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Scientific article

Impact of international nuclear safety conventions on the evolution of Kazakhstan's legislative framework in the nuclear energy sector

D.R. Saipinov*

National Center of Science and Technology Evaluation, Almaty, Kazakhstan

(e-mail: daniyar.saipinov@mail.ru)

Abstract: The article examines the influence of international conventions and nuclear safety standards on the legislative policy of the Republic of Kazakhstan in the field of atomic energy. The relevance of the research is driven by Kazakhstan's plans to construct a nuclear power plant and the growing need to strengthen national regulatory frameworks in line with global safety requirements. The purpose of the study is to identify the mechanisms through which Kazakhstan's international obligations under the NPT, the Convention on Nuclear Safety, the Joint Convention and IAEA documents are incorporated into national legislation and shape its development. The scientific and practical significance lies in providing a comprehensive analysis of how international norms affect current legal reforms. The methodology is based on comparative legal analysis of international treaties, the 2021 Environmental Code and the Law "On the Use of Atomic Energy". The findings demonstrate Kazakhstan's high level of alignment with international standards, including the improvement of radioactive waste management procedures and the advancement of transboundary environmental assessment. The study contributes to understanding the foundational role of international regimes in national policymaking. Its practical value consists of supporting further enhancement of the legal framework necessary for the implementation of nuclear energy projects.

Keywords: international conventions, nuclear safety, IAEA, legislative policy, radioactive waste.

Introduction

The worldwide nuclear market expansion since 2000 demonstrates how nuclear power has become a fundamental component of the global energy infrastructure. States now evaluate

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*the corresponding author

nuclear technologies as their primary choice for low-carbon energy production because of climate change requirements and energy security needs. The International Atomic Energy Agency (IAEA) reports that more than thirty nations are planning to build new power units and restart their nuclear energy programs [1]. The World Nuclear Industry Status Report 2024 shows that Chinese and Russian nuclear projects started construction on 35 new reactors between 2019 and 2024 [2]. The need for dependable power generation and new reactor designs, including small modular reactors, drives up competition in the worldwide market while speeding up nuclear safety regulations. The IAEA document shows how the Life Management of Nuclear Power Plants Network functions as a tool to assist countries that are new to nuclear energy [3].

Kazakhstan, which possesses the world's largest natural uranium reserves and is a strategic supplier of nuclear fuel, likewise faces the necessity of developing its own generating capacity. According to the World Nuclear Association, Kazakhstan holds approximately 14% of global uranium reserves and produced about 23,270 tU in 2024 [4]. In the context of rising domestic electricity consumption and ongoing economic modernization, the discussion surrounding the construction of a nuclear power plant has taken on a systemic character: as reported by World Nuclear News, since 2014 Kazakhstan's enterprise KNPP has carried out preliminary work, including site selection (for example, Ulken on the shore of Lake Balkhash) and the examination of small modular reactor options [5]. National strategic planning documents emphasize the need to diversify the energy mix and reduce dependence on carbon-intensive sources. For example, the analytical article "Kazakhstan's Energy Future: The Role and Importance of Nuclear Power Plants" states that Kazakhstan is facing an "electricity shortage" and may encounter a deficit of up to 6.2 GW by 2030 [6]. Parallel preparatory activities include site assessment, public consultations, evaluation of technological solutions, and analysis of regulatory requirements. The political-legal dimension of this process is particularly significant, as the prospective establishment of a nuclear power plant inevitably touches upon a wide range of issues-from environmental safety to international cooperation and compliance with non-proliferation obligations.

The international commitments of Kazakhstan serve as a fundamental structure which determines how the nation will develop its nuclear energy legislation. The 1994 Convention on Nuclear Safety, along with three other international agreements, requires Kazakhstan to follow specific safety standards for nuclear facilities. The UN system hosts the NPT text [7] while the IAEA maintains three conventions, including the Convention on Early Notification of a Nuclear Accident [8] and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency [9] and the 1994 Convention on Nuclear Safety and Kazakhstan's national reports about its implementation [10].

The IAEA Safety Standards together with IAEA peer-review procedures and international reporting systems directly shape the development of national regulatory frameworks (see foundational instruments: IAEA, Fundamental Safety Principles SF-1; Safety of Nuclear Power Plants: Design, SSR-2/1 (Rev.1); Disposal of Radioactive Waste, SSR-5). The nation of Kazakhstan works to build its position as a trustworthy nuclear power through its continuous updates of domestic nuclear sector laws to match international standards. The Law "On the Use of Atomic Energy" [11] and the 2021 Ecological Code [12] demonstrate this adaptation.

The relevance of this study is driven by the need for a scholarly examination of how international conventions and their associated safety standards shape the structure, directions, and substantive content of Kazakhstan's legislative policy in the nuclear sphere. The choice of this topic is particularly significant against the background of the emerging national nuclear

program and the growing international requirements for ensuring the safety of nuclear installations, managing radioactive waste, and regulating transboundary impacts. The current status and development prospects of Kazakhstan's nuclear energy sector are evidenced, in particular, by the country profile data published by the IAEA and analytical reviews on the development of nuclear power in Central Asia [13]. The study makes it possible to determine the extent to which the existing regulatory framework aligns with the country's international obligations and how these obligations shape the further evolution of the legal landscape in the field of nuclear energy.

The modern international framework for nuclear safety operates through multiple agreements that control nuclear material spread and nuclear facility operations and radioactive waste management. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) functions as the fundamental framework that requires states to stop nuclear weapon distribution while supporting atomic energy for peaceful purposes and strengthening international safeguards. The IAEA performs safeguard implementation through its verification process, which confirms that nuclear materials serve only peaceful purposes. Kazakhstan upholds its NPT membership and Comprehensive Safeguards Agreement with the IAEA (Agreement on the Application of Safeguards in connection with the NPT of 26 July 1994 [14]) through its Model Additional Protocol and enhanced verification procedures, which enable its entry into worldwide control systems.

The 1994 Convention on Nuclear Safety operates as a supplementary agreement to the non-proliferation framework because it concentrates on ensuring nuclear power facilities operate safely. The Convention requires states to take responsibility for nuclear safety through independent regulatory bodies that prevent accidents and protect facilities while promoting safety culture development. The Contracting Parties conduct periodic peer reviews of national reports during their meetings, which enables them to detect organizational problems and ensure domestic laws match international standards. The Convention provides Kazakhstan with essential criteria to create operational standards for research reactors and future power reactors.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) focuses on the critical nuclear policy matter of spent nuclear fuel (SNF) and radioactive waste management. The Convention requires states to establish national systems for accounting, control, safe storage, and final disposal of waste, as well as mechanisms for site evaluation, licensing of relevant activities, and oversight of their implementation. For Kazakhstan, participation in the Joint Convention is reflected in specific national reports on waste management, which is particularly important given the presence of legacy facilities from the Semipalatinsk Test Site and the infrastructure of historical mining and processing operations [15].

The 1986 Convention on Early Notification of a Nuclear Accident was developed in response to the Chernobyl disaster and is aimed at ensuring the prompt exchange of information in the event of incidents capable of causing transboundary consequences. The Convention requires states to immediately provide affected parties and the IAEA with information regarding the time of the accident, its nature, radionuclide releases, and measures taken (IAEA, Convention on Early Notification of a Nuclear Accident). The implementation of these provisions obliges states to establish monitoring systems, rapid communication channels, and mechanisms for assessing environmental impacts.

The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency works together with the early-notification system to establish rules for international emergency response collaboration. The Convention sets rules for providing technical help and expert

services and material support while defining procedures for emergency support requests and operational coordination and radiation safety protocols for emergency response activities (IAEA, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency). For Kazakhstan, this instrument is particularly relevant due to the need to integrate the national civil protection system with international response mechanisms, as well as in light of potential transboundary risks associated with nearby nuclear-infrastructure facilities [16].

The international framework consists of multiple treaties, which work together to maintain consistency between non-proliferation rules and technical safety standards and environmental protection and nuclear incident response protocols. The legislative policy of Kazakhstan requires ongoing updates to its national standards because of IAEA regulatory procedures and environmental rules and nuclear material control systems. This is confirmed, in particular, by the provisions concerning the powers of the authorized body on atomic energy, which include preparing proposals for improving legislation in the field of the peaceful use of atomic energy [17].

