INSTRUMENTS OF THE JOINT CONVENTION AND THE POTENTIAL FOR THEIR EFFECTIVE USE

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The article evaluates some additional benefits that can be potentially gained from the participation of Russian organizations in the events held within the framework of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. It presents proposals on how national achievements can be demonstrated and advanced international experience can be used by nuclear industry organizations during such events.

Keywords: *Joint Convention, safety, radioactive waste, spent nuclear fuel, Meeting of the Contracting Parties, national report.*

The Joint Convention on the Safety of Spent Fuel (SNF) Management and the Safety of Radioactive Waste (RW) Management (the Joint Convention, the Convention) is a multilateral legally binding international instrument [1] dealing with the safety of SNF and RW management at the global level. In keeping with its provisions, the Contracting Parties, i.e. the states that have acceded to this instrument, participate in the information exchange involving four stages. A key stage provides for the development of a national report, in which a Contracting Party to the Convention indicates the practical measures implemented at the national level to fulfill its obligations enshrined in the Joint Convention. The two subsequent stages provide for remote transmission and receipt of information, i. e., posting questions to the national reports and providing answers to them. The most important final stage of the information exchange between the Contracting Parties to the Convention is the in-person stage providing for their collegial discussion at the Review Meetings of the Contracting Parties, which are held once every three years at the IAEA headquarters.

During the preparation of six national reports [2]—[4] of the Russian Federation on the implementation of its obligations arising from the Joint Convention, no fundamental questions arose between the organizations that were supplying the initial data as regards the information content of the national report and its sections. Its structure and the content of its sections are regulated by relevant guidelines of the Convention [5].

Moreover, the information presented in the national report shall be reliable, up to date, consistent without any reservations and sufficient to confirm the fulfillment of the obligations assumed under the Convention. At the same time, one shall comply with the requirements of the Russian legal framework as regards the dissemination of restricted information. Thus, during the preparation of the National Report of the Russian Federation, nuclear organizations supplying the initial data to be included into the National Report were asking about the volume and level of detail of such information. Therefore, one may conclude that not all parties involved in this process had clear understanding of the mechanisms and relevant benefits from the preparation of the reports of the Russian Federation and the review of the national reports provided by other Contracting Parties to the Convention.

This paper evaluates the potential for gaining some additional benefits from the participation of Russian operating organizations in the preparation of national reports under the Joint Convention.

They can be essentially achieved in two focus areas: (1) presentation of national achievements and therefore expanding the prospects for their commercialization in international markets and (2) gaining insights into international practices and approaches in SNF and RW management, as well as nuclear decommissioning to evaluate the potential for their further implementation at the national level in the organizations of the Rosatom State Corporation.

Presentation of national achievements with the view to expand the prospects for their commercialization in international markets

The opportunity to demonstrate our national achievements in full becomes available when filling in the information to the national reports. The overwhelming majority of the Contracting Parties to the Convention consistently use these opportunities to highlight their progress in the area of its application. A similar approach has been followed by Russian organizations starting with the first national report, i. e., for almost two decades now.

For a long time, the national RW management system was facing a few unresolved challenges related to waste accumulation, as well as the unclarity as regards the ownership rights over unused nuclear material and the costs associated with legacy facilities and their upgrading to a safe state, etc. Ratification of the Joint Convention by the Russian Federation in 2005 has required intensive efforts to reform this system, including the development of a corresponding federal law enshrining the requirement for mandatory RW disposal. The subsequently approved Program for the Development of the Nuclear Industry in the Russian Federation [6], as well as the developed and approved concept and the Federal Target Program Nuclear and Radiation Safety in 2008—2015 (FTP NRS-1) [7] heralded a fundamental shift in addressing RW management challenges in the Russian Federation.

In 2011, Federal Law No. 190-FZ [8] was adopted enshrining the basic principles regulating RW management activities: mandatory RW disposal; splitting the entire RW inventory into retrievable and non-retrievable waste; state responsibility for RW disposal; establishment of an internationally recognized financial liability concept, i. e. the so-called *"polluter pays"* principle.

