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Nuclear weapons and nuclear deterrence in Eastern Europe

Introduction

Nuclear weapons are the youngest and have the greatest firepower of all the weapons of mass destruction. The blatant effect of these weapons is based on the use of intranuclear energy, emitted during the reaction of decay (nuclear weapons) or fusion (thermonuclear weapons) of certain chemical elements. Nuclear ammunition use the fission reaction of the nuclei of heavy elements – uranium 235 and plutonium 239. Thermonuclear ammunitions (mainly aerial bombs and payloads carried by intercontinental missiles) use the fusion of nuclei of light element atoms – most often a mixture of hydrogen isotopes. A variant of thermonuclear weapons is neutron charges, in which the production of neutrons is amplified by the use of fission heat to accelerate the fusion reaction between deuterium and tritium.

In the context of threats to the survival of life on our planet, the huge stockpiles of nuclear weapons in the arsenals of nuclear powers may be of particular concern. Already in 1965, the combined power of the nuclear warheads of the United States and the then USSR could be expressed in the sum of 22 tons of explosives "attributable" to each inhabitant of the globe. It should be recalled here that the power of nuclear explosions is given in terms of the so-called TNT equivalent, which determines how much conventional explosive (TNT) is needed to cause an explosion with a power comparable to that of a given nuclear charge. Strategic nuclear weapons have payloads of 50kt or more. Up to 10Mt., which means an explosion energy equivalent to the detonation of TNT in the amount of 50 thousand to 10 million tons. In the second half of the twentieth century, the nuclear potential on our globe developed quantitatively and qualitatively. Among other things, neutron weapons and many new means of delivering nuclear warheads were developed. In English, the term *overkill capacity* has even been coined, which can roughly be explained as the potential ability to overkill. It is a number that tells us how many times the military potential exceeds enough to destroy life on earth "once". In the

1970s, the nuclear arsenal was capable of destroying life on Earth a thousand times over. The U.S. nuclear arsenal culminated in 1967, when the number of nuclear warheads hovered around 33,000. Russia's nuclear apogee was reached in 1986 with 45,000 nuclear weapons[1].

The first atomic bombs built in the U.S. were intended to act as a "bogeyman" to the former Soviet Union, whose conventional military capabilities at the time far exceeded those of the United States. The decision to use nuclear weapons in the attacks on Hiroshima and Nagasaki, in a situation where Japan's defeat was practically a foregone conclusion, seems to confirm the thesis that nuclear weapons were primarily intended for demonstration of force.

The crucial factor was the direct effect, in the form of explosions destroying entire cities in an instant. Less important, because it was immediately imperceptible to the decision-makers of the time, was the problem of radioactive contamination of the area. As we know, the effects of a nuclear bomb explosion depend on its power, the altitude at which it explodes and meteorological conditions. The glaring factors are: shock wave, thermal radiation, penetrating radiation, radioactive contamination of the area and the then underestimated electromagnetic pulse, destroying electronic devices in the area far beyond the area of direct damage. One of the causes of the lethal effects of a nuclear explosion, in addition to the shock wave and thermal radiation that cause immediate damage, is the radiation emitted in its aftermath.

Radioactivity, depending on meteorological conditions, can spread over large areas and cause effects that can be felt for decades after an explosion. For the inhabitants of the Japanese islands, the problem of irradiation of people and terrain has become one of the most important. That is why, years later, many of those who survived the tragedy were to envy others for their immediate death. For example, nearly half of the 200,000 victims of the Hiroshima attack died many years after the explosion because of radiation sickness.

At that time, there was no thought of another side effect of the use of nuclear weapons - the effect of strong cooling. The first observations on this phenomenon can be found in publications from 1945. It has been observed that black, radioactive rain fell on both Hiroshima and Nagasaki.

The 1950s and the construction of Russia's first nuclear bomb broke the American monopoly on this type of weapon. A nuclear arms race has begun, which has led the nuclear superpowers to possess the already insane number of warheads.

[1] Zarychta S., Broń jądrowa w kształtowaniu bezpieczeństwa 1945-2015, Bellona, Warszawa, 2016

At that time, a significant problem for military strategists was the choice of targets for tens of thousands of nuclear warheads. When there were no potential targets, and therefore there was a "fear" of stopping the production of new warheads, the strategic thought turned to an attack on the enemy's launchers. From that moment on, the spiral of armaments was self-winding, because the more launchers the enemy built, the more nuclear warheads needed to be built, necessary to destroy them.

It should be remembered that the destruction of missile launchers would often require the use of more nuclear warheads, because each launcher has several launch holes, and the missiles are moved between these holes through a system of underground corridors. New launchers were built for a larger number of warheads, and these in turn were a pretext for similar actions on the other side of the "Iron Curtain".

