

MARKING THE 10TH ANNIVERSARY SINCE THE ENACTMENT OF THE RADIOACTIVE WASTE MANAGEMENT LAW — 10 STATEMENTS REGARDING THE USS RW BACKGROUND, ITS CURRENT STATE AND DEVELOPMENT PROSPECTS

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On July 15, 2011, the Federal law 190-FZ On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation of July 11, 2011 was enacted in the Russian Federation. The nuclear community has shortened its name to the Radioactive Waste Management Law. Today, 10 years later, it seems necessary to summarize the main results and the lessons learned.

Somewhat simplified approaches applied in radioactive waste (RW) management early in the development of nuclear technologies resulted in large inventories of RW with relevant RW storage conditions not always providing an adequate level of safety for the population and the environment. The Russian nuclear industry entered the XXI century continuing the stockpiling of RW with no proper solutions providing its final disposal and, most importantly, with no legal framework regulating the relations of stakeholders in this field, in particular, the liability of RW generators for future RW disposal. It was only by 2007–2008, that a proper economic setup has emerged in our country allowing to address the accumulated challenges. At this time, a strategic decision was made on the long-term development of nuclear power and nuclear industry in Russia, which has required relevant decision-making on the establishment of a modern RW management system.

To implement the new approach, an up-to-date legal and regulatory framework was needed. The Federal law on Radioactive Waste Management has become its cornerstone. The law adopted in 2011 enshrined the State liability for the safe RW management, disposal of earlier accumulated RW inventories, as well as for arranging and providing safe and cost-effective management of newly generated RW, including its disposal.

In general, it took several years to draft the law and to agree its provisions with interested federal executive authorities. These efforts were carried out in parallel with the development and implementation of the Federal Target Program Nuclear and Radiation Safety in 2008–2015. Having most complete knowledge on the situation in the country, the developers of this program started the development of a new regulatory framework primarily focused on RW management. Leading specialists of the State Atomic Energy Corporation Rosatom and industry organizations were basically involved in this work with certain support provided by IBRAE RAS (Nuclear Safety Institute of RAS) and Russian atomic law experts that have also played an important role in it. Since, at that time, the maturity level of the RW management practice was much higher abroad, some foreign experts took part in this work as well, including the efforts performed under the

TACIS project involving specialists from national waste management operators from Sweden (SKB), Germany (DBE), France (ANDRA), the Netherlands (COVRA), Spain (ENRESA), the UK (NIREX).

After the first reading by the State Duma, a big number of remarks was submitted to the profile committee. Discussions on some of them were quite tense. And finally, on July 11, 2011, the RW Management law 190-FZ was enacted.

Its provisions fully comply with international practice and IAEA recommendations.

Russia has acceded to all international agreements setting forth general RW management requirements providing full access to the international market. The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management was ratified by Russia in 2005. Corresponding obligations were implemented into the national legal framework, including the RW Management law. Once every three years, Russia, similarly to other Member States of the Joint Convention, presents its national report on measures implemented to fulfill its obligations at a special IAEA session. At the same time, international bodies have recognized that our national legal and regulatory framework addressing the RW management field meets all modern international requirements.

It can be argued that currently there are no basic international norms that have not been accounted for in Russian legal provisions. At the same time, efforts on the implementation of best practices accounting for the lessons learned from international RW management practices, optimization of legal and regulatory framework have been ongoing non-stop which is seen as a natural process.

The most important points should be noted.

The law states that RW should be managed in the Russian Federation under a unified state system, i. e., we establish a common infrastructure, funding sources, information support for the decision-making with the forecasts regarding RW generation and disposal rates being harmonized. The State Corporation Rosatom has been assigned as a RW management public authority responsible for the establishment of this system.

At the same time, the Government has taken the liability for the challenges associated with previously accumulated RW inventories, whereas the costs related to the management of newly generated RW throughout the life cycle should be covered by corresponding waste generators (i.e., a well-known internationally recognized polluter pays principle).

The law provides for a single specialized organization — the National Operator for RW Management authorized to dispose of the waste in purposely established facilities.

In addition, the law establishes a number of other important restrictions. For example, RW import from other countries for the purpose of its storage, processing and disposal is prohibited, as well as the establishment of any new facilities intended for the disposal of special (non-removable) RW and LRW disposal facilities.

After the RW law enactment, the RW management setup has suffered some major changes for the operating organizations:

from that time on they had to pay for future RW disposal and its conditioning, which provided an economic incentive for the reduction of RW generation and optimization of its management. Previously, both institutionally and technically it was easier to categorize any waste generated at a nuclear enterprise as RW than to demonstrate its radiation safety, which resulted in somewhat inefficient use of waste management and storage capacities. When relevant fees were introduced, in the first year alone, RW generation decreased by more than 20% due to a more attentive attitude towards waste segregation. Further on, the enterprises have launched comprehensive efforts to minimize waste generation and to provide its conditioning, which basically paved the way for the development of the RW management infrastructure.

Essential were also the provisions of the law stipulating that RW should be conditioned to provide its compliance with waste disposal requirements within a specified time frame. If previously most of the RW inventory could be stored in temporary structures/storage facilities with no proper plans envisaged for its further management, now the enterprises tend to develop certain strategies specifying relevant RW processing methods and facilities.