In accordance with Article 10 [8], the deployment of the Unified State System for Radioactive Waste Management (USS RW) was started to arrange and ensure safe and cost-effective RW management, including waste disposal in the Russian Federation. At the first two stages of its deployment, the key documents regulating relevant legal and institutional framework were adopted.

For two decades since the Convention was ratified by the Russian Federation, the National Reports of the Russian Federation have been continuously reflecting infrastructural, technological, regulatory and institutional measures seen to enhance the safety, especially those related to the "results of past practical activities" implemented under the Federal Targeted Program NRS-1 [7] and Nuclear and Radiation Safety in 2016—2035 (FTP NRS-2) [9], as well as the departmental programs.

Extensive RD&D and practical efforts deployed in the key sectors associated with the nuclear back-end, i. e., SNF, RW management and nuclear decommissioning, contributed to a convincing progress achieved by Russian nuclear industry both in addressing previously postponed nuclear legacy challenges and in establishing a somewhat solid foundation for reliable nuclear and radiation safety assurance in the future.

Discussion of these measures in the national reports, on the one hand, confirming the fulfillment of relevant obligations undertaken by the Russian Federation under the Joint Convention, and on the other hand, providing insight regarding the scale of activities implemented under FTP NRS-1 [7] and FTP NRS-2 [9] convincingly demonstrates the potential of the country's industry and technologies.

It should be noted that the regulatory documents of the Joint Convention are a dynamically developing mechanism enabling somewhat flexible presentation of information within the framework of existing requirements. In particular, to demonstrate the export potential of the industry, it provides opportunities for broader presentation of the large-scale activities implemented in Russia in the national report of the Russian Federation, which has been conceptually formulated in [10]. Considerable changes as regards more ample presentation of information related to nuclear and radiation safety in RW and SNF management, including the one provided at nuclear legacy sites, proposed in [10], have already been reflected in the 7th national report of the Russian Federation. In the future, this practice is supposed to add more insight to the national technical capabilities.

We believe that information on SNF reprocessing, construction of new nuclear power plant (NPP) units, including those at new sites, deployment of NFC closure components, etc., has great potential in highlighting the achievements of the Russian

nuclear industry. As it comes to including information on RW and SNF management methods and approaches, which are considered unique against the backdrop of the global nuclear industry, the national reports of the Russian Federation should pay particular attention to information security and exclude the dissemination of classified information (for example, commercial secrets).

Taking part in face-to-face discussions of national reports at the Review Meetings of the Contracting Parties is a rare opportunity to exchange views on the key areas of activity in the management and safety regulation of nuclear facilities.

Evaluation of advance international practices as regards the potential of their application by the organizations of the Rosatom State Corporation

The second global realm of efforts seen to provide potential advantages to Russian organizations may account for the active use of the Convention's tools and mechanisms in the consideration of the international practices and their further evaluation as regards the possibility of their implementation by nuclear organizations in Russia.

In particular, these efforts may include the analysis of national reports submitted by other countries, submitting questions and comments to them, as well as answering the questions posed by other countries.

Analysis of national reports submitted by other countries. National reports of Contracting Parties uploaded no later than 7 months before each Review Meeting of the Contracting Parties on the IAEA's secure web-portal under the Joint Convention contain a great deal of data on RW and SNF management and nuclear decommissioning activities.

The experience described by other countries in their national reports is of interest and can be used to build up the expertise of Russian operating organizations and structural divisions of the State Corporation Rosatom in such areas as: siting of RW disposal facilities; public outreach and public engagement; RW disposal in near-surface disposal facilities (NSDF); construction of underground research laboratories (URL) and deep geological repositories (DGR); oversight over closed RW disposal facilities (RWDF); SNF reprocessing; recycling of uranium and plutonium.

The following aspects can be highlighted as those currently hindering the effective use of this information in the practical activities of Russian organizations: the lack of free access to national reports of other countries and their high-quality translations into Russian, as well as the impossibility of their analysis and targeted sampling so that certain information on areas of activity could be conveyed to specific organizations in the nuclear industry. These problems may be addressed provided necessary cooperation between the State Corporation Rosatom and Rostekhnadzor with relevant design institutes, scientific and operating organizations.

