The Central Research institute
of the Armed Forces of Ukraine

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

Received: *December 1, 2025* | **Revisions Requested:** - | **Revision Received:** -
Accepted: *January 29, 2026* | **Published Online:** *March 21, 2026*

Licensed (C) by Creative Commons Attribution International License 4.0 (CC BY-NC-SA)

DOI: 10.62524/msj.2025.3.4.4

The need to develop and implement a strategy for chemical, biological, radiation, and nuclear safety in Ukraine in the context of contemporary global challenges and conflicts

Yevhen Nahornyi
Doctor of Philosophy
Head of the Chemical, Biological, Radiological, and Nuclear Protection Forces
Head of the Chemical, Biological, Radiological, and Nuclear Protection Department
Command of the Support Forces of the Armed Forces of Ukraine
04119, Dehtiarivska St., 11-v, Kyiv, Ukraine
e-mail: rhbz777@ukr.net
ORCID: 0000-0001-7008-5853

Abstract. The article is devoted to a comprehensive analysis of threats to Ukraine's chemical, biological, radiological, and nuclear (CBRN) security in the context of ongoing armed aggression, accompanied by an increased risk of the use of unconventional weapons and hybrid forms of influence. The relevance of the research is determined by the transformation of modern military conflicts, in which CBRN factors are increasingly used not only as a means of physical damage, but also as an instrument of political pressure, psychological influence, and destabilization of the state management system. An additional factor contributing to the relevance of this research is the lack of a comprehensive, institutionally integrated approach to the formation of a unified CBRN security system in Ukraine, as well as the fragmentation of regulatory, legal, and organizational support in this area. The purpose of this article is to comprehensively reveal the nature, structure, and dynamics of CBRN threats to Ukraine's national security, assess their escalation potential in the context of full-scale war, and provide scientific justification for the need to create an integrated national response strategy. The research uses methods of systemic and structural-functional analysis, comparative assessment, analysis of open sources, as well as a study of the current regulatory and legal framework and practices of interagency cooperation. The main results of the research are the identification of key risk factors for CBRN threats related to enemy actions, the vulnerability of critical infrastructure, the limited capabilities of monitoring and response systems, and insufficient coordination between military and civilian structures. Systemic and organizational shortcomings in the state system for ensuring CBRN security have been identified, and existing signs of the enemy's readiness to use unconventional weapons as an element of hybrid warfare have been summarized. The practical significance of the research lies in the formation of scientifically sound approaches to the development of a state strategy for CBRN security aimed at comprehensive risk management, strengthening interagency coordination, and increasing the level of preparedness of Ukraine's defense forces and civil protection system to counter threats of chemical, biological, radiological, and nuclear origin.

Keywords: National security of Ukraine, CBRN security strategy, CBRN threats, CBRN risks.

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

Introduction

In today's global environment, countering chemical, biological, radiological, and nuclear threats is one of the key components of international security architecture. The proliferation of unconventional technologies, the increase in incidents involving hazardous chemicals, the risks of biological terrorism, the threats of nuclear provocations and sabotage of critical infrastructure are drawing the attention of the international community to the development of effective deterrence and response mechanisms. The CBRN security systems of leading states demonstrate that reliable management of CBRN risks is a necessary condition for the stability of a state and its ability to ensure its own national security.

These challenges are particularly relevant for Ukraine. The Russian Federation's ongoing armed aggression is accompanied by a growing likelihood of deliberate or accidental use of toxic agents, radioactive materials, and manipulation of nuclear facilities. Actual cases of the use of irritant chemical agents in the combat zone, regular nuclear blackmail, and the risks of provocations at the Zaporizhzhia Nuclear Power Plant create an unprecedentedly complex CBRN situation. In such conditions, ensuring Ukraine's national security is impossible without the formation of a long-term, systematic, and integrated state policy in the field of countering CBRN threats.

A brief analysis of relevant regulatory documents shows that the current regulatory system in the areas of CBRN security remains fragmented, focusing primarily on specific sectoral aspects of control and response. Issues of coordination between executive bodies, interagency cooperation, unification of response standards, and integration into international CBRN security mechanisms are insufficiently developed.

Thus, a key gap in state policy is the absence of a CBRN security strategy as a comprehensive document that would define the goals, principles, instruments, and mechanisms of state management in the field of countering unconventional threats. Existing regulations

do not form a unified approach to identifying and managing CBRN risks,

which makes it impossible to create a coordinated and effective response system.

The novelty of the study lies in substantiating the need to develop such a strategy as a fundamental element of strengthening the state's resilience, integrating it into the international system of standards, and forming a comprehensive model of CBRN security. The significance of the study is determined by the fact that the formation of a strategic approach to CBRN security is critically important for protecting the population, preserving the functioning of critical infrastructure, and strengthening the state's defense capabilities in the context of escalating global threats.

Accordingly, issues remain unresolved regarding the integration of sectoral policies, the creation of a unified interagency management model, the unification of response procedures, and the adaptation of international practices to Ukrainian conditions. The purpose of the study is to define the conceptual foundations for the formation of Ukraine's CBRN security strategy. The main tasks include analyzing existing regulatory and organizational gaps, assessing current CBRN threats, identifying ways to optimize the response system, and formulating proposals for building a comprehensive state policy in the field of CBRN security.

Methodological Framework

Analysis of open data, assessment of the enemy's capabilities to use nuclear, chemical, and biological weapons, as well as analysis of Ukraine's regulatory and legal framework.

Results

The need to analyze CBRN threats from the Russian Federation

is a prerequisite for the formation of Ukraine's national security and defense policy

in the context of hybrid warfare, which already contains elements of unconventional influence. Conducting such an analysis is not only a response to a challenge, but also a strategic requirement of

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

the times.

