

## Deterring Russian First Use of Low-Yield Nuclear Weapons

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The 2018 Nuclear Posture Review concluded that the U.S. must deploy a small number of low-yield nuclear warheads on its Trident missiles to deter Russian first use of low-yield nuclear weapons for limited nuclear strikes in conventional warfare. It states, “Russia’s belief that limited nuclear first use, potentially including low-yield weapons, can provide such an advantage is based, in part, on Moscow’s perception that its greater number and variety of non-strategic nuclear systems provide a coercive advantage in crises and at lower levels of conflict. Recent Russian statements on this evolving nuclear weapons doctrine appear to lower the threshold for Moscow’s first-use of nuclear weapons. Russia demonstrates its perception of the advantage these systems provide through numerous exercises and statements. Correcting this mistaken Russian perception is a strategic imperative.”[\[1\]](#)

The threat of Russian first use involving limited nuclear strikes was recognized by the Obama administration. In October 2016, Secretary of Defense Ashton Carter stated that “...it’s a sobering fact that the most likely use of nuclear weapons is not the massive nuclear exchange of the classic Cold War-type, but rather the unwise resort to smaller but still unprecedentedly terrible attacks, for example, by Russia or North Korea to try to coerce a conventionally superior opponent to back off or abandon an ally during a crisis.”[\[2\]](#) As Secretary of Defense Jim Mattis has stated, “We want to make certain they recognize that we can respond in kind and that we don’t have to go with the high yield weapon.”[\[3\]](#)

Domestic opposition to this NPR decision appears to be largely ideological and ignores the disparity in such weapons that now exists and Russia’s doctrine with regards to the first use of nuclear weapons. There is nothing new about low-yield warheads on ballistic missiles. In addition to Russia, the UK and France reportedly have low-yield ballistic missile warheads on their SLBMs.[\[4\]](#)

Russia reportedly has acquired low-yield, precision low-yield and low-collateral damage nuclear weapons. This was originally reported by distinguished Russian journalist Pavel Felgenhauer who wrote in 2002 that in April 1999 the Russian National Security Council approved a concept for developing and using “...non-strategic low- and flexible-yield battlefield weapons,” and that the yield of these precision weapons would be tens or hundreds of tons of TNT.[\[5\]](#) “Flexible yield” is clearly what we call variable yield or dial a yield. New Russian low-yield nuclear

weapons are reported in the Russian press including in the state media. A declassified year 2000 CIA report observed, “Moscow’s military doctrine on the use of nuclear weapons has been evolving and probably has served as the justification for the development of very low-yield, high-precision nuclear weapons. The range of applications will ultimately be determined by Russia’s evolving nuclear doctrine, and could include artillery, air-to-air weapons, ABM weapons, anti-satellite weapons or multiple rocket launchers against tanks or massed troops...”[6] In 2009, the bipartisan U.S. Strategic Commission report said Russia was developing “...low-yield tactical nuclear weapons including an earth penetrator.”[7]

Actual Russian deployment of strategic low-yield nuclear warheads (tens of tons to 200 tons yield) on Russian SLBMs (the Sineva and Bulava-30) has been reported in the state media (Sputnik News and Ria Novosti), and in the decidedly non-state media, the liberal Ekho Moskvy Radio (in an interview with hardline but well connected Russian journalist Colonel (ret.) Viktor Litovkin.).[8] Since, according to then-Defense Minister Sergei Ivanov, the Bulava-30 SLBM and RS-24/Yars ICBM use the same new warhead, it is nearly certain that the RS-24 also has low- yield options.[9]