Despite the large number of national reports submitted by the Contracting Parties to the Convention (approximately 84 countries), the volume of those available for analysis can be considerably reduced considering some specific professional interests of various organizations of the Rosatom State Corporation according to the individual sections of reports submitted by other countries and divided into classes, in particular, depending on the business interests of the Russian nuclear industry. For example, such aggregation of information provided by other countries may be achieved in the following areas: the size of the nuclear power program; information from national reports of states in which the Russian Federation is implementing or planning to implement some NPP construction projects; data concerning countries receiving fresh fuel for NPPs and states from which SNF is being and is planned to be exported for reprocessing and to which the RW is returned after such reprocessing, etc.

Advanced international achievements in the safety regulation and their evaluation considering their possible application by Rostekhnadzor

The information provided by the Contracting Parties in their national reports is of great interest to Rostekhnadzor as well, which evaluates this information on a consistent basis to take it into account in its own activities and to improve its efficiency.

The Contracting Parties, in accordance with the procedural documents of the Convention [5], present fairly detailed and complete information on the structure of their legal frameworks regulating the safety in SNF and RW management.

Such information, along with data on relevant facilities and infrastructure, can be applied effectively in the comprehensive analysis of the Russian legal framework regulating safety to identify most advanced international practices that can be accounted for.

For example, of great interest are the approaches of the Contracting Parties to establishing the safety requirements to:

- quality indicators of waste forms used to immobilize both liquid and solid RW;
- siting and closure of RW disposal facilities;
- SNF reprocessing via innovative methods;

- probabilistic safety analysis of SNF and RW management facilities.

In addition, the national reports of the Contracting Parties present the structures, powers and responsibilities of national safety regulatory authorities, which may be also of interest to Rostechnadzor and other safety regulatory authorities.

Examples of successful joint activities and delineation of powers between regulators in other countries can be evaluated to improve the coordination of supervised facilities and to build relationships between safety regulatory authorities in the Russian Federation based on agreements and administrative regulations for cooperation in various areas of federal state supervision.

Another area viewed as equally important in terms of advanced regulatory practices and their evaluation is the public engagement, namely the approaches contributing to more open and transparent activities of the regulator in:

- licensing SNF and RW management facilities;
- conducting inspections and audits of supervised facilities;
- establishing safety requirements.

Exchange of expert knowledge with other countries under the Convention

Two stages of measures implemented under the Joint Convention and providing for remote transmission and receipt of information, i.e., questions posed to national reports and answers provided to the questions posed, constitute to the exchange of expert knowledge on safe SNF and RW management and nuclear decommissioning.

Competent assessments of the problems reflected in national reports is seen as an obvious advantage of this process. Thus, foreign participants examine the approaches followed by Russia in implementing its obligations arising from the Convention, which can be viewed as a sort of a professional expert review offered free of charge. It should be noted that recently the objectivity level provided under such mutual review of the national reports and the level of openness in their discussion have been influenced by certain geopolitical factors having neither technical nor scientific grounds.

It should be emphasized that even before the development of the Convention on Nuclear Safety, i.e., a prologue to the Joint Convention, was started, international cooperation was supposed to be implemented as a supervisory mechanism offering some additional professional means fostering safety control. Years of active and persistent work by the IAEA Secretariat and IAEA Member States enabled the development and adoption of the Joint Convention in 1997, which embodied the idea of international supervision, independent and often uncompromising international expertise.

In addition, mutual qualified analysis of national reports submitted by the Contracting Parties increases the competence of the entire professional community dealing with SNF and RW management in general. This is possible largely since somewhat considerable part of such reviews and discussions is focused on innovative projects and technologies demonstrated by the Contracting Parties as examples of good practices and areas of good performance.

Questions to the national reports of other countries. Information on many of the listed areas considered of interest to Russian operating organizations can be acquired via the questions and comments posed to the submitted national reports. This mechanism stands for a mandatory part of the review process under the Convention.