Despite substantial progress in modernizing national environmental and nuclear-safety legislation, Kazakhstani academic literature still shows a fragmented approach to studying the impact of international legal regimes on domestic law-making policy. The state fulfills all international treaty provisions, which include IAEA safety protocols and NPT requirements and Convention on Nuclear Safety obligations and Joint Convention on Radioactive Waste Management and Spent Fuel Safety and early notification and mutual assistance treaties for nuclear accidents. The international frameworks function as fundamental guidelines that direct the development of nuclear facility operation rules and radioactive waste management systems and environmental tracking systems and cross-border impact management [18].

The state of Kazakhstan executes international commitments through simultaneous work on environmental law transformation, which resulted in the 2021 Ecological Code and ongoing atomic energy legislation updates. The established laws create fundamental rules for environmental impact studies and cross-border procedures and radiation protection and radioactive waste management and environmental tracking systems. The expansion of regulatory scope, the institutional strengthening of environmental authorities, and the adaptation of national procedures to international standards create an objective need for a comprehensive theoretical and legal analysis of the ongoing developments [19].

Nevertheless, existing academic publications are largely focused either on specific technical aspects of nuclear safety or on isolated issues of environmental regulation. There is a lack of studies that simultaneously account for the international architecture of nuclear safety, the requirements of key conventions, the national experience of legislative reform, and the potential challenges associated with the planned construction of a nuclear power plant [20]. The analysis of Kazakhstan's international commitments in relation to the Ecological Code's provisions remains understudied because it lacks research on transboundary effects assessment and state environmental monitoring and radioactive waste management and emergency response requirements [21].

As a result, a significant scholarly gap has emerged: there are no works providing a comprehensive analysis of how international nuclear safety regimes influence the contemporary legislative policy of the Republic of Kazakhstan. Addressing this gap is essential not only for advancing the national doctrine of nuclear and environmental law but also for ensuring the coherence of regulatory reforms with international standards and IAEA recommendations [22].

The research focuses on social connections that develop through state policy implementation for nuclear and environmental protection in Kazakhstan.

The research examines Kazakhstan's international nuclear safety commitments under the NPT framework and its conventions, together with their effects on national environmental and nuclear laws through the Ecological Code and atomic energy regulations.

The aim of the study is to identify the regulatory mechanisms through which Kazakhstan's international nuclear safety obligations determine the directions and substantive content of the state's legislative policy. Achieving this aim requires an examination of the legal instruments of the IAEA, the requirements of the NPT, the provisions of the conventions on the safety of nuclear installations, the management of spent nuclear fuel and radioactive waste, as well as the procedures for early notification and assistance in the event of nuclear accidents. Special attention is devoted to assessing the degree of implementation of these requirements in the national legal system and evaluating the consistency of domestic legislation with international standards.

Research methods

The methodology of this study is based on a comprehensive analysis of international and national legal sources regulating nuclear and environmental safety, with particular attention to the interaction between Kazakhstan's obligations under key international treaties and its domestic legislation. The research material consists of global nuclear safety regime conventions and IAEA standards, together with Kazakhstan national reports and Environmental Code of 2021 provisions and atomic energy use legislation. These documents make it possible to assess the extent to which Kazakhstan's regulatory system incorporates global requirements related to radioactive waste management, transboundary environmental procedures, emergency preparedness and environmental monitoring. The qualitative aspect of the work relies on academic publications and analytical reports that provide a doctrinal and empirical basis for understanding the evolution of national regulatory policy in this field.

In the research process, an integrated approach was applied, combining theoretical analysis of international safety regimes with a critical examination of their implementation in Kazakhstan's domestic law. The research used comparative legal analysis to identify both commonalities and differences between international standards and national regulatory systems and to assess the operational effectiveness of current legal procedures. This combination of approaches allowed to determine how international instruments influence the content and direction of Kazakhstan's legislative policy and to reveal areas where national regulation not only incorporates but also develops international standards, strengthening the country's system of nuclear and environmental safety.

Findings

The Treaty on the NPT serves as a core legal foundation that establishes the essential rules that guide Kazakhstan's national atomic energy and nuclear safety policies. The Treaty's Articles I-III require non-nuclear-weapon States to refrain from obtaining or constructing nuclear weapons or explosive devices and to prevent any assistance for their development. The treaty provisions create absolute legal barriers against nuclear material and advanced technology and specialized equipment transfers, which form the foundation for national regulatory frameworks.

Kazakhstan, as a non-nuclear-weapon State, falls fully under Articles II and III of the NPT, which require the acceptance of comprehensive IAEA safeguards based on document

INFCIRC/153. These safeguards are designed to verify the exclusively peaceful nature of nuclear materials and activities conducted within the State's territory. Kazakhstan's accession to the relevant agreements necessitated the institutionalization of mechanisms for the accounting, control, and physical protection of nuclear materials, as well as the establishment of documented transparency in the nuclear sphere. For example, Kazakhstan's safeguards report explicitly states: "...ensure accounting and control of nuclear materials and submit reports to the authorized body on their availability, movement and location" [23].

An important component of the national legal framework is paragraph 3 of Article 2 of the Ecological Code of the Republic of Kazakhstan, which establishes the priority of international treaties over national normative legal acts. This regulatory formula ensures the direct legal relevance of the NPT obligations and the IAEA safeguards agreements for the national regulatory system. In practical terms, this means that the requirements for the accounting, control, and monitoring of nuclear materials are not merely reproduced in domestic legislation but are grounded in the imperatives of international law.

The substantive provisions of the NPT exert direct influence on the institutional structure of Kazakhstan's legislation governing the management of radioactive waste and nuclear materials. Articles 369-375 of the Ecological Code set out the classification of radioactive waste, requirements for its handling, and the applicable environmental and radiation standards that align with international safety norms. These provisions form part of a broader architecture of national nuclear legislation regulating licensing procedures, physical protection, transportation, and the accounting of nuclear materials. The existence of these norms reflects the influence of international IAEA safeguards requirements, aimed at preventing the diversion of nuclear materials to military or undefined purposes.

The consistent incorporation into national legislation of procedures for state oversight, independent supervision, reporting regimes, and monitoring systems demonstrates that Kazakhstan has adopted the key provisions of the NPT as the foundation for developing a modern regulatory model for nuclear activities. The national system for nuclear material tracking and reporting operates under state authority supervision to maintain international non-proliferation requirements while demonstrating how international safeguards have become part of Kazakhstan's legal framework. The control system analysis demonstrates that the State system for nuclear material control operates through three essential elements, which include accounting and export and import control and physical protection of nuclear materials [24].

The IAEA safeguards system constitutes the central mechanism of international oversight, ensuring that nuclear materials are used exclusively for peaceful purposes. Under the comprehensive agreements concluded with non-nuclear-weapon States Parties to the NPT, the IAEA conducts inspection activities covering the entire scope of nuclear materials under the jurisdiction of the State. This model of control establishes a standardized structure of national supervision based on the mandatory, precise accounting, documentation, and transparency of all categories of nuclear materials and operations involving them.

The IAEA safeguards system has shaped the Republic of Kazakhstan's legislation through its impact on the Ecological Code's provisions about radioactive waste and nuclear material management. Articles 369-375 of the Code establish a comprehensive regulatory framework for radioactive waste management, in which the implementation of procedures and requirements set forth in the IAEA Safety Standards Series is clearly evident. The classification of radioactive waste set out in Article 369 reflects the fundamental IAEA criteria, including physical state,

source of generation, activity level, and radionuclide half-life [25]. Such harmonization ensures the unification of terminology and regulatory approaches, which is a necessary precondition for effective interaction with international safeguards mechanisms.

