

Principles and Tasks of the New Regulatory System for Radioactive Waste Management in the Russian Federation - 12020

L.A. Bolshov, I.I. Linge, V.D. Kovalchuk, S.S. Utkin
Nuclear Safety Institute of Russian Academy of Sciences, Moscow, Russia

ABSTRACT

This year the Federal Law “*On Radioactive Waste management*” was adopted in the Russian Federation. The law significantly changes the existing radioactive waste management regulatory system and assigns a lot of new tasks in order to implement new principles and overcome inevitable respective difficulties. Nuclear Safety Institute was largely involved in the process of the development of the law as well as its further co-ordination among the stakeholders, during which some important initial provisions were excluded. In the paper special features of the Russian safety regulation system for radioactive waste management are analyzed. Most significant requirements adopted by the law as well as tasks and expected difficulties related to its implementation are discussed.

INTRODUCTION

Until the end of the 20th century the problem of radioactive waste management was considered in the Russian Federation as a purely technological. In the 21st century it has turned into the strategic one. The countries with market economy (USA, France, and Great Britain) realized the necessity of special mechanisms for radioactive waste management much earlier – legal instruments were involved in order to organize the management of commercial radioactive waste; for radioactive waste arising from the defense activities special government programs were implemented [1]. Beginning in 1989 USA launched the most ambitious and large scale program to address the issues of nuclear legacy [2]. In some countries which did not implement the nuclear defense programs comprehensive systems for radioactive waste management were established almost simultaneously with the development of nuclear power (Sweden, Canada, Germany, Japan), thereby avoiding significant problems for the economy. Some countries in Eastern Europe also had time to adapt to the realities.

In the Russian Federation the development process of modern legislative framework in the sphere of atomic energy use started in the mid-1990s and continued to diversify simultaneously in several directions. Several regulatory drafts were issued: “*On the use of atomic energy*”, “*On radiation safety of the population*”, “*On environmental protection*”, and “*On subsoil*”, as well as a big number of by-laws, among which are the federal rules and regulations, including documents which regulate sanitary and hygienic aspects of radiation safety. Moreover, due to historical peculiarities of the atomic energy industry in Russia, documents of special sanitary regulation provided the initial direction in the sphere of radioactive waste management. This tendency persisted in the following years, although at present the number of requirements set up by federal rules and regulations of Rostekhnadzor (Federal Service for Ecological, Technological and

Atomic Supervision) significantly exceeds the number of those ones set by sanitary rules.

A bulky system was formed in the area of radioactive waste management as a result. This system is characterized by a virtual absence of single interdepartmental document logic. This often leads to duplication of a large majority of safety requirements or to emergence of regulations which results in conflicts in their joint reading [3]. On one hand, this system really provides safety; on the other hand, it's almost resistant to modernization, which doesn't imply any clear future prospects. The current system does not encourage participants of the radioactive waste management process to search for optimal solutions, including the launch of improved radioactive waste disposal practices in place of the current practices of radioactive waste storage.

On July 15, 2011 the Federal law "*On Radioactive Waste Management*" came into force in the Russian Federation. The adoption of this Federal Law is an important milestone on the way of establishing a legal system which is necessary for the formation of a new national system for radioactive waste management, entirely consistent with the international practice [4].

THE MAIN PRINCIPLES AND THE MILESTONES OF THE NEW SYSTEM

The following points are the key principles of the new law [5]:

- It applies to all radioactive waste existing within the territory of Russia [6], including waste arising from the defense activities and generated during mining and milling of raw materials with a high content of natural radionuclides.
- Differentiation of accumulated from newly generated waste, which implies different financial responsibility for the disposal and different approaches to radioactive waste management. In the case of newly generated waste a fixed path is provided (generation - collection- bring into conformity with the acceptance criteria - disposal). As for accumulated waste, which cannot be attributed to the category of disposable waste, flexible approaches are allowed, depending on the specific situation.
- The requirement for compulsory disposal. The scheme of disposal-oriented classification of objects contained radioactive materials are shown on Figure 1.