The professional community can obtain detailed in-depth information through thoroughly elaborated questions to the national reports submitted by other countries. Some detachment, which is still typical of a few organizations in the industry, does not contribute to the desired effect. When the questions are posed in a formalistic way, quite formalistic answers can be obtained from the opponents. At the same time, in some cases useful information was received as part of the answers to the questions posed. A case in point, the answer from France on the problems associated with the characteristics of radiological RWDF capacities. In addition, representatives of the Russian delegation have the opportunity to get specific answers from foreign participants on any questions of interest at the meetings of the country groups. It should be borne in mind that in collective events, the number of questions is limited by the time limit allocated to each state depending on the scale of its nuclear power program.

Answers to questions posed by other countries. During the past period, fulfilling its obligations under the Joint Convention, the Russian Federation has provided the necessary explanations and answers to a total of over 770 questions concerning its six national reports.

Their face-to-face discussion, on the one hand, requires careful preparation of presentation materials due to the short time limit set aside for their presentation, as well as extensive work by the leaders and experts of the Russian delegation during the panel discussion. On the other hand, it is viewed as a very effective way to demonstrate and promptly discuss and defend the national achievements.

A case in point is the persistence of the Russian delegation expressed all through the three meetings of the Contracting Parties, which made it possible to demonstrate the high technological level of the Russian nuclear industry and to consensus-approve as a good practice [16]—[19] its proposal to include the following wording in the final report of the 7th Review Meeting to the Joint Convention: "Considerable progress towards closing the nuclear fuel cycle."

Plenary session of the Joint Convention stands for the final stage of the in-person discussion process. Active and interested participation of the Russian delegation in the Plenary session guarantees that provisions and wordings reflected in the final documents of the review meeting meet the interests of the Russian nuclear industry. These documents summarize the existing achievements and challenges in safe RW and SNF management and also define the trends for the future efforts.

In addition to the above opportunities striving for more intensive implementation of potential advantages, it should be noted that as regards certain aspects these are received by Russian organizations automatically, only ipso facto their participation in the events of the Joint Convention, which may be exemplified by shaping positive public opinion.

The activities of the Russian Federation under the Joint Convention (reporting data in its national report, its public presentation at the meeting, preparation of questions and answers to questions posed by other countries) in themselves are characterized with a positive aspect facilitating practical activities, i. e., strengthening public confidence that current SNF and RW management practices, as well as the policy in this area comply with the international standards. Sections G.3.2, H.3.2 of the national reports *Public Engagement in SNF Management Activities and Public Engagement in RW Management Activities* devoted to public outreach activities emphasize that in keeping with the legal framework, public consultations is a mandatory condition for decision-making on siting SNF and RW management facilities. The requirements for public discussions on the environmental aspects of the planned activities have been enshrined in Russian and international law, national instruments, treaties and agreements with the participation of the Russian Federation.

It should be emphasized that considerable achievements of the Russian Federation in addressing the urgent problems related to maintaining and expanding public engagement and building public confidence in the field of SNF, RW management and nuclear decommissioning were noted at a plenary session of the Joint Convention.

Yet another tool supporting the dissimilation of information about the achievements of the Russian Federation in this area, as well as obtaining information about the programs and approaches of other countries in this area should be mentioned as well. Every year, the IAEA Secretariat publishes a JC Newsletter, which is aimed at providing the IAEA Member States that are not yet parties to the Convention with information about this instrument, as well as about the activities of other states in the field of RW and SNF management. Since 2011, a total of 10 JC Newsletters have been published, but it was only in 2023 that the Russian Federation took this opportunity and provided data on its national achievements as regards relevant strategies, practical activities and legislation in the field of SNF, RW management and nuclear decommissioning [11]. At the same time, such countries as Germany, Canada, Mexico, the US, Finland and France have repeatedly published materials on their practices in this area of activity in this essentially "*advertising*" booklet.

Conclusion

Thus, despite certain institutional endeavors, considerable progress and intense efforts of the Russian Federation in its engagement in the events of the Joint Convention, there are still some substantial potential opportunities for the useful application of its instruments. The discussed proposals providing for some additional focused efforts are supposed to pave the way for more advantageous and motivational activities under the Joint Convention. Based on them, Russian organizations are supposed to derive both immediate benefits and receive an incentive for future attainments, gains and implementation of their interests.

References

1. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, INFCIRC/546, IAEA, Vienna, 2001.

