Decommissioning and Site Release Problems for Georgian Nuclear Research Reactor IRT-M

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Outlines

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Introduction

Georgia is small country situated on the territory of south Caucasus region and neighbored by Turkey, Armenia, Azerbaijan and Russia. Georgia covers a territory of 69,700 km² and its population is 4.7 million, largely ethnic Georgians

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Introduction (Cont'd)

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Introduction (Cont'd)

To carry out main requirements of radiation protection the frame law "On Nuclear and Radiation Safety" was issued in Georgia on January 1, 1999. According the law Ministry of Environment of Georgia was authorized as a Regulatory Body and Nuclear and Radiation Safety Service (NRSS) was established for this purpose within the Ministry.

Georgia carries out active collaboration with IAEA, USA, France, Italy, Sweden, Turkey and other friend countries. Georgia became member state of the IAEA in February 1996 and has been receiving technical assistance since 1997 (Several important steps have been accomplished due to this assistance).

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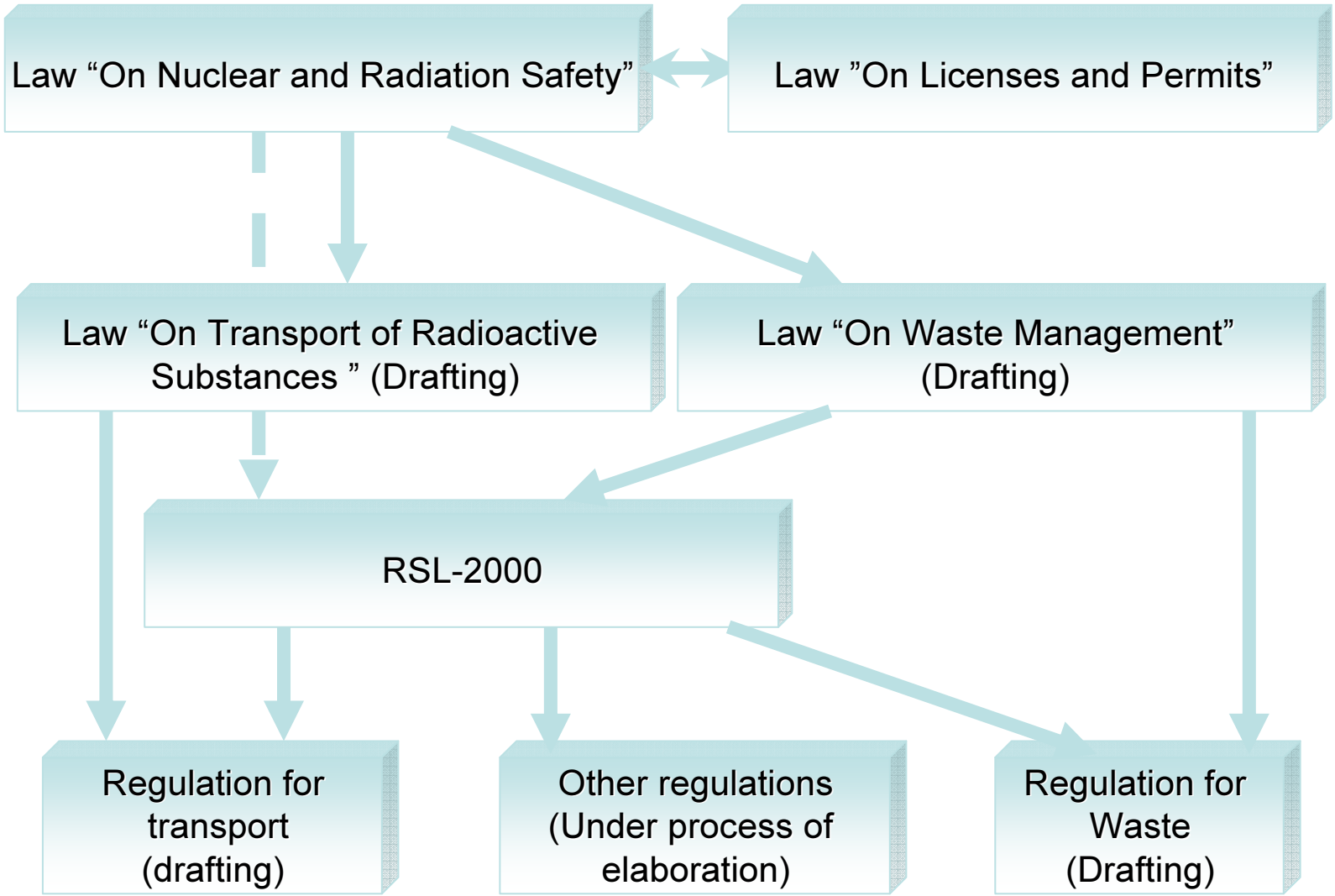
Legislative Basement



