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TACTICAL NUCLEAR WEAPONS IN CONTEMPORARY MILITARY STRATEGY: RISKS, CAPABILITIES, AND DOCTRINAL EVOLUTION

ZOLTÁN ŐZE

ARTICLE HISTORY

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ABSTRACT

Recent geopolitical tensions—especially the Russian-Ukrainian conflict—have revived concerns regarding tactical nuclear weapons. This paper explores the blurred line between tactical and strategic nuclear weapons, examining their capabilities, doctrinal relevance, and current deployment status. Through qualitative analysis based on open-source intelligence and official defense publications, the study identifies key developments in Russia's tactical nuclear arsenal, NATO's defensive posture, and the United States' modernization efforts. The paper concludes that while the probability of actual nuclear use remains low, the proliferation and doctrinal normalization of tactical nuclear weapons constitute a serious threat to international security in the 21st century.

KEYWORDS

tactical nuclear weapons, nuclear strategy, proliferation, deterrence, escalation, Russian doctrine, NATO

INTRODUCTION

In January 2022, the five recognized nuclear-armed states and permanent members of the United Nations Security Council—China, France, Russia, the United Kingdom, and the United States—issued a joint statement affirming that "a nuclear war cannot be won and must never be fought." (The White House, 2022). This echoes a historic declaration first made in 1985 by U.S. President Ronald Reagan and Soviet General Secretary Mikhail Gorbachev. (Ronald Reagen Presidental Library & Museum, 1985) In that year, the Soviet Union was estimated to secure world peace with almost 40 000 nuclear warheads, and the US with more than 23 000 (Global Nuclear Stockpiles 1945-1997, 1997).This number is now less than six thousand for both forces (Figure 1).

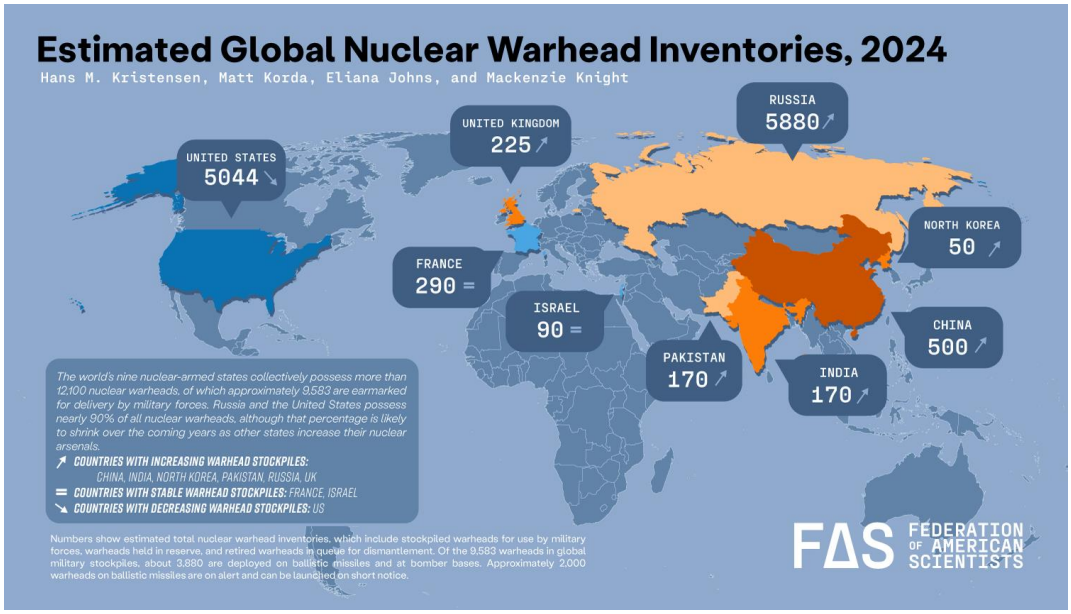


Figure 1. Number of Nuclear Warheads in the world 2024
Source: *(Kristensen, et al., 2024)*

Despite such commitments, the current international security environment reveals increasing nuclear posturing, especially concerning the use of tactical nuclear weapons.