The main CBRN threats to Ukraine are:

1.The threat of nuclear weapons use.

The Russian Federation (RF) is the state with the world's largest arsenal of nuclear weapons (over 5,000 warheads) [1, 2]. An analysis of open sources [3-7, 12] has revealed that the total number of warheads is approximately 5,459–5,580, of which 1,710–1,720 are deployed on strategic carriers, with the rest in reserve or storage. The Russian Federation possesses a full-fledged nuclear triad—a system of strategic nuclear forces that includes three main components for delivering nuclear weapons: land-based, sea-based, and air-based.

The land-based component includes the Strategic Missile Forces (SMF). This is the foundation of the Russian nuclear triad, armed with intercontinental ballistic missiles, both silo-based and mobile. The main systems include: Topol-M (SS-27), Yars (RS-24) – mobile and silo-based, Sarmat (RS-28) – a new generation heavy intercontinental missile, and the Avangard hypersonic combat unit. The Strategic Missile Forces have approximately 329 launchers for intercontinental ballistic missile complexes capable of carrying about 1,244 warheads. The missiles have a range of over 11,000 km, and each is capable of carrying up to 10 separate nuclear warheads with a yield of up to 800 kt each, which can be distributed among several targets.

The naval component includes strategic nuclear-powered ballistic missile submarines armed with sea-based intercontinental ballistic missiles. The main submarines are: Borei and Borei-A (projects 955/955A) armed with R-30 Bulava missiles, and Delfin (project 667BDRM) armed with R-29RMU2 Sineva missiles.

Approximately 12 missile carriers capable of carrying about 992 warheads are in service. The missiles have a range of up to 9,000 km, and each is capable of carrying 4 to 10 separate nuclear warheads (with a yield of 100 to 500 kt) with individual guidance.

The air component includes the long-range aviation of the Russian Aerospace Forces. The carriers of strategic nuclear weapons are bombers with cruise missiles, the main ones being: TU-160 “White Swan” – a supersonic missile carrier, TU-95MS “Bear” – a turboprop bomber, armed with X-55 and X-102 cruise missiles. The approximate number of missiles is about 580 with a range of up to 5,000 km.

In addition, there are up to 2,000 tactical weapons (aircraft bombs, artillery shells, tactical missiles, landmines, etc.) [5-7].

It is known that Russian President Vladimir Putin, by his decree No. 991 of November 19, 2024, approved an update to the nuclear doctrine, confirming a document entitled “Fundamentals of the Russian Federation's State Policy in the Field of Nuclear Deterrence” [8], which significantly transformed the concept of the use of nuclear weapons, shifting the emphasis from a defensive deterrence strategy to potential operational readiness for use. The main changes and innovations in this doctrine include [8, 9]:

lowering the threshold for use – previously, nuclear weapons in the Russian Federation could only be used in the event of a threat to the very existence of the state, but now – any “critical” threat to the sovereignty or territorial integrity of the Russian Federation or the Republic of Belarus (RB) (including conventional weapons) may be grounds for its use;

Preemptive use – a provision has been introduced on the possibility of preemptive use in the event of: mass launches of aircraft, missiles, unmanned aerial vehicles, or hypersonic weapons; attacks on Russian nuclear deterrence facilities; or disruption of the ability to launch a retaliatory strike (e.g., destruction of command posts).

“nuclear umbrella” over Belarus – the protection of an ally has been elevated to the level of defense of the Russian Federation itself; any attack on Belarus, including with conventional weapons, is equated with an attack on Russia with all the corresponding consequences;

“Collective threat” as a factor for escalation – an attack by a non-nuclear state supported by a

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

nuclear power is considered a joint attack. This creates a basis for escalation even in conflicts where Russia is not formally under direct attack with nuclear weapons;

an expanded list of threats – among the grounds for the use of nuclear weapons are now also: the deployment of missile defense systems, the militarization of space, the blocking of strategic communications, the presence of foreign troops in potentially sensitive regions, and attacks on objects of increased environmental danger;

a change in the purpose of nuclear weapons – the removal of the concept of "exclusively a deterrent" opens up the possibility of using nuclear weapons to achieve operational or political goals, which de facto legitimizes their use as a means of pressure and coercion.

In other words, the possession of nuclear weapons and their delivery systems, as well as the updated nuclear doctrine of the Russian Federation, significantly expand the arsenal of formal grounds for nuclear escalation, creating a real threat that even conventional military operations, particularly on the territory of Ukraine, could lead to the use of Russian nuclear weapons for the purpose of coercion, demonstration of force, or disruption of initiatives by NATO, the US, etc. This evolution of nuclear strategy significantly increases the unpredictability of Russia's nuclear behavior.

2.The threat of chemical weapons use.

The Soviet Union's chemical weapons program produced most types of known chemical warfare agents in huge quantities and created the world's largest chemical weapons infrastructure. At its peak, this infrastructure included four research centers, two testing centers, and eight storage facilities [10]. After the collapse of the Soviet Union, Russia inherited the entire chemical weapons arsenal, as well as most of its former production facilities, amounting to approximately 40,000 tons of chemical warfare agents, which was and remains the largest stockpile in the world [10, 11].

As a full member of the Chemical Weapons Convention (signed on January 13, 1993, ratified on November 5, 1997), Russia has committed itself to: destroy all chemical weapons stockpiles, not to produce, store, develop, or use chemical weapons, to provide reliable information on dual-use facilities, and to be subject to inspections by the Organization for the Prohibition of Chemical Weapons (OPCW) [10].

