

BRIEF NOTE ON THE APPROVAL OF THE STRATEGY FOR THE DEVELOPMENT OF A DEEP DISPOSAL FACILITY FOR RADIOACTIVE WASTE

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Provisions of the Strategy for the Development of a Deep Disposal Facility for Radioactive Waste are presented in the current edition of the Journal. The Strategy has been developed and discussed during this year. Its preliminary version was subject to a formal discussion under joint meeting of Scientific and Technical Council (hereinafter, STC) № 5 on SNF and RW Management Technologies and STC № 10 on Radiation and Environmental Safety of the State Corporation Rosatom chaired by Members of the Russian Academy of Sciences B. F. Myasoedov and L. A. Bolshov. Lively discussion held during this meeting has resulted in a positive statement of a broad scientific and nuclear industry community, as well as of the Russian Academy of Sciences. After necessary elaborations the Strategy has been approved by the Director General of the State Corporation Rosatom.

Now, a few words on the origin of this document.

International experience has shown that strategic decisions regarding the establishment of similar facilities were made at a highest level. Russian disposal project is also a case in point. Decision on radioactive waste (RW) disposal are made at legislative and government level. Article 20 of the Federal law № 190-FZ On the Management of Radioactive Waste and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 specifies that the National Operator shall act as a design and construction customer for RW disposal facilities. In keeping with Decision of the Government of the Russian Federation, Federal State Unitary Enterprise NO RAO was assigned as the National Operator for Radioactive Management. That means, that NO RAO is the only organization being responsible for the final isolation of radioactive waste, as well as executing other functions associated with this responsibility. Obviously, construction of such

a unique facility for Russia having an operational life and potential hazard time of many thousands of years should be extensively justified and relevant activities thoroughly planned for many years ahead. For this reason, senior management of the State Corporation Rosatom being a state management authority in the field of RW management deemed it to be necessary to develop a framework paper discussing the strategy for the establishment of such a facility.

A few words on the importance of this paper.

Firstly, current considerable efforts in SNF reprocessing. This task is considered of a highest priority. Thus, it is in the spent fuel that most part of anthropogenic radioactivity generated by nuclear power is concentrated. The key task is to ensure the recycling of valuable materials and nuclear materials as well also contained in SNF. We close the management cycle involving valuable nuclear materials and extract unnecessary radioactive components in form of concentrates (i.e. radioactive waste). To enhance the effectiveness of these processes, activities in different areas are being carried out including those associated with some perspective ones. More considerable tasks associated with even more complex cycles are being set and addressed (reactor facility BREST with at-reactor cycle performed under PRORYV project or molten-salt reactor project).

Common SNF reprocessing technologies are also addressed under a big number of projects. Each year during the last 5 years RT-1 plant initiated some new projects aimed at reprocessing of new SNF types. Environmental safety of operational processes has been simultaneously enhanced as well. In 2015, capping of B-9 water reservoir's (lake Karachay) surface area was completed. The situation around the Techa Cascade of Water Reservoirs containing some 65% of the total LRW inventory

has been also stabilized. Strategic master plan addressing TCR issues is being implemented. Thus, to date for most part of RW inventory, a final vision regarding its final state, thorough understanding of its life cycle and necessary tools for safety assessment and strategy analysis have been developed. During the last 15 years, a set of measures has been implemented to reduced radioactive discharges into TCR, old hydroengineering facilities were upgraded and new facilities constructed reducing radionuclide discharges into the environment, LRW treatment complex was commissioned, monitoring system was enhanced.

Pilot and Demonstration Center at MCC started to test the new reprocessing equipment. MCC is also involved in activities providing for pilot manufacturing of MOX and REMIX nuclear fuel. It should be noted that for all the cases listed above, perspective nuclear fuel cycles are required to involve robust and safe systems enabling to extract redundant activity which is literally not suitable for any future uses, i.e. radioactive waste. Most hazardous waste are intended for geological disposal.

Secondly, it is important to make this leap forward. Geological disposal project first launched in Russia almost 30 years ago has stalled, notwithstanding active changes taking place in the nuclear sector. At the time the project was launched, RT-2 plant and dry storage facility KhOT-2 (MCC) were not yet available. In 2008, construction of a Pilot Demonstration Center for SNF reprocessing was started. This leap forward involving the design development and the siting decision was made between 2008 and 2015. We obtained the permit to start construction activities at the site. However, further activities were apparently lacking of thorough discussion needed to address the arising scientific and engineering issues. It was only in late 2013, that such detailed discussions involving different experts engaged in scientific and technical councils of the State Corporation Rosatom were finally launched. Moreover, their frequency, depth and the amount of criticism and recommendations has also started to grow from year to year.

Thirdly, the specific nature of geological disposal matters. This topic attracts a variety of experts engaged in different fields. General public is also very concerned about this matter. We have read and heard about it before, but now we have actually started to perceive these public concerns including those associated with a blind spot that evolved mostly due to the title of the project that already had passed all the reviews. Thus, the Project was implemented under provisions of the Report on the Justification of Siting and Construction of a RW Storage Facility not Being Considered as a Nuclear Facility Established under the Design Documentation on Construction of a Final Disposal Facility for RW (Krasnoyarsk Region, Nizhnekansk Massif) as Part of Underground Research Laboratory (2015). This title fueled the debates around the assumptions

suggesting the immediate construction of a disposal facility. The approved strategy gives a clear answer to this question — it is an underground research laboratory that is going to be constructed. Strategic Master Plan for R&Ds embracing a wide scope of different areas has been developed. STC recommendations provide for the establishment of the Scientific Coordinator responsible for work planning and coordination. It is only after the main stage of URL R&Ds is completed (around 2030) that the decision on construction of the deep geological repository is going to be made.

Fourthly, a clear message to our international colleagues was required stating that our country is aspiring to follow common international practice in construction of similar facilities, also involving international peer reviews. Thus, construction of the geological disposal facility will not be subject to the same discussions as those that arose around the LRW deep injection practice. As for the deep well injection practice, we are decisively advancing the implementation of the recommendations expressed during relevant IAEA peer review. This advancement is however not proceeding as quickly as nuclear industry, international experts and Russian regulators might have wished.

In this respect, the Strategy seems to address all the challenges expected: it states a clear preliminary goal — to establish an underground research laboratory, sets a clear time frame for the decision regarding construction of the deep disposal facility itself — 2030. We have defined the purpose of the planned URL — it should provide the answers to all questions arising under the long-term safety case development. These answers are to be provided in form of convincing evidence resulting from the experiments conducted, putting to an end all the discussions regarding previously conducted experiments. And what is of a particular importance, it should contribute to the internationally gained knowledge on relevant matters.

Currently, a quite favorable situation has evolved. On the one hand, we can start relevant activities at the site, including those associated with the establishment of monitoring system, facility infrastructure, elaboration of geological setting and etc. On the other hand, we are able to have a much more comprehensive look on design solutions in place. All the more so as over 10 years have passed since the requirements to the repository were set forth. Our plans regarding RW generating enterprises have been also considerably elaborated. All the circumstances listed above, greater involvement of scientific community, also with the help of this Journal, enable evolutionary updating of the safety concept developed for the planned RW repository. It should be particularly noted that each phase of the project supposes not only the establishment of some facilities, but also some practical efforts aiming to update the safety concept and provide a comprehensive discussion of the results obtained.