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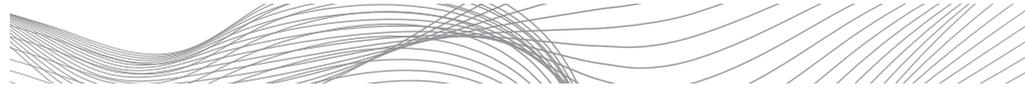
Global Edition

Sergey Semenov

Strategic Offensive Arms Control: Military-Technical Aspects



MOSCOW, 2021



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The research is aimed at analyzing the military-technical aspects of strategic offensive arms control. By reviewing the nuclear doctrines and the available open-source data on the two countries' respective nuclear arsenals, the author analyzes the impact of the New START Treaty implementation on the U.S. and Russian nuclear arsenals as well as discusses the potential implication of the two countries' nuclear forces modernization programs on the future arms control agreements. The paper is structured into four sections, discussing the state and development of Russian and U.S. nuclear forces in 2011-2021, the two countries' nuclear forces modernization plans and relevant discussions within expert and policymaking communities.

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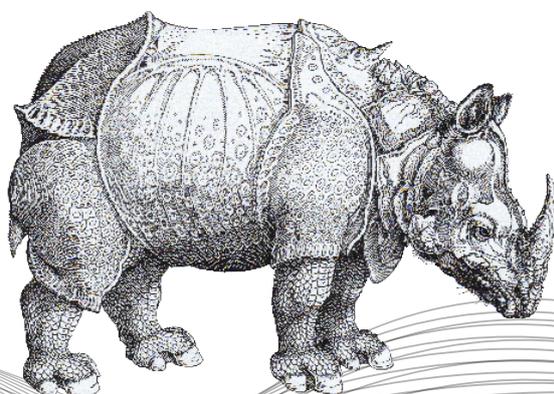
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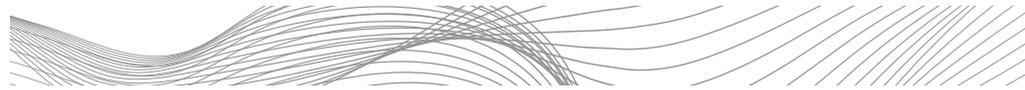
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Highlights

- New START implementation led to sizeable reductions in both Russian and U.S. strategic nuclear forces and breakout (upload) potentials.
- The uncertainty around further prospects for strategic arms control, the growing challenge U.S. policymakers perceive from China, and domestic pressure will complicate the further modernization planning for the United States.
- Russian nuclear forces are expected to remain at the current level. Their composition meets the national security need for the foreseeable future.
- U.S. would likely seek a limit on all deployed and non-deployed warheads couples with more stringent verification procedures and more limits on Russian road- and rail-mobile ICBMs as well as on novel Russian armaments.
- The question is what price the U.S. is willing to pay for their demands.



Strategic Offensive Arms Control: Military-Technical Aspects

Sergey Semenov

It should be noted that the data available on the U.S. Strategic Nuclear Forces is much more extensive and detailed in comparison with the information on Russian Strategic Nuclear Forces. In order to cover the gap, where appropriate the author relied on the estimates by independent Russian and American experts, pieces of news in the Russian media, statements by Russian military officials, and New START aggregate data exchanged two times every year.

The data available on the U.S. nuclear forces from the Department of State webpage in its turn allows to calculate the number of warheads deployed on ICBMs and SLBMs. Since all the ICBMs in the United States have been downloaded to one warhead per missile, and every bomber is counted as deployed with one warhead, the number of warheads deployed on SLBMs may be calculated as:

$$WD (SLBM) = WD (T) - (D (ICBM) + D (HB)), \text{ where}$$

WD (SLBM) – warheads deployed on SLBMs;
 WD (T) – warheads deployed, total;
 D (ICBM) – deployed ICBMs;
 D (HB) – deployed heavy bombers;

The upload (breakout potential) for the U.S. nuclear forces is calculated based on the technical specifications of missiles deployed, their maximum warhead load, warheads available from stockpile. For concrete delivery systems the upload potential may be calculated as:

$$UP = f (TWA, MWL); MWL = TL * MWL, \text{ where}$$

UP – Upload potential;
 TWA – total warheads of a given type available in stockpile;
 MWL – maximum warhead load per missile;
 TL – total launchers;

Please, see the charts below for the application of this methodology.

U.S. nuclear forces in 2010-2021

The 2010 Nuclear Posture Review¹ developed under the Obama administration envisaged that the United States would retain the nuclear triad comprised by ICBMs, SLBMs, and heavy bombers. Retaining the triad, as the U.S. nuclear war planners put it, would continue to provide the U.S. leadership with the capability to hedge against future threats. At the same time the NPR concluded that the United States could reduce the size of its nuclear forces down to the limits provided for by the New START without prejudice to its national security interests².

The 2010 Nuclear Posture Review was the first document to unequivocally establish nuclear disarmament as the ultimate goal of U.S. nuclear policy. At the same time, the NPR did not fully reflect the spirit of Barack Obama's Prague speech promise to reduce the reliance on nuclear weapons in U.S. defense policy. In contrast, the document emphasized the need for a nuclear triad as well as the need to maintain ICBMs on high level of alert. This was conditioned by Senate demands that the New START ratification be accompanied by a full-fledged modernization of the U.S. nuclear triad.

As to the nuclear forces structure, the 2010 NPR provided for the following levels of deployed SDVs: up to 420 deployed single-warheaded Minuteman-III ICBMs with hundreds of additional warheads ready for rapid upload, up to 240 deployed Trident II SLBMs at 12 deployed Ohio-class SSBNs and up to 60 nuclear-capable heavy bombers³.

In 2014 the Obama administration released the unclassified summary of the plan for New START-compliant nuclear forces⁴, which envisaged that the Minuteman-III ICBM force would be further reduced down to 400 missiles. Notwithstanding the political differences between the Obama and Trump administrations, the plan had been fulfilled under the Trump presidency.

As it may be seen from Chart 1, currently the United States deploys around 1456 strategic nuclear warheads on 400 ICBMs, 220 SLBMs, and 60 heavy bombers. At the same time, the United States still has significant upload (breakout) potential. Should the New START treaty have expired, Washington would have been able to mount additional warheads on the already deployed delivery systems. Each of its 200 Minuteman-III ICBMs can carry an additional two warheads. The Trident-II submarine-launched ballistic missiles (SLBMs), which are currently equipped with 4 or 5 warheads each, can carry as many as 8. The United States could also deploy up to 60 additional Minuteman-III ICBMs (carrying up to 180 NW between them) and up to 116 additional Trident-II SLBMs (up to 928 NW) – but the size of the existing US active reserve of warheads (1922 strategic warheads, according to open-source reports) makes this scenario unlikely. Based on these figures, 3,470 warheads would be a realistic estimate of the existing US breakout potential.⁵

¹ Nuclear Posture Review Report April 2010. U.S. Department of Defense. URL: https://dod.defense.gov/Portals/1/features/defenseReviews/NPR/2010_Nuclear_Posture_Review_Report.pdf

² Ibid

³ Ibid

⁴ Report on Plan to Implement the Nuclear Force Reductions, Limitations, and Verification and Transparency Measures Contained in the New START Treaty Specified in Section 1042 of the National Defense Authorization Act for Fiscal Year 2012 (U). U.S. Department of Defense. URL: <https://archive.defense.gov/documents/New-START-Implementation-Report.pdf>

⁵ Sergey Semenov, Andrey Baklitskiy, Evgeniy Buzhinskiy, Vladimir Orlov. If the New START Treaty expires with no extension: scenarios for Russia. Security Index Occa-



Chart I. U.S. Nuclear Forces Structure & Upload Potential

Delivery system	Number of delivery systems	NW per delivery system, max.	NW total	
			Current	Potential
LGM-30G Minuteman III	400			
Mk12A	200	3*W78	200	600
Mk21/SERV	200	1*W87	200	200
Total on ICBM	400	-	400	800 (700)
Trident II D5-LE	220	-		
Mk4A		8/14 ⁶ W76-1/0		1,486 ⁷⁸
Mk4A (low-yield)		2 W76-2		50
Mk5		8 W88		384
Total on SLBM	220 ⁹	-	1,050	1,920
B-52H Stratofortress	44 (79) ¹⁰	12 air-launched cruise missiles		300 ¹¹
B-2A Spirit	12	gravity bombs		322
Total on HB	56		300	850
SNW total			1,456 (1,750) ¹²	3242

Source: compiled by the author based on the estimates by U.S. Department of State, Federation of American Scientists

sional Paper Series Global Edition №6 (11), 2020. PIR Center. URL: <http://pircenter.org/en/articles/2218-3808361>

⁶ A Trident-II SLBM can carry a maximum load of 14 W76-0 warheads.

