

## **Russian plans for construction of the facilities for isolation of radioactive waste**

*by Mr. Viktor Akhunov, Rosatom, Russia*

Great amount of radioactive waste (RW) has been accumulated during decades of operation of the nuclear industry facilities in Russia. Majority of waste – about 90% - consists of uranium tails. Special conditioning of this waste is not required. The remaining 10% of solid RW need to be placed in special storages. Today these waste are stored in 1170 RW storage facilities. Substantial amount of waste needs to be conditioned and then disposed of.

Improvement of RW management is one of the main tasks of the Rosatom activities together with maintaining the defence capabilities of the Russian Federation and operation of the nuclear power. Federal Programme "Nuclear and Radiation Safety of the Russian Federation in 2008-2012" has been developed recently. Funding of main aspects of the RW management is envisaged in this Programme, including final isolation of waste. Now the State pays attention the RW management problems, because without resolution of these problems further large scale development of nuclear power is not possible.

RW disposal in deep geological formations is being studied now. It is an urgent issue, because the last production reactor at Mining and Chemical Combine in Siberia will be shutdown in two years time, and its decommissioning begins. It is planned to put all available low and intermediate waste in available rock cavities which will be prepared for the waste storage. Besides, a special deep facility for isolation of high-level waste will be built in the rock formation of the Nizhnekansky massif at the depth of 400-800 m. Regional waste storage in geological formations will be built also at Mayak plant. However, location of the Regional waste repository in the European part of Russia where majority of Russian NPPs located, is not selected yet.

At the moment, one of the most important problems is construction of the Regional storage facility for waste that is being generated in the course of remediation of sites and submarine dismantlement. Amount of waste currently accumulated at the former naval bases in Andreeva Bay and in Gremikha in the North-western Russia are given in Table 1. Estimates on the volumes of waste that will be generated during remediation of these sites are given in the Table too.

**Table 1**

**SRW that should be treated during remediation of the naval coastal bases**

Site	SRW accumulated, m <sup>3</sup>	SRW generated, m <sup>3</sup>	SRW in total, m <sup>3</sup>	Total activity, Bq
Andreeva Bay	17650	10500	28150	5x10 <sup>14</sup>
Gremikha	1500	2500	4000	1x10 <sup>13</sup>
Shipyards and Atomflot	5434	533	5967	5x10 <sup>14</sup>
Total	24584	13533	38117	1x10 <sup>15</sup>

In addition to waste specified above, some amount of SRW will be also generated during dismantlement of the nuclear service ships (NSS) and dismantlement of the Admiral Ushakov nuclear powered cruiser retired from the Navy. In this case the total volume of waste that should be conditioned by 2020 corresponds to about 42 000 m<sup>3</sup>.

In the future about 52 000 m<sup>3</sup> will be generated in addition to the given number as a result of further dismantlement of NSS, Admiral Ushakov cruiser, nuclear icebreakers and disassembling the reactor compartments that contain some SRW inside after 70-year of storage in Sayda Bay. Therefore, in perspective it is necessary to condition and isolate about 100 000 m<sup>3</sup> of waste in the whole North-western Region. 80% of this volume corresponds to low-level RW.

This is the reason why we plan to establish a Regional Centre for conditioning and storage of 100000 m<sup>3</sup>. This Centre will be built in Sayda Bay where the first stage of the reactor compartment coastal storage facility was commissioned. At this site in one location we will concentrate all waste of the Region and Russian North will be clean. This facility is very important for us and we ask CEG to support implementation of this project.

Concerning main facilities of the Andreeva Bay and the Gremikha sites, we plan to perform the following activities. Preparation of the spent reactor cores (SRC) of the Alfa-class submarines for the long-term storage is to be done in Gremikha site. Radioactive waste will be transported from this site partly to the Andreeva Bay and partly to the Regional Centre in Sayda. The main task for the Gremikha site is stabilization of the current situation. At the same time the main task for the Andreeva Bay site is removal of spent fuel and further remediation of the site. It is necessary to establish some capabilities there for management of liquid and solid waste in order to perform SNF management and prepare SNF for removal from the site. RW management complex and temporary storage facility for 20 000 m<sup>3</sup> of waste are to be built there. This complex is intended for the time necessary for SNF removal from Andreeva Bay and from Gremikha – not more than 20 years. Project on its establishment should be implemented very quickly because we are not able to remediate the Gremikha site without this complex. We found common understanding of this problem with Italy and rely on their assistance.

Concerning isolation of high-level waste (e.g. control rods and ion-exchange resins): A design is available for using available shaft located in about 70 km from the Andreeva Bay. About 4000 m<sup>3</sup> of waste in containers could be placed there. About 4 million US\$ is required for equipment of this shaft and another 6 million US\$ is necessary for procurement of containers. These could be pig-iron containers with additional barrier for protection during 100 years, or it could be a pig-iron with ball-type graphite or any other materials.

Now we have a certified container for transportation of SNF of research reactors and the contract is placed for manufacturing of six such containers.

In general plans for the North-West are very practical and they will be implemented within the next five years.