On September 27, 2017, Russia officially announced the complete destruction of its chemical arsenal, which was recognized by the OPCW, but in 2018 and then in 2020, there were high-profile poisonings that proved the opposite: the poisoning of Sergei and Yulia Skripal in the UK—the substance used was Novichok (A-234), a military nerve agent, and the poisoning of Alexei Navalny, [23] where a substance from the Novichok series was also identified (according to the conclusions of laboratories in Germany, France, and Sweden, it was a military poisonous agent developed as part of the Folian program).

The use of Novichok is direct evidence that the Russian Federation not only stores chemical warfare agents but also uses them. This indicates that Russia has not ceased its research and development activities in the field of chemical weapons, and that its production base has been concealed or converted to dual-use. The use of Novichok (an extremely complex and powerful neurotoxin) is impossible without support from state structures, which indicates that Russia officially or unofficially maintains and manages programs related to chemical warfare agents, despite its international obligations.

Since the start of Russia's full-scale invasion of Ukraine, there have been about 12,000 recorded cases of dangerous chemicals and agents prohibited by international conventions being used against Ukrainian Armed Forces units (Fig. 1). The radiation, chemical, and biological protection units of the Armed Forces of Ukraine have collected more than 900 samples, some of which were sent for analysis to the L.I. Medved Institute of Environmental Hygiene and Toxicology and the OPCW. The results of the analysis showed that the samples taken in the areas of application contained chlorobenzalmalononitrile (CAS 2698-41-1, CS) and chloroacetophenone (CAS 532-27-4, CN) [13], which contain substances with tear-inducing and irritating effects, violating the requirements of

The Central Research institute
of the Armed Forces of Ukraine

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

Article I, paragraph 5, and Article II, paragraph 7, of the Chemical Weapons Convention [30].

The fact that Russian troops used them on the front lines, in particular against Ukrainian military personnel, indicates: a deliberate violation of international humanitarian law and the rules and customs of war; Russia's testing of the "gray zone" of international law; a transition from covert use to systematic combat use, which legitimizes the possibility of further use of more dangerous toxic substances.

The numerous cases of chemical weapons use in Syria (sarin, chlorine gas) cannot be ignored. According to investigations by the OPCW and the United Nations (UN), there have been at least 17 confirmed cases and, according to various sources, 77–85 cases under investigation, resulting in the deaths of about 2,000 people, mostly civilians [14, 15]. Russia did not formally use chemical weapons, but it directly covered up and supported the actions of the Syrian regime, blocked international investigations, and spread disinformation in an attempt to shift the blame onto rebels or "terrorists." Through these actions, Russia set a precedent of impunity, which increases the risk of chemical weapons being used again in other conflicts.

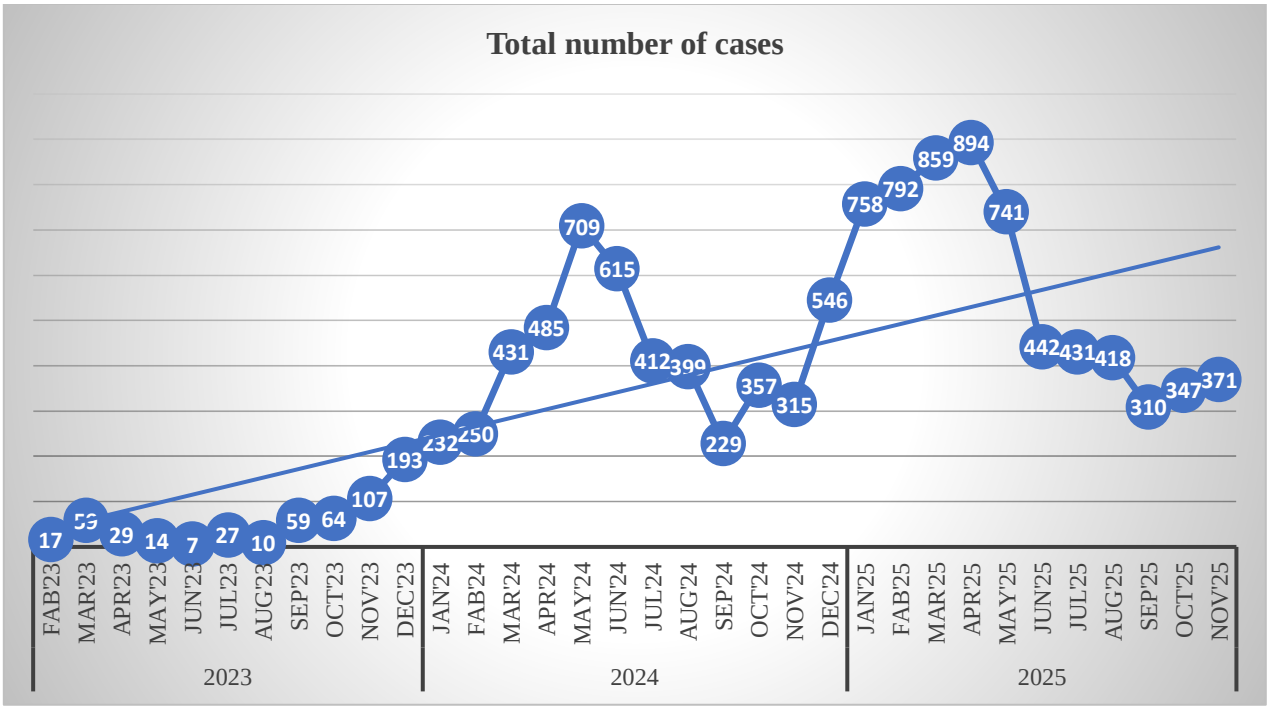


Figure 1. Number of recorded cases of the use of dangerous chemical substances by Russia during the period 2023–2025

