**Recommendations for Justification of Selection and Application of Barrier Clay Materials in Radioactive Waste Storage Facilities**

**(RB-042-24)**

**Federal Environmental, Industrial and Nuclear Supervision Service, Moscow, 2024**

This Safety Guide in the Use of Atomic Energy RB-042-24[[1]](#footnote-1) “Recommendations for Justification of Selection and Application of Barrier Clay Materials in Radioactive Waste Storage Facilities” (hereinafter referred to as the Safety Guide) has been developed in accordance with Article 6 of Federal Law No. 170-FZ “On the Use of Atomic Energy” dated November 21, 1995 in order to facilitate compliance with the requirements of federal rules and regulations in the field of the use of atomic energy “Safety in Radioactive Waste Management. General Provisions” (NP-058-14), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision No. 347 dated August 5, 2014 (registered by the Ministry of Justice of the Russian Federation on November 14, 2014, registration No. 34701), as amended by Orders of the Federal Environmental, Industrial and Nuclear Supervision Service No. 582 dated November 22, 2018 (registered by the Ministry of Justice of the Russian Federation on December 12, 2018, registration No. 52986), No. 163 dated May 18, 2022 (registered by the Ministry of Justice of the Russian Federation on July 14, 2022, registration No. 69272), federal rules and regulations in the field of the use of atomic energy “Radioactive Waste Disposal. Principles, Criteria and Basic Safety Requirements” (NP-055-14), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 379 dated August 22, 2014, (registered by the Ministry of Justice of the Russian Federation on February 2, 2015, registration No. 35819), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 582 dated November 22, 2018 (registered by the Ministry of Justice of the Russian Federation on December 12, 2018, registration No. 52986), No. 163 dated May 18, 2022 (registered by the Ministry of Justice of the Russian Federation on July 14, 2022, registration No. 69272), federal rules and regulations in the field of the use of atomic energy “Near-Surface Disposal of Radioactive Waste. Safety Requirements” (NP-069-14), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service dated June 6, 2014, No. 249 (registered by the Ministry of Justice of the Russian Federation on August 14, 2014, registration No. 33583), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 582 dated November 22, 2018 (registered by the Ministry of Justice of the Russian Federation on December 12, 2018, registration No. 52986), No. 163 dated May 18, 2022 (registered by the Ministry of Justice of the Russian Federation on July 14, 2022, registration No. 69272), federal rules and regulations in the field of the use of atomic energy “Safety Requirements for Special Radioactive Waste Disposal Sites and Special Radioactive Waste Preservation Sites” (NP-103-17), approved by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 418 dated October 10, 2017 (registered by the Ministry of Justice of the Russian Federation on November 2, 2017, registration No. 48779), as amended by Order of the Federal Environmental, Industrial and Nuclear Supervision Service No. 163 dated May 18, 2022 (registered by the Ministry of Justice of the Russian Federation on July 14, 2022, registration No. 69272).

This Safety Guide contains recommendations of the Federal Environmental, Industrial and Nuclear Supervision Service on the selection, justification of selection and application of barrier clay materials, including:

* justification of the selection of barrier clay materials depending on the safety functions performed by engineered safety barriers based on them;
* quality control and assurance of barrier clay materials at the sites of radioactive waste storage facilities before and during construction of engineered safety barriers;
* monitoring the condition of engineered safety barriers based on barrier clay materials;
* justification for the performance of the established safety functions by engineered safety barriers based on barrier clay materials.

The scientific and technical level of the Safety Guide corresponds to the current level of science and technology, the requirements of legal and regulatory documents in force in the Russian Federation, as well as recommendations of international organizations, including:

* INTERNATIONAL ATOMIC ENERGY AGENCY. Disposal of Radioactive Waste. Specific Safety Requirements No. SSR-5. IAEA. Vienna (2011);
* INTERNATIONAL ATOMIC ENERGY AGENCY. The Safety Case and Safety Assessment for the Disposal of Radioactive Waste. Specific Safety Guide No. SSG-23. IAEA. Vienna (2024);
* INTERNATIONAL ATOMIC ENERGY AGENCY. Characterization of Swelling Clays as Components of the Engineered Barrier System for Geological Repositories. Results of an IAEA Coordinated Research Project 2002–2007, IAEA‑TECDOC-1718, IAEA, Vienna (2013);
* INTERNATIONAL ATOMIC ENERGY AGENCY. Technical Aspects Related to the Design and Construction of Engineered Containment Barriers for Environmental Remediation. Technical Reports Series No. 493, IAEA, Vienna (2023).

The Safety Guide is intended for use by:

* organizations involved in the operation of RW storage facilities, siting, design, construction and closure of near-surface RW disposal facilities;
* organizations performing activities and/or providing services to operating organizations on design, construction, operation and decommissioning (closure) of the specified facilities, including performance of research and development for engineered safety barriers based on barrier clay materials.

Released for the first time.

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