Despite such a large increase in the nuclear arsenal, the possibility of a so-called limited nuclear war was still considered. Scientists and the military considered various scenarios of a nuclear war that would only partially destroy the enemy's territory or industrial potential. Russia's launch of only 10 nuclear-warhead strategic missiles at U.S. oil refineries would destroy about 70% of oil refining capacity and "accidental" deaths of two to five million people living near these plants.

Most often, however, the prevailing view was that only an absolute balance of nuclear potential could prevent a military confrontation between Russia and the United States. The fear of a nuclear response from the adversary was to become a guarantor of peace for many years to come.

However, this balance of fear, while relatively effective, has aroused debates among many philosophers seeking a moral appreciation of the phenomenon. Some American philosophers point to the fact that in such a situation, entire societies become hostages in the hands of a foreign nuclear power. This position on nuclear deterrence was taken, among others, by Douglas P. Lackey, a professor of philosophy at Brauch College, The Graduate Centre and the City University of New York. Others, on the other hand, still believe in the effectiveness of the so-called pre-emptive strike. Steven Lee, a professor of philosophy associated with Hobart College and William Smith College, was among those in favour of such a strike.

As military capabilities reached astronomical proportions and the threat of large-scale nuclear strikes became more and more real, scientists took seriously the problem of a global environmental catastrophe – called nuclear winter. In the early 1980s, it was suspected that the emission of large quantities of dust and soot, capable of absorbing much of the sun's radiation, could permanently alter the physical properties of the atmosphere. It has been calculated that it

would take a thousand simultaneous explosions of 1 Mt to produce enough dust and soot to bring the earth's climate back to the last ice age.

In 1995, Russia's nuclear arsenal consisted of 7,500 nuclear warheads, most of which were more than 1 Mt. Taking into account a similar number of warheads on the American side, it can be easily calculated that the global nuclear potential at the end of the 20th century was several times higher than the level that would have led to a global environmental catastrophe.

Taking into account various scenarios of nuclear war, including widespread fires in forests, cities and industrial facilities, including gas installations and oil wells, more accurate calculations of the effects of nuclear war carried out by American scientists have shown that in addition to the basic factors of destruction (shock wave, thermal radiation, penetrating radiation), equally dangerous "side effects" of nuclear explosions may appear in the form of:

• Heavy clouds of toxic gases, resulting from the destruction of industrial infrastructure;

• Huge amounts of soot and fumes from fires in large forest areas;

• Secondary, radioactive contamination of the area, due to the spread of a cloud of radioactive dust;

• Weakening of the protective ozone layer that protects the Earth from ultraviolet radiation, which could lead to a tenfold increase in this radiation on our planet.

The cumulative effect of the primary and secondary effects of the use of nuclear weapons would, according to scientists, be the threat of the destruction of the human species and other biological species, both terrestrial and marine. According to Carl Sagan and Richard Turco, authors of a book on nuclear winter, the conclusions of the study allow us to consider the possibility of something that could be compared to the Apocalypse, if not to the extinction of the human race.

As many scientists, military and politicians claim that a nuclear war could not be won, the fear of accidentally unleashing an all-out nuclear war (for example, when the first missile was launched due to a malfunction of technical equipment or an attack by a madman) came to the fore. At that time, the possibility of reducing such a risk began to be considered.

For example, Richard L. Garwin, one of the most famous experts in the field of nuclear weapons, an advisor to several U.S. presidents on national defence and military control, proposed, among other things, this solution: in the event of a nuclear attack on a given target, the attacked side would respond by destroying a target half the size. If the two powers agreed to such a solution, instead of escalating the destruction, it would be less and less[2].

[2] Charpak G., Garwin R. L., Błędne ogniki i grzyby atomowe, Warszawa 1999

The effectiveness of such agreements can be debated here, but any proposal aimed at limiting the scale of damage in the event of an accidental launch of the first missile deserves consideration.

Still, many countries have shown interest in acquiring nuclear technologies and building their own nuclear bombs since the beginning of the appearance of nuclear weapons,

One of the ways in which both nuclear technologies and the materials necessary for the production of nuclear weapons have penetrated has been through the rapid development of nuclear energy in the world.

Due to the fear that nuclear weapons will enter countries ruled by dictators, political extremists or religious fanatics, measures have been taken to restrict access to nuclear technology for countries that do not yet possess nuclear weapons, without, however, limiting the possibilities of developing nuclear energy. Therefore, the main effort of the international community is directed towards maintaining control over compliance with agreements on the reduction of military arsenals and preventing the circulation of modern weapons technologies and components countries carrying out illicit nuclear programmes.