The provisions of Article 372, which establish requirements for the environmentally safe storage and disposal of radioactive waste, are of particular significance. This norm sets out the mandatory licensing of relevant activities, the provision of physical protection, the prevention of uncontrolled releases, and the documentation of storage parameters. These elements correspond to IAEA requirements concerning the creation of multilayer control barriers, the minimization of environmental risks, and the maintenance of an adequate level of safety at all stages of the radioactive material lifecycle [26]. The national system of accounting and control implemented under these regulations ensures compliance with both safeguard obligations and international standards governing the management of radioactive waste.

The regulation of environmental impact assessment (EIA) procedures and transboundary environmental assessment likewise demonstrates the substantial influence of international requirements. Article 75 of the Ecological Code provides for the inclusion of transboundary impact assessment within the EIA process whenever an activity may adversely affect the territory of another State. Articles 80-84 establish a detailed procedure for identifying such impacts, conducting consultations, preparing documentation, and engaging with affected parties. These provisions are consistent both with IAEA recommendations aimed at fostering international transparency in the nuclear sphere and with the requirements of the Espoo Convention governing transboundary environmental impact assessment.

The IAEA safeguards system guides Kazakhstan to follow international safety standards and transparency requirements and control measures for atomic energy applications through its national laws. The implementation of these standards enables Kazakhstan to join the international nuclear and environmental safety framework, which supports the development of nuclear infrastructure while reducing cross-border risks.

The national legal framework of Kazakhstan includes international nuclear and environmental safety standards as a fundamental element for its legislative modernization process. The Ecological Code of Kazakhstan includes Article 46, which enables international environmental standards to enter the country through national standardization procedures to support global regulatory requirements and scientific progress. This legal framework creates a normative channel for incorporating IAEA recommendations, International Organization for Standardization (ISO) standards, and other international regulatory instruments into the national context.

The international standards of the IAEA, particularly the documents of the IAEA Safety Standards Series (General Safety Requirements, Safety Guides), play a system-forming role for national requirements governing the handling of radioactive materials, radiation safety, and the management of nuclear installations. The provisions of the Ecological Code require the competent authority to take international standards into account when developing and revising national regulations, thereby creating a mechanism for the regular updating of legislation in accordance with developments in the international nuclear safety regime. This practice is consistent with the principles of the IAEA, which aim at harmonizing global requirements and unifying regulatory criteria.

In Kazakhstan's normative system, the implementation of international standards is expressed not only through the mandatory consideration of technical requirements but also

through the encouragement of their voluntary application by business entities. Paragraph 3 of Article 46 provides for a reduction in the degree of regulatory risk during state environmental inspections for organizations that have implemented international environmental management systems. In this context, ISO 14001 – which establishes internationally recognized criteria for environmental management – is of particular importance. Its application promotes greater corporate responsibility in environmental protection and provides additional guarantees of environmental safety at high-risk facilities, including potential nuclear-energy installations. For example, one study shows that economic and environmental factors significantly influence the implementation of ISO 14001 [27].

International standards function as tools to connect Kazakhstan with worldwide technical regulation systems and international trade operations. The use of ISO and IAEA standards together with interstate standards enables technical requirement comparison and supports international work and treaty-based environmental and nuclear safety obligations [28]. The upcoming nuclear energy development requires these mechanisms because they establish both regulatory frameworks and organizational structures for operating critical infrastructure facilities safely.

Overall, the legal framework of Article 46 of the Ecological Code forms an integrative model aimed at the continuous convergence of national regulation with international standards. This approach strengthens the stability of the national system of environmental and nuclear regulation, enhances its transparency, and ensures its alignment with international safety requirements.

The Republic of Kazakhstan established national institutions for environmental expertise and EIA through international obligations that stemmed from nuclear safety regulations and transboundary environmental agreements. The Ecological Code contains an extensive normative framework governing impact assessment procedures (Arts. 48-50, 64-65), which align in nature with international standards, including the requirements of the 1991 Espoo Convention and IAEA recommendations on assessing the environmental impacts of nuclear facilities.

The basic provisions of environmental assessment, set forth in Articles 48-50, are aimed at identifying and analyzing all significant impacts of the proposed activity, taking into account the principles of potential environmental hazard, consideration of alternatives, and long-term forecasting. These norms are consistent with international practice, which requires the assessment of environmental risks at the early decision-making stages and the evaluation of several project development alternatives, including the "no-action" option. This conceptual foundation ensures the integration of international methodological approaches into national regulation.

Particularly important are the requirements contained in Articles 64-65, which establish the mandatory nature of environmental impact assessment for activities involving facilities of categories I and II. Nuclear installations and activities related to the handling of nuclear materials invariably fall within these categories, consistent with international practice, where nuclear facilities are regarded as activities with a high potential impact. The mandatory nature of EIA, including in cases of significant modifications to the operation of a facility, aligns with IAEA recommendations aimed at preventing uncontrolled changes in safety levels.

The significant influence of international treaties is especially evident in the regulation of transboundary impacts. Under paragraph 2 of Article 80, national legislation is directly guided by the international treaties of the Republic of Kazakhstan when determining the grounds

and procedure for conducting a transboundary assessment. This provision ensures the direct implementation of the Espoo Convention, which requires notification of neighbouring states and consultations when an activity may cause significant adverse effects beyond the jurisdiction of the State of origin. The practice of transboundary assessment is analyzed in detail in Zingashina's study "Transboundary Environmental Assessment in the Aral Sea Basin" [29].

Articles 80-84 establish a multi-level administrative mechanism for transboundary assessment, including the decision to initiate the procedure, the conduct of consultations, the transfer of documentation in the language of the receiving State, and the consideration of comments and proposals from authorities and the public of affected States. This procedure serves as a normative reflection of the international processes operating under the Espoo Convention and is comparable to the IAEA approach, which requires transparency and the involvement of all potentially affected parties in the safety-assessment process.

The establishment of mechanisms for translating documentation, the mandatory consideration of submitted comments, and the requirement to provide documented evidence of how such comments were addressed are consistent with international standards of transparency and accountability. Similar requirements appear in IAEA guidance documents on environmental assessment for nuclear facilities and in the practice of States Parties to the Espoo Convention, underscoring Kazakhstan's commitment to ensuring conformity with international procedural safeguards.

Overall, the national environmental impact assessment system demonstrates institutional convergence with international procedures aimed at ensuring environmental and nuclear safety, including the mandatory early identification of risks, the conduct of inter-State consultations, and the consideration of comments from affected parties. Such harmonization helps strengthen confidence in the national regulatory system and enhances the quality of decision-making in the field of nuclear-energy development.

The national environmental regulation system of Kazakhstan bases its international cooperation framework on international obligations, which determine State environmental protection and atomic energy safety policies. The Ecological Code of Kazakhstan, through Article 412, requires international cooperation to follow universal international law principles and Kazakhstan-ratified international treaties. This provision institutionalizes international standards as a mandatory basis for national legal regulation, creating the prerequisites for harmonizing domestic legislation with global regimes of environmental and nuclear safety.

The development of provisions on international treaties in Article 413 further specifies the mechanisms for their implementation at the national level. Paragraph 2 of Article 413 stipulates that the implementation of international treaties may include the development of targeted action plans, the identification of responsible State bodies, the assessment of the effectiveness of Kazakhstan's participation in international agreements, and the carrying out of transboundary procedures. This normative construct demonstrates that international obligations are not limited to the formal accession to international instruments but require the development of an internal strategy and the adaptation of national legislation and administrative mechanisms.

The Ecological Code provisions show direct alignment with international nuclear agreements. The Non-Proliferation of Nuclear Weapons Treaty, along with IAEA safeguards agreements and three nuclear safety conventions and two conventions on early notification and assistance, create an international framework that directly affects Kazakhstan's regulatory policy. Paragraph 2 of Article 413 effectively institutionalizes the mechanism for implementing these instruments by

providing for the development of internal action plans and a system for interagency allocation of competencies.

Of special importance is the fact that international treaties on nuclear safety are directly integrated into the sphere of environmental law. This is due to the intersection of nuclear and environmental regulation in matters involving the handling of nuclear materials, the prevention of radiation impacts, the assessment of transboundary effects, and the provision of informational transparency. As noted in one study, Kazakhstan uses its participation in international regimes not only as a foreign-policy initiative but as the foundation of its domestic environmental and radiation policy [30]. These international obligations thus form the basis for a comprehensive risk-management model reflected in Articles 369-375, which govern radioactive waste management, and in Articles 80-84, which regulate transboundary impact-assessment procedures.