Russian media have also reported that Russia has developed and deployed new low-yield tactical nuclear weapons. In 2004, Russian television displayed a new howitzer which it said: “...could be used to fire low-yield nuclear bombs.”[10] In 2013, Academician Yevgeniy Avrorin, a former Director of the Sarov nuclear weapons laboratory (the All-Russian Scientific-Research Institute), in an interview published by the Sarov laboratory, said the Russian 152-mm nuclear artillery shell with “a kiloton yield” has been “broadly deployed” throughout the Russian Army.[11] In 2009, Russia’s main official news agency ITAR-TASS (now called TASS) reported that, “The nuclear submarine Severodvinsk will be equipped with long-range cruise missiles that can potentially carry low-capacity tactical warheads.”[12]The 2018 NPR report indicates that Russia has CRBM (Close Range Ballistic Missiles) which would have to have low-yield warheads because of their limited range. Dr. Philip Karber, President of the Potomac Foundation, has stated that roughly half of Russia’s 5,000 tactical nuclear weapons have been modernized with new sub-kiloton nuclear warheads for air-defense, torpedoes and cruise missiles.[13]

Russia is also reportedly developing advanced low-collateral damage designs. In 1999, Major General (ret.) Vladimir Belous discussed the development of “neutron artillery shells, mortar shells, and operational-tactical missile warheads.”[14] A declassified CIA report gives this some additional credibility, noting, “A number of articles [in the Russian press] suggest that Russia is developing low-yield warheads with enhanced radiation that could be used on high-precision non-strategic weapons systems.”[15] Moreover, in 2013, the Sarov nuclear weapons laboratory said that during the Cold War they had developed a peaceful nuclear explosive (PNE) device that was 99.85% based on fusion.[16] This is essentially a low-yield/low-collateral damage nuclear weapon. The only question would be its size and weight but, worst case, it certainly could be delivered by any strategic bomber which can deliver large and heavy weapons. Vice Admiral (ret.) Robert Monroe, former Director of the Defense Nuclear Agency, has recently stated that Russia is now 20 years ahead of the U.S. in such weapons.[17]

Pavel Felgenhauer has written that the Russian S-300, S-400, S-500 air defense missiles and the Moscow ABM are nuclear capable and have a secondary ground-attack capability.[18] While he

did not mention yield, these missiles, two of which the Russians say are designed to intercept ballistic missiles and satellites in near space,[\[19\]](#) would have to have very low-yield warheads unless Russian leaders don't mind destroying Russia with nuclear EMP effects from their own weapons. Both TASS and Sputnik News, both state media, have confirmed Felgenhauer's report that the S-300 and S-400 anti-aircraft missiles have the capability to attack ground targets.[\[20\]](#) The 2018 NPR confirms the existence of nuclear warheads on Russian anti-aircraft missiles.[\[21\]](#)