The radioactive waste management activities should be carried out within the framework of a unified state system which predetermines identical rules regardless of departmental affiliation as well as the sources of generation. Below are the basic steps of this system building for 2011-2015 and the organizational tasks:

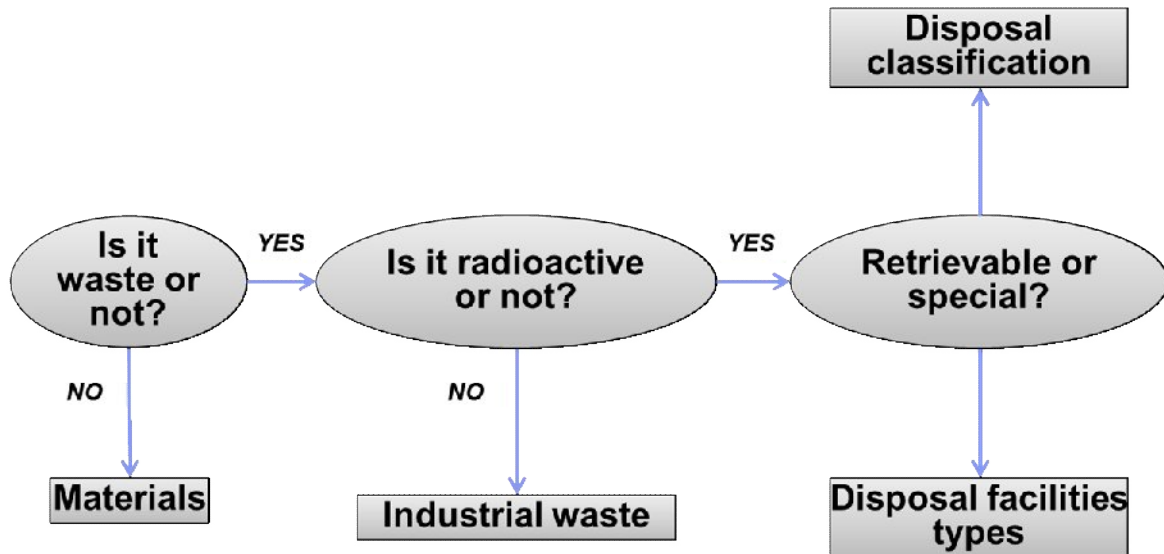


Fig. 1. The scheme of classification of objects contained radioactive materials.

- The formation of legal regime and financial mechanisms for management of newly generated waste should be completed. This requires the development and adoption of a large number of regulations by the Government of the Russian Federation, (the governing body in the field of radioactive waste management, the regulator). Formation of the system as well as its further operation will be determined by their quality, balance and harmonization level.
- The local strategies for the industry should be developed. This work was started about two years ago. As a result approximately 90% of the major enterprises have to transform the existing flow sheets for radioactive waste management according to the algorithm: generated - reprocessed - packed - given the national operator. For a small number of enterprises the possibility of legal registration of on-site disposal schemes that are already in use is provided. These are enterprises with the greatest amount of newly generated waste. Finally, for the single super complex enterprises (e.g., the "Mayak" plant) the implementation of individual strategies will be required. For other producers, who generate generally small volumes of radioactive waste, the most difficult aspect is the organization of their interaction (including financial matters) with the national operator (Figure 2).
- The design and construction of infrastructure facilities including disposal sites for very LLW, LL/ILW should be started. The decision-making process on their location and construction is rather complicated and involves different stakeholders (from the Government the Russian Federation to the municipal officials). Taking into account the possible conflicts of interest, one can predict the complexity of issue concerning the establishment of a necessary disposal facilities' system.
- Initial registration of accumulated radioactive waste should be carried out.
- The best practices in the field of radioactive waste management should be mastered.

- The internal service market for radioactive waste management should be established.