Taken together, the provisions of Articles 412-413 demonstrate that international cooperation functions not as a declarative policy element but as a structuring principle that determines the content and direction of the development of Kazakhstan's environmental and nuclear legislation. This model promotes further convergence of national regulatory practice with international standards and enhances the effectiveness of Kazakhstan's participation in global mechanisms for ensuring environmental and nuclear safety.

The institution of State environmental monitoring, established in Articles 152-159 of the Ecological Code of the Republic of Kazakhstan, plays a significant role in the implementation of the State's international obligations in the field of nuclear and radiation safety. The substance of these provisions demonstrates the direct influence of international standards, particularly the 1986 Convention on Early Notification of a Nuclear Accident, IAEA requirements on emergency preparedness and response, and regimes governing the exchange of environmental information in a transboundary context.

The Unified State System for Environmental and Natural Resources Monitoring (Art. 152) encompasses a set of procedures aimed at the timely identification of changes in environmental conditions, the forecasting of potential adverse effects, and the provision of coordinated responses by State authorities. The inclusion of monitoring processes relating to physical and biological indicators, air quality, water resources, the state of ecological systems, and the impacts of climate change forms a basis for the prompt dissemination of information in the event of nuclear or radiological incidents. This is confirmed by research conducted at the Semipalatinsk Test Site, where integrated monitoring systems for radiological parameters and natural factors have been developed [31, p. 85]. Such an architecture aligns with international requirements for national early-warning and response systems and ensures Kazakhstan's compliance with the Convention on Early Notification.

A central component of this framework is the establishment of the National Data Bank on the state of the environment and natural resources (Art. 155). This information system is designed to accumulate, systematize, integrate, and enable the automated exchange of data among State authorities and other monitoring participants. In both structure and purpose, the National Data Bank reflects international standards of transparency and accountability found in IAEA documentation, including principles of open access, timeliness, and accuracy of information. The integration of natural-resource cadastres, environmental-permit registries, and waste-monitoring systems, including radioactive waste, ensures the availability of all key information necessary for assessing environmental and nuclear safety.

The regulation of access to the National Data Bank (Art. 156) further reinforces compliance with international requirements. The provision of free access to information for State bodies, individuals, and legal entities, as well as the absence of restrictions on copying and reproducing data, where such data do not constitute protected categories under the law-confirms adherence to principles of openness and public availability of environmental information articulated in Article 5 of the Ecological Code. This policy is consistent with IAEA approaches aimed at enhancing transparency in the management of nuclear materials and radiation safety. International practice shows that open-access environmental and radiological information strengthens trust among States and reduces the risk of misinformation in emergency situations. Scholarly literature also emphasizes that the new Ecological Code has strengthened public access to information [32].

Environmental monitoring as a component of the system (Art. 159) provides additional evidence of the alignment of national regulation with international standards. The mandatory nature of systematic observation, data collection, and analysis, as well as the provision of access to environmental information for individuals and legal entities, reflects the principles of the Aarhus Convention and contributes to meeting requirements related to transparency and public awareness of risks associated with high-hazard activities, including nuclear facilities.

Taken together, the provisions of Articles 152-159 of the Ecological Code establish a normative and institutional foundation that enables Kazakhstan to fulfil its international obligations in the fields of monitoring, information exchange, and the prevention of nuclear and radiological incidents. The national monitoring system, built upon the principles of regularity, reliability, and openness of data, strengthens Kazakhstan's integration into the global nuclear-safety framework and enhances the resilience of the State's emergency-management system.

The Ecological Code of the Republic of Kazakhstan (Arts. 211, 227, 395) contains a stable framework for emergency response that supports the State's international commitments regarding nuclear and radiation safety. The provisions follow the requirements of the 1986 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and IAEA standards for emergency preparedness and response through the document GS-R-2 "Preparedness and Response for a Nuclear or Radiological Emergency".

Article 211 contains essential rules that control the release of pollutants into the atmospheric air during emergencies. The requirement to notify State authorities right away, within two hours after detecting an emergency situation, follows the international standard for quick information sharing established through the Convention on Early Notification and the Convention on Assistance. The IAEA established standards that require facilities to implement immediate pollution prevention measures through facility shutdown operations to protect human populations from radiological incidents.

Similar provisions appear in Article 227, which regulates emergency situations involving water bodies. The explicit requirement for immediate notifications and for the adoption of measures to prevent deterioration of water quality demonstrates the universal approach adopted in national legislation towards different types of environmental media. This universality aligns with international practice, in which emergency response is understood as a comprehensive set of measures covering all potential pathways of contamination, including atmospheric, aquatic, and soil environments.

Article 395 establishes general requirements applicable to any type of environmental emergency. These include the need for rapid response, immediate notification of government oversight bodies, and the adoption of measures to eliminate adverse consequences. This

normative structure forms a uniform response regime for emergencies occurring at category I and II facilities, which is particularly important for activities involving nuclear materials and radioactive substances.

The substantive characteristics of these provisions reflect Kazakhstan's fulfilment of international procedures on emergency preparedness and response. The obligations placed on operators-including preventing the spread of contamination, shutting down the source of increased hazard, and providing information to State authorities-correspond to international standards in the fields of physical protection, radiation safety, and emergency-risk management. The presence of a unified action algorithm confirms Kazakhstan's commitment to ensuring coherence between domestic response mechanisms and global actions in the event of nuclear or radiological emergencies.

The regulation of emergency response within the Ecological Code strengthens the national preparedness system by ensuring compliance with international obligations and enhancing the resilience of State governance in the face of environmental and technological threats. The institutional integration of international standards forms the legal foundation for the effective protection of the population and the environment in emergencies of any scale.

The Ecological Code of the Republic of Kazakhstan includes Articles 369-375, which establish a complete system for radioactive waste management that fulfills all international nuclear safety standards from the 1997 Joint Convention. The provisions follow international standards for radioactive waste management through their structure and content, which demonstrates the State's dedication to meet IAEA guidelines for radioactive material storage and processing and disposal.

Article 369 establishes the basis for the classification of radioactive waste, defining it according to physical state, level of radioactivity, and origin. This classification corresponds to the international system used in IAEA Safety Standards, including the division of waste into low-, intermediate-, and high-level categories. The application of quantitative activity criteria based on specific radioactivity indicators confirms Kazakhstan's commitment to aligning with international methodological approaches to waste categorization, which are essential for ensuring safe management practices.

The provisions of Article 372 specify environmental requirements for the storage and disposal of radioactive waste, including the necessity of preventing nuclear chain reactions, applying radiation-safety norms, accounting for all risks, and preventing unauthorized access to radioactive materials. The requirement of mandatory licensing for activities related to waste storage and disposal corresponds to the Joint Convention's requirement that State Parties establish effective regulatory and supervisory systems in this area.

Particular attention should be given to the technical requirements for radioactive waste storage and disposal facilities contained in Article 373. The established criteria for site selection – including geological stability, absence of karst formations, depth of groundwater, and the presence of impermeable geological formations – align with the international safety standard IAEA SSR-5 "Disposal of Radioactive Waste". This document sets out requirements for protective barriers, site characteristics, and engineered systems designed to prevent the migration of radionuclides into the environment throughout the entire period of potential hazard. The application of analogous criteria in national legislation confirms the implementation of international best practices in the design and operation of radioactive waste repositories.

Article 374 contains one of the key mechanisms for fulfilling international obligations – the direct prohibition on the import of radioactive waste into the Republic of Kazakhstan for storage

or disposal. This prohibition is consistent with international safety standards and the provisions of the Joint Convention aimed at preventing the transboundary transfer of radioactive waste to States with less developed control systems. Moreover, this rule aligns with international efforts to prevent the creation of "nuclear dumping grounds" on the territory of individual States, thereby strengthening Kazakhstan's national radiation-safety regime.