⁷ The figure could be as high as 2,600 warheads if the W76-0 warheads are used. Such a sharp increase is unlikely because the United States has a total of only 3,822 nuclear warheads, including the sub-strategic ones. Hans Kristensen estimates that only 1,750 of them are currently deployed, and approximately 2,050 are kept in active reserve. Also, the W76-0 warheads are being gradually decommissioned over doubts about their reliability.

⁸ Kristensen estimates that the US Navy has 1,600 W76-1 warheads.

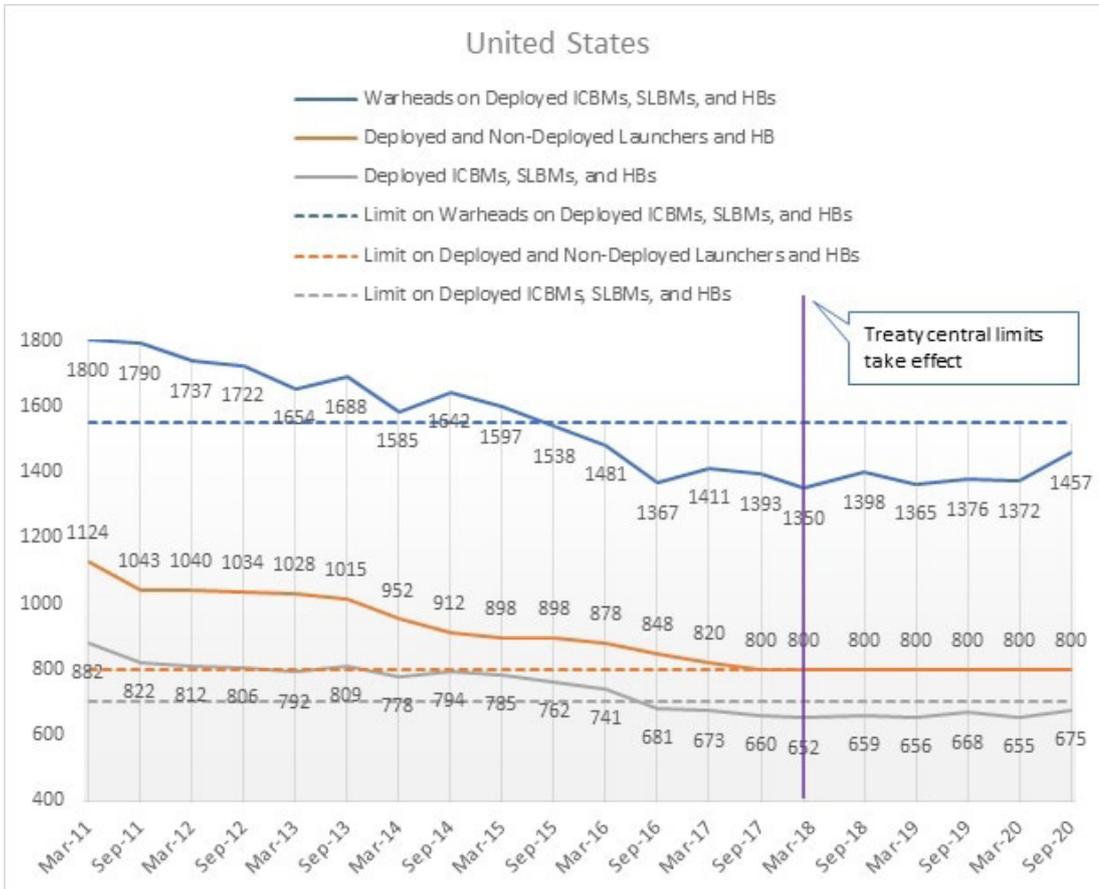
⁹ The US could potentially deploy up to 328 SLBMs because some of the Trident-II SLBM launchers have not been converted under the New START procedures.

¹⁰ Russia does not regard the conversion of 41 B-52H bombers for non-nuclear missions as irreversible.

¹¹ According to open sources, only 300 ALCMs were retained in the stockpile.

¹² Under the New START counting rules/actual number.

Diagram 1. U.S. Nuclear Forces Structure in 2011-2021



Source: U.S. Department of State

As it may be seen from Diagram 1 and Chart 2, the United States had to accomplish significant reductions in its nuclear forces, primarily by eliminating 103 ICBM launchers out of which 53 Peacekeeper.

ICBM silo launchers had not been eliminated under the START I Treaty due to its permissive numerical ceilings and complicated elimination procedures. The United States also had to reduce the number of deployed heavy bombers from 122 in 2011 to 49 in 2021. Such a reduction was achieved partly due to the conversion of all B-1B strategic bombers for non-nuclear missions.

The most significant reduction, however, deals with highly capable Trident II SLBMs, which are characterized by some Russian military experts as a “masterpiece of missile design” due to its technical perfection¹³. In order to meet the numerical limits under the New START Treaty the United States had to convert 4 launch tubes on each of its 14 Ohio-class SSBNs. Such conversion has reduced the U.S. upload potential by 32 missiles and 256 warheads.

The Russian Federation, nevertheless, was unable to certify the conversion as the silos could be reconverted back to operational status in a few hours. The case in point is that the United States did not remove steam generators from the launch tubes or fill it with concrete to ensure the irreversible character of the conversion. In-

¹³ Sineva vs Trident 2. Voennoe Obozreniye. URL: <https://en.topwar.ru/68054-sineva-protiv-trident-2.html>



stead, the United States only replaced with flexible membrane with a metal plug¹⁴.

Chart 2. U.S. Nuclear Forces Structure in 2011-2021

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Deployed warheads, total	1800	1737	1688	1642	1597	1367	1393	1350	1365	1457
Warheads, on SLBM					1060	895	945	901	918	1000
Warheads per SLBM					4,27	4,28	4,45	4,43	4,39	4,34
Deployed means of delivery, total	882	812	809	794	785	681	660	652	656	675
Deployed ICBMs		449	448	447	449	416	399	400	398	397
Non-deployed ICBMs		324	313	307 ¹⁵	246	270	281	278	268	261
Non-deployed ICBM launchers		108	109	20	5	38	55	54	56	57
Deployed SLBMs		241	260	260	248	209	212	203	209	230
Non-deployed SLBMs		181	147	151	160	210	215	231	239	234
Non-deployed SLBM Launchers		95	76	76	88	111	68	77	71	50
Deployed Heavy Bombers		122	101	87	88	56	49	49	49	60
Non-deployed heavy bombers		25	21	22	20	18	17	17	17	
Deployed and Non-Deployed Launchers	1124	1040	1015	912	895	848	800	800	800	800

Sources: compiled by the author based upon U.S. Department of State, U.S. Nuclear Forces (Hans Kristensen)

Below is the detailed analysis of the current state off each component of the U.S. nuclear forces.

¹⁴ Foreign Ministry statement. February 5, 2018. Ministry of Foreign Affairs of the Russian Federation. URL: https://www.mid.ru/ru/press_service/spokesman/official_statement/-/asset_publisher/t2GCdmD8RNlr/content/id/3054864?p_p_id=101_INSTANCE_t2GCdmD8RNlr&_101_INSTANCE_t2GCdmD8RNlr_languageId=en_GB

¹⁵ Including MX Peacekeeper

1.1 Land-based ICBMs

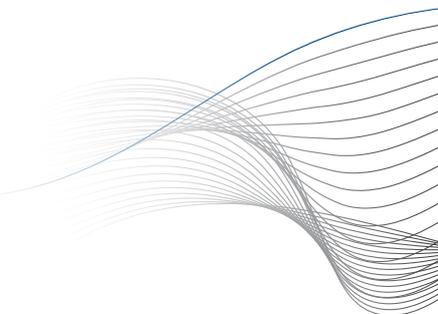
Under the original 1991 START Peacekeeper (MX) ICBMs were accountable as their silos had not been destroyed due to financial considerations. The case was that the START elimination procedures¹⁶ envisaged that a silo was to be exploded or excavated, something seen as a very costly procedure. Given that the START numerical ceilings were high, it was much more advantageous for the United States to count those silos as deployed launchers rather than remove them from accountability by following the aforementioned procedures. The MX missiles themselves were removed from their respective silo launchers by September 2005. Some of the W87 warheads from MX ICBMs were re-deployed on Minuteman-III missiles (one warhead per missile)¹⁷.