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Legislative Basement (Cont'd)

It is also anticipated to issue:

New version of the Frame Law;
Law "On Radioactive Waste and Handling with Radioactive Waste";
Law "On Transport of Radioactive Substances";
Amendments to frame law "On Nuclear and Radiation Safety"
Amendments to RSL-2000;
"Main Rules for Transport of Radioactive Substances";
"Main Rules for Handling with Radioactive Waste"
"On Physical protection"
"On Inspection of Nuclear and Radiation Activity"

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Research Reactor

Georgia had only one nuclear research reactor IRT-M belonged to the Institute of Physics (IP) Georgian Academy of Sciences. Operation of the reactor was stopped at 1988. The reactor IRT-M was operated safely on different levels of power (After second reconstruction the power was increased up to 8 MW) during 75, 000 hours and produced ~ 9 GW *Day thermal energy.

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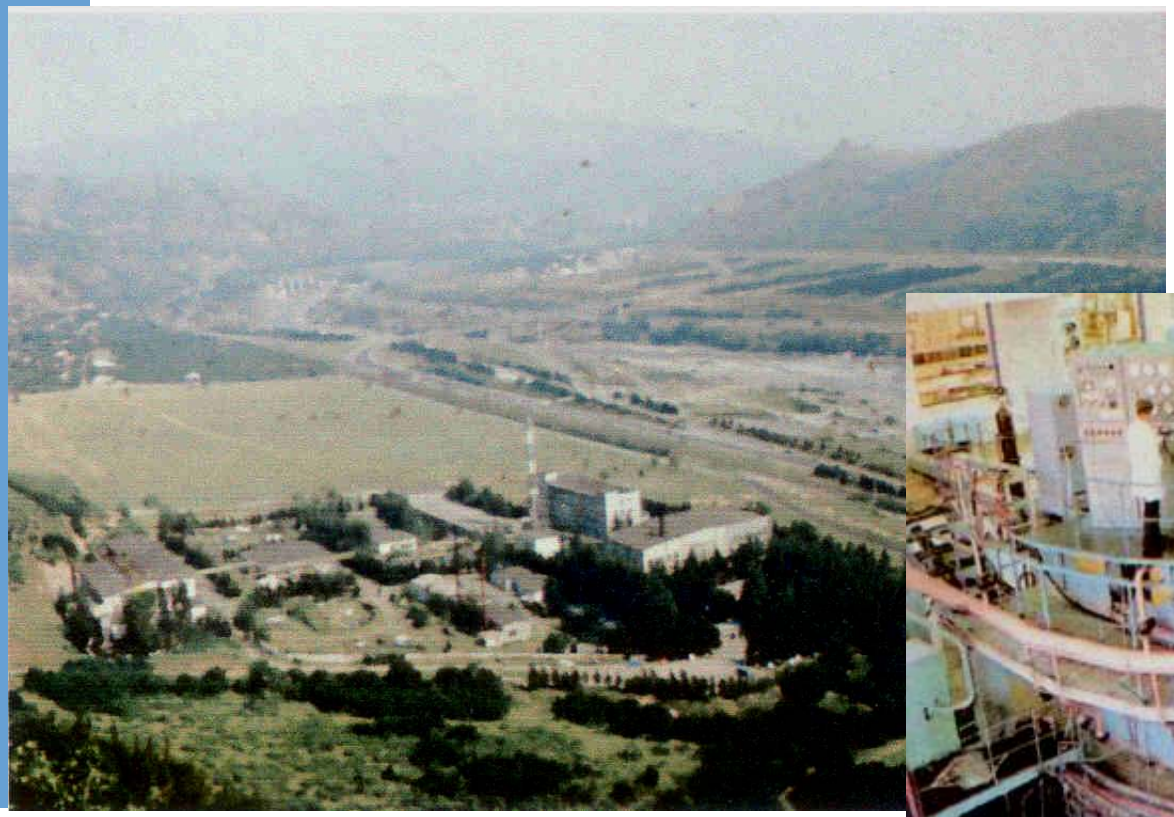
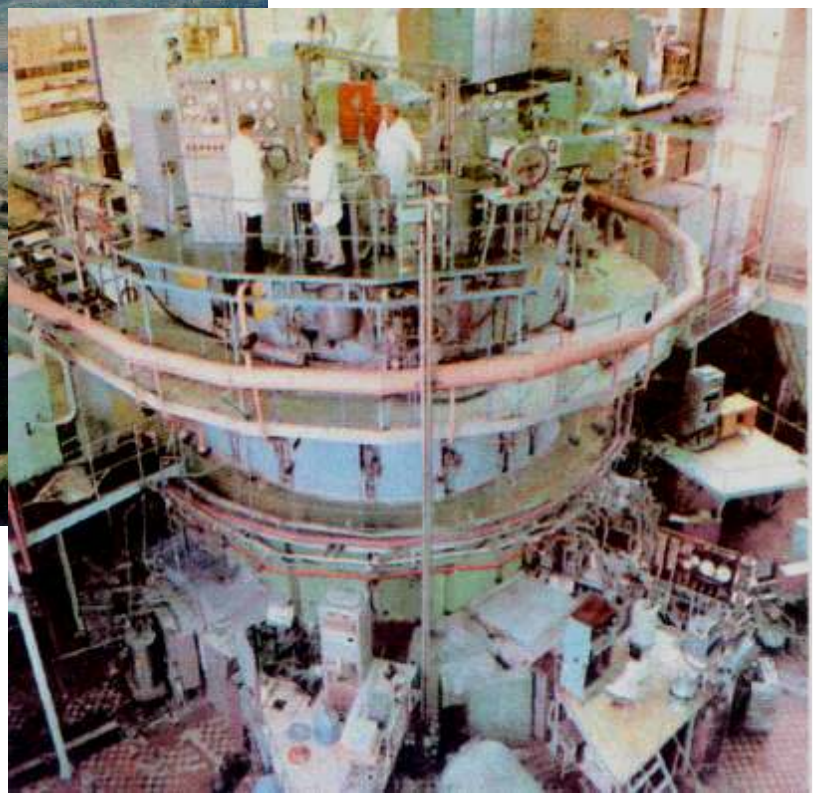
Research Reactor (Cont'd)





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Decommissioning

Not having appropriate financial and technical resources for carrying out full procedure of reactor decommissioning, IP issued decision to shut down reactor by new method called on site disposal. This method was approved by RB. Description of the method was published in IAEA document: IAEA TECDOC-1124, On-Site Disposal as a Decommissioning Strategy, pp.38-42, November 1999.

All activities were conducted under IAEA TC Project GEO/4/002 “Conversion of Resource-Exhausted Research Nuclear Reactor into a Low Power Facility for Neutron-Activation Analyzes”. The reactor core was covered by special concrete by underwater concreting method.

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Decommissioning (Cont'd)