In other words, analysis of the historical and contemporary context of the Russian Federation's use of chemical weapons (hazardous chemicals) indicates its systematic disregard for its international obligations, even despite its official membership in the Chemical Weapons Convention. The legacy of the Soviet chemical weapons production program, inherited by Russia in the 1990s, contrary to its obligations to completely destroy its arsenal, has enabled the Russian Federation to retain the technological, scientific, and infrastructural capacity to rapidly resume the production of chemical weapons (toxic substances for military use). High-profile poisonings using nerve agents, systematic involvement and cover-up by the Syrian regime in the use of chemical weapons in the conflict against the civilian population, consistent and systematic informational and propaganda "probing" of the international reaction (deliberately creating the image of the acceptability of using chemical weapons by denying guilt, shifting responsibility, blocking international investigations, and creating "gray

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

areas" in law enforcement), as well as the systematic use of dangerous chemicals on the battlefield in Ukraine, poses a real threat of the Russian Federation's full-scale use of chemical weapons (toxic substances) – both as weapons on the battlefield and as instruments of terror against the civilian population.

3.Threat of biological weapons use.

The Russian Federation has been a party to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (the Convention) since 1975 (signed on April 10, 1972, ratified on March 30, 1975). Within the framework of this Convention, the Russian Federation has repeatedly officially declared that it has eliminated all military biological programs inherited from the Soviet Union, and such statements have been publicly confirmed at the UN, particularly in the 1990s and 2000s.

The Russian Federation inherited from the Soviet Union one of the world's most secretive and extensive biological weapons development programs, known as "Biopreparat," which included more than 40 enterprises, research institutes, and factories disguised as civilian medical or pharmaceutical facilities. The Biopreparat program operated from the 1970s to the early 1990s, formally under the authority of the USSR Ministry of Medical Industry, but in reality controlled by the State Security Committee, the Ministry of Defense, and the General Staff of the USSR Armed Forces. During its operation, a large number of biological warfare agents were developed, such as anthrax, plague, tularemia, brucellosis, yellow fever, Ebola and Marburg, smallpox, genetically modified strains of influenza, measles, herpes, and others. In 1992, by decree of Russian President Boris Yeltsin, the Bioprepar program was disbanded, after which some institutions were closed and some were transferred to the union republics.

At the same time, the analysis shows that after the transformation, a large number of enterprises and institutions remained in the Russian Federation that have the potential to carry out a full cycle of work, from research and development to the possible production of biological weapons. The key ones include: The State Scientific Center for Virology and Biotechnology "Vector" (Koltsovo, Novosibirsk Region); The 48th Central Research Institute of Microbiology of the Ministry of Defense of the Russian Federation (Sergiev Posad); the Center for Military-Technical Problems of Bacteriological Protection of the Research Institute of Microbiology of the Ministry of Defense (MOD) of the Russian Federation; the Smorodintsev Institute of Epidemiology; Virology Center of the Research Institute of Microbiology of the Ministry of Defense of the Russian Federation (Zagorsk-6); State Scientific Center for Applied Microbiology and Biotechnology (Obolensk) and others.

All these institutions are integrated into the modern scientific, medical-biological, and epidemiological system of the Russian Federation, formally performing civil or defense-medical functions, but at the same time retaining a clearly expressed dual potential, i.e., technical (the presence of laboratories with BSL-3/4 biological protection, aerosol chambers, animal vivariums, large-scale production facilities), personnel (specialists in military microbiology, virology, bioengineering, and toxicology), and infrastructure capacity for covert research and the resumption of biological weapons programs. Moreover, the existence of extensive ties with military structures, including the Russian Ministry of Defense, the Federal Security Service, and the Russian Guard, creates the risk of rapid militarization of such facilities in the event of a corresponding political decision.

In recent years, Russia has been systematically spreading information narratives about the alleged existence of a network of "secret American biological laboratories" on the territory of Ukraine, where biological weapons are being developed with the participation of foreign instructors and scientists. The Russian Federation has accused Ukraine of creating combat pathogens and conducting experiments on animals and humans, particularly in regions of active combat operations [17, 18]. These allegations have been repeatedly voiced in international forums, including at special meetings of the UN Security Council initiated by Russia (March 11, 2022) [19]. At the same time, no objective or verified evidence was presented, and most of the so-called "evidence" turned out to be

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

fabricated or manipulative.

Such rhetoric is a classic example of informational and psychological preparation of public opinion, both within the Russian Federation itself and at the international level, for a potential provocative incident or even the use of biological weapons. In the context of war and declining trust in international institutions, Russia is creating an information field that can be used to legitimize its further aggressive actions, in particular destructive acts aimed at discrediting Ukraine or justifying the use of biological agents. In other words, all these actions by the Russian Federation look like a classic scenario of information cover-up before a possible provocative or destructive act involving the use of biological weapons.

The motivation and possible objectives of the use of biological weapons by the Russian Federation may include:

creating areas (zones) of contamination in frontline areas in order to prevent the advance of the Armed Forces of Ukraine by harming personnel or creating an infectious hazard;

conducting a psychological attack by creating panic among the civilian population through the infection of water supplies, food, or the environment;

organizing a large-scale provocation “under a false flag” with subsequent accusations against Ukraine, the US, or NATO of violating the Biological Weapons Convention;

using Ukraine as a testing ground for the latest biological agents in conditions of real armed conflict in order to assess their effectiveness and tactical potential.