Since the withdrawal of MX ICBMs from service in 2005, Minuteman-III missiles remain the only land-based intercontinental ballistic missile at the U.S. disposal. Deployed in the 1970s, the missiles have undergone a number of life-extension programs and are currently scheduled to remain in service up until the 2030s.

The United States began the reductions in the size of its ICBMs in the late 2000s as the Department of Defense (DoD) decided to retire some 50 ICBMs equipped with different type of C2 systems (Malmstrom AFB). The eliminated missiles were to be used for flight-testing purposes and thus contribute to maintaining the reliability of the nuclear forces. The respective silo launchers at Malmstrom AFB were filled with gravel under the New START elimination procedures¹⁸.

MM-III ICBMs were initially deployed with 3 warheads per missile, resulting in original 1500 warheads for 500 missiles. De-MIRVing of the land-based component began in 2001 when in order to comply with the START I limit the United States began to install only one warhead at 150 ICBMs at Warren Air Force Base. The de-MIRVing was also accompanied by the destruction of the “bullhead platform”, which rendered the missiles capable of only carrying only a single warhead. The trend towards a single-warhead ICBM force continued in the 2010 Nuclear Posture Review, when the Obama administration declared that the Minuteman-III would be downloaded to carry only one warhead per missile.

At the same time, it should be noted that the New START does not provide for the irreversibility of the de-MIRVing procedures (the destruction of the bulkhead), which in the future may allow the United States to increase the number of warheads per missile. Such an option was not discarded under the Trump administration. As revealed by Marshall Billingslea, Trump’s Special Envoy for Arms Control and the test of MM-III in 2020, the United States was considering the option should the New START have not been extended¹⁹.



LGM-30G, Minuteman III
Missile

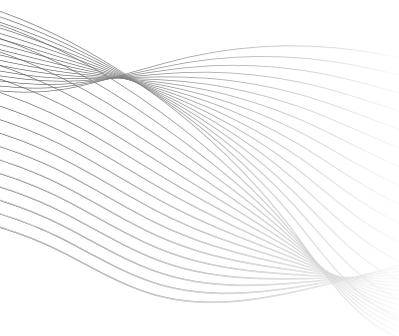
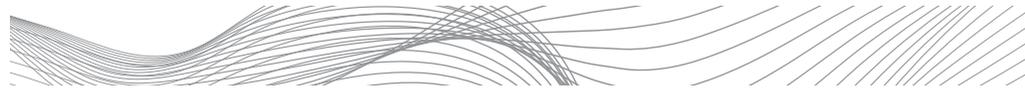
Source: www.nps.gov

¹⁶ Protocol On Procedures Governing Conversion Or Elimination. Federation of American Scientists. URL: <https://fas.org/nuke/control/start2/text/convers.htm>

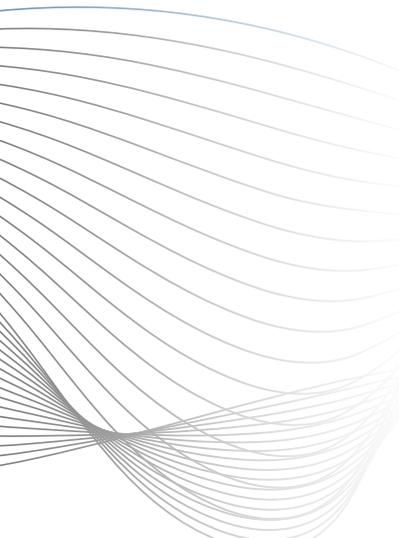
¹⁷ MM-III ICBMs have never been tested with an assembly of three W87 warheads

¹⁸ Amy Woolf. U.S. Strategic Nuclear Forces: Background, Developments, and Issues. Congressional Research Service. URL: <https://crsreports.congress.gov/product/pdf/RL/RL33640>

¹⁹ Test Of Minuteman III ICBM With Three Reentry Vehicles Sure Seems Like A Warning To Russia (Updated). The Drive. August 4, 2020. URL: <https://www.thedrive.com/the-war-zone/35352/test-of-minuteman-iii-icbm-with-three-reentry-vehicles-sure-seems-like-a-warning-to-russia>



New START does not provide for the irreversibility of the de-MIRVing procedures (the destruction of the bulkhead), which in the future may allow the United States to increase the number of warheads per missile



1.2 SLBMs

As it may be seen from the chart above, sea-based strategic nuclear forces continued to constitute the bulk of the U.S. nuclear arsenal. The U.S. nuclear forces fleet comprises 14 Ohio-class SSBNs, 20 launch tubes each²⁰, with a total warhead load of up to 1000 warheads²¹. To comply with the New START numerical ceilings the United States had to reduce the number of launch tubes from 24 to 20. One also has to bear in mind that each time only 12 SSBNs are being actually deployed, with another two being in mid-life overhaul and refueling.

Each Trident D5 SLBMs can be equipped to carry up to 8 warheads. However, the usual practice under START I was to deploy the missiles with no more than six warheads, as of signing of the New START the quantity was estimated to be as low as 4 warheads per missile. As of Spring 2021, an average SLBM carries 4,34 warheads.

Actual warhead loading may be higher as in 2020 in line with the findings by the 2018 Nuclear Posture Review²² low-yield W76-2 warheads entered into service²³. The warheads are a degraded version of W76-1 warhead without second stage, which were designed to counter the alleged Russian “escalate-to-deescalate” doctrine²⁴. According to the estimates by Hans Kristensen from the Federation of American Scientists, there are 25-50 W76-2 warheads deployed and it would make no sense to deploy more than one-two such warheads per missile.

The available warhead stockpile allows the United States to fulfill the upload potential of the SLBMs almost fully, if the need arises.

1.3 Heavy bombers

Currently the United States deploys 48 heavy bombers: 12 B-2A Spirit strategic bombers and B-52H bombers. The former are equipped with B61-7, B83-11 and B83 nuclear gravity bomb and ensure the penetration of enemy missile defenses due to the “stealth” technology. B-52H bombers are veterans of U.S. strategic aviation. Deployed in the late 1950-s and having undergone several modernization cycles, the bombers of this type are likely to continue to constitute the bulk of the U.S. strategic aviation for the foreseeable future. The bombers of this type can carry up to 12 ALCMs per aircraft.

It should be noted that B-1B heavy bombers, which are no longer accountable under the New START still retaining at least some capability for nuclear missions. For instance, in December 2020 the USAF tested the bombers of this type to deploy JASSM (Joint Air-to-Surface Standoff Missile) upon an external pylon²⁵. This means that while these bombers are not covered by the New START, they still cannot be discarded as a factor in the “strategic equation”.

²⁰ Originally Ohio-class SSBNs had 24 launch tubes

²¹ The maximum loading is 2240 warheads given the conversion of 32 launch tubes

²² 2018 Nuclear posture review. U.S. Department of Defense. URL: <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>

²³ Trump’s new nuclear weapon has been deployed. DefenseNews. February 4, 2020. URL: <https://www.defensenews.com/smr/nuclear-arsenal/2020/02/04/trumps-new-nuclear-weapon-has-been-deployed/>

²⁴ According to numerous official Russian statements, no such doctrine exists.

²⁵ Giancarlo Casem, B-1B Lancer completes successful external release demonstration, Air Force Global Strike Command, Edwards Air Force Base, CA, December 9, 2020. URL: <https://www.afgsc.af.mil/News/Article-Display/Article/2441552/b-1b-lancer-completes-successful-external-release-demonstration/>

Under the New START counting rules, each deployed bomber is counted as one deployed warhead. The real loading is evidently higher. The Federation of American Scientists estimated that 60 hundreds U.S. heavy bombers were deployed with approximately 200 nuclear warheads with several hundreds more in long-term storage facilities.