Senior Russian officials have talked about Russian low-yield nuclear weapons. In 2007, Russian Deputy Chief of the General Staff General Alexander Rukshin, said Russia had "...created low-yield nuclear tactical nuclear ordnance with a yield of no more than 5 kilotons, which can be employed on the battlefield."[\[22\]](#) In 2009, Vice Admiral Oleg Burtsev, then-First Deputy Chief of the Russian Naval Staff, said that tactical nuclear weapons may be the future and, "We can install low-yield warheads on existing cruise missiles."[\[23\]](#) These statements are particularly interesting because they were made in contravention of the Russian propaganda line that the U.S. was developing such weapons, which was untrue at that time. It is normal for Russia to charge that the U.S. is doing what Russia is actually doing. Further confirmation of low-yield tactical nuclear weapons comes in a March 2009 ITAR-TASS story which said, "The missiles [on the new Russian nuclear submarine Severodvinsk] are capable of carrying low-yield tactical nuclear warheads and are meant to be used against the potential enemy's aircraft carrying groups."[\[24\]](#) In December 2015, President Putin revealed that the Kalibr and Kh-101 cruise missiles used in attacks against Syrian targets, "...can be equipped either with conventional or special nuclear warheads."[\[25\]](#) Interfax-AVN reported that the Kalibr has a "nuclear kiloton warhead."[\[26\]](#) Advanced low-yield nuclear and thermonuclear weapons were reportedly developed by the Soviet Union in its later years.[\[27\]](#) Russian expatriate Nikolai Sokov writes, "...as early as 1992, Lieutenant General Evgeniy Negin announced that Russia already had developed a miniaturized nuclear weapon."[\[28\]](#) In 1994, Russian Atomic Energy Minister Viktor Mikhaylov stated that "a new generation" of nuclear weapons could be developed by the year 2000.[\[29\]](#) In 1996, he called for the construction of 10,000 very low-yield nuclear weapons.[\[30\]](#) In August 2003, when he was Director of the Sarov nuclear weapons laboratory, Mikhaylov said Russian efforts to improve thermonuclear weapons continued and that there were weapons "yielding hundreds of tons."[\[31\]](#) This is more than a low-yield weapon. It would also be a low-collateral damage design (effectively a neutron bomb) which would be cleaner (producing less collateral damage) and more militarily effective than low-yield fission weapons against some targets. That same year he observed, "The philosophy of thermonuclear weapons has changed today, and on the agenda is the development of high-precision and deep-penetration nuclear bombs," further adding that Russia was ahead of the United States in these weapons.[\[32\]](#) In December 2002, he declared, "The scientists are developing a nuclear 'scalpel' capable of 'surgically removing' and destroying very localized targets. The low-yield warhead will be surrounded with a superhardened casing which makes it possible to penetrate 30–40 meters into rock and destroy a buried target—for example, a troop command and control point or a nuclear munitions storage facility."[\[33\]](#) These are very impressive characteristics. Since this was said 16 years ago and Mikhaylov also said that it would take 10-20 years to develop this weapon, these weapons could already be available. In March 2004 Mikhaylov again stated that, "Thermonuclear weapons development philosophy has changed and work is being conducted on the development of precision-guided munitions with penetrating capability."[\[34\]](#)

Concerning the Russian Vostok 2010 military exercise, the official newspaper of the Far East Military District said, “To suppress a large center of the separatists’ resistance and to achieve minimal losses of the attacking troops a low-yield ‘nuclear’ attack was mounted against the enemy.”[\[35\]](#) In the same exercise, Pavel Felgenhauer wrote that Russia used a nuclear-armed S-300 surface-to-air missile against a ground target.[\[36\]](#)

Despite the near hysterical reaction from Russia and U.S. arms control enthusiasts, the U.S. program for a low-yield warhead for the Trident missile is quite modest, prudent and not remotely comparable to existing Russian capabilities and programs. The weapons that the U.S. plans to install will be small in number, modest in cost, not a new type of nuclear weapon and will not require a nuclear test.[\[37\]](#) This clearly rules out low-collateral damage warheads, precision or near-precision accuracy, or earth penetration – all capabilities that the Russians are reported to have or are developing. Such restrictions also preclude any significant warfighting capability. The purpose of the low-yield Trident warhead is not warfighting but rather to deter Russian first use of nuclear weapons which would very likely involve precision low-yield or low-collateral damage nuclear weapons. The Russians believe they can use these without precipitating a massive nuclear exchange.

The Trident submarines have the survivability that is necessary for an effective deterrent, but they have 1980s level accuracy which is good but not precision or near precision. Their survivable capability could deter Russian first use of low-yield weapons including use against bomber bases and nuclear-capable fighter bases to eliminate U.S. retaliatory capability against low-yield attack by a preemptive attack. However, these aircraft are not on alert and, hence, unless put on alert can be eliminated by about ten ordinary nuclear weapons. A 2007 study by CSIS concluded, “In a ‘bolt from the blue’ attack, just five dedicated nuclear strikes could take out all three strategic nuclear bomber bases and the two submarine bases.”[\[38\]](#) Trident submarines at sea will very likely survive, but non-alert bombers present at their bases could be destroyed. A small number of B-61 nuclear bombs are reportedly deployed at five NATO air bases in Europe.[\[39\]](#) Again, they could be taken out by a small nuclear attack if they are not on alert or dispersed. A very good recent analysis by James R. Howe has concluded that a small number of precision low-yield nuclear weapons would eliminate the ability of these bases to retaliate for months (even assuming no follow-on Russian nuclear attacks) with very low levels of collateral damage.[\[40\]](#) Howe also raised concern about the possibility of a much larger Russian precision-low-yield attack (about 1,300 to 1,500 weapons) which has the potential to defeat NATO with modest collateral damage.