Article 375 regulates the transportation of radioactive waste, establishing the obligation to comply with international norms and procedures. The duties of the consignor and carrier, as well as requirements for packaging, labeling, and transport-vehicle safety, reflect the provisions of IAEA recommendations on the safe transport of radioactive materials (IAEA Regulations for the Safe Transport of Radioactive Material). The integration of these standards ensures uniform safety approaches and reduces the risk of incidents during the transport of radioactive materials both within Kazakhstan and in a transboundary context.

The provisions of Articles 369-375 establish a complete framework for radioactive waste management that operates within the international nuclear safety framework. The provisions show Kazakhstan develops its regulatory framework through international best practices to protect people and the environment from radioactive material threats. The national legislation alignment with international standards enhances Kazakhstan's position as a nation, which upholds its nuclear and radiation safety commitments.

Discussion

The evaluation of Kazakhstan's international nuclear safety commitments against its domestic environmental and atomic laws shows strong alignment between these two sets of regulations. The international framework bases its core elements on the Treaty on the Non-Proliferation of Nuclear Weapons (1968), and IAEA safeguards system and Convention on Nuclear Safety (1994), and Joint Convention on Spent Fuel and Radioactive Waste Safety (1997), and Espoo Convention and its associated agreements for nuclear accident response. All these international agreements require States Parties to use their established core standards when developing their nuclear energy policy frameworks.

The Ecological Code of the Republic of Kazakhstan contains explicit implementation of essential international principles. The legal framework of Article 2 establishes priority for international treaties that create direct effect for the NPT and the Convention on Nuclear Safety and other instruments to determine domestic regulatory content. The national regulatory framework of Kazakhstan includes a State system for accounting and control of nuclear materials and licensing and physical protection of facilities because the country maintains non-nuclear-weapon status under Articles II-III of the NPT.

Particular significance lies in the comparison of Ecological Code provisions with IAEA international standards. The norms regulating radioactive waste management (Arts. 369-375) rely on the classification methodology and safety-assessment approaches developed within the IAEA Safety Standards. Requirements governing disposal facilities correspond to the provisions of IAEA SSR-5, confirming that national technical criteria conform to international recommendations. The prohibition on the import of radioactive waste for disposal, established in Article 374, reflects Kazakhstan's obligations under the Joint Convention to prevent transboundary environmental risks.

The extent to which international requirements for EIA implementation needs evaluation. The framework of Articles 48-50, 75 and 80-84 establishes a complete environmental

assessment system which includes strategic environmental assessment and environmental impact assessment and transboundary impact assessment. The system includes procedures for State involvement and mandatory consultation and translation requirements and comment evaluation, which follow the Espoo Convention and IAEA guidelines for nuclear activity assessments. National regulation not only reproduces international requirements but also further details administrative procedures, ensuring greater transparency and predictability.

The analysis also indicates an enhanced level of implementation of international standards in monitoring and information exchange. The establishment of the Unified State System for Environmental and Natural Resources Monitoring and the National Data Bank (Arts. 152-159) aligns with the principles of the international early-notification and information-openness regimes embedded in the IAEA conventions of 1986. The requirements for prompt notification of competent authorities in the event of accidents (Arts. 211, 227, 395) demonstrate the direct implementation of the international GS-R-2 norms governing emergency preparedness and response.

Overall, Kazakhstan's national legislation is not only aligned with international requirements but also contains mechanisms that further develop and specify global standards. The most substantial contribution of international obligations is observed in the sphere of environmental impact assessment and transboundary procedures, where Kazakhstan has introduced administrative mechanisms that exceed the minimum international requirements in terms of procedural depth and formalization. All of this demonstrates the State's commitment to building an integrated regulatory system that ensures high standards of environmental and nuclear safety.

Despite the high degree of consistency between national regulation and international obligations, several structural and substantive challenges remain within Kazakhstan's legal system, requiring further normative clarification. One of the most significant issues is the absence in the Ecological Code of an independent, systematic chapter dedicated specifically to the regulation of atomic energy. The existing provisions related to radioactive waste management, environmental impact assessment, monitoring, and emergency response are dispersed across multiple sections, which complicates their integrated application. Such fragmentation reduces the systemic coherence of regulation and complicates law-enforcement practice, particularly in the context of the contemporary trend toward integrating sectoral norms into a unified nuclear-safety framework.

The Ecological Code lacks specific methods to merge its provisions with the Law of the Republic of Kazakhstan "On the Use of Atomic Energy", which creates additional implementation difficulties. The two acts establish legal frameworks that share common provisions regarding State oversight and nuclear material tracking and physical security standards and radioactive waste management and facility operation requirements at dangerous facilities. However, issues concerning the distribution of powers among competent authorities, licensing procedures, and the specifics of interagency coordination lack sufficient detail. This inconsistency may hinder the fulfilment of international obligations, as mechanisms of oversight and control in the field of nuclear safety in international practice are built upon a clearly defined allocation of institutions and functions.

The issue of sustainable management of SNF also requires particular attention, especially in the absence of operating nuclear power plants. Although Kazakhstan's regulatory framework contains provisions on radioactive-waste and SNF management developed in accordance with IAEA standards and the requirements of the Joint Convention, the country currently has no

functioning nuclear power reactors. With the prospect of constructing the first nuclear power plant, there is a need to adapt national regulations to future SNF-management cycles, including long-term storage, reprocessing, and final disposal. International practice presupposes the existence of pre-developed SNF-management strategies, yet this issue has not yet received comprehensive legislative formulation in Kazakhstan.

The issues and challenges identified above indicate the need for further improvement of the regulatory system governing nuclear and environmental safety. While maintaining a high level of compliance with international requirements, Kazakhstan must shift from a fragmented set of norms to a coherent and institutionally coordinated regulatory model capable of addressing emerging technological, energy-related, and international legal developments.

The role of international conventions and standards in shaping Kazakhstan's system of nuclear and environmental safety is not only of theoretical but also of pronounced practical significance. The international treaties that Kazakhstan participates in serve as essential references for creating national laws and establishing institutional rules for regulation. The NPT and Convention on Nuclear Safety and Joint Convention on Spent Fuel Safety and Radioactive Waste Management and IAEA safeguards system instruments establish a compulsory regulatory framework which enables the development of legal systems for control and material management and monitoring and emergency response. This influence determines not only the content of specific provisions of the Ecological Code but also the strategic approaches to modernizing the entire field of State regulation.

Equally significant is the fact that the Republic of Kazakhstan is one of the most active participants in IAEA institutional mechanisms in the Eurasian region. The country's engagement in OSART, IRRS, and INIR missions, along with its regular reporting within peer-review mechanisms, contributes to the continuous updating of national standards in light of international best practices. Kazakhstan's regulatory approaches are oriented toward the best available technologies, the IAEA Safety Standards Series, and the Agency's recommendations on radioactive waste management and accident prevention. This orientation toward internationally recognized standards supports the stability of national policy and ensures a high level of confidence among international partners.

The practical relevance of international influence is also evident in Kazakhstan's integration of its economic and energy strategies into global cooperation chains. The construction of Kazakhstan's first nuclear power plant, along with radioactive waste management systems and institutional oversight updates, needs to follow international standards because they determine the country's ability to obtain sophisticated technology and equipment and specialized technical support. International obligations thus serve as a formative factor for national regulators, providing them with a methodological basis for decision-making and setting the direction for legal development.

Taken together, these circumstances confirm that international norms and standards are not limited to the role of an external source of obligations but constitute a key instrument in the practical development of Kazakhstan's model of environmental and nuclear safety. This transformation reflects the State's strategic pursuit of a regulatory system comparable with Western and global standards, thereby strengthening Kazakhstan's position as a responsible participant in the international nuclear-safety community.

The forthcoming development of nuclear energy in the Republic of Kazakhstan, including current plans for constructing the country's first nuclear power plant, necessitates further

improvement of national legislation toward its harmonization with modern international safety standards. Given the high technological complexity of nuclear facilities and the significant potential risks involved, regulatory frameworks must comply with the requirements of key IAEA guidance documents, particularly SSR-2/1 "Safety of Nuclear Power Plants: Design," SSG-12 "Licensing Process for Nuclear Installations," and SSG-35 "Site Survey and Site Selection for Nuclear Installations". These documents establish detailed criteria for design, licensing, site selection, and operational safety, serving as internationally recognized benchmarks in the regulation of nuclear installations.