However, the information available and estimated by independent experts cast a shadow on the assumption that “hundreds more bombs and warheads” are available for upload unto heavy bombers. In sum, there are approximately 322 B61 and B83 nuclear gravity bombs in the stockpile. The upload potential of B-52H bombers carrying ALCMs is in its turn defined by the number of missiles rather than only warheads: various estimated suggest that the United States has 300–500 missiles of this type²⁶.

Russian nuclear forces in 2010-2021

As of Spring 2021, Russia had yet to complete the long-term modernization program of its strategic nuclear forces. In December 2020 President Vladimir Putin announced that the share of modern armaments in the Russian nuclear triad had reached 86%, with the figure expected to reach 88,3% in 2021. That means that the non-conventional forces are the priority for the Russian leadership in terms of defense expenditure.

Currently the Russian Federation deploys approximately 1600 strategic nuclear warheads²⁷ on around 310 ICBMs, 160 SLBMs, and 68 strategic bombers. The number is different from the figures in the aggregate data exchanges since the New START counting rules assign only one warhead to each heavy bomber.

Like the United States, Russia has some upload potential as it does not fully load its missiles in order to comply with the New START central limit of 1550 deployed warheads. While it is not known exactly what delivery systems have been downloaded, independent U.S. experts that SS-18 and SS-27 ICBMs as well as SS-N-32²⁸ SLBM have been most affected by the limit.

Should the United States sharply increase its nuclear arsenal, Russia would be able to respond by increasing its own strategic offensive weapons count from the current 1,570 to 3,037–3,205 nuclear warheads by means of mounting extra warheads on its existing delivery systems; by deploying an additional 22 UR-100NUTTKh and Yars ICBM; and by loading up the SLBMs of the *Knyaz Vladimir* ballistic missile submarine to their maximum capacity. According to independent US experts, the breakout potential of the Russian strategic offensive arsenal is limited to 2,440 warheads in the short term. This assessment is consistent with the statements by the commander in chief of the Strategic Missile Forces Colonel General Sergey Karakaev who states that “under *force-majeure* circumstances Russia is able to increase its strike capabilities”²⁹.



RS-20 Voyevoda (SS-18 Satan)

Source: www.techcult.ru

²⁶ Krsitensen. Ibid

²⁷ Real counting is used. Under the New START new counting rules the number is lower (1447)

²⁸ NATO designations are used

²⁹ Командующий РВСН рассказал о структуре ядерного щита. RIA Novosti. URL: <https://ria.ru/20111216/518396383.html>



Under the New START, Russia first and foremost had to eliminate its non-deployed launchers. As it had fewer delivery vehicles from the outset of the Treaty implementation, Moscow was unconstrained in the implementation of modernization programs. Hence According to the data openly available from TASS and RIA Novosti, in 2011-2020 Russia acquired 15-23 ICBMs on a yearly basis^{30, 31, 32}. The limited telemetry exchange also allowed Russia to conduct ICBM launcher without revealing their specifications to the potential adversary. Hence, in the discussed period Russia had been conducting 5-12 launches each year^{33, 34, 35, 36}.

Chart 3. Russian Nuclear Forces & Upload Potential, 2021

Delivery system	Number of delivery systems	NW per delivery system, max.	NW total	
			Current	Potential
RS-20 Voyevoda	46	10		460
UR-100NUTTKh	2 (30)	1/6 ³⁷		30/170 ³⁸
RS-12M Topol (road-mobile)	45	1		45
RS-12M2 Topol-M (silo-based)	60	1		60
RS-12M1 Topol-M (road-mobile)	18	1		18
RS-24 Yars (road-mobile)	135	4		540
RS-24 Yars (silo-based)	14	4		56
Total on ICBMs			810	1,191/1,349
RSM-50	16	7		112
RSM-54 Sineva	96	4		384
RSM-56 Bulava	48 (64) ³⁹	10		640
Total on SLBMs			560	1,136

³⁰ Россия до конца года поставит на боевое дежурство 15 «Ярсов». RIA Novosti. December 17, 2012. URL: <https://ria.ru/20131217/984578659.html>

³¹ <https://ria.ru/20131127/980124462.html>

³² <https://ria.ru/20161215/1483663400.html>

³³ РВСН в 2011 году произведут 10 пусков межконтинентальных ракет. November 30, 2011. RIA Novosti. URL: <https://ria.ru/20101130/302577924.html>

³⁴ РВСН в 2012 году запустят вдвое больше МБР, чем в этом – командующий. RIA Novosti. URL: <https://ria.ru/20111216/518215563.html>

³⁵ РФ планирует в 2013 году запустить вдвое больше МБР, чем в этом. RIA Novosti. URL: <https://ria.ru/20121214/914775520.html>

³⁶ РВСН в 2014 году проведут в 2 раза больше пусков, чем в 2013 году. RIA Novosti. URL <https://ria.ru/20131217/984577851.html>

³⁷ Using only Avangard warheads / using MIRV warheads

³⁸ Using all 30 ICBM with Avangard warheads / using 28 missiles with MIRV warheads

³⁹ The count includes the *Knyaz Vladimir* ballistic missile submarine, which is expected to enter into service with the Northern Fleet in June 2020.

STRATEGIC OFFENSIVE ARMS CONTROL: MILITARY-TECHNICAL ASPECTS

Tu-95MS	21	16 air-launched cruise missiles		336
Tu-95MSM	18	14 air-launched cruise missiles		252
Tu-160	11	12 air-launched cruise missiles		132
Total on HB			200	720 (580) ⁴⁰
SNW total			1,426 (1570)	3,205 (2,440) ⁴¹

Source: compiled by the author based on the estimates by U.S. Department of State, Federation of American Scientists

Chart 4. Russian Nuclear Forces Aggregate Data 2011-2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Warheads, total	1537	1499	1480	1512	1643	1796	1561	1444	1426	1447
Warhead load per ICBM\ SLBM	3,2	3,3	3,35	3,38	3,44	3,94	3,26	3,01	3,05	3,03
Deployed means of delivery, total	521	499	492	498	528	508	501	527	513	510
Deployed ICBMs	295	322	326	304	311	307	316	318	318	302
Deployed and non-deployed heavy Bombers	76	72	72	72	72	70	68	68	68	50
Deployed SLBMs	160	144	160	160	160	176	176	176	160	160
Deployed and Non-Deployed Launchers	865	884	900	905	911	847	790	779	757	764

Source: compiled by the author

⁴⁰ Kristensen estimates that Russia has a total of 580 warheads suitable for use with heavy bombers.

⁴¹ Kristensen estimates that Russia has 1,570 deployed warheads and approximately 870 strategic nuclear warheads that are kept in reserve



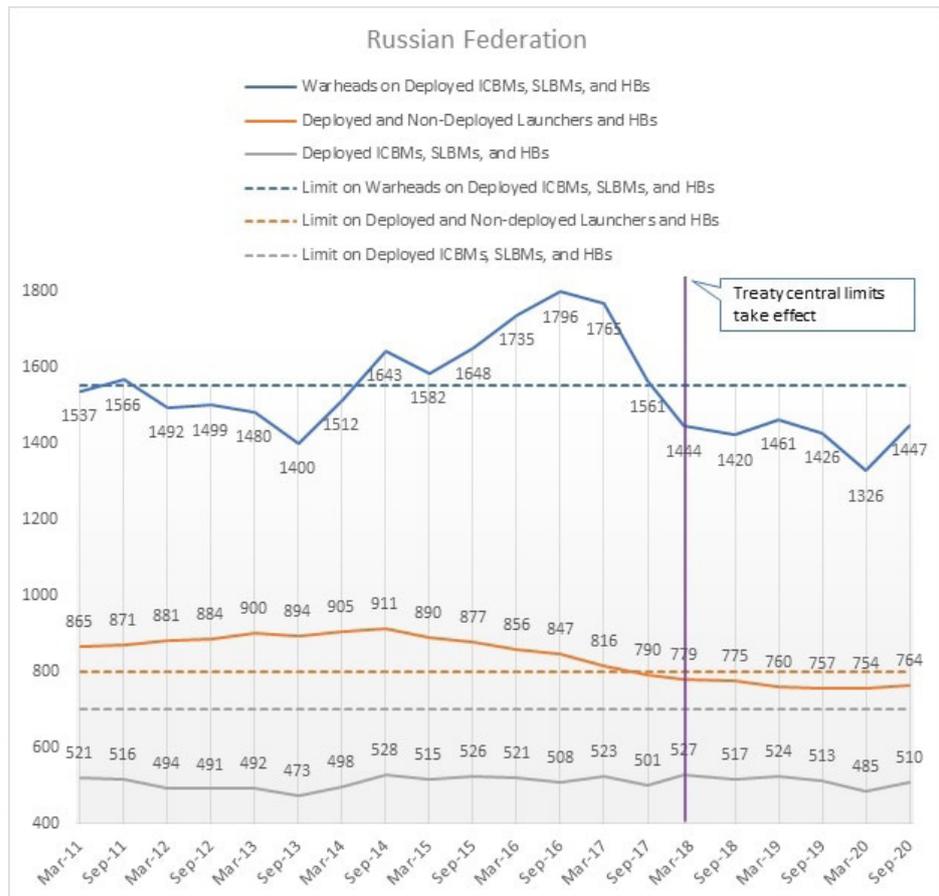
2.1 ICBMs

As of early 2021, the Strategic Missile Forces were estimated to have around 310 deployed intercontinental ballistic missiles. Those included several types of ICBMs including soviet legacy systems such as SS-18, SS-19, and SS-25⁴².