The NPR decision on Trident low-yield capability was recommended by the Obama administration’s Defense Science Board in December 2016.[\[41\]](#) It plugs a major hole in our current deterrent capability at virtually no cost.

Putin’s remarkably militant nuclear superweapons speech to the Russia Duma on March 1, 2018, should be a wake-up call regarding the need to create a more effective deterrent to counter Putin’s irresponsible policies. Make no mistake about the intended target of this speech. As Maxim Trudolyubov, a senior fellow with the Kennan Institute, observed, “...Interestingly, both state-run [Russian] news media and independent outlets agreed that the speech was mainly

targeted at Washington.”[42] Putin first staked out a claim to the former Soviet states because “...Russia, which was known as the Soviet Union or Soviet Russia abroad” had lost them with the demise of the Soviet Union.[43] Then, he alternated between portraying Russia as a victim (making ridiculous claims about U.S. missile defense and the failure of the West to “listen” to Russia) and making extreme forms of standard Russian nuclear threats – nuclear superweapons and an “immediate” nuclear launch after a supposed Western attack. Pavel Felgenhauer summed up the message as, “Russia is not aggressive, according to Putin, but it demands what it believes it is due—otherwise, its doomsday nuclear superweapons are ready.”[44]

Putin does not want Russia to be listened to. He wants its imperialism and aggression accepted at the point of his nuclear superweapons. After declaring to the West, “So listen now,” Putin went into a speech which, as a noted British Russia expert Roger McDermott observed, “...offered a vision of the Russian Armed Forces more akin to a parody of Dr. Strangelove.”[45] Derek Williams and Adam B. Lowther attribute Russian confidence that Russia can start a nuclear conflict, control it and win it to the fact that, “...Vladimir Putin believes the United States lacks the will and the weapons to respond not only to limited nuclear war but the cohesive use of nuclear deterrence for political gain.”[46] We need nuclear deterrent programs that would convince Putin that his theory of victory is foolhardy and if he tries aggression it will be resisted and defeated and that Russian nuclear weapons first use will not assure his victory. We must assure that any U.S. President has the broadest possible range of credible nuclear options to convince any potential aggressor to desist from attacking us or our allies with nuclear or WMD weapons.

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#### **Notes:**

[1] Department of Defense, *Nuclear Posture Review*, (Washington D.C., US, Department of Defense, February 2018), pp. XI-XII, available at <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>.

[2] “Remarks by Secretary Carter to troops at Minot Air Force Base, North Dakota,” (Washington D.C., U.S. department of Defense, Sept. 26, 2016), available at <http://www.defense.gov/News/Transcripts/Transcript-View/Article/957408/remarks-by-secretary-carter-to-troops-at-kirtland-afb-new-mexico>.

[3] Jamie McIntyre, “Jim Mattis: Low-yield nukes mean US won't have to choose between ‘surrender’ and ‘suicide’,” *The Examiner*, February 6, 2018, available at <https://dialog.proquest.com/professional/docview/1999173890?accountid=155509>.

[4] Federation of American Scientists, “Trident-II D-5,” Federation of American Scientists, December 4, 2006, <http://fas.org/nuke/guide/uk/slbn/d-5.htm>.: David S. Yost, “France’s New



Nuclear Doctrine,” *International Affairs*, Vo. 82, No. 4 (2006), p. 704, available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2346.2006.00564.x/abstract>.

[5] Pavel Felgenhauer, “Bomber Makers Trade Union,” *The Moscow Times*, March 14, 2002, available at <http://www.themoscowtimes.com/opinion/article/bomb-makers-trade-union/247805.html>.