During the Cold War, the balance of terror was maintained through the doctrine of mutually assured destruction, primarily involving strategic nuclear arsenals. Today, however, a renewed focus on tactical nuclear weapons—smaller, more flexible, and battlefield-oriented nuclear arms—is reshaping nuclear deterrence strategies. Russian military doctrine, in particular, reflects a lowering of the nuclear threshold, and exercises involving simulated use of TNWs have become more frequent. At the same time, the United States and NATO have modernized their limited tactical capabilities in response.

This article examines the evolving role of tactical nuclear weapons in modern military doctrines. It addresses key definitional challenges, analyzes current deployment patterns, and assesses the risks associated with their potential use. By placing these developments in historical and strategic context, the study aims to clarify how tactical nuclear weapons influence deterrence, escalation dynamics, and international security.

1 METHODS

This study employs a qualitative, document-based analytical approach, drawing on a wide range of primary and secondary sources. Key data points are extracted from official reports published by national defense institutions—including the U.S. Department of Defense and NATO—alongside strategic analyses by think tanks such as the Federation of American Scientists and the International Institute for Strategic Studies. Historical data on nuclear arsenals are drawn from declassified archives and peer-reviewed academic literature.

The methodology includes comparative analysis to evaluate the evolving doctrines and deployment strategies of tactical nuclear weapons in different nuclear-armed states. Particular emphasis is placed on the Russian Federation, the United States, and NATO allies, whose nuclear postures and capabilities represent the most dynamic areas of development in the post-Cold War era. The study also mentions very limited elements of game theory to interpret deterrence logic and escalation risks, especially in crisis scenarios involving potential tactical nuclear use.

To complement doctrinal analysis, the paper reviews current nuclear modernization programs and regional deployments, such as forward-basing in Europe and weapons storage near Russia's western borders. Open-source satellite imagery and intelligence assessments are referenced when relevant to support claims about deployment readiness.

2 RESULTS

The analysis reveals several key developments regarding tactical nuclear weapons (TNWs) in the 21st century:

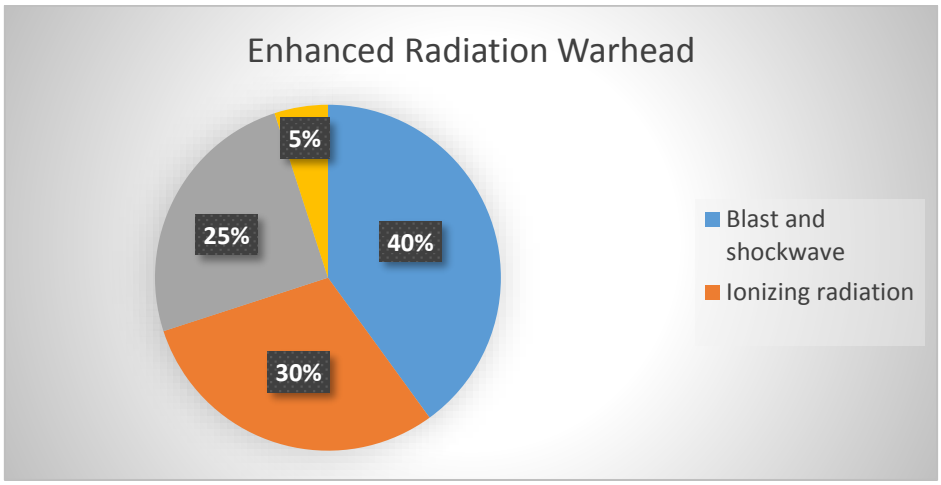
1. Russian tactical superiority and forward storage: Russia possesses the largest and most diversified arsenal of TNWs, estimated at nearly 2,000 warheads. These are believed to be stored in dozens of central facilities, with some near conflict zones such as the Ukrainian border (e.g., Belgorod). While not kept on constant alert, Russian TNWs can be prepared for deployment within hours or days, posing a serious challenge to early-warning systems.
2. Doctrinal shifts and use thresholds: Russia’s military doctrine increasingly integrates TNWs into conventional scenarios, suggesting their potential use to de-escalate conflicts on favorable terms. This is reinforced by recurring nuclear signaling during military exercises and public statements by top officials.
3. U.S. and NATO modernization efforts: In contrast, the United States currently deploys around 230 tactical nuclear weapons, all of which are gravity bombs (B61 variants), with approximately 150 stationed in five NATO member states. Recent modernization programs include the W76-2 low-yield warhead on Trident submarine missiles, and the B61-12 upgrade for enhanced precision.
4. Technological alternatives to tactical nuclear use: Advances in precision-guided conventional munitions have reduced the strategic utility of TNWs in Western military doctrines. NATO has gradually eliminated most TNWs from its stockpile, favoring non-nuclear deterrence tools and strategic ambiguity.
5. Proliferation and risk of escalation: The relative portability and lower political barrier to using TNWs increase the risk of limited nuclear exchanges, especially in regional conflicts. Despite their smaller yields, TNW use would likely result in massive civilian casualties and uncontrollable escalation.