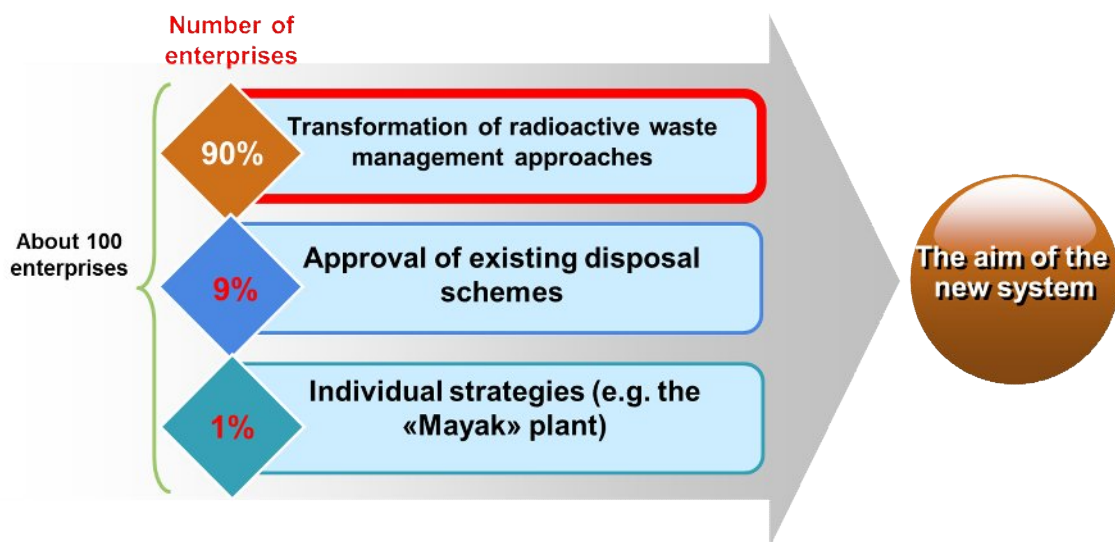


Fig. 2. The groups of main local strategies.

THE MAIN CHALLENGES IN FORMATION THE NEW SYSTEM

The adoption of the law is a fundamental, but only the first step in establishing the national system for radioactive waste management. Its entry into force means the termination of almost all uncontrolled radioactive waste generation and accumulation. However, if the purely practical issues concerning radioactive waste conditioning are clear, the quality of the system for radioactive waste management in general will depend on the successful solution of the following scientific and technical problems:

1. Criteria for assigning normal waste to radioactive waste. Their definition should be guided by the following principles: evolutionary succession of legal and regulatory framework; considerations on purposes for which the criteria are used, the need for simplicity and consistency of the law enforcement; the maximum possible separation of powers between the various regulatory authorities. One can assume that these criteria will be similar to the existing ones, except the boundary that determines the assignment of materials and media to liquid radioactive waste. At present time this criterion can't be rated as a technological and is related to the radiation exposure on the human by drinking water use. To some extent it's derived from the requirements of the Federal Law "On Environmental Protection" prohibiting the discharge of liquid radioactive waste into the environment. Thus, a new boundary should be established. On the one hand, this boundary would ensure the environmental safety, on the other hand - would not hamper the enterprises to carry out legal discharge practice, as well as to perform the necessary technological procedures.

2. Introduction of radioactive waste disposal classification (Figure 1 – right upper block) which will differ from that current one aimed at radiation safety ensuring only (Figure 3).

