II. Russian nuclear forces

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As of January 2016 Russia maintained an arsenal of approximately 4490 nuclear warheads assigned to nuclear-capable delivery vehicles. About 2540 of these are strategic warheads, of which around 1790 are deployed on ballistic missiles and at bomber bases. Russia also possessed nearly 1950 non-strategic (tactical) nuclear warheads, all of which are in central storage. A further 2800 warheads are in reserve or retired and awaiting dismantlement, for a total inventory of roughly 7290 warheads (see table 16.3).

Russia met the ceiling of 1550 deployed warheads mandated by the 2010 Russian–US Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START) in 2012, six years earlier than envisaged by the treaty.[1] Since 2013, however, the number of deployed warheads has been increasing. It stood at 1648 accountable warheads as of 1 September 2015.[2] This increase is an anomaly created by the transition from older to newer weapon systems, and Russia is expected to reach compliance with the New START Treaty by 2018 as required.

Russia is in the middle of a long transition from Soviet-era forces to newer weapons, albeit on a less than one-for-one basis. As this transition continues over the next decade (all Soviet-era strategic ICBMs are scheduled to be retired by 2022), the overall size of Russia's nuclear arsenal will probably fall further, even without a follow-on arms reduction treaty.

Russia's nuclear modernization is motivated by the need to replace old systems, maintain rough overall parity with the United States, and to enhance weapon survivability and efficiency, and national prestige. However, despite a strong commitment to modernizing its nuclear forces, Russia faces serious financial constraints that, combined with its inefficient defence industry and widespread corruption, are likely to lead to the postponement or even cancellation of some of the modernization programmes.

Strategic bombers

Russia's Long-Range Aviation Command includes approximately 13 Tu-160 (Blackjack), 30 Tu-95MS16 and 27 Tu-95MS6 (Bear) bombers. Some of these may not be fully operational. The maximum loading on these bombers is

[1] Russian–US Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START, Prague Treaty), signed 8 Apr. 2010, entered into force 5 Feb. 2011.

[2] US Department of State, Bureau of Arms Control, Verification and Compliance, 'New START Treaty aggregate numbers of strategic offensive arms', Fact Sheet, 1 Jan. 2016. Under New START, each heavy bomber is counted as carrying only 1 warhead, even though the aircraft can carry larger payloads of nuclear-armed cruise missiles or nuclear gravity bombs.

Table 16.3. Russian nuclear forces, January 2016

Type/ Russian designation (NATO designation)	No. of launchers	Year first deployed	Range (km)[a]	Warhead loading	No. of warheads[b]
Strategic offensive forces					**2 542**[c]
Bombers	*60/70*[d]				*798*[e]
Tu-95MS6 (Bear-H6)	24/27	1981	6 500–10 500	6 x AS-15A ALCMs, bombs	162
Tu-95MS16 (Bear-H16)	25/30	1981	6 500–10 500	16 x AS-15A ALCMs, bombs	480
Tu-160 (Blackjack)	11/13	1987	10 500–13 200	12 x AS-15B ALCMs or AS-16 SRAMs, bombs	156
ICBMs	*307*				*1 040*
RS-20V (SS-18 Satan)	46	1992	11 000–15 000	10 x 500–800 kt	460
RS-18 (SS-19 Stiletto)	20	1980	10 000	6 x 400 kt	120
RS-12M Topol (SS-25 Sickle)	90[f]	1985	10 500	1 x 800 kt	90
RS-12M2 Topol-M (SS-27/silo)	60	1997	10 500	1 x 800 kt	60
RS-12M1 Topol-M (SS-27)	18	2006	10 500	1 x (800 kt)	18
RS-24 Yars (SS-27 Mod 2)	63	2010	10 500	4 x (100 kt)	252
RS-24 Yars (SS-27 Mod 2/silo)	10	2014	10 500	4 x (100 kt)	40
RS-26 Yars-M (SS-27 Mod 3)	–	(2016)	5 500+	3 x (100 kt)	–
SLBMs	*176*[g]				*704*[g]
RSM-50 Volna (SS-N-18 M1 Stingray)	32	1978	6 500	3 x 50 kt	96
RSM-54 Sineva (SS-N-23 M1)	96	1986/2007	9 000	4 x 100 kt	320
RSM-56 Bulava (SS-N-32)	48	2014	>8 050	6 x (100 kt)	288
Non-strategic forces					**~1 948**[h]
ABM, air/coastal defence	*~1 100*				*~480*
53T6 (SH-08, Gazelle)	68	1986	30	1 x 10 kt	~68
S-300 (SA-10/20)	1 000[i]	1980/1992	. .	1 x low kt	~400
SSC-1B (Sepal)	30	1973	500	1 x 350	~12
Air Force weapons	*388*[j]				*~568*
Tu-22M3 (Backfire-C)	120	1974	. .	3 x ASM, bombs	~300
Su-24M/M2 (Fencer-D)	200	1974	. .	2 x bombs	~200
Su-34 (Fullback)	68	2006	. .	2 x bombs	~68
Army weapons	*140*				*~140*
Tochka (SS-21 Scarab)	80	1981	120	(1 x 10 kt)	~80
Iskander-M (SS-26 Stone)	60	2005	300[k]	(1 x 10 kt)	~60
Navy weapons					*~140*
Submarines/surface ships/air		SLCM, ASW, SAM, depth bombs, torpedoes[l]			
Total deployed/assigned warheads					**~4 490**
Reserve and retired warheads awaiting dismantlement					~2 800
Total inventory					**~7 290**