3 DISCUSSION

The resurgence of tactical nuclear weapons (TNWs) in contemporary military strategy represents a fundamental challenge to the long-standing norms of nuclear deterrence and escalation management. The Cold War deterrence model relied on strategic nuclear weapons with high yields and guaranteed second-strike capabilities, thereby creating a clear threshold against nuclear use. In contrast, TNWs blur the distinction between nuclear and conventional warfare due to their lower yield, shorter range, and flexible deployment options.

For military purposes, the Enhanced Radiation Warhead also known as neutron bomb is best suited for the destruction of life forces, a special type of small thermonuclear weapon that produces minimal light and heat effects but emits large amounts of lethal radiation (Figure 2). A neutron weapon differs from a conventional nuclear weapon in that its primary effect is the adverse physiological effects caused by the neutrons it emits (Medical Implications of Enhanced Radiation Weapons, 2010).

The shockwave has a lower energy, so physical structures, including houses and industrial installations, are less affected. Because the effects of neutron radiation diminish very rapidly with distance, much smaller areas are exposed to lethal levels of radiation (A Comparison of the Effects of Neutron Bombs and Standard Fission Weapons, 1981).



Graph 1. Enhanced Radiation Weapons'effects
Source: (Enhanced Radiation Weapons, 1978)

Because of its relatively small strike area, the neutron weapon would be highly effective against tank units and infantry on the battlefield, but would not threaten cities or other structures within a few kilometers. The American scientist Samuel Cohen[1], who died in 2010, developed the concept of the weapon (Cohen, 1978).

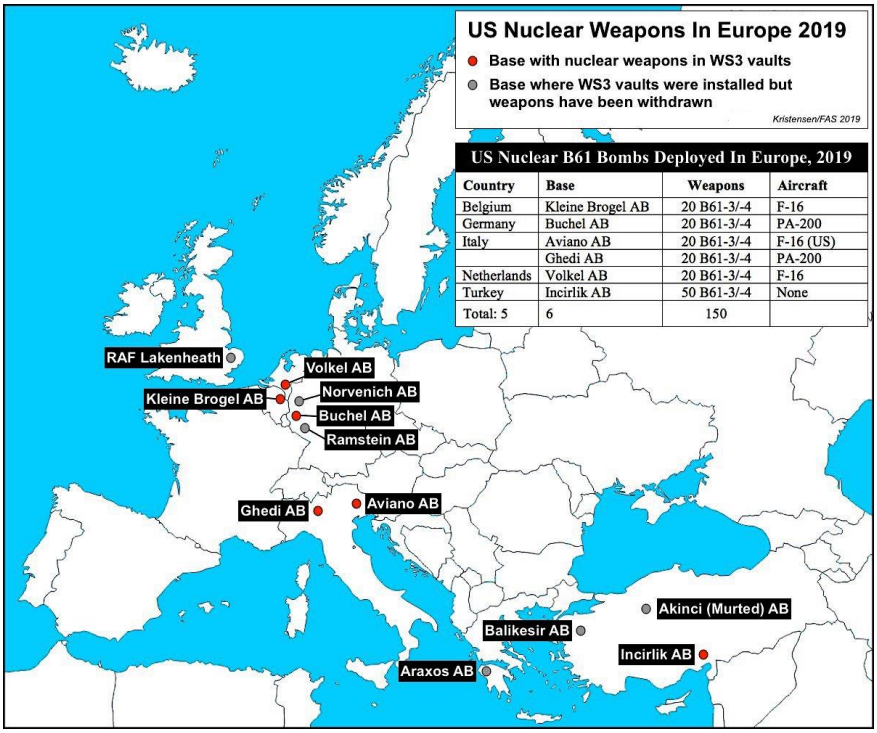
[1] Samuel T. Cohen (Brooklyn, January 25, 1921 – Los Angeles, November 28, 2010) was an American physicist. In 1947, he joined RAND and worked as a consultant at the Lawrence Livermore National Laboratory. The RAND project was established by the United States Air Force to research the weapons of the future. In 1958, Cohen developed the neutron bomb here.