Analysis of the above data leads to the conclusion that, despite its international legal obligations and public statements about compliance with the Biological Weapons Convention, the Russian Federation maintains a powerful dual-use scientific and industrial infrastructure capable of quickly resuming full-scale programs to create biological weapons. The systematic refusal to comply with international transparency requirements, the existence of laboratories with a high level of biosecurity, human resources with experience in military microbiology, and a targeted information campaign to discredit Ukraine and the United States indicate preparations for the possible use of biological agents as a means of pressure or attack.

Of particular concern is the fact that there is no effective international instrument at the global level to strictly control compliance with the provisions of the Biological Weapons Convention. This creates the possibility of impunity for violations, as the mechanism does not provide for mandatory inspections or effective sanctions procedures in case of non-compliance. This legal “loophole” only increases the risk of biological weapons being used in the future.

Given these factors, the threat of the Russian Federation using biological weapons against Ukraine is quite real, requiring constant monitoring, a significant strengthening of international control, and the implementation of preventive measures within the framework of the national system of protection against CBRN threats.

In addition to the threats of direct use of nuclear, chemical, and biological weapons, Ukraine faces a number of **potential threats related to CBRN factors** that can have an equally devastating impact. These threats include:

1. Use of a “dirty bomb.” This is an unconventional explosive device that combines a conventional explosive with radioactive materials. Its use does not cause a nuclear explosion, but creates an area of radioactive contamination, leading to long-term environmental, social, and psychological consequences. The threat lies in the possibility of using such weapons in cities, on critical infrastructure, or for the purpose of terror. In October 2022, Russian Defense Minister Sergei Shoigu stated that Ukraine was “preparing a provocation using a dirty bomb” [20].

The possible goals of such statements may be: to prepare the ground for their own provocation in order to accuse Ukraine of escalation; to intimidate the population in Ukraine and create possible panic; to disrupt international support for Ukraine by discrediting it; to divert attention from their own actions; and others.

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

2. Sabotage attacks on infrastructure facilities. This refers to the deliberate damage, destruction, or seizure of facilities that store or process hazardous substances—nuclear power plants, radiochemical and uranium facilities, chemical plants, and hazardous chemical storage facilities. Such attacks may be aimed at causing mass casualties, creating an environmental disaster, or destabilizing regions. The potential access of the Russian Federation to such facilities in temporarily occupied territories, where accounting and control are significantly complicated, poses a particular danger.

3. Incidental damage and destruction of facilities with CBRN risks during combat operations. Military operations near nuclear power plants (as in the case of the Zaporizhzhya Nuclear Power Plant), chemical plants, and warehouses with hazardous materials carry the risk of uncontrolled damage. This can cause radiation or chemical leaks, even without the direct use of weapons of mass destruction.

4. **Incidents and accidents due to improper storage and control of hazardous substances.** Violations of safety standards in warehouses, laboratories, and transport hubs can lead to uncontrolled emissions or contamination. In wartime, control over such facilities is often limited or lost.

5. **Damage to radioactive waste disposal sites and biological burial grounds.** Violations of the integrity of such facilities, particularly during combat operations or as a result of sabotage, can lead to large-scale and long-term contamination of the environment (soil, groundwater and surface water, atmospheric air).

In the case of biological burial grounds, pathogens of particularly dangerous infections, such as anthrax, tularemia, brucellosis, cattle plague, African swine fever, and avian influenza, may be released, posing a direct threat to the life and health of the population. Ukraine has more than 13,500 potentially dangerous sites (burial grounds with infected animal remains) [21].

In the event of damage to radioactive waste disposal sites, there is a risk of radiation exposure, the creation of exclusion zones, and the long-term unsuitability of territories for economic use. In the radioactive sphere, Ukraine has hundreds of temporary storage facilities at the Chernobyl Nuclear Power Plant, as well as industrial landfills with radioactive waste, which in total occupy several million cubic meters of materials of varying activity [22].

Such scenarios will have not only environmental and sanitary consequences, but also socio-economic and security consequences, including population evacuation, international concern, and reputational damage to the state.

An analysis of the current spectrum of CBRN threats related to the use or incidents caused by CBRN agents indicates that Ukraine is at increased risk of CBRN attacks as a result of both the direct use of weapons of mass destruction and indirect forms of their use: sabotage, terrorist acts, combat operations in high-risk areas, damage to critical infrastructure or burial sites.

Thus, CBRN threats to Ukraine are real, multidimensional, and systemic. All this requires an effective, rapid, and coordinated response from state institutions and the existence of a clear legal mechanism for responding to, preventing, and eliminating the consequences of such threats.

In this regard, it is important to analyze the current legislative and regulatory framework of Ukraine governing the field of CBRN security, in particular: national response to threats, interagency coordination, security of high-risk facilities, standards for storage and transportation of hazardous substances, etc.

Next, we consider the extent to which Ukraine's current legal documents meet the modern challenges in the field of CBRN security, whether they provide a systematic approach to managing such risks, and whether there are legal gaps that need to be addressed immediately in the context of war.

To this end, we analyze Ukraine's legislative and regulatory framework [24-29] in the field of CBRN security, which indicates its fragmentation and dispersion, coverage of narrow aspects of security within a specific industry, regulation of control, response, transportation, and protection of the population, but not comprehensive coverage of all CBRN threats, and the lack of a unified

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

interagency, polycentric approach.

The main regulatory and legal document that defines the priorities of Ukraine's national interests, threats to its national security, and the main directions of activity to ensure it is the Decree of the President of Ukraine "On the Decision of the National Security and Defense Council of Ukraine" of September 14, 2020, "On the National Security Strategy of Ukraine" (Strategy) [25].