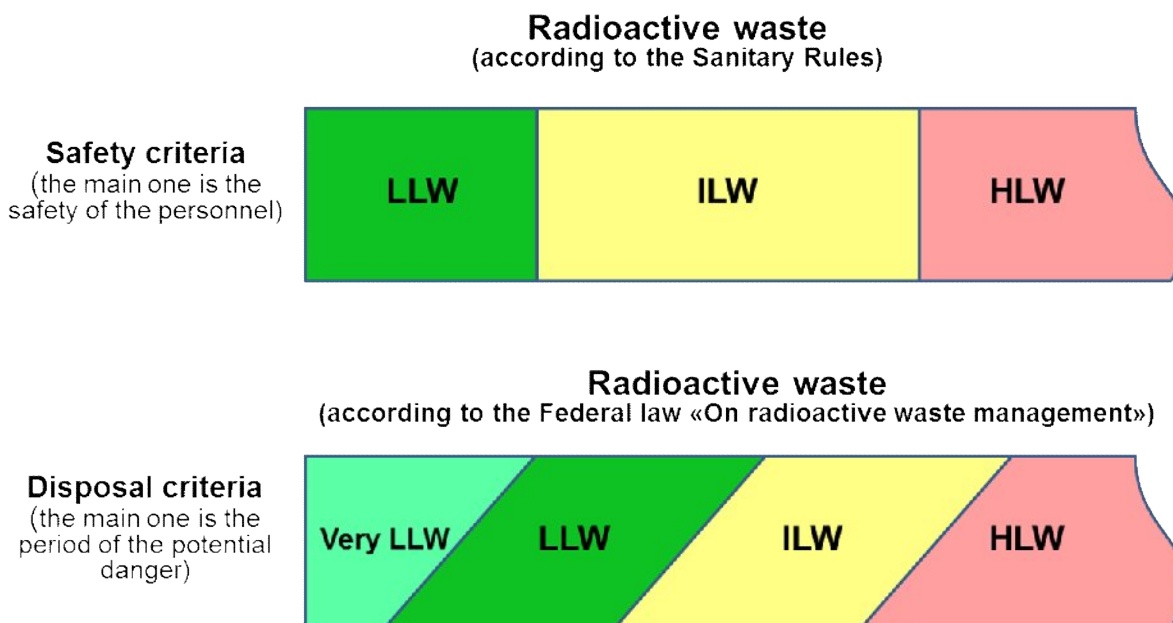


Fig. 3. The expected radioactive waste disposal classification.

3. Introduction of an extended classification of radioactive waste storage facilities (Figure 1 – right lower block) which is caused, first of all, by the necessity to address legacy issues (Figure 4). Elaboration of criteria used to assign waste to the category of special radioactive waste [7] allowed to assume that a limited number of radioactive waste placement sites can be directly attributed to the category of special. These are:

- Facilities created with the use of nuclear explosive technology for peaceful and defense purposes.
- Subsurface water reservoirs for radioactive waste storage with the total volume not less than 10^3 m^3 .
- Radioactive waste repositories established before the formation of the modern safety regulation system, if their condition does not allow them to be recognized as disposal sites.
- Facilities for which conservation projects are carried out.

The safety requirements presented in federal rules and regulations were never adapted to nuclear legacy facilities [8]. It resulted in the need to develop special bylaws (mainly sanitary rules) practically for each problem facility. For example, the Techa Cascade of Reservoirs of the "Mayak" plant had the status of «special industrial water reservoir» until recently. Due to inconsistency with the general safety requirements this water reservoir could neither be attributed to any nuclear facilities nor to environmental objects. This problem was solved only at the end of 2010, when the Techa Cascade of Reservoirs was given the status of surface water storage of LLW, that is - nuclear facility [9].

In order to eliminate these situations, the "On Radioactive Waste Management" law provides a differentiation between newly formed and accumulated radioactive waste. The latter ones are reclassified as «special» in case if it's inappropriate to remove them from storage facilities. Further, these special wastes depending on possibility of the safety assessment or the period of their potential hazard are stored at the site or disposed on site. Despite the presence of a uniform procedure for categorizing radioactive waste as "special" (corresponding to the criteria established by the Government of the Russian Federation) the algorithm of the safety assessment is unique in each case. It is essential that the volume of special waste must be such as to eliminate the desire for accurate evolution of risks and possibilities of its extraction.