The neutron bomb was designed to stop a possible invasion of Western Europe by Soviet forces. Currently, the technologies to create an Enhanced Nuclear Warhead are owned by the United States, Russia and China (possibly France). In the 1980s, the US had 20-30,000 tactical nuclear weapons and the Soviet Union had about 13-22,000 (Global Nuclear Stockpiles 1945-1997, 1997).

The United States of America stationed most of its warheads in Western Europe, because then it was part of the American military doctrine what the Russians have now: if conventional forces fail to stop the enemy, then nuclear weapons can come in.

During the Cold War, the Warsaw Pact's conventional troops were outnumbered in Europe, which the US countered with missile deployments that provoked protests from the population in many places. However, with the collapse of the Soviet Union, the Warsaw Pact was dissolved, NATO was enlarged, and the balance of power was reversed, with conventional supremacy shifting to NATO.

This is reflected in the fact that the US now has only about 230 tactical nuclear weapons, all of them aircraft-launched (B61 family), conventional nuclear bombs, and an estimated 150 of them are in Europe - divided between the five countries with six US bases - Belgium (Kleine Brogel), Germany (Brüchel), Italy (Aviano and Ghedi), the Netherlands (Volkel) and Turkey (Incirlik) (Graph 2). NATO largely eradicated its tactical nuclear stockpile after the end of the Cold War mainly because in the meantime, military technology has evolved to the point where conventional weapons are more precise - especially artillery and missiles – and they are able to perform similar tasks more cheaply and with less complication.



Graph 2. The U.S. nuclear weapons in Europe in 2019
Source: (Kristensen, 2019)

The UK – which now only has submarine-launched ballistic missiles – and France do not have tactical nuclear weapons, although the French's air-launched devices have similar characteristics.

Meanwhile, a US congressional report estimates that Russia still has almost 2,000 (Woolf, 2022) tactical nuclear weapons, and an increasing number of them are modernized, such as the Iskander missile-mounted version (Figure 2) that is also deployed in the Kaliningrad enclave between Poland and Lithuania.

Figure 2. Technical data of the Iskander missile, which can also be equipped with the AA-60 warhead (yield of 10–100 Kt)
Source: (BBC News, 2022)

Shortly after the turn of the millennium, Moscow started to modernize its nuclear arsenal and delivery systems on Putin's orders. In the face of Russian efforts, and following the annexation of Crimea, Barack Obama launched the US modernization program, which is expected to last up to 30 years and cost at least 1.5 trillion dollars (Bennett, 2023).

It was the next US president, Trump, who ordered the development of warheads that could be mounted on Trident missiles used on submarines, and the W76-2, which can scale between 25 and 100 kilotons, was completed relatively quickly and was deployed in January 2020 (Mehta, 2020).

During the Cold War, tens of thousands of warheads kept NATO and the Warsaw Pact member countries from using nuclear weapons against each other through mutually assured destruction, because escalation threatened the total annihilation of human civilization -

which, fortunately, has only happened in science fiction novels. The mechanism of nuclear deterrence can be derived mathematically using game theory methodology. The best example of this is the Cuban Missile Crisis, a study of which mathematically deduces exactly why nuclear apocalypse did not occur in 1962 (Shaabani, et al., 2023).