Section II of the Strategy mentions:

in paragraph 7 – the increased likelihood of biological threats, in particular the emergence and spread of infectious diseases;

in paragraph 10 – threats related to the proliferation of weapons of mass destruction, etc.;

in paragraph 27 – threats to critical infrastructure, in particular infrastructure related to nuclear safety, such as nuclear power plants or other facilities with hazardous substances, in the context of hostilities, cyberattacks, or sabotage;

in paragraph 28 – the consequences of the Chernobyl disaster, which still affect the environment and human health, as well as inadequate waste management; emphasis is placed on the decline in environmental safety, including in the area of radioactive waste management; deterioration in the quality of air, water, and food, as well as an ineffective industrial waste management system, indicating potential risks of chemical pollution, accidents, and disasters;

Paragraph 29 highlights the impact of the COVID-19 pandemic, which has exposed problems in the healthcare and biosafety systems and a lack of preparedness for biological emergencies.

The above points do not provide a clear and unambiguous definition of CBRN threats as a separate category of national threats. Although certain elements related to CBR risks are mentioned indirectly (in the context of environmental disasters, pandemics, infrastructure degradation, the consequences of the Chernobyl accident, etc.), none of them are directly defined as a CBRN threat or a threat related to weapons of mass destruction.

In Section III of the Strategy, CBRN security issues are not addressed directly or systematically. Only a few formulations indirectly refer to the sphere of CBRN security, i.e., they do not contain specific provisions on CBRN security policy as such. The current vision of the state's foreign and domestic policy effectively ignores the need for a separate specialized CBRN security policy, which significantly reduces the state's ability to predict, prevent, and respond to relevant threats in the context of armed conflict and hybrid warfare.

Section IV does not directly mention the need to counter CBRN threats. There is no mention of structures, institutions, or regulations directly responsible for CBRN protection or response to CBRN incidents. It contains only general formulations, such as "responding to emergencies of any nature," without specifying the specifics of CBRN emergencies that require specialized training, resources, and coordination.

The section does not contain a systematic or specialized approach to CBRN security issues. It lacks specific tasks, measures, or institutional plans that would reflect the importance of CBRN threats in Ukraine's current security environment. This indicates the need to supplement the strategy with elements that will ensure the state's readiness to prevent, detect, respond to, and eliminate CBRN emergencies.

The Final Provisions of the Strategy list the strategic documents that are to specify its implementation. In the context of CBRN security, we observe the following:

the biosafety and biological protection strategy is the only document directly dedicated to the CBRN security component, namely biological threats, but there are no separate documents on chemical, radiation, and nuclear security;

there is no chemical, radiation, and nuclear security strategy.

Partial coverage of CBRN threats, namely: the public safety and civil protection strategy potentially covers emergency response, including CBRN emergencies, but without focusing on specifics. Strategies for environmental safety, cybersecurity, and information security may be

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

indirectly relevant in the context of CBRN threats, but only within their narrow scope.

Based on an analysis of the Strategy, it has been determined that it directly provides for the formation of a biosafety and biological protection strategy, but other components of CBRN security are completely ignored both in terms of the titles and content of planning documents, which indicates an asymmetrical and incomplete approach to the formation of CBRN security policy and, in the context of a military threat from a state .

The set of CBRN risks for Ukraine is real, systemic, and multidimensional. The state's response must be rapid, coordinated, and regulated, which in turn requires the implementation of priority measures:

the development and adoption of a nationwide CBRN security strategy integrated with defense planning and international mechanisms;

creation of a centralized interagency system for managing CBRN risks;

strengthening the capabilities of CBRN defense forces, in particular with regard to preventing the impact of CBRN threats and providing protection during CBRN incidents;

harmonization of legislation with the standards of international organizations (NATO, EU, OPCW, WHO, and IAEA);

strengthening international cooperation and ensuring Ukraine's participation in control and verification mechanisms.

Discussion

The results of the analysis demonstrate the need to consolidate and streamline the efforts of the relevant actors at the strategic level, since, as things stand, it is impossible to implement the CBRN security policy model based on the NATO model, where efforts are focused on maintaining the integrity of the security cycle in the form of a sequence of “prevention – protection – response – recovery”.

The key issue here is to determine the need to develop a national CBRN security strategy that provides for an integrated system of military and civilian components with a clear definition of the roles and tasks of all participants, and, as a means of its implementation, the development of an effective echeloned CBRN protection system similar to those used by NATO member countries, based on a clear interagency structure.

At the same time, the development of a project to create a CBRN security strategy allows work to begin on building a state CBRN security system, starting with the formation of a legislative framework at the level of state leadership. This provides an opportunity to create a legal instrument for the implementation of measures to prevent and respond to CBRN incidents, which is particularly urgently needed by the state security system, especially in conditions of martial law.

Conclusion

The study confirmed that the current spectrum of CBRN threats to Ukraine is systemic, multidimensional, and escalatory in nature. An analysis of the capabilities and intentions of the Russian Federation, an assessment of its nuclear doctrine, evidence of the preservation of chemical and potentially biological programs, as well as the practice of using hazardous chemicals in the combat zone demonstrate the reality of a scenario of unconventional influence on Ukraine. Combined with the shortcomings of the current system of state management in the field of CBRN security, this requires a transition from fragmented measures to a comprehensive, strategically balanced approach.

The results of the study showed that Ukraine lacks a single regulatory and administrative document that would define a comprehensive model for countering unconventional threats, ensure the integration of sectoral policies, the unification of response standards, interagency coordination, and interaction with international institutions. The existing security mechanisms do not ensure adequate risk management, and the current regulatory framework does not fully reflect the scale of

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

contemporary challenges.