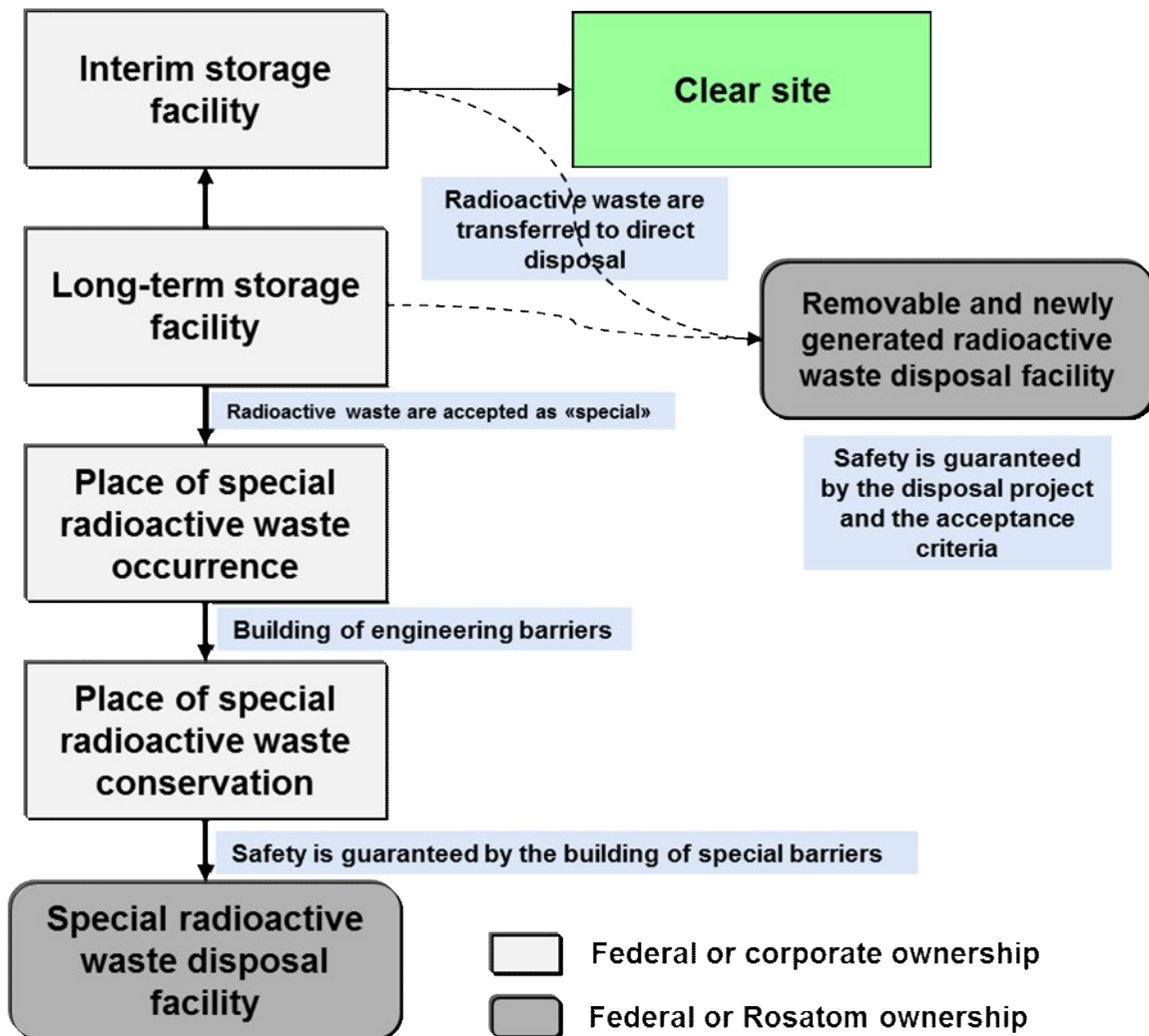


Fig. 4. Storage and disposal facility types

4. Finally, as a separate task is seen the creation of a modern methodological base focused on a comprehensive safety justification of disposal and conservation sites, as

well as harmonization of the decisions made by all the stakeholders. During the seminar Safety Case for radioactive waste disposal facilities based on modern migration models of radionuclides in geological formations and engineered barriers, held in May 2010 in the Nuclear Safety Institute, leading experts noted that the majority of domestic work on safety case and safety assessment is based on attitudes formed in the 1990s. Foreign experience and recommendations stipulated by international organizations such as IAEA not always find a practical application, which hamper mutual understanding at the international level and does not promote confidence in the results obtained by local specialists. The need to harmonize the regulatory framework for radioactive waste disposal including the safety case and the relevant conceptual apparatus of modern international requirements and approaches was stated separately.

CONCLUSIONS

Modernization of the Russian radioactive waste management system is a long overdue problem. We can conclude that rate of the development is defined only by the efficiency of discussions concerning legislation.

Adoption of the Federal Law *"On Radioactive Waste Management"* determines the features of the new development stage for Russian nuclear industry. On the one hand, it provides the solution for the accumulated problems, on the other hand - the formation of modern management mechanisms for nuclear and radiation safety.

However after analyzing the whole situation with respect to operators, the regulator and the authority we expect not only a lot of benefits but also some problems which should be discussed and solved.

The main tasks deal with the necessity of rapid coordination and approval of large number of bylaws concerning:

- distinction between industrial and radioactive waste (it is of high importance for liquid substances);
- distinction between removable and special accumulated radioactive waste;
- disposal classification of radioactive waste taking into account radionuclide specific activity, half-life time and type of disposal facility;
- acceptance criteria for the disposal.

Somewhat separate tasks are:

- transformation of the radioactive waste management system at the enterprises; and
- development of the modern methodology for safety case of radioactive waste near-surface and geological disposal.

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