R-36 Voevoda is a silo-based heavy missile, which entered into service in the late 1980s. The ICBM is capable of carrying up to 10 warheads, which allow the 46 deployed SS-18 to carry up to 460 warheads. Apparently, the real load-factor was reduced in order to comply with the New START numerical limits. The missile is planned to be substituted by Sarmat heavy ICBM in 2021-22.

Another Soviet-legacy system is UR-100NUTTKH, which was adopted in 1980 and was originally scheduled to have been withdrawn from service by now. However, a small number of these “dry”⁴³ missiles was acquired from Ukraine, which can be installed in non-deployed launchers. The ICBM is now the delivery vehicle for the Avangard hypersonic glide vehicle, which entered into service in late 2019⁴⁴.

Diagram 2. Russian Nuclear Forces Aggregate Data in 2011-2020



Source: U.S. Department of State

⁴² Hans Kristensen, Matt Korda. Russian Nuclear Forces 2021. Bulletin of Atomic Scientists. 77:2, 90-108. URL: <https://www.tandfonline.com/doi/pdf/10.1080/00963402.2021.1885869?needAccess=true>

⁴³ UR-100NUTTH is a liquid-fuel ICBM. When it has not been fueled, it can be kept in storage in “dry state” from many years without any loss in efficiency and reliability.

⁴⁴ Interview with Former Russian Minister of Defence Sergey B. Ivanov to Vesti 24. December 24, 2018. URL: https://www.youtube.com/watch?v=Rw_KY2-KCYM

After the expiration of START I the Russian Federation began the deployment of new RS-24 “Yars” MIRVed ICBMs (both silo-based and road-mobile), which was designed to replace the aging “Topol” ICBMs. As the commander-in-chief of the Strategic Missile Forces Gen. Sergey Karakaev noted in one of his interviews to the Russian mass media, the missile is an improved variant of “Topol-M” ICBM that accommodates the experience of its service⁴⁵.

Older “Topol” and road-mobile and silo-based ICBMs are being gradually replaced by “Yars” missiles with a pace of 1-2 regiments per year⁴⁶. A newer version of Topol, “Topol-M” carries only one warhead. A total of 78 missiles of this type had been deployed by 2012. Eventually, as it was publicly revealed in 2019 by senior defense officials, Topol-M ICBMs will also be substituted by “Yars” missiles⁴⁷.

“Yars” is an upgraded version of “Topol-M” which is capable of carrying multiple independently targeted re-entry vehicles (MIRVs) (up to 3 MIRVs per missile, according to U.S. estimates). As the commander-in-chief of RVSN stated in 2020, around 150 “Yars” ICBMs had entered into service by 2020. RVSN is expected to upgrade to Yars missiles by 2024.

The completion of the ICBM modernization program will likely put an end to the decades-long decreases in the RVSN forces because of arms control agreements as well as inadequate resources.

2.2 Submarine-Launched Ballistic Missiles

The Russian Sea Strategic Nuclear Forces (**МСЯС** by its acronym in Russian) comprise 11 nuclear-powered ballistic missile submarines (SSBNs or **ПЛАРК** by its acronym in Russian). In contrast to the U.S. nuclear fleet, which deploys only one type of SSBNs, the Russian Navy has three classes of SSBNs: six Project 667 BRDM submarines (NATO designation Delta-IV), one Project 667BRD submarine (NATO designation: Delta III), and four Borei-class submarines, each of which has 16 launch tubes for submarine-launched ballistic missiles (SLBMs). According to independent estimates, a total of 6 hundred warheads is deployed on SLBMs, the maximum load being 816 nukes.

The Russian nuclear fleet deploys several types of SLBMs, which are discussed below.

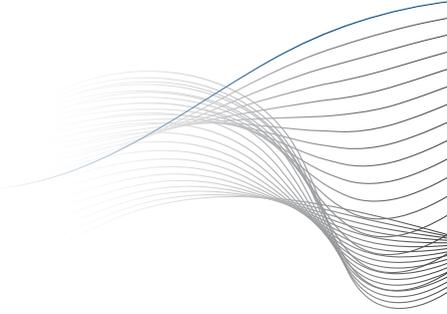
The bulk of the Russian nuclear submarine fleet – Delta IV SSBNs may carry two types of SLBMs: Sineva liquid-fuel missiles (maximum load of 4 warheads) and its modified version “Lainer”. The only remaining Delta-III class submarine “Ryazan” is armed with 16 RSM-50 SLBM with a maximum load of 3 nuclear warheads.

However, in the 1990s there began a transition from the use of liquid-fuel SLBMs on the Russian SSBNs. Notwithstanding the level of technical perfection of liquid-fuel missiles, they are much more complicated in operation, which conditioned the development of the solid-fuel SLBM “Bulava” now deployed on four Borei-class submarines. Eventually another four SSBNs of this class are designed to replace Delta-III and Delta-IV nuclear submarines by mid-2020s. Additional four SSBNs are scheduled to be delivered by 2023, with the ninth and tenth Borei-class SSBNs intended to enter into service by 2027.

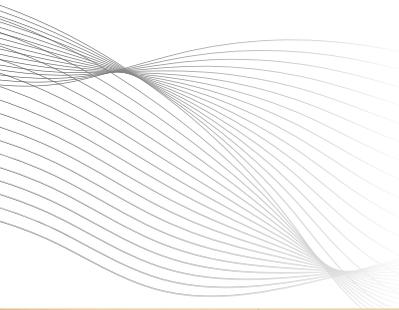
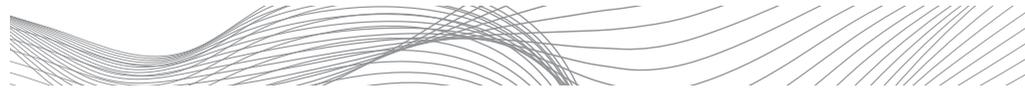
⁴⁵ РВСН отказываются от мобильного «Тополя-М» в пользу РС-24. RIA Novosti. URL: <https://ria.ru/20101130/302579195.html>

⁴⁶ Each regiment comprises 8 missiles.

⁴⁷ Меняем «Тополя» на «Ярсы». Rossiyskaya Gazeta. July 21, 2015. URL: <https://rg.ru/2015/07/21/rvsn-site.html>



The available warhead stockpile allows the United States to cover the upload potential of the SLBMs almost fully, if the need arises



4th-generation project 955 (Borey) nuclear missile submarines.

Source: www.rt.com

2.3 Strategic Bombers

The air-leg of the Russian nuclear triad consists of Tu-160 “White Swan” (NATO designation: Blackjack) and Tu-95 MS (NATO Designation: Bear) heavy bombers. According to the estimates by the Federation of American Scientists, around 50 bombers are actually deployed and are accountable under the New START. Both bombers are equipped with air-launched cruise missiles (Kh-55, Kh-102). Tu-95 are believed to carry from 6 (internally) to 16 missiles (internally and on external pylons) depending on the modification. Tu160 heavy bombers are estimated to be capable of carrying up to 12 ALCMs.

Maximum capabilities, however, do not mean that the HBs are actually deployed with up to 14 ALCMs per aircraft. Every additional missile on board shortens the range of the bomber. The maximum capacity of the Russian strategic aviation is around 800 warheads, of which, however, only 200 are really deployed or kept in appropriate air-bases storage areas.