2. Linge I. I., Dorogov V. I., Sharafutdinov R. B., Nepeypivo M. A., Khaperskaya A. V. Ob opyte predstavleniya Natsional'nykh dokladov Rossiyskoy Federatsii po vypolneniyu obyazatel'stv v ramkakh Ob"yedinonnoy konventsii [On the experience of presenting National Reports of the Russian Federation on the fulfillment of obligations under the Joint Convention]. *Yadernaya i radiatsionnaya bezopasnost' — Nuclear and Radiation Safety,* 2016, no. 1 (79), pp. 18—27.

3. Dorogov V. I., Ponizov A. V., Haperskaya A. V. O podgotovke pyatogo natsional'nogo Doklada Rossiyskoy Federatsii o vypolnenii obyazatel'stv,

vytekayushchikh iz Ob"edinennoy konventsii o bezopasnosti obrashcheniya s otrabotavshim toplivom i o bezopasnosti obrashcheniya s radioaktivnymi otkhodami [On the preparation of the fifth national report of the Russian Federation on the implementation of the obligations arising out of the Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management]. *Radioaktivnye otkhody — Radioactive Waste,* 2017, no. 1, pp. 99—106.

4. Kryukov O. V., Haperkaya A. V., Dorofeev A. N., Ferapontov A. V., Kudryavtsev E. G., Linge I. I., Utkin S. S., Dorogov V. I., Sharafutdinov R. B., Ponizov A. V., Vasilishin A. L. Vypolnenie obyazatel'stv Rossii v ramkakh Ob"edinennoy konventsii o bezopasnosti obrashcheniya s otrabotavshim toplivom i o bezopasnosti obrashcheniya s radioaktivnymi otkhodami [Implementation of Obligations of Russia under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management]. *Radioaktivnye otkhody — Radioactive Waste,* 2019, no. 1 (6), pp. 25—36.

5. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Guidelines regarding the Form and Structure of National Reports. INFCIRC/604/Rev 3. Vienna, IAEA Publ., 2014.

6. *Programma razvitiya atomnoy otrasli Rossiyskoy Federatsii* [Program for Nuclear Industry Development in the Russian Federation]. Approved by the President of the Russian Federation on June 8, 2006 (No. 4483) (as amended on March 16, 2020 No. 289-13).

7. *Kontseptsiya Federal'noy tselevoy programmy "Obespecheniye yadernoy i radiatsionnoy bezopasnosti na 2008 god i na period do 2015 goda"* [Concept of the Federal Target Program Nuclear and Radiation Safety in 2008 — 2015]. Approved by the Order of the Government of the Russian Federation No. 484-r of April 19, 2007.

8. *Federal'nyy zakon "Ob obrashchenii s radioaktivnymi otkhodami i o vnesenii izmeneniy v otdel'nyye zakonodatel'nyye akty Rossiyskoy Federatsii"* [Federal Law On Radioactive Waste Management and Amendments to Certain Legislative Acts of the Russian Federation] of July 11, 2011 No. 190-FZ (as amended by Federal Laws No. 188-FZ of July 2, 2013, No. 429-FZ of December 8, 2020, No. 421-FZ of December 21, 2021).

9. *Federal'naya tselevaya programma "Obespecheniye yadernoy i radiatsionnoy bezopasnosti na 2016—2020 gody i na period do 2035 goda"* [Federal Target Program Nuclear and Radiation Safety in 2016-2035] http://ftsp-yarb2030.rf (accessed on: 18.10.2024).

10. Dorofeev A. N., Utkin S. S., Dorogov V. I., Samoilov A. A., Mamchits E. G., Ponizov A. V., Vasilishin A. L. O razvitii struktury predstavleniya dannykh v natsional'nom doklade Rossii v ramkakh Ob"edinennoy konventsii [On Structural Advancements in the Presentation of Data under the National Report of Russia on the Joint Convention]. *Radioaktivnye otkhody — Radioactive Waste,* 2021, no. 4 (17), pp. 9—21. DOI: 10.25283/2587-9707-2021-4-9-21.

11. https://www.iaea.org/sites/default/files/23/12/jc_newsletter_issue_10_final-12dec.pdf (accessed on: 18.10.2024).

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