Another direction for further development concerns the expansion of safety-assessment procedures, including multilayered requirements for analyzing design-basis and beyond-design-basis accidents, evaluating external hazards, and protecting against extreme natural events. Incorporating more detailed mechanisms for periodic safety reassessment, operational experience analysis, and safety-culture requirements into national legislation will contribute to the formation of a resilient regulatory oversight system capable of ensuring reliable protection of the population and the environment.

Further institutional strengthening of international peer-review mechanisms also acquires particular importance. The established effectiveness of regular IRRS, OSART, and INIR reviews in improving transparency, identifying regulatory gaps, and facilitating the adoption of advanced nuclear-safety solutions illustrates their practical value. In the future, Kazakhstan may expand its participation in such missions across all stages of the nuclear power plant life cycle – from preliminary site selection to operation. This would facilitate the adaptation of global best practices and promote a high level of confidence within the international community.

These prospects indicate the need for continued evolution of the legislative system toward greater detail in regulatory requirements, broader integration of comprehensive international standards, and strengthened mechanisms of independent oversight. Given the strategic significance of nuclear energy, the development of the regulatory framework should be grounded in principles of transparency, scientific justification, and sustainable functioning, aligning with Kazakhstan's long-term interests and global trends in the nuclear sector.

Conclusion

The evolution of Kazakhstan's legislation in the field of nuclear and environmental safety demonstrates that international conventions and the universal norms of the global nuclear regime have served as a key systemic factor in shaping the country's contemporary legal policy. As a State Party to the Treaty on the Non-Proliferation of Nuclear Weapons, Kazakhstan consistently fulfills its obligations as a non-nuclear-weapon State, ensuring comprehensive accounting, control and oversight of nuclear materials in line with the IAEA safeguards framework. Cooperation with the Agency, including the implementation of comprehensive safeguards, principles of physical protection and safety standards, has predetermined the high degree of institutional coherence between the national regulatory model and the international nuclear regime.

Legal developments in the area of spent fuel and radioactive waste management reflect Kazakhstan's sustained implementation of its obligations under the 1997 Joint Convention. The incorporation of its requirements is evident in the detailed regulatory classification of waste categories, technical standards for storage and disposal facilities, and the explicit prohibition

on the transboundary import of radioactive waste. These elements illustrate Kazakhstan's adherence to the strictest international safety criteria.

The 2021 Ecological Code of Kazakhstan emerged from international obligations, which led to the creation of environmental impact assessment systems and the development of cross-border cooperation frameworks and enhanced monitoring and information disclosure practices. The most important aspect of the law includes its provisions about cross-border environmental impact assessments, which follow the Espoo Convention and IAEA guidelines. These norms enhance legal predictability and interstate coordination in the implementation of potentially hazardous projects, including nuclear energy facilities.

International safety standards have become not only a point of reference but also a practical tool for the modernization of national legislation, ensuring its scientific robustness and long-term stability. At the same time, Kazakhstan's prospective plans for constructing a nuclear power plant necessitate further harmonization of the legal framework with the current IAEA SSR and SSG series documents, including standards for design, operation, spent fuel management and decommissioning. The reinforcement of international safety reviews, regular peer-review mechanisms and institutional cooperation with international organizations is gaining critical importance for the formation of a comprehensive national nuclear safety system.

In view of these factors, it can be concluded that international treaties and standards have exerted a decisive influence on the structuring of Kazakhstan's entire system of legal regulation in the field of nuclear energy use and environmental protection. Further improvement of national legislation, grounded in international obligations and global best practices, will play a crucial role in ensuring a high level of protection for the population and the environment in the context of the potential commissioning of nuclear energy facilities in the Republic of Kazakhstan.

References

1. Fisher M. Developing Nuclear Power Infrastructure in Newcomer Countries – URL: https://www.iaea.org/bulletin/developing-nuclear-power-infrastructure-in-newcomer-countries (accessed: 15.05.2025).

2. The World Nuclear Industry Status Report 2024 (HTML). –URL: https://www.worldnuclearreport.org/The-World-Nuclear-Industry-Status-Report-2024-HTML (accessed: 20.03.2025).

3. New IAEA Network Supports Countries in Long Term Operation of Nuclear Reactors. –– URL: https://www.iaea.org/newscenter/news/new-iaea-network-supports-countries-in-long-term-operation-of-nuclear-reactors (accessed: 10.04.2025).

4. Uranium and Nuclear Power in Kazakhstan.– URL: https://world-nuclear.org/information-library/country-profiles/countries-g-n/kazakhstan (accessed: 01.08.2025).

5. Kazakhstan nuclear power plant project moving ahead.– URL: https://www.world-nuclear-news.org/articles/kazakhstan-nuclear-power-plant-project-moving-ahead (accessed: 10.07.2025).

6. Kazakhstan's Energy Future: The Role and Importance of Nuclear Power Plants –URL: https://www.eurasian-research.org/publication/kazakhstans-energy-future-the-role-and-importance-of-nuclear-power-plants/ (accessed: 05.06.2025).

7. Treaty on the Non-Proliferation of Nuclear Weapons – URL: https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons (accessed: 18.03.2025).

8. Convention on Early Notification of a Nuclear Accident– URL: https://www.iaea.org/topics/nuclear-safety-conventions/convention-early-notification-nuclear-accident (accessed: 22.05.2025).

9. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency– URL: https://www.ifrc.org/docs/idrl/I148EN.pdf (accessed: 12.04.2025).

10. Third national report of the Republic of Kazakhstan on compliance with obligations subsequent upon the Convention on Nuclear Safety– URL: https://www.iaea.org/sites/default/files/national_report_of_kazakhstan_for_the_8th_review_meeting.pdf (accessed: 15.07.2025).

11. On Use of Nuclear Energy. Law of the Republic of Kazakhstan dated 12 January 2016 № 442– URL: https://adilet.zan.kz/eng/docs/Z1600000442 (accessed: 20.04.2025).

12. Ecological Code of the Republic of Kazakhstan. The Code of the Republic of Kazakhstan dated 2 January 2021 № 400-VI– URL: https://adilet.zan.kz/eng/docs/K2100000400 (accessed: 15.05.2025).

13. Кузьмина Е.М. Атомная энергетика в Центральной Азии // Геоэкономика энергетики. – 2021. – Т. 16. – №4. – С. 6-21.

14. Agreement of 26 July 1994 Between the Republic of Kazakhstan and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons– URL: https://www.iaea.org/publications/documents/infcircs/agreement-26-july-1994-between-republic-kazakhstan-and-international-atomic-energy-agency-application-safeguards-connection-treaty-non-proliferation-nuclear-weapons (accessed: 30.05.2025).

15. Фаизова Р.С. Инициативы Казахстана по созданию безъядерной зоны в Центральной Азии // Вестник Российского университета дружбы народов. Серия: Международные отношения. – 2011. – №3. – С. 31-36.

16. Парамузова О.Г. Современные международно-правовые проблемы ядерной безопасности и радиационной защиты // Евразийская интеграция: экономика, право, политика. – 2020. – №2 (32). – С. 56-64.

17. Постановления Правительства РК и положения об Агентстве РК по атомной энергии– URL: https://www.gov.kz/uploads/2024/3/15/bf14d1ddec54279bf5285d2b545dfe82_original.25307.docx (accessed: 10.07.2025).

18. Нукушева А.А. Международно-правовые аспекты регулирования в области атомной энергетики // Вестник Института законодательства и правовой информации Республики Казахстан. – 2022. – №3 (70). – С. 171-180.

19. Жадауова Ж.А., Рамазанова А.С. Совершенствование законодательства в сфере радиационной безопасности населения // Вестник Института законодательства и правовой информации Республики Казахстан. – 2022. – №4 (71). – С. 235-245.