[6] “Evidence of Russian Development of New Subkiloton Nuclear Warheads [Redacted],” Intelligence Memorandum, Central Intelligence Agency, August 30, 2000, approved for release October 2005, pp. 6, 10, available at [http://www.foia.cia.gov/sites/default/files/document\\_conversions/89801/DOC\\_0001260463.pdf](http://www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0001260463.pdf).

[7] William J. Perry and James R. Schlesinger, *America’s Strategic Posture - The Final Report of the Congressional Commission on the Strategic Posture of the United States*, (Washington D.C.: U.S. Institute of Peace, 2009), p. 12, available at [http://media.usip.org/reports/strat\\_posture\\_report.pdf](http://media.usip.org/reports/strat_posture_report.pdf).

[8] Ilya Kramnik, “Nevsky and Novomoskovsk: Two Submarines for Putin,” *Sputnik News*, December 12, 2010, available at <http://sputniknews.com/analysis/20101215/161784522.htmlz>.: Andrey Kislyakov, “Does Russia Need a ‘Wet’ Missile and One More Tank?,” *Ria Novosti*, January 19, 2008. (Translated by World News Connection).; “Russian pundit Litovkin argues case of Bulava,” *Ekho Moskvy Radio*, July 17, 2009. (Translated by World News Connection).

[9] “Russia to use same warheads on land, sea,” *UPI News Track*, April 24, 2006. (Transcribed by World News Connection).

[10] “Russian TV shows howitzer capable of firing low-yield nuclear warheads,” *BBC Monitoring Former Soviet Union*, April 11, 2004, available at <https://dialog.proquest.com/professional/docview/460568620?Accounted=155509>.

[11] Академик Евгений Николаевич Аврорин: «Наука — это то, что можно сделать, а техническая наука — это то, что нужно сделать», *atomicenergy.ru*, April 10, 2013, available at <http://www.atomic-energy.ru/interviews/2013/04/10/41068>. (In Russian).

[12] “RF To Build 6 Nuclear Subs With Long-range Cruise Missiles,” *ITAR-TASS*, March 27, 2009. No longer available on the *TASS* webs-site, but Western press stories citing the *ITAR-TASS* report remain on the internet. “Russia to build 6 nuke subs with Cruise Missiles,” *CNN*, March 28, 2009, available at <https://army.ca/forums/index.php?topic=85048.0> [World/](#).

[13] A video of Karber’s presentation is available at <http://www.lse.ac.uk/ideas/podcasts/karber>.

[14] National Institute for Public Policy, “Section II Minimum Deterrence: Fragile Hope for Constant and Benign Threat Environment,” (Fairfax Va.: National Institute for Public Policy, September 2014.), p. 22, available at <http://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Other/Litigation%20Release%20-%20Section%20II%20Minimum%20Deterrence%20Fragile%20Hope.pdf>.

[15] Office of Russian and European Analysis, Central Intelligence Agency “Russia: [Deleted],” June 22, 2000, available at <http://www2.gwu.edu/~nsarchiv/NSAEBB/NSAEBB200/20000622.pdf>.

[16] “About Snezhinsk,” *CNCP.ru*, April 2013, available at [http://www.cncp.ru/new\\_site/ng/participants/snezhinsk/snezinsk1.shtml](http://www.cncp.ru/new_site/ng/participants/snezhinsk/snezinsk1.shtml).

[17] Vice Admiral (ret.) Robert Monroe, “Facing the grave nuclear risk,” *The Washington Times*, January 27, 2017, available at <https://www.washingtontimes.com/news/2017/jan/26/america-must-resume-underground-nuclear-testing/>.