Nuclear reactor tank before, during and after concreting

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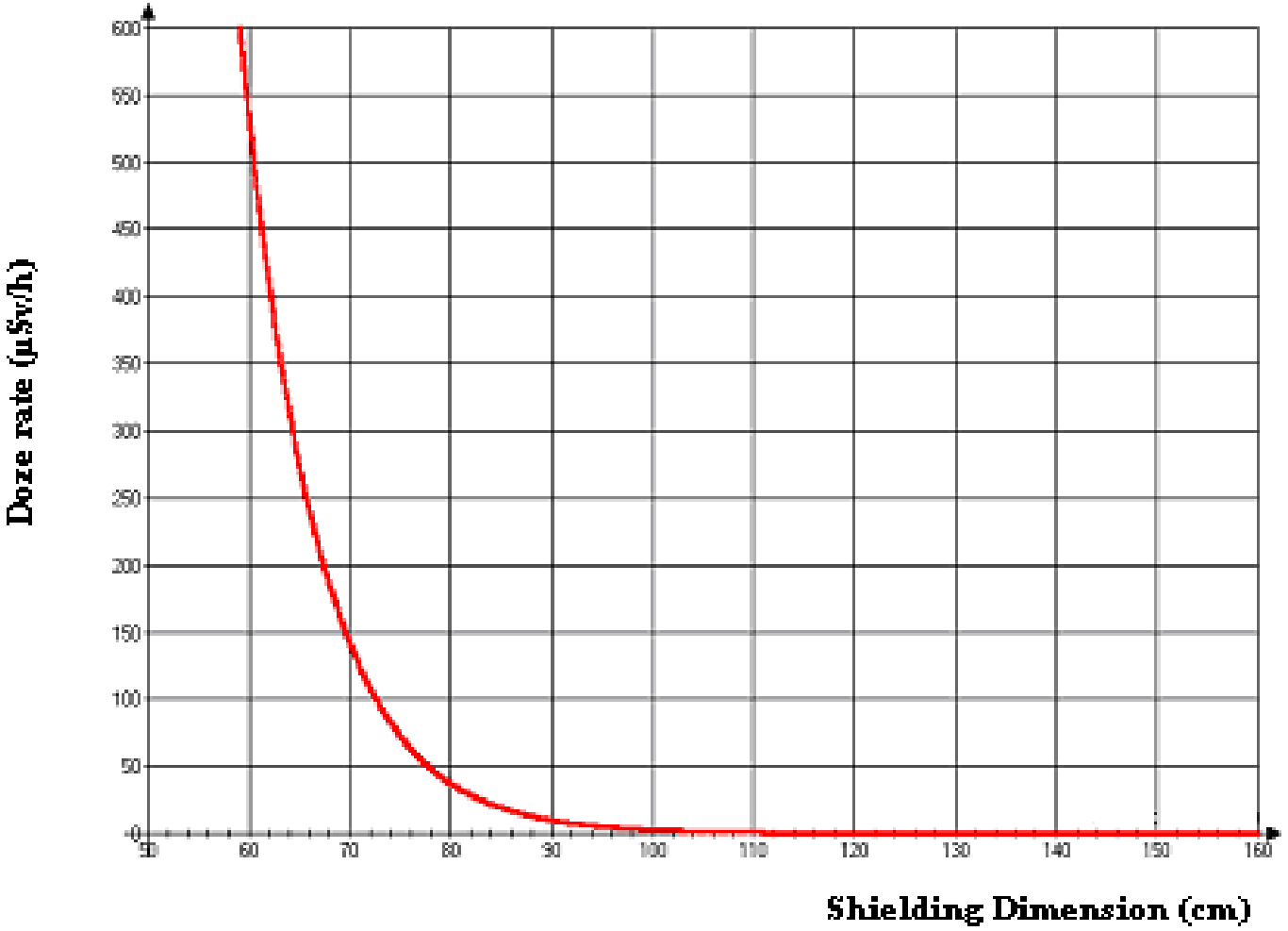
Decommissioning (Cont'd)



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Decommissioning (Cont'd)

Full scale reactor dismantling was started only after putting into operation Centralized Storage Facility (CSF).

Within IAEA TC project GEO /3/002 primary and secondary cooling systems of the reactor were dismantled. The primary circuit was characterized by inner surface contamination mainly by radionuclides ^{60}Co (20-30 Bq/cm^2). The secondary circuit was assigned as a radiologically clean. The items was not decontaminated, but hermetically closed.

Resigns and comparably high active waste were concreted into 200l drums.