20. Гельманова З.С., Саульский Ю.Н., Abdul Walid F.W. Мини-атомные электростанции в Казахстане: возможности, вызовы и обеспечение безопасности // In the World of Science and Education. – Almaty, 2025. – С. 9-15.

21. Еркинбаева Л.К., Бекежанов Д.Н., Калымбек Б. Экологическая информация и ее значение в осуществлении международного эколого-правового сотрудничества Республики Казахстан // Вестник Института законодательства и правовой информации Республики Казахстан. – 2023. – №1 (72). – С. 91-97.

22. Парамузова О.Г. Международно-правовые регулирования проблемы защиты окружающей среды от радиоактивного загрязнения // Евразийская интеграция: экономика, право, политика. – 2023. – Т. 17. – №3 (45). – С. 109-119.

23. Fifth National Report of the Republic of Kazakhstan on Compliance with the Obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management– URL: https://www.iaea.org/sites/default/files/2025-08/kazakhstan-national-report-8rm-english.pdf (accessed: 15.07.2025).

24. Yeligbayeva G.Zh. The System of Nuclear Material Control of Kazakhstan. –– URL: https://inis.iaea.org/records/c1bf0-2sp20 (accessed: 20.05.2025).

25. IAEA Safety Standards. Classification of Radioactive Waste for Protecting People and the Environment. No. GSG-1. General Safety Guide– URL: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf (accessed: 22.06.2025).

26. IAEA Safety Standards. Disposal of Radioactive Waste for Protecting People and the Environment. No. SSR-5. Specific Safety Requirements – [Electronic resource] – URL: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1449_web.pdf (accessed: 01.08.2025).

27. Zhidebekkyzy A., Amangeldiyeva B. The Influence of Economic and Environmental Factors on the Adoption of Responsible Production Standards // Eurasian Journal of Economic and Business Studies. – 2025. – №69 (1). – С. 97-110.

28. IAEA Experts Assess Kazakhstan's Progress in Nuclear Infrastructure Development, 03.04.2023 –– URL: https://astanatimes.com/2023/04/iaea-experts-assess-kazakhstans-progress-in-nuclear-infrastructure-development/ (accessed: 18.04.2025).

29. Ziganshina D.R. Transboundary Environmental Assessment in the Aral Sea Basin: The Interplay of International and Domestic Law // Central Asian Journal of Water Research. – 2018. – Т. 4. – №2. – С. 27-47.

30.Joldybayeva E. Kazakhstan's Leadership in International Relations: The Cases of Nuclear and Environmental Security // Мемлекеттік басқару және мемлекеттік қызмет. – 2022. – №4 (83). – С. 105-118.

31.Nurpeisova M.B., Umirbaeva A.B., Fedorov E.V., Miletenko N.A. Integrated Monitoring-Based Assessment of Deformation and Radiation Situation of Territorial Domains // Eurasian Mining. – 2021. – №1. – С. 83-87.

32. Kumar Y. Analysis of Kazakhstan's New Environmental Code: Focus on Environmental Awareness Aspects, April 2022 –– URL: https://www.researchgate.net/publication/367712785_Analysis_of_Kazakhstan%27s_New_Environmental_Code_Focus_on_environmental_awareness_aspects (accessed: 25.05.2025).

Д.Р. Сайпинов

Ұлттық мемлекеттік ғылыми-техникалық сараптама орталығы, Алматы, Қазақстан
(e-mail: daniyar.saipinov@mail.ru)

Қазақстанның атом энергиясы саласындағы заңнамалық саясатының дамуына халықаралық ядролық қауіпсіздік жөніндегі конвенциялардың ықпалы

Аңдатпа: Мақала халықаралық ядролық және радиациялық қауіпсіздік жөніндегі конвенциялар мен стандарттардың Қазақстан Республикасының атом энергиясы саласындағы заңнамалық саясатының қалыптасуына және оның әрі қарай дамуына ықпалын талдауға арналған. Зерттеудің өзектілігі елдегі АЭС салу мәселесінің күн тәртібіне шығуына, сондай-ақ ұлттық реттеу тетіктерін халықаралық талаптармен үйлестіру қажеттілігіне байланысты артып отыр. Жұмыс мақсаты – ЯҚТШ, Ядролық қауіпсіздік жөніндегі конвенция, Бірлескен конвенция және МАГАТЭ қауіпсіздік стандарттарынан туындайтын халықаралық міндеттемелердің ұлттық құқыққа енгізілу тетіктерін айқындау және олардың заңнамалық саясатқа ықпал ету дәрежесін бағалау. Зерттеудің ғылыми және практикалық маңызы халықаралық нормалардың жүзеге асырылуын кешенді құқықтық талдау арқылы ашылады. Әдіснамасы халықаралық шарттарды, 2021 жылғы Экологиялық кодекстің және «Атом энергиясын пайдалану туралы» Заңның нормаларын салыстырмалы-құқықтық тұрғыдан зерделеуге негізделген. Алынған нәтижелер Қазақстанның радиоактивті қалдықтарды басқару, лицензиялау, реттеуші тәуелсіздік және трансшекаралық экологиялық бағалау салаларында халықаралық стандарттарға едәуір жақындағанын көрсетті. Зерттеудің құндылығы ядролық қауіпсіздік режимдерінің ұлттық құқықтық саясатқа жүйелік ықпалын дәлелдеуде. Практикалық мәні ядролық энергетика жобаларын іске асыру үшін құқықтық базаны жетілдіруге бағытталған ұсынымдармен айқын-далады.

Түйін сөздер: халықаралық конвенциялар, ядролық қауіпсіздік, МАГАТЭ, заңнамалық саясат, радиоактивті қалдықтар.

Д. Сайпинов
Национальный центр государственной научно-технической экспертизы, Алматы, Казахстан
(e-mail: daniyar.saipinov@mail.ru)

Влияние международных конвенций по ядерной безопасности на развитие законодательной политики Казахстана в сфере атомной энергии

Аннотация: Статья посвящена анализу влияния международных конвенций и стандартов ядерной безопасности на формирование законодательной политики Республики Казахстан в сфере атомной энергии. Актуальность исследования определяется планами строительства АЭС и необходимостью укрепления национальной системы регулирования в соответствии с глобальными требованиями. Целью работы является выявление механизмов, посредством которых международные обязательства Казахстана по ДНЯО, Конвенции о ядерной безопасности, Объединённой конвенции и документам МАГАТЭ интегрируются в национальное право и определяют его дальнейшее развитие. Научная и практическая значимость исследования заключается в восполнении пробела в комплексном анализе воздействия международных норм на современное законодательство. Методология основывается на сравнительно-правовом анализе международных договоров, Экологического кодекса 2021 года и Закона «Об использовании атомной энергии». Основные результаты подтверждают, что Казахстан выстроил высокую степень соответствия международным требованиям, включая совершенствование процедур обращения с радиоактивными отходами и развитие трансграничной оценки воздействия. Вклад исследования состоит в выявлении системообразующей роли международных режимов. Практическое значение определяется тем, что выводы могут служить основой для дальнейшего совершенствования нормативной базы и реализации проектов ядерной энергетики.

Ключевые слова: международные конвенции, ядерная безопасность, МАГАТЭ, законодательная политика, радиоактивные отходы.

References

1 Fisher M. Developing Nuclear Power Infrastructure in Newcomer Countries. Available at: https://www.iaea.org/bulletin/developing-nuclear-power-infrastructure-in-newcomer-countries (accessed: 15.05.2025).

2 The World Nuclear Industry Status Report 2024 (HTML). Available at: https://www.worldnuclearreport.org/The-World-Nuclear-Industry-Status-Report-2024-HTML (accessed: 20.03.2025).

3 New IAEA Network Supports Countries in Long-Term Operation of Nuclear Reactors. Available at:https://www.iaea.org/newscenter/news/new-iaea-network-supports-countries-in-long-term-operation-of-nuclear-reactors (accessed: 10.04.2025).

4 Uranium and Nuclear Power in Kazakhstan. Available at: https://world-nuclear.org/information-library/country-profiles/countries-g-n/kazakhstan (accessed: 01.08.2025).