The 2010 Military Doctrine of the Russian Federation specified the conditions under which Moscow would employ nuclear weapons. While under the previous doctrine, Russia reserved the right to use nuclear weapons in situations “critical to national security”, in 2010 Moscow declared it would resort to nuclear weapons if attacked with weapons of mass destruction or facing conventional offensive when “the very existence of state is put in jeopardy”. In order to preserve deterrence, the Russian nuclear forces were to be capable of dealing “pre-determined damage” to the aggressor. In order to do so, in the view of military experts, Russia prioritized the deployment of SLBMs and road-mobile ICBM which are capable of surviving a nuclear strike and penetrating adversarial missile defenses.

2.4 U.S. Nuclear Forces Modernization

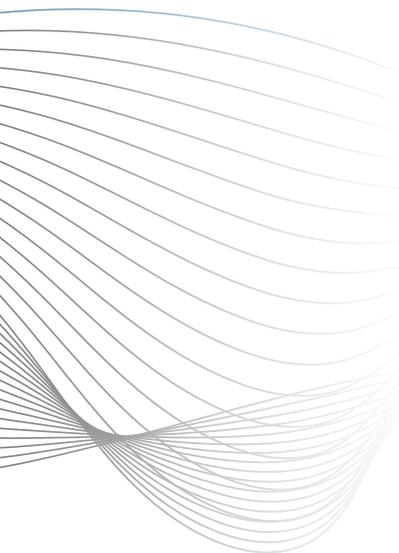
U.S. Senate gave its advice and consent to the ratification of the New START Treaty on condition of a full-fledged U.S. nuclear forces modernization. The previous cycle of modernization took place in 1970-90s. At that time Minuteman III ICBMs entered into armaments, Peacekeeper (MX) ICBMs, Ohio-class SSBNs, Trident C-4 and D-5 SLBMs, strategic bombers B-1B and B-2 Spirit. Some of the aforementioned systems were no longer necessary given the end of the Cold War, some of them still determine the outfit of the U.S. nuclear arsenal.

The “face” of the U.S. nuclear forces, though, is becoming more wrinkled. The components of the armaments developed at the height of the Cold War are becoming outdated. The maintenance of such systems is becoming more challenging. The U.S. military opines that this is an unaffordable luxury in the great power competition epoch.

The previous modernization program was completed in the 1990-s in what came to be known as one of the most successfully implemented modernization programs. Peacekeeper (MX) ICBM, Ohio-class submarines, Trident SLBMs, B-2 stealth bombers stem from that program. Thus, since 1990s the United States was in no need of major investments in its nuclear forces, which were quite modern at that time⁴⁸.

At the same time Russia and China, two major U.S. com-

⁴⁸ Konstantin Bogdanov. U.S. Nuclear Forces Modernization// Военно-экономическое развитие и безопасность. Edited by L. Pankova. P. 61



petitors had been pursuing their modernization cycles at a different pace. In essence, the United States begins its modernization program when Moscow and Beijing are finishing theirs.

For the last ten years the U.S. military has charted the contours of renovating the entire nuclear triad, which have yet to materialize. While rear fights regarding the specifics of modernization program are possible, the baseline scenario is crystal clear. The United States is amending the key element of the strategic equation -the strategic offensive arms.

Russia is not indifferent towards the scale of those corrections. Despite the increasing role of conventional strategic arms in the strategic equation, the equation itself pivots upon the numerical parity in strategic offensive armaments. Any attempts to upset this parity will force Russia to alter its defense and arms control policies.

The current state of U.S. nuclear forces was analyzed in the previous sections. This section will explore in greater detail the prospects for the modernization of all the three legs of the U.S. nuclear forces. The particular focus is put upon Columbia-class SSBNs, GBSD program and the air-leg of the arsenal.

2.5 GBSD (Ground-Based Strategic Deterrent)

The decision to start R&D on a new ground-based ICBM was taken in 2014. While the creation of a road-mobile ICBM or life-extension of the existing Minuteman-III ICBMs were considered as an alternative, the concerns that the aging of the current ICBM force outweighed the possible benefits of a simple life-extension⁴⁹.

As one may judge by the little data available from open sources, the premium is put upon the reliability rather than a dramatic improvement of the missile capabilities. Inter alia, it is planned that the new ICBM will be single warhead, although the possibility of equipping it with a bulkhead for hosting MIRVs is not discarded. One may neither discard the possibility that the missile will be equipped with a hypersonic glide vehicle should it be developed in the United States. The missile will also take advantage of newer C2 infrastructure, which will make it more resilient to emerging challenges.

The new missile is scheduled to enter into service in 2029 and will function until 2075. Currently the R&D activities are ongoing.

It is expected that GBSD will be equipped with W87-1 warheads (one of the previous denominations – IW-1 (interoperable warhead-1), which initially was also expected to be fit for SLBMs. However, the R&D on these warheads were suspended in 2016. The change means that the design of the warhead will be based upon the existing W87 warheads, which had previously been mounted upon MX missiles and which are more powerful than the W78-1 warheads installed on the half of the

⁴⁹ Lauren Caston, Robert S. Leonard, Christopher A. Mouton, Chad J. R. Ohlandt, S. Craig Moore, Raymond E. Conley, Glenn Buchan. The Future of the U.S. Intercontinental Ballistic Missile Force. RAND Corporation, URL: https://www.rand.org/content/dam/rand/pubs/monographs/MG1200/MG1210/RAND_MG1210.pdf



current ICBM fleet. The main disadvantage of the W78 warhead is that it uses sensitive explosives, which renders it less safe for operation.

However, the development of new warheads may be delayed by the challenges the U.S. nuclear weapons complex is facing. As numerous governmental experts have pointed out, the aging infrastructure will likely hamper the fulfillment of the declared objective to produce 80 plutonium pits by 2030. In its turn, the delay will likely affect the production of new warheads for GBSD⁵⁰.

It should be noted that the GBSD program is faced with significant opposition coming from the Democrats in Congress and independent analysts. Their core argument is that the United States does not need ICBMs to ensure credible deterrence and is not fit for countering adversaries other than Russia since the missiles will still have to overfly Russian territory to strike targets in China, North Korea, or Iran. Such an overflight, in their view, risks provoking the retaliation from Russia.

The experts close to the Democratic party also maintain that forgoing the land leg of the nuclear forces would “stabilize U.S. nuclear doctrine by focusing it on a more survivable second-strike capability based on SLBMs rather than continuing to pursue preemptive-strike capability with ICBMs. This claim is based on the assumption that ICBMs are most vulnerable to an attack and thus are only useable in a first strike.

This “school of thought” also argues that the Republicans’ insistence upon the retention of ICBMs is motivated by the desire to attract further investment from the DoD to their home states. However, as Democrat-affiliated think tanks posit, investment into infrastructure and education will produce more opportunities for the labor market than the deployment of GBSD⁵¹.

Phasing out GBSD or renouncing the ICBM force as such is, of course, an extreme proposition that does not enjoy consensus in the U.S. policymaking and expert communities. As the experts of Republican orientation point out (Frank Miller, Tim Morrison, and others), the analyses calling for the elimination of the land-based ICBM or another life extension of the Minuteman-III misses the military point. According to them, no military planner thinks that land-based missiles invite an attack due to the overwhelming power of the other two elements of the nuclear triad and their second-strike capability. Republicans also maintain that extending the life of Minuteman-III is related to technical risks as most of the components are no longer in production, and the development of a new missile, GBSD, is the most cost-effective solution⁵². This school of thought also cited the development of Russian and Chinese nuclear programs as a major reason for rearmament and modernization^{53, 54}.