But the threat appears to be resurgent, with Vladimir Putin announcing the deployment of nuclear weapons in the event of an attempted intervention by an outside power during his invasion of Ukraine (Cimbala, et al., 2024). The Russian rhetoric is most likely to threaten with so-called "tactical nuclear weapons", which differ in range and purpose of deployment from strategic nuclear weapons (Tactical nuclear weapons, 2019). The distinction between tactical and strategic nuclear weapons is not straightforward and involves multiple factors:

- Range is often more important consideration than explosive power.
- The nature of the target and the weapon's intended use are also determining factors.
- Some experts argue that the "tactical" and "strategic" distinction is not useful, and that all nuclear weapons should be considered collectively.

The yield does not typically determine whether a nuclear weapon is classified as strategic or tactical - even if we can establish that it is not justified to use a high-yield nuclear weapon for tactical purposes (near friendly forces), while low-yield nuclear weapons can also achieve strategic effects. Indeed, the yield alone is not a decisive factor in categorizing a nuclear weapon as strategic or tactical. There are significant overlaps in the explosive power of tactical and strategic weapons. The classification of weapons is greatly influenced by their intended use: tactical weapons are generally designed for battlefield use, such as against large infantry formations or armored units while strategic weapons are intended more for attacking the enemy's homeland, cities, or strategic nuclear forces. According to Encyclopaedia Britannica the “tactical nuclear weapons, small nuclear warheads and delivery systems intended for use on the battlefield or for a limited strike” (Encyclopaedia Britannica). Technically, a tactical nuclear weapon is one that is not subject to the START agreements on strategic nuclear arms limitation.

However, a significant difference between tactical and strategic nuclear weapons is that strategic nuclear weapons are kept in constant readiness, because if the attack mechanism is activated at any time based on strictly controlled codes, the attacked country's retaliatory strike will arrive within minutes. Tactical nuclear weapons, on the other hand, are generally not ready for deployment. These devices are stored in central warehouses, there are dozens of such secret facilities in Russia, one of them happens to be right at the Ukrainian border, near the city of Belgorod, one of the launching points of the Russian invasion in February 2022 (Alberque, 2022). It would take a few hours or a few days to prepare the weapons for potential use, and in the present circumstances it is safe to assume that Western intelligence organizations are closely monitoring such actions.

Russian military doctrine is particularly notable in this context. The integration of TNWs into operational planning and their simulation in large-scale exercises reflect a doctrinal willingness to consider limited nuclear strikes in conventional conflict scenarios. This “escalate to de-escalate” approach carries significant risks: it reduces the psychological and strategic barriers to nuclear use and complicates adversaries' decision-making during crises. Moreover, Russian TNWs are not covered by strategic arms control treaties such as New START, making transparency and verification virtually impossible.

Meanwhile, the U.S. and NATO responses have been cautious but significant. While maintaining a much smaller TNW arsenal, modernization efforts such as the B61-12 and W76-2 reflect a shift toward credible, flexible deterrence. However, NATO’s current doctrine still prioritizes non-nuclear means, relying on advanced precision munitions and collective defense mechanisms rather than expanding its TNW stockpile.

The broader strategic implication is that the availability of TNWs may tempt political and military leaders to consider their use under the false assumption of limited consequences. Yet simulations and policy studies consistently show that any nuclear detonation—even of the lowest yield—would likely lead to rapid and potentially uncontrollable escalation. This raises profound ethical, humanitarian, and strategic concerns.

Furthermore, TNWs pose significant proliferation risks. As more states seek deterrence capabilities, the temptation to develop small-yield nuclear weapons may grow, particularly in volatile regions where full-scale nuclear arsenals are politically or technically unfeasible. The blurred threshold for use may also encourage rogue states or non-state actors to pursue tactical nuclear technologies.

CONCLUSION

Tactical nuclear weapons have re-emerged as a central issue in 21st-century military strategy, particularly in light of Russia’s assertive nuclear signaling and doctrinal flexibility. Although these weapons are often viewed as limited-use tools, their deployment carries substantial strategic and humanitarian risks. Unlike strategic weapons, TNWs are not constrained by international treaties, making their development and potential use harder to monitor and regulate.