- [18] Pavel Felgenhauer, "Russia Seeks to Impose New ABM Treaty on the US by Developing BMD," *Eurasia Daily Monitor*, Volume 7, No. 136 (July 16, 2010), available at [http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews\[tt\\_news\]=36624](http://www.jamestown.org/single/?no_cache=1&tx_ttnews[tt_news]=36624).
- [19] "Russia: Comments by Deputy Defense Minister Ostapenko on Aerospace Defense Troops Programs Commentary by Interfaks-AVN, Moscow, 24 April: The New S-500 Air Defense Missile System Will Be Able To Effectively Combat Advanced Offensive Aerospace Weapons..." *Interfax-AVN Online*, April 26, 2013. (Translated by World News Connection).: "Regiment of S-400 to enter duty in Sevastopol in February 2018," *TASS*, October 24, 2017, available at <http://tass.com/defense/972236>.
- [20] "Russian Armed Forces will get five S-400 air defense systems in September-October 2016," *TASS*, February 29, 2016, available at <http://tass.ru/en/defense/859641>.: "S-400 missile defense regiment takes up combat duty outside Moscow (VIDEO)," *Sputnik News*, January 11, 2017, available at <https://sputniknews.com/russia/201701111049464109-russia-s-400-moscow/>.
- [21] *Nuclear Posture Review*, op. cit., p. 53.
- [22] Quoted in Mark B. Schneider, "The Future of the U.S. Nuclear Deterrent," *Comparative Strategy*, Vol. 27, No. 4 (October 31, 2008), p. 348, available at <http://www.tandfonline.com/doi/abs/10.1080/01495930802358539>.
- [23] "Russian Federation Will Increase Role of Tactical Nuclear Weapons on Multirole Nuclear Submarines," *Gazeta*, March 23, 2009, available at <https://dialog.proquest.com/professional/docview/460452801?Accounted=155509>.
- [24] "Russia's Severodvinsk attack sub to be armed with new cruise missiles," *BBC Monitoring Former Soviet Union*, March 27, 2009, available at <https://dialog.proquest.com/professional/docview/460438489?Accounted=155509>.
- [25] "Meeting with Defence Minister Sergei Shoigu," *Kremlin.ru*, December 8, 2015, available at <http://en.kremlin.ru/events/president/news/50892>.
- [26] "Shipbuilding And Navy; Severodvinsk nuclear sub tests will end in 2012 - Navy commander," *Interfax*, August 24, 2012, available at <https://dialog.proquest.com/professional/docview/1038339219?accountid=155509>.
- [27] John T. Correll, "The Neutron Bomb," *Air Force Magazine*, December 2017, available at <http://www.airforce-mag.com/MagazineArchive/Pages/2017/December%202017/The-Neutron-Bomb.aspx>.
- [28] Nikolai Sokov, "TACTICAL NUCLEAR WEAPONS ELIMINATION: NEXT STEP FOR ARMS CONTROL," *The Nonproliferation Review*, Winter 1997, p. 18, available at <http://www.nonproliferation.org/wp-content/uploads/npr/sokov42.pdf>.
- [29] "New Generation of Arms," *The Moscow Times*, June 7, 1994, available at <http://www.themoscowtimes.com/news/article/new-generation-of-arms/212085.html>.
- [30] Sokov, "TACTICAL NUCLEAR WEAPONS ELIMINATION: NEXT STEP FOR ARMS CONTROL," op. cit., p. 18.: George Lewis and Andrea Gabbitas, "What Should Be Done About Tactical Nuclear Weapons?" (Washington D.C., The Atlantic Council, March 1999, p. 18.
- [31] Quoted in Schneider, "The Future of the U.S. Nuclear Deterrent," op. cit., p. 348.
- [32] Quoted Mark B. Schneider, *The Nuclear Forces and Doctrine of the Russian Federation*, (Fairfax Va.: National Institute Press, 2006), p. 20, available at <http://www.nipp.org/Publication/Downloads/Publication%20Archive%20PDF/Russian%20nuclear%20doctrine%20--%20NSF%20for%20print.pdf>.
- [33] Quoted in Schneider, "The Future of the U.S. Nuclear Deterrent," op. cit., p. 348.