. . = not available or not applicable; ( ) = uncertain figure; ABM = anti-ballistic missiles; ALCM = air-launched cruise missile; ASM = air-to-surface missile; ASW = anti-submarine warfare; ICBM = intercontinental ballistic missile; kt = kiloton; NATO = North Atlantic Treaty

Organization; SAM = surface-to-air missile; SLBM = submarine-launched ballistic missile; SLCM = sea-launched cruise missile; SRAM = short-range attack missile.

[a] Aircraft range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

[b] The number shows the total number of warheads assigned to the delivery systems.

[c] Approximately 1790 of these strategic warheads are deployed on ballistic missiles and at bomber bases. The remaining warheads are in central storage.

[d] The 1st number is the number of bombers estimated to be counted under the New START Treaty. The 2nd number is the total number of bombers in the inventory.

[e] Of the 798 weapons estimated to be assigned to long-range bombers, only 200 weapons are thought to be present at the 2 strategic bomber bases. The remaining weapons are in central storage facilities.

[f] It is possible that the number of RS-12 missiles is lower, around 72 missiles.

[g] Two of the Delta SSBNs are in overhaul at any given time and do not carry their assigned nuclear missiles and warheads.

[h] Non-strategic nuclear warheads are not deployed with their delivery systems but kept in a central storage facility, according to the Russian Government.

[i] There are at least 80 S-300 sites across Russia, each with an average of 12 launchers, each with 2–4 interceptors. Each launcher has several reloads. The SA-10 has been nearly replaced by the SA-20.

[j] The figures show total aircraft but only some of them are thought to have nuclear missions.

[k] Although many unofficial sources and news media reports say the SS-26 has a range of nearly 500 km, the US Air Force NASIC lists the range as 300 km.

[l] Only submarines are thought to be assigned nuclear torpedoes.

Sources: Russian Ministry of Defence press releases; US Department of State, START Treaty Memoranda of Understanding, 1990–July 2009; New START aggregate data releases, various years; US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson AFB, OH, May 2013); BBC Monitoring; Russian news media; Russian Strategic Nuclear Forces, <http://www.russianforces.org/>; International Institute for Strategic Studies, *The Military Balance* (Routledge: London, various issues); Cochran, T. B. et al., *Nuclear Weapons Databook*, vol. 4, *Soviet Nuclear Weapons* (Harper & Row: New York, 1989); *Jane's Strategic Weapon Systems*, various issues; *Proceedings*, US Naval Institute, various issues; 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; and authors' estimates.

almost 800 nuclear weapons, of which approximately 200 might be stored at the two strategic bomber bases. The Tu-160s and about 15 of the Tu-95s are based at the Engels Air Base near Saratov in western Russia. The remaining Tu-95s are based at the Ukrainka Air Base near Belogorsk in eastern Russia.

Each Tu-160 can carry up to 12 AS-15B Kent (Kh-55) long-range cruise missiles. The Tu-95MS16 can carry up to 16 AS-15A long-range cruise missiles, and the Tu-96MS6 can carry up to 6 AS-15As. There is some uncertainty about whether the bombers are still equipped to carry nuclear gravity bombs. Given their age and limited penetration capability, it is reasonable to assume that their nuclear role is focused on delivering standoff cruise missiles instead of gravity bombs.

Modernization of the ageing Tu-160 and Tu-95MS bombers is well under way, with several improved bombers already deployed. Only 'a few tens' of the 59 remaining Tu-95MS aircraft will be modernized, and the rest will be

retired, while 'at least 10' Tu-160s will be modernized by 2020.[3] Modernizing ten aircraft would cost at least 34 billion roubles ($10 billion).[4]

In light of the serious delays in the development of the next-generation bomber programme known as PAK-DA, the Russian Government has decided to resume production of the Tu-160, presumably in anticipation of a declining Tu-95MS fleet and faced with the limits on modernizing existing Tu-160s. The new-production version is dubbed Tu-160M2, a designation similar to the one used for the upgraded Tu-22M3 and Su-24M2. Production of at least three bombers per year is planned to begin in 2023.[5] The Air Force says it plans to buy at least 50 Tu-160M2s, which indicates that the programme will likely replace most of the Tu-95MS bombers as well.[6]

Land-based ballistic missiles

As of January 2016 Russia's Strategic Rocket Forces (SRF)—the branch of the armed forces that controls Russia's land-based ICBMs—consisted of 12 missile divisions grouped into 3 armies and deploying a total of 307 ICBMs of seven different types and variations. The ICBM force carries approximately 1000 warheads, nearly 60 per cent of Russia's deployed strategic warheads.