The truth, as always, is somewhere in between. The author believes that the Biden administration would seek to balance the two

⁵⁰ NNSA Should Further Develop Cost, Schedule, and Risk Information for the W87-1 Warhead Program. U.S. Government Accountability Office. URL: <https://www.gao.gov/assets/gao-20-703.pdf>

⁵¹ See for example Matt Korda. Siloed Thinking: a closer look at the Ground-Based Strategic Deterrent. Federation of American Scientists, March 2021. URL: <https://fas.org/man/eprint/siloed-thinking.pdf>

⁵² Peter Huessy. 10 Reasons The US Should Build New Nuclear Missiles, GBSD. Breaking Defense, October 30, 2017. URL: <https://breakingdefense.com/2017/10/10-reasons-the-us-should-build-new-nuclear-missiles-gbsd/>

⁵³ Carl Rehberg. GBSD: An Imperative Without Delay. RealClearDefense. URL: https://www.realcleardefense.com/articles/2019/11/21/gbsd_an_imperative_without_delay_114860.html

⁵⁴ Shane Preswater. Why We Need a New ICBM. Defense One. URL: <https://www.defenseone.com/ideas/2020/12/why-we-need-new-icbm/170547/>

aforedescribed approaches. On the one hand, the national security demands articulated by the military will be observed: GBSD will eventually enter into service, but perhaps at lower levels in order to reduce spending. On the other, the U.S. administration would pursue further arms control arrangements in order to ensure a favorable climate for the modernization effort and use it as a pretext for the reductions it desires.

Chart 5. U.S. ICBM Modernization Program

	Deployed	Total	Total launchers	Warheads per missile	Warheads of this type available	Total deployed	Upload potential
Minuteman III	400		454	1-3 W78	400 ⁵⁵	200	600
				1 W87	540 ⁵⁶	200	200
GBSD	400	642	454 ⁵⁷	1-3 W87-1	525 ⁵⁸		450 ⁵⁹
				IW-1	n/a	n/a	n/a

Source: compiled by the author based on the estimates by the Congressional Research Service and the Federation of American Scientists

2.6 Sea-based Nuclear Forces

The modernization of the sea-leg mostly deals with replacing the current Ohio-class SSBNs with brand-new Columbia-class SSBNs. From the strategic stability vantage point, the main difference between the two vessels is that the Columbia-class SSBNs will have 16 launch tubes instead of current 24 (20). Their total number of submarines will be reduced from 14 to 12. The boat will also use electrical propulsion system, which would render it less noticeable for anti-submarine warfare⁶⁰.

That means that by 2039 the total number of deployed SLBMs will have been reduced from the current 280 to 192 missiles. Should the current level of warhead loading be maintained, that would mean that around 825 warheads will be deployed on U.S. SSBNs, with the maximum loading being 1536 warheads instead of current 2240 (see Chart 7 for more details).

The U.S. administration would pursue further arms control arrangements in order to ensure a favorable climate for the modernization effort and use it as a pretext for the reductions it desires

⁵⁵ Я. Вяткин. Там же. URL: <https://topwar.ru/165918-likvidacija-dogovora-snv-3-kto-v-vyigryshe.html> 20 декабря 2019

⁵⁶ In reality there might be less nuclear warheads of this type. URL: <https://topwar.ru/165918-likvidacija-dogovora-snv-3-kto-v-vyigryshe.html>

⁵⁷ Including test launchers

⁵⁸ The author assumes that W87-1 warheads would be in essence refurbished W87 warheads, which are currently deployed on 200 Minuteman-III missiles. A total of 525 W87 warheads is currently available in the U.S. stockpile.

⁵⁹ Assuming that another 50 missiles are actually deployed in 50 non-deployed ICBM silo launchers

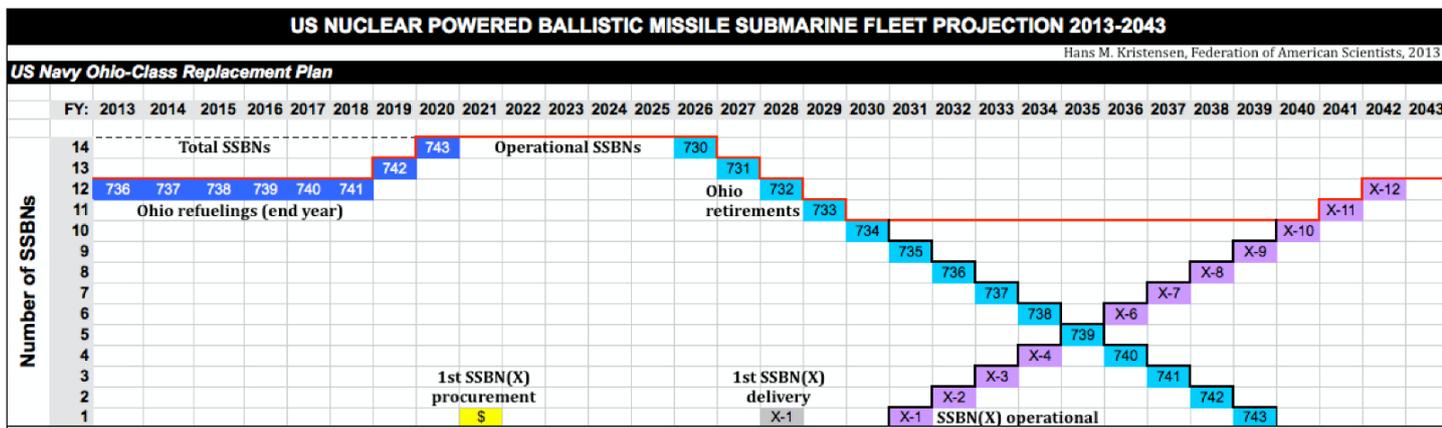
⁶⁰ Ronald O'Rourke. Navy Columbia (SSBN-826) Class Ballistic Missile Submarine Program: Background and Issues for Congress. Congressional Research Service. URL: <https://crsreports.congress.gov/product/pdf/R/R41129/202>



The new SSBN force will rely upon new warheads – W93, which was announced by the outgoing Trump administration in 2020. However, the production of a new warhead may be impaired by the poor state of the U.S. nuclear weapons complex, which had been underfinanced for the period after the end of the Cold War. It is neither clear if the U.S. Navy will continue to use W76-1 and W76-2 (low-yield) warheads for the period after 2040.

Another factor to keep in mind when discussing the modernization of the U.S. nuclear fleet is the schedule of the production of new Columbia-class submarines. In the mid-2030s Ohio-class submarines are expected to retire at a greater rate than the pace of construction of Columbia-class SSBNs. As shown in Chart 6, at the lowest point as low as 5 nuclear ballistic missile submarines are expected to remain in service in 2035.

Chart 6. U.S. Nuclear Powered Ballistic Missile Submarine Fleet Projection 2013-2043



Source: Federation of American Scientists

Chart 7. U.S. SSBN Modernization Implications

	Submarines, total	Launchers per submarine	Total SLBM launchers	Warheads per launcher	Warheads of this type available	Deployed warheads	Potentially
SSBN Ohio	14	20 (24)	240 (280) ⁶¹	Do 8 W76-1	1465 ⁶²	1000	2240
				W76-2	25 ⁶³		
				W88	384		
SSBN Columbia	12	16	196	8 W76-1/ W93	-	825	1536

Source: Federation of American Scientists

⁶¹ Out of them only 240 SLBM launchers are currently deployed as two Ohio-class SSBNs are undergoing and extensive overhaul and refueling.

⁶² According to Hans Christensen

⁶³ According to Hans Christensen

2.7 Heavy bombers

As a result of the air-leg of the nuclear triad modernization, the overall numbers are expected to remain the same. A new bomber – B-21 Raider is expected to replace B-2A Spirit bombers in 2025-2030. However, the new aircraft is expected to largely retain the technical specifications of the B-2A, that being a subsonic aircraft capable of carrying only gravity nuclear bombs.

The main factor of change is the production of a new ALCM – LRSO (Long-Range Stand-Off Weapon), which will reverse the tendency toward the decline in the number of ALCMs in the U.S. arsenal. Currently, there are around 300 AGM-86B missiles deployed with less than W80-4 warheads for them available (see Chart 8).