In recent decades, Moscow has incorporated simulations of the use of tactical nuclear weapons into its major military exercises and has repeatedly renewed its military doctrine (Kofman, et al., 2021). In addition to that, leading Russian politicians regularly mention the possibility of using nuclear weapons (Pennington, et al., 2024). In response to the advisory opinion requested by the UN General Assembly in its resolution 49/75K, the 1996 resolution of the International Court of Justice in The Hague stated that the use or threat of use of nuclear weapons, although not directly regulated, is indirectly a form of aggression and cannot be used as a pre-emptive strike. (International Court of Justice, 1996)

For years, NATO has interpreted Russian military doctrine as permitting the use of tactical nuclear weapons to achieve military objectives by leveraging their deterrent effect and forcing the opponent to retreat (Daryl, 2022). The NATO Secretary General is also regularly required to issue statements regarding the deployment of Russian nuclear weapons in Belarus and NATO's nuclear deterrence capabilities (North Atlantic Treaty Organization, 2022).

However, simulations show that the use of a nuclear weapon, no matter how low the yield, can lead to a severe escalation and the loss of millions of lives. Moreover, although Putin regularly advocates the use of a tactical nuclear weapon − which many military experts say would not achieve any military advantage (Alberque, 2022) − it would only make himself and his country more pariah-like.

The findings of this study suggest that the existence and modernization of TNWs weaken the deterrent effect of mutually assured destruction by introducing the possibility of "limited" nuclear warfare. This creates dangerous ambiguity in escalation scenarios and undermines decades of arms control efforts. While the probability of tactical nuclear weapon use remains low, the mere possibility necessitates robust policy responses from the international community.

Unlike strategic nuclear arms, which are designed for large-scale deterrence and retaliation, tactical nuclear weapons serve battlefield purposes and often fall outside formal arms control agreements. Going forward, it is imperative for nuclear-armed states and alliances to develop clear policies, invest in verification mechanisms, and pursue arms control frameworks that include TNWs. Failure to address the risks associated with these weapons could lead to miscalculations with catastrophic consequences.

REFERENCES

A Comparison of the Effects of Neutron Bombs and Standard Fission Weapons. Scoville, Herbert Jr. 1981. 4, s.l. : Bulletin of Peace Proposals, 1981, Vol. 12. https://doi.org/10.1177/096701068101200413

Alberque, William. 2022. The International Institute for Strategic Studies. Russia is unlikely to use nuclear weapons in Ukraine. [Online] 10 10, 2022. https://www.iiss.org/online-analysis/online-analysis//2022/10/russia-is-unlikely-to-use-nuclear-weapons-in-ukraine.

BBC News. 2022. Ukraine war: Could Russia use tactical nuclear weapons? BBC News. [Online] 2022. https://www.bbc.com/news/world-60664169.

Bennett, Michael. 2023. Congressional Budget Office. Projected Costs of U.S: Nuclear Forces, 2023 to 2032. [Online] 07 2023. https://www.cbo.gov/system/files/2023-07/59054-nuclear-forces.pdf.

Cimbala, J. Stephen and Korb, J. Lawrence. 2024. Bulletin of The Atomic Scientists. Putin's nuclear warnings: heightened risk or revolving door? [Online] 03 28, 2024.

https://thebulletin.org/2024/03/putins-nuclear-warnings-heightened-risk-or-revolving-door/.

Cohen, Samuel. 1978. The neutron bomb, political, technological and military issues. USA : Institute for Foreign Policy Analysis, 1978.

Daryl, Kimball G. 2022. Arms Control Association. New Tactical Nuclear Weapons? Just Say No. [Online] 5 2022. https://www.armscontrol.org/act/2022-05/focus/new-tactical-nuclear-weapons-just-say-no.

Encyclopaedia Britannica. Britannica. tactical nuclear weapons. [Online] https://www.britannica.com/technology/nuclear-weapon.