On July 1, 1968, 133 countries signed the Treaty on the Non-Proliferation of Nuclear Weapons in London, Moscow and Washington. The Treaty on the Non-Proliferation of Nuclear Weapons, also known as the Nuclear Non-Proliferation Treaty (NPT) is a unique agreement to prevent the proliferation of arms as well as for the promotion of nuclear energy for peaceful purposes. The provisions of the Treaty oblige firearms states to non-proliferation of nuclear weapons, other nuclear explosive devices or nuclear their technology to other countries that do not possess these weapons.

States Parties having nuclear weapons are also required, in accordance with Article VI of that Treaty, to 'conduct negotiations in good faith on effective measures related to the interruption of the nuclear arms race in the short term and disarmament nuclear power as well as general and complete disarmament under strict and effective international control. In the first article of the Treaty, nuclear-weapon States undertook not to transfer those weapons or the technology of their production to third countries. In the second article, on the other hand, countries that do not possess nuclear weapons declare that they will not seek to acquire them. In addition, the document regulates the rules for controlling the flow of fissile materials and technologies for the peaceful use of nuclear energy.

Each State Party is obliged to comply with the established procedures in this regard established on the basis of individual agreements with the International Atomic Energy Agency (IAEA).The treaty stipulates that all nuclear materials used for peaceful purposes, as well as

facilities for their production and processing, fall under jurisdiction and must be reported to the IAEA. Inspectors must have unhindered access to those facilities, in order to ensure that the periodic monitoring and inspections. However, there are no regulations verification of nuclear disarmament commitments as part of the NPT[3].

Under the pressure of public opinion, attempts to limit the existing nuclear arsenals were also made more and more boldly. In the 1970s, these efforts were intensified, leading to the signing of the "Start I" and "Start II" treaties between the major nuclear powers.

For instance, The START II treaty was destined to provide for the reduction of nuclear warheads to 2,971 on the Russian side (including 912 warheads on strategic bombers, 315 on silos and 1,744 on submarines) and 3,500 on the U.S. side (including 1,272 on bombers, 500 on silos and 1,728 on submarines).

At the same time, Russian President proposed limiting the number of missiles to 1,500 missiles. on each side. Due to technical and financial problems, as well as the strong political influence of the military lobby in Russia, the process of implementing the 'Start II' treaty was seriously threatened. Even if Vladimir Putin's proposal would had been accepted, it should be remembered that the Russians need only 600 warheads to destroy 80% of the U.S. industrial potential.

The last Strategic Arms Limitation Treaty New START was ratified by both sides, the Russian Federation and The U.S. Congress in 2010. Russia cut out its participation in New START on February 21st, 2023.

The disarmament treaties such as SORT, a series of START Treaties, including New START, focused mainly on reducing the number of maximum number of warheads and means of delivery, i.e. intercontinental ballistic missiles (ICBMs), surface-to-surface ballistic missiles (ICBMs) submarines (SLBMs) and strategic bomber aircraft capable of to carry these armaments. However, these agreements did not include tactical nuclear weapons, the deployment of which in Central and Eastern Europe was particularly dangerous in view of the threat of nuclear conflict during the Cold War. These weapons are widely considered to be destabilizing because they are specific enough to launch a nuclear attack without early warning. Currently, Russia's arsenal of tactical nuclear warheads is several times larger on NATO's total stockpiles in Europe. Despite the gradual filling of the Strategic Nuclear Weapons Reduction Commitments Russia was reluctant to talk about limiting his tactical nuclear arsenal.

[3] Kmentt A., How Divergent Views on Nuclear Disarmament Threaten the NPT, on-line: https://www.armscontrol.org/act/2013-12/divergent-views-nuclear-disarmament-threaten-npt [23.12.2023]

This is due to Moscow's long-standing concept based on the assumption that these weapons are of strategic importance for achieving military objectives in the event of regional armed conflicts. On many occasions, the Soviet Union, and later the Russian Federation, carried out manoeuvres involving the use of this type of weapon. In the event of an armed conflict, tactical nuclear weapons have provided the Russians with a significant advantage over conventional means. These weapons are still in service with the Russian Aerospace Forces, Land Forces, and Navy, and play a key role in the implementation of the Kremlin's propaganda policy.

As a the part of Soviet Union, Ukraine hosted a large part of the Soviet Union's nuclear forces. The 1994 Budapest Memorandum, which called for the removal or destruction of nuclear weapons on Ukrainian territory, was signed in response to some resistance on the part of the newly elected Ukrainian government to give up its nuclear capabilities. The goal of this agreement was to establish security guarantees associated with Ukraine's entry into the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as an independent state. It was reached by Ukraine, Russia, the United States, and the United Kingdom. The other nuclear-armed governments, China and France, made comparable but less extensive pledges[4]. Nowadays, Ukraine has no nuclear weapons, and all the delivery trucks that the Soviet Union kept have either been converted or destroyed (in the case of the eleven Tu-160 Blackjack strategic bombers that were scrapped) or returned to Russia.