- [34] Quoted in Schneider, *The Nuclear Forces and Doctrine of the Russian Federation*, op. cit., p. 16.
- [35] John W. Parker, *Russia's Revival: Ambitions, Limitations, and Opportunities for the United States* (Washington, D.C.: Institute for National Strategic Studies, January 2011), p. 23, available at John W. Parker, *Russia's Revival: Ambitions, Limitations, and Opportunities for the United States* (Washington, D.C.: Institute for National Strategic Studies, January 2011), p. 23, available at <http://www.dtic.mil/dtic/tr/fulltext/u2/a546683.pdf>.
- [36] Pavel Felgenhauer, "Russia Seeks to Impose New ABM Treaty on the US by Developing BMD," *Eurasia Daily Monitor*, Vol. 7, No. 136 (July 16, 2010), available at [http://www.jamestown.org/single/?no\\_cache=1&tx\\_ttnews\[tt\\_news\]=36624](http://www.jamestown.org/single/?no_cache=1&tx_ttnews[tt_news]=36624).
- [37] "News Briefing on the 2018 Nuclear Posture Review," U.S. Department of Defense, February 2, 2018, available at <https://www.defense.gov/News/Transcripts/Transcript-View/Article/1431945/news-briefing-on-the-2018-nuclear-posture-review/>.
- [38] Owen C. W. Price and Jenifer Mackby, eds., *Debating 21st Century Nuclear Issues*, (Washington, DC: Center For Strategic and International Studies, 2007), 23, available at [www.northropgrumman.com/analysis-center/other-publications/assets/triad-mono graph.pdf](http://www.northropgrumman.com/analysis-center/other-publications/assets/triad-mono-graph.pdf).
- [39] Hans M. Kristensen, "B61-12: The New Guided Standoff Nuclear Bomb," *Federation of American Scientists*, May 2, 2014, available at [https://fas.org/programs/ssp/nukes/publications1/Brief2014\\_PREPCOM2.pdf](https://fas.org/programs/ssp/nukes/publications1/Brief2014_PREPCOM2.pdf).
- [40] James R. Howe, "Potential Military Utility of Russian Employment of Advanced Technology Nuclear Weapons in Europe—Implications for US Extended Deterrence," Vision Centric, Inc., no date.
- [41] Defense Science Board, *Seven Defense Priorities for the New Administration*, (Washington, D.C.: The Defense Science Board, December 2016), p. 24, available at [https://www.acq.osd.mil/dsb/reports/2010s/Seven\\_Defense\\_Priorities.pdf](https://www.acq.osd.mil/dsb/reports/2010s/Seven_Defense_Priorities.pdf).
- [42] Maxim Trudolyubov, "Putin Is Pushing a War Mentality on Unwilling Russians (Op-ed)," *The Moscow Times*, March 6, 2016, available at <https://themoscowtimes.com/articles/putin-is-pushing-a-war-mentality-on-unwilling-russians-op-ed-60714>.
- [43] "Presidential Address to the Federal Assembly," The Kremlin, March 1, 2018, available at <http://en.kremlin.ru/events/president/news/56957>.
- [44] Pavel Felgenhauer, "Putin Unveils Array of Nuclear 'Super Weapons' Aimed at US," *Eurasia Daily Monitor* Volume: 15 Issue: 32, (March 1, 2018), available at <https://jamestown.org/program/putin-unveils-array-of-nuclear-super-weapons-aimed-at-us/>.
- [45] Roger McDermott, "Russia's Armed Forces Rehearse New 'Shock-Fire' Tactics," *Eurasia Daily Monitor* Volume: 15 Issue: 34, (March 6, 2018), available at <https://jamestown.org/program/russias-armed-forces-rehearse-new-shock-fire-tactics/>.
- [46] Derek Williams and Adam B. Lowther, "Lower-Yield Weapons Will Raise, Not Lower, the Threshold for Nuclear Use," *Defense One*, August 29, 2017, available at <http://www.defenseone.com/ideas/2017/08/lower-yield-weapons-will-raise-not-lower-threshold-nuclear-use/140610/>.