Every items were marked with regulatory number to create full scale inventory of the waste

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Decommissioning (Cont'd)

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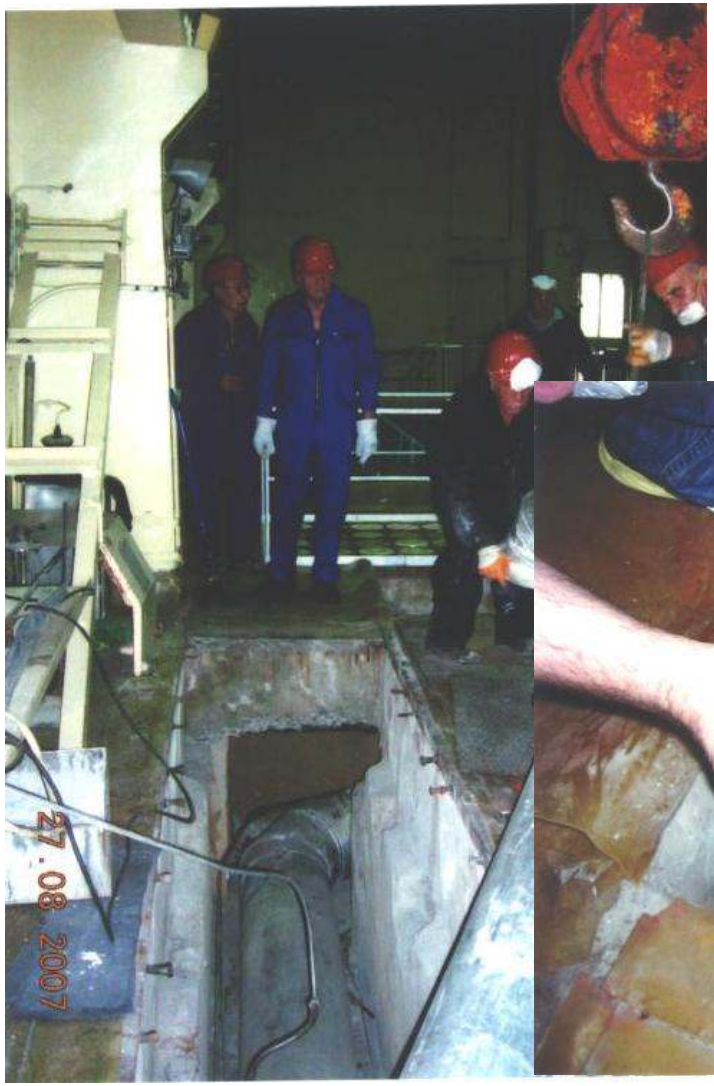
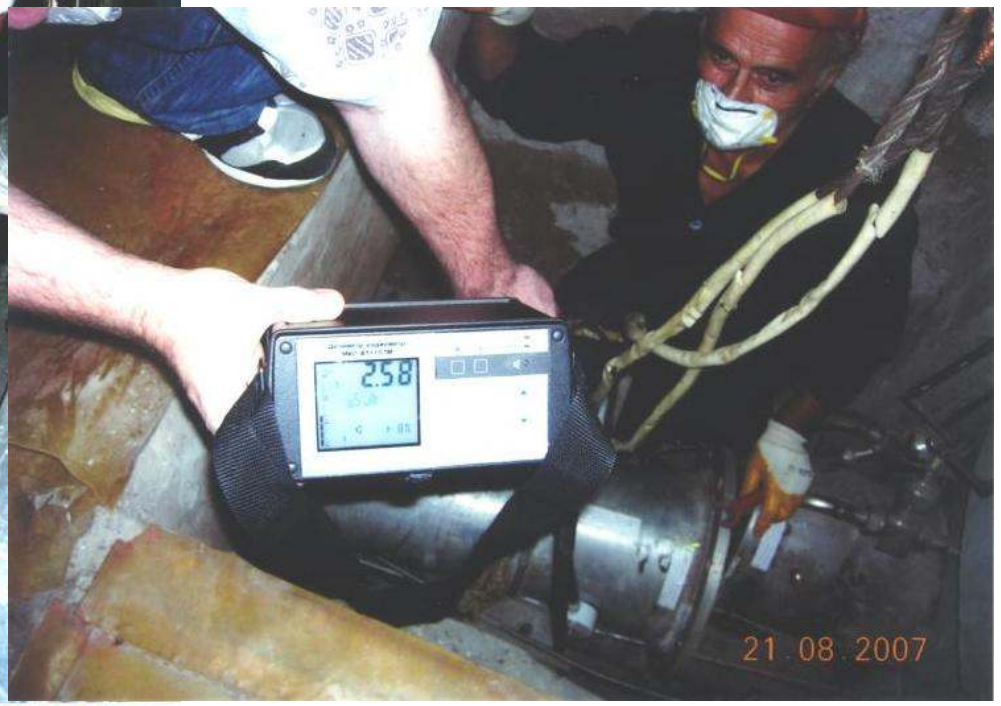
Decommissioning (Cont'd)