In these circumstances, there is a clear need to develop and implement a CBRN security strategy for Ukraine as part of the state's national security strategy. Such a strategy should define the priorities of the national response, create the basis for an integrated risk management system, strengthen the institutional capacity of the security and defense sector, and ensure the adaptation of international standards to Ukrainian realities. The implementation of such a strategy will be a key element in enhancing the state's resilience, protecting the population, and strengthening defense capabilities in the long term.

Prospects for further research include developing a detailed model of interagency cooperation in the CBRN security system, assessing the resources needed for its implementation, establishing national response standards, and creating indicators of the future strategy's effectiveness. International legal mechanisms for holding the Russian Federation accountable for violations of conventional norms and opportunities for deepening Ukraine's cooperation with international partners in the field of CBRN security require separate study.

Recommendations

The research materials are valuable for:

Ukrainian government bodies (the National Security and Defense Council, the Cabinet of Ministers, the Ministry of Internal Affairs, the Ministry of Health, the Ministry of Defense, the State Emergency Service) that formulate policies in the field of national security and civil protection against CBRN threats.

military units (organizations, institutions) and subdivisions of the security and defense sector responsible for assessing threats, responding to CBRN incidents, and planning countermeasures and mitigation measures;

research institutions and think tanks studying unconventional threats, strategic planning, and state security policy;

local authorities involved in the civil protection system and ensuring the readiness of public services to respond to CBRN incidents;

Ukraine's international partners who support the development of institutional capacity in the field of CBRN security;

specialists in crisis management, medical and environmental safety, for whom the study can serve as a basis for practical decisions in the field of protecting the population and the environment from CBRN threats.

Conflict of Interest

The author declares that he has no competing interests related to the subject of the article.

References

1. Ho, V. (2025, August 2). *Where are the world's nuclear weapons, and who owns them?* The Washington Post. https://www.washingtonpost.com/world/2025/06/24/iran-israel-world-countries-nuclear-stockpile
2. Wikipedia. (2025, July 16). *Strategic nuclear forces of the Russian Federation*. https://ru.wikipedia.org/wiki/Стратегические_ядерные_силы_Российской_Федерации
3. Debug Lies News. (2024, July 25). *Exclusive report: Russian nuclear arsenal in 2024*. https://debuglies.com/2024/07/25/exclusive-report-russian-nuclear-arsenal-in-2024
4. Wikipedia. (2025, November 13). *New START*. https://en.wikipedia.org/wiki/New_START
5. GlobalMilitary.net. (2025). *Nuclear arsenal of Russia*. https://www.globalmilitary.net/nuclear/rus
6. MySurvival.uk. (2025, June 24). *World nuclear arsenals*. https://mysurvival.uk/risks/war/war-

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

nuclear-arsenals.php
7. Kristensen, H. M., Korda, M., Johns, E., & Mackenzie, K. (2024, March 7). *Russian nuclear weapons, 2024*. Bulletin of the Atomic Scientists. https://thebulletin.org/premium/2024-03/russian-nuclear-weapons-2024
8. Russia Matters. (2024, November 19). *New principles of Russia's nuclear deterrence liberalize conditions for use, unsurprisingly*. https://www.russiamatters.org/blog/new-principles-russias-nuclear-deterrence-liberalize-conditions-use-unsurprisingly
9. Breaking Defense. (2024, November 20). *Putin's new nuclear doctrine: It's my arsenal and I'll strike if I want to*. https://breakingdefense.com/2024/11/putins-new-nuclear-doctrine-its-my-arsenal-and-ill-strike-if-i-want-to/
10. Voice of America News. (2016, September 19). *Moscow destroys 95 percent of its chemical weapons*. https://www.voanews.com/a/russia-chemical-weapons-/6741443.html
11. Sage Journals. (2015). *Chemical weapons disposal: Russia tries again*. https://journals.sagepub.com/doi/full/10.2968/057005015
12. Arms Control Association. (2025, July). *Arms control and proliferation profile: Russia*. https://www.armscontrol.org/factsheets/arms-control-and-proliferation-profile-russia
13. Organisation for the Prohibition of Chemical Weapons. (2025, June 24). *OPCW issues report on third technical assistance visit to Ukraine following an incident of alleged use of toxic chemicals as a weapon*. https://www.opcw.org/media-centre/news/2025/06/opcw-issues-report-third-technical-assistance-visit-ukraine-following
14. von Hein, M. (2018, April 13). *Chemical attacks in Syria – a chronicle*. Deutsche Welle. https://www.dw.com/uk/хімічні-атаки-у-сирії-хроніка/a-43379551
15. Ukrinform. (2021, June 4). *17 cases of chemical weapons use recorded in Syria*. https://www.ukrinform.ua/rubric-world/3259210-u-sirii-zafiksuvali-17-vipadkiv-zastosuvanna-himicnoi-zbroi.html
16. Alibek, K., & Handelman, S. (1998). *Biohazard: The chilling true story of the largest covert biological weapons program in the world*. Random House. https://www.nlm.nih.gov/nichsr/esmallpox/biohazard_alibek.pdf
17. The New York Times. (2022, March 11). *U.S. fights bioweapons disinformation pushed by Russia and China*. https://www.nytimes.com/2022/03/10/us/politics/russia-ukraine-china-bioweapons.html
18. EUvsDisinfo. (2022, September 26). *Disinfo: Russia presented evidence of U.S. biolabs in Ukraine at the Convention on Biological Weapons*. https://euvsdisinfo.eu/report/russia-presented-evidence-of-us-biolabs-in-ukraine-at-the-convention-on-biological-weapons
19. Ukrainska Pravda. (2023, April 17). *War speeches: Russia uses the UN Security Council for propaganda, and Ukraine is preparing for a counteroffensive*. https://www.pravda.com.ua/eng/columns/2023/04/17/7398250/
20. Radio Svoboda. (2022, October 24). *ISW: Shoigu's statements about a "dirty bomb" are intimidation and a continuation of Russia's long-standing information campaign*. https://www.radiosvoboda.org/a/news-isw-shoigu-brudna-bomba/32097618.html
21. LB.ua. (2018, October 3). *There are about 13,500 anthrax hotspots in Ukraine, according to the Ministry of Health*. https://lb.ua/society/2018/10/03/409103_ukraine_okolo_135_tisyach_ochagov.html
22. Nosovskyi, A., Shestopalov, V., Shybetskyi, I., & Krone, J. (2022). *Nuclear threat resulting from Russian military occupation of the Chornobyl exclusion zone*. https://www.ispnpp.kiev.ua/nuclear-threat-resulting-from-russian-military-occupation-of-chornobyl-exclusion-zone
23. TSN. (2022, September 3). *Who invented it, how it works, and where it is produced: Key facts about Novichok*. https://tsn.ua/svit/hto-vinayshov-yak-diye-ta-de-viroblyayut-golovne-pro-