As the Ukrainian-Russian war drags on, Russia continues to play the nuclear card. On 25th May 2023, the heads of the defence ministries of Russia and Belarus, signed an agreement regulating the deployment of Russian tactical nuclear weapons on Belarusian territory. Tactical nuclear weapons are short-range weapons, up to a maximum of about 450-500 km, capable of carrying nuclear payloads ranging from 10 KT to 1 MT. It is designed for direct combat operations, therefore it can be used in limited operations. Moreover, Belarus has changed its military doctrine. The document includes a provision for the deployment of tactical nuclear weapons. These are Russian missile systems equipped with nuclear warheads, which, according to official information provided by Minsk and Moscow, are already on the territory of Belarus. Still, Russia and Belarus are parties to the 1968 Non-Proliferation Treaty (NPT)[5].

[4] The Budapest Memorandum on Security Assurances, Budapest, Hungary, 1994.

[5] Wilk A., Żochowski P., Konsekwencje rozmieszczenia rosyjskiej broni jądrowej na Białorusi, on-line: https://www.osw.waw.pl/pl/publikacje/analizy/2023-06-06/konsekwencje-rozmieszczenia-rosyjskiej-broni-jadrowej-na-bialorusi [23.12.2023]

In November 2023 Russia has announced that it is withdrawing ratification of the 1996 Comprehensive Test Ban Treaty (CTBT)[6]. The key element of the CTBT is a total ban on all nuclear tests. If Russia were no longer part of the treaty, it might decide to conduct a test and demonstrate its nuclear capabilities. Meanwhile, Russia develops weapons such as RS-28 Sarmat intercontinental ballistic missile (ICBM) and the Avangard- hypersonic glide vehicle (HGV) which are capable of carrying nuclear weapons. It seems that the development of strategic weapons will proceed at a rapid pace. Therefore, strong strategic deterrence remains required.

By analysing the process of the development of nuclear weapons, the directions of their development, the size of nuclear arsenals and the struggle to limit strategic nuclear armaments, the following conclusions can be drawn: Nuclear weapons are extremely expensive and require highly developed technologies to produce, and therefore these weapons cannot be as readily available as other WMD. Moreover,

- The development of nuclear energy significantly facilitates access to modern nuclear technologies for countries that do not possess these weapons;
- It is almost certain that the fear of the use of nuclear weapons by the enemy has protected humanity from an all-out military confrontation between the nuclear powers;
- According to some philosophers, nuclear deterrence deserves moral condemnation because it treats entire societies as potential hostages in the hands of a foreign power possessing nuclear weapons;
- Currently, each of the two nuclear superpowers (the U.S. and Russia) possesses enough nuclear weapons to (multiple) completely destroy life on our planet;
- These stockpiles are gradually being reduced, but even after the implementation of the agreements, the number of nuclear warheads in the world will be more than seven times higher than the ceiling determined by scientists to be sufficient to cause a global environmental catastrophe
- Despite the use of increasingly modern safeguards, there is a well-founded fear that nuclear arsenals could be accidentally activated, resulting in a global environmental catastrophe that would result in the total destruction of life on Earth.

[6] Trevelyan M., Explainer: What is the Test Ban Treaty and why would a country conduct a nuclear test?, on-line: https://www.reuters.com/world/europe/what-is-nuclear-test-ban-treaty-why-is-russia-changing-its-position-2023-10-17/ [23.12.2023]

Undoubtedly, one of the most important security challenges in the region, in the context of the Russia-Ukraine war, has been the resurgence of nuclear threats, nuclear escalation risks and nuclear deterrence.

Streszczenie:

Broń jądrowa została użyta dwa razy w ciągu prawie 80 lat jej istnienia, ze względu na odstraszający efekt jej niewyobrażalnego destrukcyjnego wpływu. Od 1945 r. odstraszanie między wielkimi mocarstwami trwa, nawet jeśli w pewnych okresach występowało z różną intensywnością. Obecnie broń jądrowa jest testowana bardziej rygorystycznie niż kiedykolwiek, od momentu jej powstania. Wydaje się jasne, że w najbliższej perspektywie rozwój broni strategicznej będzie postępował w szybkim tempie. Niewątpliwie jednym z najważniejszych wyzwań bezpieczeństwa w regionie, spowodowanym wybuchem wojny rosyjsko-ukraińskiej w lutym 2022 r., jest nasilenie gróźb nuklearnych i zwiększenia ryzyka eskalacji nuklearnej oraz odstraszania nuklearnego. W związku z tym nadal istnieje wymóg silnego odstraszania strategicznego.

Słowa kluczowe:

Broń jądrowa, nuklearne odstraszanie, broń masowego rażenia

Key words:

Nuclear weapons, nuclear deterrence, weapon of mass destruction

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