Abstract

of the dissertation submitted for the degree of Doctor of Philosophy (PhD) under the «8D04201 – Law» educational program

Roza Seilkassymova

Title: «Legal Regulation of the Medical Waste Recycling Process in the Republic of Kazakhstan»

General description of the research. The dissertation examines the theoretical and applied issues of legal regulation of medical waste recycling in the Republic of Kazakhstan. Medical waste is considered a distinct object of legal regulation, and the relationship among collection, sorting, storage, transportation, decontamination, recovery, recycling, utilization, and disposal operations is defined. Particular attention is paid to the conditions for sending waste for recycling, the relationship between the sanitary class and the code in the Waste Classifier, and the legal status of the material after treatment.

The first section examines the concept and legal nature of medical waste, the development of its regulation, and its governing principles. The second section analyzes international and national legal foundations, law-enforcement practice in Kazakhstan, conditions for sending waste for recycling, end-of-waste status, and liability. The third section substantiates proposals for improving legislation, allocating duties among participants, electronic traceability, documentary confirmation of the final operation, and separate collection of household medical and pharmaceutical waste.

The relevance of the research. The updated constitutional and legal basis for protecting human life and health and ensuring a favorable environment was established by the new Constitution of the Republic of Kazakhstan, adopted in the national referendum of 15 March 2026. Medical waste varies in composition and level of hazard. According to the World Health Organization, approximately 85 percent of waste from healthcare facilities is general waste, while about 15 percent is hazardous waste of an infectious, chemical, or radioactive nature. Materials uncontaminated by hazardous substances should therefore be collected separately and sent for recycling, while the safety of hazardous waste should be confirmed by the results of appropriate treatment.

In Kazakhstan, requirements for handling medical waste are established by the Environmental Code, the Code of the Republic of Kazakhstan On Public Health and the Healthcare System, sanitary rules, and the Waste Classifier. However, the sanitary class, waste code, hazardous properties, applied technology, and subsequent legal status are not fully interlinked. After waste is transferred to an operator, its route, the technology applied, and the final operation are not systematically recorded in a unified system. Differences in units of measurement in official statistics impede data comparison. A survey of 1,167 respondents showed demand for an accessible system for accepting unused medicines and household medical products.

It is also important to distinguish the legal outcomes of the operations. Decontamination aims to reduce or eliminate the hazardous properties of waste,

whereas recycling returns suitable materials to the production cycle. Completion of decontamination therefore does not mean that waste immediately becomes secondary material. The safety outcome, material composition, technology applied, and possibility of further use must be confirmed separately. If the sequence of these stages is not clearly defined, verifying the subsequent movement of waste and the final outcome of treatment becomes difficult.

Degree of development of the research. Foreign and Kazakhstani studies address the effects of medical waste on health and the environment, treatment technologies, sanitary safety, the circular economy, the legal regime, and household pharmaceutical waste. However, the interconnected issues of the relationship between sanitary class and waste code, the transition from decontamination to recycling, end-of-waste status, electronic traceability after transfer to an operator, allocation of duties among participants, and acceptance of waste from the public have not been comprehensively studied.

The object of the dissertation research. The object of the research is the social relations arising among healthcare organizations, carriers, operators, recycling enterprises, and public authorities during the separate collection, storage, transportation, decontamination, transfer for recycling, introduction of medical waste into secondary circulation, and confirmation of the final operation.

Subject of the research. The subject of the research comprises the national legal rules governing these relations, international requirements, foreign legal practice, scholarly concepts, and law-enforcement materials.

Research base. The source base comprised the Constitution of the Republic of Kazakhstan, environmental and healthcare legislation, sanitary rules, the Waste Classifier, international conventions, documents of the World Health Organization and the International Atomic Energy Agency, and the experience of the European Union and foreign states. The empirical base included official statistics for 2020–2024, law-enforcement materials, observations in healthcare organizations, 10 semi-structured interviews, the experience of Swedish pharmacies, and a survey of 1,167 respondents.

The interviews helped clarify practices relating to the classification, separate collection, temporary storage, internal accounting, decontamination, transfer to an operator, and subsequent treatment of medical waste. The experience of Swedish pharmacies was used to assess an organizational model for separately accepting unused medicines, insulin products, used syringes, and needles from the public. The survey aimed to determine public awareness, household waste-disposal practices, and attitudes toward a dedicated collection system.

Purpose and objectives of the dissertation research. The purpose of the research is to conduct a comprehensive analysis of the theoretical and applied foundations of the legal regulation of medical waste recycling, determine its legal nature, and develop proposals for improving national legislation and law-enforcement practice. To achieve this purpose, the following objectives were set:

– to define the concept and legal characteristics of medical waste;

– to examine the formation and stages of development of legal regulation;

– to study the principles of legal regulation of recycling;

– to analyze international legal practice;
– to conduct a legal analysis of current national legislation;
– to identify current recycling practices and the main problems;
– to study safe recycling and the legal traceability of waste movement;
– to analyze the legal grounds for liability for environmental harm;
– to identify directions for improving national legislation;
– to propose ways to improve the organization of medical waste recycling.

