result of the Partial Dismantling activities:**

	<b><u>Planned:</u></b>	<b><u>Obtained:</u></b>
✓ Solid RAW, reactor pool, metal 2a and 2b category	1680 kg	1686 kg
✓ Solid RAW, reactor pool, non-metals 2a and 2b category	70 kg	70 kg
✓ Solid RAW, thermal column, metal 2a and 2b category	5040 kg	5040 kg
✓ Solid RAW, thermal column, non-metal 2a and 2b category	10000 kg	11035 kg
✓ Solid RAW, primary cooling loop, metal 1 and 2a category	5800 kg	2736 kg
✓ Liquid RAW, Reactor hall, tanks, coolant from reactor pool	60000 l	60000 l
✓ Liquid RAW, Reactor hall, tanks, decontamination solutions	6000 l	1000 l
✓ Liquid RAW, Reactor hall, RAW storage, ion-exchange resins	320 l	160 l



All RAW from Partial Dismantling of IRT-Sofia research reactor were placed in special containers type СТБК on site next to the Reactor Equipment Storage.



All non RAW were placed in ISO containers on the reactor site.



A final radiological survey of the reactor pool and the premises after completion of dismantling activities has been performed to ensure that the realize criteria have been met.



The prepared Final Report gives opportunity for new equipment and systems mounting.