Enhanced Radiation Weapons. Kaplan, M. Fred. 1978. 5, s.l. : Scientific American, 1978, Vol. 238. OTI ID 6539823. https://doi.org/10.1038/scientificamerican0578-44

Global Nuclear Stockpiles 1945-1997. Taylor & Francis online. 1997. 6, s.l. : Bulletin of the Atomic Scientists, 1997, Vol. 53. https://doi.org/10.1080/00963402.1997.11456792.

International Court of Justice. 1996. International Court of Justice. Legality of the Threat or Use of Nuclear Weapons. [Online] 1996. https://www.icj-cij.org/case/95.

Kofman, Michael, et al. 2021. Center for Naval Analysis. Russian Military Strategy: Core Tenets and. [Online] 08 2021. https://www.cna.org/reports/2021/08/Russian-Military-Strategy-Core-Tenets-and-Operational-Concepts.pdf.

Kristensen, Hans. 2019. Federation of American Scientists. Urgent: Move US Nuclear Weapons Out Of Turkey. [Online] 2019. https://fas.org/publication/nukes-out-of-turkey/.

Kristensen, Hans, et al. 2024. Federation of American Scientists. Status Of World Nuclear Forces. [Online] 03 29, 2024. https://fas.org/initiative/status-world-nuclear-forces/.

Medical Implications of Enhanced Radiation Weapons. Reeves, I. Glen. 2010. 12, s.l. : Military Medicine, 2010, Vol. 175. https://doi.org/10.7205/MILMED-D-10-00115

Mehta, Aaron. 2020. Defense News. Trump’s new nuclear weapon has been deployed. [Online] 2 4, 2020. https://www.defensenews.com/smr/nuclear-arsenal/2020/02/04/trumps-new-nuclear-weapon-has-been-deployed/.

North Atlantic Treaty Organization. 2022. North Atlantic Treaty Organization. Press conference by NATO Secretary General Jens Stoltenberg following the extraordinary Summit of NATO Heads of State and Government. [Online] 2022. https://www.nato.int/cps/en/natohq/opinions_193613.htm?selectedLocale=en.

Pennington, Josh and Regan, Helen. 2024. CNN World. Putin says he’s ready to use nuclear weapons if Russian state at stake, but ‘there has never been such a need’. [Online] 3 2024. https://edition.cnn.com/2024/03/13/europe/russia-putin-nuclear-weapons-ukraine-intl-hnk/index.html.

Ronald Reagen Presidental Library & Museum. 1985. Ronald Reagen Presidental Library & Museum. [Online] 11 21, 1985. [Cited: 11 01, 2024.] https://www.reaganlibrary.gov/archives/speech/joint-soviet-united-states-statement-summit-meeting-geneva.

Shaabani, Somajeh and Gordji, Madjid Eshaghi. 2023. International Journal of Cuban Studies . GAME THEORY AND A NEW INSIGHT INTO HOW THE CUBAN MISSILE CRISIS WAS RESOLVED. [Online] 2023. https://www.jstor.org/stable/48728269?seq=7. https://doi.org/10.13169/intejcubastud.15.1.0039

Tactical nuclear weapons. Kristensen, M. Hans and Korda, Matt. 2019. 5, s.l. : Bulletin of the Atomic Scientists, 2019, Vol. 75. ISSN: 0096-3402. https://doi.org/10.1080/00963402.2019.1654273

The White House. 2022. The White House. Statements and releases. [Online] 01 03, 2022. [Cited: 11 20, 2024.] https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/03/p5-statement-on-preventing-nuclear-war-and-avoiding-arms-races/.

U.S. Departmment of Defense. 2023. media.defense.gov. Annual report to Congress. [Online] 2023. [Cited: 11 12, 2024.] https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.

Woolf, Amy F. 2022. Russia's Nuclear Weapons: Doctrine, Forces, and Modernization. [Online] 2022. https://sgp.fas.org/crs/nuke/R45861.pdf.

Zoltán ŐZE, Ph.D.
Address of workplace: H-1101 Budapest. 9-11 Hungária krt.
Telephone, fax. +36303283269
E-mail: oze.zoltan@uni-nke.hu