Methodological basis of the dissertation research. In accordance with the interdisciplinary nature of the research, normative-doctrinal, comparative legal, systemic, and formal-logical methods were applied. Normative analysis focused on defining the relationship among the principal operations, recyclability, and the requirements for end-of-waste status. The comparative method enabled international standards and foreign experience to be compared with the legislation of Kazakhstan. Law-enforcement practice was studied using official data, interviews, observation, and a sociological survey.

Systemic and formal-logical approaches were used to identify the relationship among sanitary, environmental, and technological requirements, synthesize the findings, and formulate legislative proposals. Foreign solutions were assessed in terms of their compatibility with Kazakhstan's legal system, public-administration structure, and existing permitting procedures.

Scientific novelty of the dissertation. Medical waste recycling is substantiated as an independent process with its own conditions and legal consequences. The legal attributes of medical waste are clarified and an original definition is formulated; the relationship among decontamination, recovery, recycling, utilization, and disposal operations is distinguished. Proposals are developed concerning recyclability criteria, conditions for sending decontaminated waste for recycling, end-of-waste requirements, electronic registration at the level of a container or homogeneous batch, and the separate acceptance of medical and pharmaceutical waste from the public.

The proposed legal model provides for the consistent recording of a waste item's sanitary class, code under the Waste Classifier, quantity, carrier, operator, applied technology, and final operation. These data make it possible to determine the stage at which duties pass from the healthcare organization to the operator and to define the limits of responsibility. Electronic records do not include patients' personal medical data.

Principal provisions and conclusions submitted for defense.

1) The legal regulation of medical waste recycling constitutes an intersectoral legal regime because sanitary and epidemiological, environmental, and technological requirements apply concurrently from the moment waste is generated until its final legal status is established, while their content varies depending on the hazardous properties and risk level of the waste and the selected treatment method.

2) The more matters concerning the relationship between the sanitary class of medical waste and its Waste Classifier code, the allocation of duties when it is transferred to an operator, the legal status of the material after treatment, and the

procedure for confirming the final operation remain unregulated by law, the more frequently these matters are interpreted differently in law-enforcement practice.

3) Decontaminated medical waste may be sent for recycling only when its sanitary and epidemiological safety, the technology applied, and a positive laboratory-control result are documented; if any one of these three conditions is not confirmed, the waste must not be sent for recycling.

4) Waste status ends when all four conditions are met: the recovery or recycling operation is completed, and the safety of the resulting material, its compliance with established requirements, and its suitability for further use are confirmed. If any of these conditions is not met, waste status is retained.

5) Electronic registration of medical waste movement by container or homogeneous batch, with the applied technology and final operation recorded in the system, provides documentary confirmation of each stage of the recycling route and makes it possible to identify the responsible party from the recorded data when the route is violated.

6) The absence of an accessible system for the separate acceptance of medical and pharmaceutical waste from the public increases the likelihood that it will be stored at home without control or discarded with municipal waste, whereas specialized collection points ensure that such waste is transferred for safe treatment in a traceable manner.

Theoretical significance of the dissertation research. The research expands the theoretical understanding of medical waste recycling as an intersectoral legal regime. The original definition and the legal characteristics of the principal operations provide a basis for further research in this field and for the development of environmental and medical law.

Approbation of the research results. The main findings of the study were published in four scholarly works: one article in an international scientific journal indexed in Scopus; two articles in scientific journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan; and one article in scientific conference proceedings.

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2. Seilkassymova R. A., Nurmukhankyzy D. Legal and economic issues of improving the medical waste management system // Bulletin of the Karaganda University “Law Series”. – 2025. – Vol. 30, No. 2(118). – P. 25–34. – DOI: 10.31489/2025L2/25-34.

3. Wojtczak D., Nurmukhankyzy D., Seilkassymova R. A. Legal Aspects of Regulation of Medical Waste Treatment and Disposal in the Republic of Kazakhstan: Problems and Directions of Improvement // Bulletin of the Institute of Legislation and Legal Information of the Republic of Kazakhstan. – 2026. – Vol. 81, No. 1. – P. 87–99. – DOI: 10.52026/2788-5291_2026_81_1_87.

4. Seilkassymova R. A. Towards the issue of recycling medical waste in Kazakhstan: problems and solutions // Правовое регулирование обращения с твёрдыми бытовыми отходами в контексте реализации целей устойчивого развития: вызовы и перспективы: материалы международной научно-практической конференции (Караганда, 25 сентября 2025 г.). – Караганда: ТОО «Arko Printing House», 2025. – С. 181–184.

Structure and length of the dissertation. The dissertation consists of an introduction, three sections, ten subsections, a conclusion, a list of references, and appendices. The first section addresses the theoretical and legal foundations; the second covers international and national regulation and law-enforcement practice; and the third focuses on directions for legislative and organizational improvement.