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

novachok-yakim-otruyili-navalnogo-i-skripaliv-1618975.html
24. Constitution of Ukraine. (2020). *Constitution of Ukraine*. https://zakon.rada.gov.ua/laws/show/254%D0%BA/96-%D0%B2%D1%80#Text
25. President of Ukraine. (2020, September 14). *Decree No. 392/2020: On the decision of the National Security and Defense Council of Ukraine "On the National Security Strategy of Ukraine"*. https://zakon.rada.gov.ua/laws/show/392/2020#n12
26. Verkhovna Rada of Ukraine. (2025). *Law of Ukraine "On the Defense of Ukraine" (No. 1932-XII)*. https://zakon.rada.gov.ua/laws/show/1932-12
27. Verkhovna Rada of Ukraine. (2025). *Law of Ukraine "On National Security of Ukraine" (No. 2469-VIII)*. https://zakon.rada.gov.ua/laws/show/2469-19#Text
28. Verkhovna Rada of Ukraine. (2025). *Law of Ukraine "On the Armed Forces of Ukraine" (No. 1934-XII)*. https://zakon.rada.gov.ua/laws/show/1934-12#Text
29. Verkhovna Rada of Ukraine. (2022). *Law of Ukraine "On Chemical Safety and Chemical Product Management" (No. 2804-IX)*. https://zakon.rada.gov.ua/laws/show/2804-20#Text
30. United Nations. (1998). *Convention on the prohibition of the development, production, stockpiling and use of chemical weapons and on their destruction*. https://zakon.rada.gov.ua/laws/show/995_182#Text

Необхідність розробки та впровадження стратегії хімічної, біологічної, радіаційної, ядерної безпеки України в умовах сучасних глобальних викликів та конфліктів

Євген Нагорний
доктор філософії
начальник військ РХБ захисту – начальник управління РХБ захисту
Командування Сил підтримки Збройних Сил України
04119, вул. Дегтярівська, 11-в, Київ, Україна
e-mail: rhbz777@ukr.net
ORCID: 0000-0001-7008-5853

Анотація. Стаття присвячена комплексному аналізу загроз хімічній, біологічній, радіаційній та ядерній безпеці України в умовах триваючої збройної агресії, що супроводжується зростанням ризиків застосування неконвенційних засобів ураження та гібридних форм впливу. Актуальність дослідження зумовлена трансформацією сучасних воєнних конфліктів, у яких чинники хімічної, біологічної, радіаційної та ядерної безпеки дедалі частіше використовуються не лише як засіб фізичного ураження, а й як інструмент політичного тиску, психологічного впливу та дестабілізації системи державного управління. Додатковим фактором актуальності є відсутність в Україні цілісного, інституційно інтегрованого підходу до формування об'єднаної системи хімічної, біологічної, радіаційної та ядерної безпеки, а також фрагментарність нормативно-правового та організаційного забезпечення у зазначеній сфері. Метою статті є комплексне розкриття характеру, структури та динаміки загроз хімічної, біологічної, радіаційної та ядерної безпеки для національної безпеки України, оцінювання їх ескалаційного потенціалу в умовах повномасштабної війни, а також наукове обґрунтування необхідності створення інтегрованої стратегії національного реагування. У процесі дослідження використано методи системного та структурно-функціонального аналізу, порівняльної оцінки, аналізу відкритих джерел, а також вивчення чинної нормативно-правової бази й практики міжвідомчої взаємодії. Основні результати дослідження полягають у визначенні ключових чинників ризику загроз хімічної, біологічної,

ISSN (print): 2786-9318
ISSN (online): 2786-9326
Military Science. Vol. 3 No. 4 (2025)

радіаційної та ядерної безпеки, пов’язаних із діями противника, вразливістю критичної інфраструктури, обмеженими спроможностями систем моніторингу та реагування, а також недостатнім рівнем координації між військовими й цивільними структурами. Виявлено системні та організаційні недоліки державної системи забезпечення хімічної, біологічної, радіаційної та ядерної безпеки та узагальнено наявні ознаки готовності противника до застосування неконвенційних засобів ураження як елемента гібридної війни. Практична значущість дослідження полягає у формуванні науково обґрунтованих підходів до розроблення державної стратегії хімічної, біологічної, радіаційної та ядерної безпеки, спрямованої на комплексне управління ризиками, посилення міжвідомчої координації, підвищення рівня готовності сил оборони та системи цивільного захисту України до протидії загрозам хімічного, біологічного, радіаційного та ядерного походження.

Ключові слова: національна безпека України, стратегія ХБРЯ безпеки, ХБРЯ загрози, ХБРЯ ризики.