Some key developments that have taken place over the decade should be noted:

- The first SRW disposal facility (Novouralsk) meeting all modern safety standards was established.
- Water areas of five near-surface storage facilities for LRW that had been categorized as special (non-removable) waste, i. e., subject to in-situ disposal, were capped, including the lake Karachay (reservoir V-9 at PA Mayak site).
- At PDC UGR site, completed was the entombment of a graphite stack constituting to the production reactor EI-2. In the near future, another reactor will be entombed at the MCC site.

- Financial basis enabling the long-term planning of RW disposal efforts has been established. It is a special reserve fund formed by fees paid by waste generators in accordance with standards established based on the hazard level of the generated RW. In the future, relevant funds will cover the cost of RWDF construction and operation, including large-scale R&Ds to be performed in an underground laboratory to demonstrate the safety of RW Class 1 and 2 disposal.
- Efforts are underway to condition the RW and provide its compliance with relevant regulatory requirements for disposal.
- Completed was the dismantlement and disposal of unguarded radioisotope thermoelectric generators (RTGs) previously used at autonomous navigation facilities and posing significant potential radiation and environmental hazard due to the high activity of their radioactive content.
- R&Ds focused on RW management have advanced significantly. In particular, peer-reviewed Radioactive Waste Journal has been established under the efforts on the development of a proper national scientific and information resource and has already entered the list of publications of the Higher Attestation Commission (16 issues with more than 150 thematic articles have been published to date), more than 10 monographs have been published.

Of course, there are some challenges that we've faced. Such challenges obviously cannot be avoided during the establishment and further development of such a large-scale and complex system as the Unified State System for Radioactive Waste Management. The main one is associated with the deployment of a system providing final RW isolation (disposal facilities). Relevant efforts commanded great attention from the public and regulatory authorities, which requires careful development of relevant engineering solutions and their feasibility study and takes longer than was initially anticipated. Nevertheless, certain progress has been achieved and we believe that in the future, thanks to the experience gained, we'll manage to address the emerging problems in a prompt manner.

The second point is the lack of public credence in RW management activities in general. During the implementation of relevant practical activities, nuclear enterprises are faced, in particular, with the propagation of fake news and misinformation through new media channels. Therefore, it seems crucial to provide even greater openness and transparency of socially important decision-making and a close cooperation with the representatives

of responsible media. I would like to note that this problem also complicates the first challenge, since the initiatives on RWDF establishment are regularly faced with public opposition, despite the fact that these decisions are the only way to finally resolve the RW management issue.

Although some considerable uncertainties emerged during the development of the law, time has shown the fundamental correctness of all the principles laid down in its provisions. However, it also revealed the necessity of its "fine tuning" since in the mid-2000s, specialists still did not have complete knowledge on the volumes of both accumulated and newly generated RW inventories, no reliable data was available on the existing setup at the RW sites and the RW characteristics, no hands-on experience on the establishment of RW disposal facilities considering the modern safety requirements was available as well.

In 2016, 5 years since the adoption of the law, an initiative was launched to analyze the law enforcement practice and to evaluate the need for further improvement of USS RW legal regulations. Over 80 remarks and proposals were submitted by key enterprises generating the bulk of the RW inventory. It's worth noting that each enterprise has its own outlook on the situation, and in a number of cases the proposals were either multidirectional or focused on problems of some specific enterprises with no account taken of the bigger picture. In this regard, it took a lot of time to develop some flexible decisions: as the result, proposals regarding the amendments to be introduced to the provisions of the law were developed, they were discussed within the nuclear community and in the near future they are going to be submitted to the interested federal executive authorities.

The main tasks for the practical implementation of legislative provisions on RW management can be summarized as follows:

Further improvement of the final RW disposal system. While the case of near-surface disposal facilities is clear from a scientific point of view, deep disposal of certain RW categories requires a deeper scientific and technological study. An underground research laboratory envisaged for such in-depth research is currently being established, which is seen as a multidimensional interdisciplinary activity with the scientific support provided by IBRAE RAS and dozens of contractors that have already been engaged in this work. We should be ready for an unprecedentedly thorough consideration of all the nuances associated with the long-term safety both

by the Russian regulator and under a number of international reviews.

Efforts on the isolation of surface storage reservoirs and production reactors should be continued providing stable progress in the pre-disposal treatment of both newly generated and legacy RW.

Another important task refers to the optimization of RW management costs given an unconditional compliance with basic principles of radiation safety.

Actually, an overly conservative approach to radiation and hygienic regulation is applied when it comes to the industrial uses of atomic energy. Even at the dawn of the nuclear era, it was precautionary decided to apply consistent steps minimizing any technogenic risks, despite their smallness compared to the risks of medical and natural exposure. This approach considerably increases the RW management costs (especially the RW disposal costs) with no significant safety benefits achieved. Here, one should adhere to the harmonization of national standards with relevant international recommendations, which are much more flexible, for example, considering the RW disposal requirements.

During the development and operation of the USS RW infrastructure, particularly important is the task of establishing mutual understanding with the public. The obligation on providing the public with information on the safety of proposed RW management facilities undertaken by Russia under the Joint Convention is fulfilled in accordance with the national legal framework. Public discussions are held under the environmental impact assessment process in keeping with relevant provisions of the Federal Law on the Environmental Protection.

Technical specialists state with confidence that at present time the risks associated with RW management can be considered negligible for the population. At the same time, we understand that perception is a reality: if people are afraid, this matter should be addressed earnestly.

International practice shows that public acceptance is achievable, but for a number of reasons we cannot “directly” copy the successful recipes of other countries. Anyway, we are well aware of how relevant this issue is and will certainly continue our efforts in this area.