Chart 8. U.S. Nuclear Forces Air Component Modernization

Aircraft	Missiles per aircraft	Armament	Missiles available	Warheads available	Currently deployed	Potentially deployed
B-52H	12	AGM-86B	300	Less than 500 W80-1	200 ⁶⁴	300
		LRSO	-	-	-	432 ⁶⁵

2.8 Russian Nuclear Forces Modernization

Much less information is openly available about the Russian nuclear forces modernization. One of the few reliable sources are President Putin’s addresses to the Federal Assembly, outlining the priorities for the Russian military^{66, 67}. One may identify the following directions:

- The deployment of RS-28 silo-based heavy ICBM (expected in 2021-2022), which will replace Voevoda (Satan) heavy ICBM and will have the capacity to carry up to 10 warheads. Some statements by President Vladimir Putin imply that the missile will have unlimited range.
- Avangard hypersonic glide vehicle is predicated upon the Soviet-era project “Albatros” and is designed to circumvent U.S. missile defenses by using unpredictable trajectories. Currently the system is on test service (Russian: **ОПЫТНО-БОЕВОЕ ДЕЖУРСТВО**) in Dombrovskiy missile base in the Orenburg region (Southern Urals). According to numerous statements by Russian officials, the complex is deployed upon UR-100NUTTKH liquid-fuel ICBMs and may potentially be deployed atop Sarmat heavy ICBMs.
- Deployment of Burevestnik nuclear-powered cruise missile of unlimited range, further development of Poseidon autonomous underwater nuclear-capable vehicle with the objec-

⁶⁴ Yaroslav Vyatkin. Another small lie in Pentagon’s big nuclear game. URL: . <https://topwar.ru/152401-ocherednaja-malenkaja-lozh-v-bolshoj-jadernoj-igre-pentagona>

⁶⁵ Assuming that the deployment levels of B-52H heavy bombers remain the same (36 aircraft)

⁶⁶ Presidential Address to the Federal Assembly. March 1, 2018. Kremlin. URL: <http://en.kremlin.ru/events/president/news/56957>

⁶⁷ Presidential Address to the Federal Assembly. February 20, 2019. Kremlin. URL: <http://en.kremlin.ru/events/president/news/59863>



tive to penetrate adversarial missile defenses. According to the leaks, the former would be able to reach the depth of one thousand meters underwater and is designed to strike sea-based objectives. According to the U.S. estimates, the system R&D had not yet been completed, with the deployment expected no earlier than 2027. The Burevestnik (Skyfall) nuclear-powered cruise missile is at a lower stage of maturation. According to the U.S. sources and mass media reports, most of the tests have failed, with some of them even leading to casualties⁶⁸.

- Barguzin Rail-Mobile ICBM. Was almost ready, when postponed in 2017. As TASS reports citing its sources in the Russian military-industrial complex, the decision was conditioned by the lack of financial resources, with the priority given to Avangard glide vehicle.
- RS-26 Rubezh ICBM, which was suspended in 2018 for the same reasons as Barguzin rail-mobile ICBM. Has the range of 2000-6000 km. It is not yet known if the Kedr ICBM announced in 2021 will be based on RS-26 blueprints.

As President Putin this array of nuclear modernization programs is designed as a response to the U.S. withdrawal from the ABM Treaty in 2002⁶⁹. While the U.S. missile defense in its current state cannot upset the strategic balance, it has the potential for improvement, which, if fulfilled, would undermine the Russian second-strike capabilities.

The aforementioned modernization programs are not likely to significantly increase the overall size of the Russian strategic nuclear forces as some of the Soviet-era systems will still have to be retired. According to open sources, Voevoda (Satan) class missiles will begin retirement in 2022⁷⁰, Topol-class ICBMs are expected to be withdrawn from service in 2021-2022, and their modernized version Topol-M life service is expected to end in 2032^{71, 72}.

⁶⁸ Kristensen. Ibid

⁶⁹ Putin. Op. Cited

⁷⁰ "Сатана" останется на вооружении России до 2022 года - ПБСН. RIA Novosti. URL: <https://ria.ru/20121214/914770084.html>

⁷¹ Перевооружение ПБСН на «Тополь-М» завершится в 2012 году. December 13, 2011. RIA Novosti. URL: <https://ria.ru/20111216/518210576.html>

⁷² Каракаев: комплексы "Тополь" планируется использовать до 2021 года. RIA Novosti. URL: <https://ria.ru/20151216/1343018001.html>

Conclusion

The New START implementation led to sizeable reductions in both Russian and U.S. strategic nuclear forces. Moreover, it created a predictable and comfortable environment for Russia to modernize its nuclear forces, ensured stability and predictability in nuclear postures. Whereas the number of deployed launchers and delivery vehicles remained pretty much the same, Moscow managed to put an end to the gradual shrinking of its nuclear forces due to low levels of financing and aging infrastructure.

Inter alia, the implementation of the New START led to the reduction in the two countries' breakout (upload) potentials. Currently, the United States is not capable of deploying more than 3,400 strategic nuclear warheads as a maximum. For Russia, such potential is somewhat lower 2,400 warheads at the low level taking into account the presumed limitations of the warhead reserves to 3,200 warheads taking into account the maximum loading of the Russian means of delivery.

Concrete figures do not really as much as they appear. Whether the correlation is 3,400:3,200 or not, the strategic parity between Russia and the United States cannot be upset by the deployment of additional warheads: strategic deterrence would be preserved under any scenario. Moreover, no one in the sane mind would really increase the numbers of warheads and means of delivery deployed: there is just no military need to that end, with the procedures being quite costly.

Further modernization (especially in the period of 2026-2040) will be more challenging for the United States than for Russia. The uncertainty around further prospects for strategic arms control, the growing challenge U.S. policymakers perceive from the People's Republic of China, and domestic pressure complicate the modernization planning.

The baseline scenario is that the United States will be able to carry out the modernization program as presently planned and will remain within New START numerical ceilings. For this scenario to materialize, two conditions are to be observed. Firstly, the White House and the Department of Defense will have to ensure a stable flow of financial resources into the modernization activities, which are unprecedentedly expensive. Secondly, the threat environment is to remain stable. That means that U.S.-Russian and U.S.-China confrontation should remain on their current levels.

However, given the domestic situation in the United States and the demand of the progressive wing of the Democratic Party to reduce the defense expenditure, one should not exclude that the Biden administration will try to kill two birds with one shot by pursuing more ambitious arms control initiatives with Russia in order to reduce the magnitude of the modernization. Under this scenario, the United States would likely forgo the GBSD program, opting for another life-extension of Minuteman-III missiles. In order to avoid the attrition of spare missiles kept for testing purposes, the United States would likely reduce the number of ICBMs from the current four hundred to three hundred at highest. Such an initiative would likely anger the Republicans in Congress and would only become possible after the 2022 Congressional elections.

The Russian nuclear forces are expected to remain at the current level. Their composition meets the national security need for the foreseeable future. After the completion of the U.S. nuclear forces modernization program the strategic balance may be expect-



ed to remain unshattered: the core element of strategic stability, the parity in strategic offensive arms, will mostly remain the same.

The question is what Russia would like to get from the U.S. side in future arms control agreements?

The answer would be that Russia has almost everything it needs in terms of SOAs, its demands are related to missile defense and conventional strategic capabilities. The only thing the United States may offer in terms of SOA control is the cessation of its cooperation on Trident-II with the United Kingdom, which is unlikely unless the Great Britain makes the decision to become a non-nuclear-weapons state.

The United States in its turn would likely seek a limit on all deployed and non-deployed warheads coupled with more stringent verification procedures and more limits on Russian road- and rail-mobile ICBMs as well as on novel Russian armaments. As it always happens in arms control diplomacy, one may ask whatever one wants, but the question is what price the United States is willing to pay. The demands are high and should cost a lot. Limits on Avangard and other novel-systems would require the United States to make concessions on missile defense and outer space. Their demands regarding Rubezh would imply searching for tradeoffs in terms of INF systems. ■

STRATEGIC OFFENSIVE ARMS CONTROL: MILITARY-TECHNICAL ASPECTS

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Sergey Semenov

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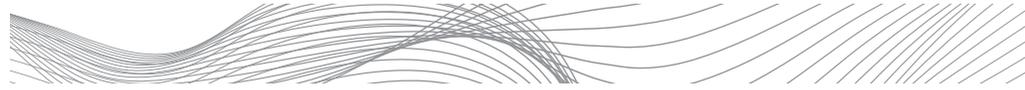
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REBUILDING THE RUSSIAN-AMERICAN DIALOGUE ON GLOBAL SECURITY

This occasional paper was made within the framework of the project Rebuilding the Russian-American Dialogue on Global Security, which is part of the Nuclear Nonproliferation & Russia Program. Russian-American dialogue on global security issues has been among PIR Center's priorities for many years. With the current deteriorating state of the bilateral relations, the importance of such dialogue between the two countries has been increasingly growing over the past few years, a tendency that will expectedly remain valid for many years ahead.