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Waste Management

The order of president of Georgia No. 840 September 18, 2004 prescribed establishment of the storage facility on territory of Applied Research Center (former Nuclear Center) of Institute of Physics.
The storage facility was dedicated to safely keep the following type of radioactive waste:

Radioactive waste from reactor decommissioning;
Recovered orphan radioactive source;
Disused radioactive sources;
Any other type radioactive waste appropriate for safe storing in the storage facility.

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Waste Management (Cont'd)

The decision to build storage facility on the former reactor site (Applied Research Center) the Agency criteria (WS-G-6.1 Para.5.20) and was conditioned by the following factors:

(a) Applied Research Center has staff having knowledge and skills for handling with radioactive waste;
(b) Applied Research Center has some workshops possible to use in future for waste treatment;
(c) There are some premises on the site of the Center can be reconstructed and used as a storage;
(d) Construction of the storage does not need any additional geological investigations;
(e) Waste from the reactor can be conditioned and kept on the site avoiding long distance transport;
(f) To take into consideration public opinion to avoid construction of radiation facility on new territory.

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Waste Management (Cont'd)

Concreted waste in drums:
^{137}Cs – 1.013×10^{10}Bq ^{60}Co – 6.2×10^{8}Bq

Sealed pumps:
^{137}Cs – 8.06×10^{6}Bq ^{60}Co – 7.44×10^{7}Bq

Ion exchanger filter:
^{137}Cs – 2.3×10^{9}Bq ^{60}Co – 7.2×10^{8}Bq

Sealed up pipes:
^{137}Cs – 1×10^{8}Bq ^{60}Co – 2.65×10^{9}Bq

Sealed heat exchangers:
^{137}Cs – 2.59×10^{7}Bq ^{60}Co – 5.18×10^{7}Bq

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Waste Management (Cont'd)

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Decommissioning (2)

Based on the monitoring results the site characterization was conducted:

- General conditions
- Identification of possible radiological contaminants and their concentration
- The potential presence of underground structure and contaminants

IAEA new TC project GEO/3/004 for decommissioning is going to dismantle auxiliary structures outside the reactor building

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Site Release

Criteria - dose constraints:

- 300 μSv/a – to define restriction conditions or optimizing activities
- 10 μSv/a – unrestricted use

The site condition – restricted use:

- Waste management:
- Entombing the reactor core
- Ongoing decommissioning activities

The site end point:

- Further use for waste treatment, conditioning and storing

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Site Release (Cont'd)

Optimizing procedure - conducting of cleanup activities, considering:

- Characterization nature and level of contamination;
- Assessment of significant impact;
- Evaluation of possible cleanup methods;
- Defining of goals.

Way to solve:

- Establishment of waste treatment facility

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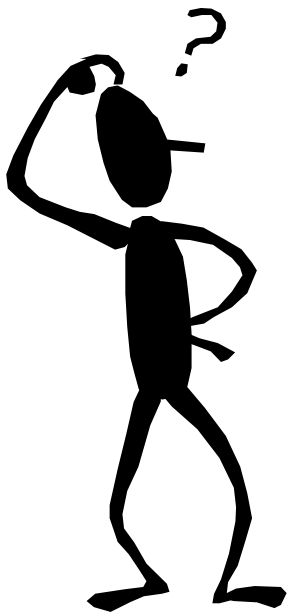
Thanks for Attention



Questions?