5 Kazakhstan nuclear power plant project moving ahead. Available at: https://www.world-nuclear-news.org/articles/kazakhstan-nuclear-power-plant-project-moving-ahead (accessed: 10.07.2025).

6 Kazakhstan's Energy Future: The Role and Importance of Nuclear Power Plants. Available at: https://www.eurasian-research.org/publication/kazakhstans-energy-future-the-role-and-importance-of-nuclear-power-plants/ (accessed: 05.06.2025).

7 Treaty on the Non-Proliferation of Nuclear Weapons. Available at: https://disarmament.unoda.org/en/our-work/weapons-mass-destruction/nuclear-weapons/treaty-non-proliferation-nuclear-weapons (accessed: 18.03.2025).

8 Convention on Early Notification of a Nuclear Accident. Available at: https://www.iaea.org/topics/nuclear-safety-conventions/convention-early-notification-nuclear-accident (accessed: 22.05.2025).

9 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. Available at: https://www.ifrc.org/docs/idrl/I148EN.pdf (accessed: 12.04.2025).

10 Third national report of the Republic of Kazakhstan on compliance with obligations subsequent upon the Convention on Nuclear Safety. Available at: https://www.iaea.org/sites/default/files/national_report_of_kazakhstan_for_the_8th_review_meeting.pdf (accessed: 6 15.07.2025).

11 On Use of Nuclear Energy. Law of the Republic of Kazakhstan dated 12 January 2016 No. 442. Available at: https://adilet.zan.kz/eng/docs/Z1600000442 (accessed: 20.04.2025).

12 Ecological Code of the Republic of Kazakhstan. The Code of the Republic of Kazakhstan dated 2 January 2021 No. 400-VI. Available at: https://adilet.zan.kz/eng/docs/K2100000400 (accessed: 15.05.2025).

13 Kuzmina E.M. Atomnaya energetika v Tsentralnoy Azii [Nuclear energy in Central Asia] Geoekonomika energetiki. 16(4). 6-21(2021). [in Russian]

14 Agreement of 26 July 1994 Between the Republic of Kazakhstan and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons. Available at: https://www.iaea.org/publications/documents/infcircs/agreement-26-july-1994-between-republic-kazakhstan-and-international-atomic-energy-agency-application-safeguards-connection-treaty-non-proliferation-nuclear-weapons (accessed: 30.05.2025).

15 Faizova R.S. Initsiativy Kazakhstana po sozdaniyu bez'yadernoy zony v Tsentralnoy Azii [Kazakhstan's initiatives on creating a nuclear-weapon-free zone in Central Asia] Vestnik Rossiyskogo universiteta druzhby narodov. Seriya: Mezhdunarodnye otnosheniya. 3. 31-36(2011). [in Russian]

16 Paramuzova O.G. Sovremennye mezhdunarodno-pravovye problemy yadernoy bezopasnosti i radiatsionnoy zashchity [Modern international legal problems of nuclear safety and radiation protection] Evraziyskaya integratsiya: ekonomika, pravo, politika. 2(32). 56-64(2020). [in Russian]

17 Postanovleniya Pravitelstva RK i polozheniya ob Agentstve RK po atomnoy energii [Governmental resolutions of the Republic of Kazakhstan and regulations on the Atomic Energy Agency of Kazakhstan]. Available at: https://www.gov.kz/uploads/2024/3/15/bf14d1ddec54279bf5285d2b545dfe82_original.25307.docx (accessed: 10.07.2025). [in Russian]

18 Nukusheva A.A. Mezhdunarodno-pravovye aspekty regulirovaniya v oblasti atomnoy energetiki [International legal aspects of regulation in the field of nuclear energy] Vestnik Instituta zakonodatelstva i pravovoy informatsii Respubliki Kazakhstan. 3(70). 171-180(2022). [in Russian]

19 Zhadauova Zh.A., Ramazanova A.S. Sovershenstvovanie zakonodatelstva v sfere radiatsionnoy bezopasnosti naseleniya [Improving legislation in the field of radiation safety of the population] Vestnik Instituta zakonodatelstva i pravovoy informatsii Respubliki Kazakhstan. 4(71). 235-245(2022). [in Russian]

20 Gelmanova Z.S., Saulskiy Yu.N., Abdul Walid F.W. Mini-atomnye elektrostantsii v Kazakhstane: vozmozhnosti, vyzovy i obespechenie bezopasnosti [Mini nuclear power plants in Kazakhstan: opportunities, challenges and safety assurance] In the World of Science and Education. Almaty. 9-15(2025). [in Russian]

21 Yerkinbayeva L.K., Bekezhanov D.N., Kalymbek B. Ekologicheskaya informatsiya i ee znachenie v osushchestvlenii mezhdunarodnogo ekologo-pravovogo sotrudnichestva Respubliki Kazakhstan [Environmental information and its significance in implementing international environmental-legal cooperation of the Republic of Kazakhstan] Vestnik Instituta zakonodatelstva i pravovoy informatsii Respubliki Kazakhstan. 1(72). 91-97(2023). [in Russian]

22 Paramuzova O.G. Mezhdunarodno-pravovye regulirovaniya problemy zashchity okruzhayushchey sredy ot radioaktivnogo zagryazneniya [International legal regulation of environmental protection from

radioactive contamination] Evraziyskaya integratsiya: ekonomika, pravo, politika. 17(3). 109-119(2023). [in Russian]

23 Fifth National Report of the Republic of Kazakhstan on Compliance with the Obligations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Available at: https://www.iaea.org/sites/default/files/2025-08/kazakhstan-national-report-8rm-english.pdf (accessed: 15.07.2025).

24 Yeligbayeva G.Zh. The System of Nuclear Material Control of Kazakhstan. Available at: https://inis.iaea.org/records/c1bf0-2sp20 (accessed: 20.05.2025).

25 IAEA Safety Standards. Classification of Radioactive Waste for Protecting People and the Environment. No. GSG-1. General Safety Guide. Available at: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1419_web.pdf (accessed: 22.06.2025).

26 IAEA Safety Standards. Disposal of Radioactive Waste for Protecting People and the Environment. No. SSR-5. Specific Safety Requirements. Available at: https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1449_web.pdf (accessed: 01.08.2025).

27 Zhidebekkyzy A., Amangeldiyeva B. The Influence of Economic and Environmental Factors on the Adoption of Responsible Production Standards Eurasian Journal of Economic and Business Studies. 69(1). 97-110(2025).

28 IAEA Experts Assess Kazakhstan's Progress in Nuclear Infrastructure Development. Available at: https://astanatimes.com/2023/04/iaea-experts-assess-kazakhstans-progress-in-nuclear-infrastructure-development/ (accessed: 18.04.2025).

29 Ziganshina D.R. Transboundary Environmental Assessment in the Aral Sea Basin: The Interplay of International and Domestic Law Central Asian Journal of Water Research. 4(2). 27-47(2018).

30 Joldybayeva E. Kazakhstan's Leadership in International Relations: The Cases of Nuclear and Environmental Security Memlekettik basskaru zhane memlekettik kyzmet. 4(83). 105-118(2022).

31 Nurpeisova M.B., Umirbaeva A.B., Fedorov E.V., Miletenko N.A. Integrated Monitoring-Based Assessment of Deformation and Radiation Situation of Territorial Domains Eurasian Mining. 1. 83-87(2021).

32 Kumar Y. Analysis of Kazakhstan's New Environmental Code: Focus on Environmental Awareness Aspects. Available at: https://www.researchgate.net/publication/367712785_Analysis_of_Kazakhstan%27s_New_Environmental_Code_Focus_on_environmental_awareness_aspects (accessed: 25.05.2025).

Information about the author:

Saipinov D. **–** PhD, National Center of Science and Technology Evaluation, 050026, Almaty, Kazakhstan

Сайпинов Д.Р. **–** PhD,Ұлттық мемлекеттік ғылыми-техникалық сараптама орталығы, 050026, Алматы, Қазақстан

Сайпинов Д.Р. **–** PhD, Национальный центр государственной научно-технической экспертизы, 050026, Алматы, Казахстан.