The ICBM force is undergoing significant transformation due to the gradual replacement of Soviet-era missiles with newer (but fewer) ICBMs. By the end of 2015, approximately 56 per cent of the force had been upgraded, a modernization that began in 1997; all the remaining Soviet-era (ICBMs) will be retired by 2024.

Taking into account current plans announced by the Russian military, the ICBM force could potentially decline to under 300 missiles over the next decade. To keep rough parity with the larger US ICBM force, which is planned to be maintained at 400 deployed missiles under New START, the Russian military is prioritizing deployment of multiple independently targetable re-entry vehicles (MIRVs) on its new ICBMs. By the early 2020s, the ratio of silo and road-mobile missiles will be roughly the same, but the mobile launchers will be carrying a greater proportion of the ICBM warheads because of the addition of MIRVs to mobile missiles. Before 2010, all Russian road-mobile missiles were single-warhead weapons; by 2022, all but 18 will carry MIRVs.

[3] Mikhailov, A., [Strategic bomber 'Bear' to be left in service], *Izvestiya*, 20 Sep. 2012 (in Russian); and 'Russia to upgrade over 10 Tu-160 bombers by 2020', RIA Novosti, 7 Feb. 2012.

[4] 'Russian defense ministry signs $100 m deal to overhaul 3 Tu-160 bombers', RIA Novosti, 26 July 2013.

[5] 'Russian defense ministry started to sign the first contracts for the project Tu-160M2', Aviaport (Novosti), 17 July 2015; and Novichkov, N., 'Russia's future PAK DA bomber to be delayed by Tu-160M2 production', *Jane's Defence Weekly*, 20 July 2015.

[6] 'Russia to produce successor of Tu-160 strategic bomber after 2023', Sputnik News, 4 June 2015.

The liquid-fuel, silo-based RS-20V (SS-18) is armed with 10 warheads, and carries about 44 per cent of the warheads in the ICBM force. Roughly 46 of the Soviet-era missiles remain, down from 108 a decade ago. These are deployed at two missile fields: 28 missiles in four regiments at Uzhur in Krasnoyarsk Krai, and 18 missiles in three regiments at Dombarovsky in Orenburg Oblast. The RS-20V will remain in service until it is replaced by the RS-28 (Sarmat), which will begin in the early 2020s.

Approximately 20 of the liquid-fuel, silo-based RS-18s (SS-19s) remain in service, down from 130 missiles a decade ago. Each missile carries an estimated 6 warheads, giving a total of 120 warheads deployed. The last RS-18 is scheduled to be withdrawn from service by 2019.[7] The 20 remaining RS-18s are thought to be split between the Kozelsk division in Kaluga Oblast and the Tatishchevo division in Saratov Oblast.[8]

The third Soviet-era ICBM, the solid-fuel road-mobile RS-12M Topol (SS-25), is being rapidly reduced. There are now an estimated 90 RS-12Ms left, down from 315 missiles a decade ago. It is possible that the number is even lower, around 72, depending on how the upgrade from RS-12M to RS-24 is being carried out in the divisions.[9] The RS-12M is scheduled to be fully retired by 2021.[10] The RS-12M has been used in intermediate-range test-launches from Kapustin Yar to Sary-Shagan in recent years, which appear to have been related to the development of new ICBM warheads.

The solid-fuel single-warhead RS-12 Topol-M (SS-27 Mod 1) is deployed in both road-mobile (RS-12M1) and silo-based (RS-12M2) versions. Deployment in silos started at Tatishchevo in 1997 and was completed in 2012 after 60 missiles were installed. Deployment of the road-mobile RS-12M1 version followed at Teykovo, northeast of Moscow in 2007–10.

Deployment of the multiple-warhead version of the RS-12, known as RS-24 Yars (SS-27 Mod 2), began in 2010 on road-mobile launchers based at Teykovo. As of late 2015, five or six additional mobile regiments had been fully or partially upgraded at the Novosibirsk and Tagil missile divisions.[11] Upgrades from RS-12M to RS-24 will now follow at Yoshkar-Ola and Irkutsk.

[7] 'Russia's Voyevoda ICBM to remain in service for another decade–commander', Interfax, 15 Dec. 2012, Translation from Russian Open Source Center.

[8] It is possible that a second regiment is still operational at Kozelsk but satellite images indicate that all but those converted to RS-24 may have been deactivated.

[9] The higher number of 90 RS-12Ms assumes upgrades to RS-24 happen gradually regiment-by-regiment rather than the RS-12M being withdrawn from all regiments in a division as soon as the first regiment begins the upgrade.

[10] [SRF will be armed with Soviet ballistic missiles until 2021], Novosti-Kosmonavtiki, 17 Dec. 2013 (in Russian).

[11] Falichev, O., ['Sarmat' to replace 'Voyevoda'], VPK-news, Dec. 2015 (in Russian); and 'Russian general gives details of ICBM re-armament, including RS-26/Yars-M', Interfax, 21 July 2015, Translation from Russian, BBC Monitoring.

Each division will receive one RS-24 regiment in 2016, although not all of the new regiments are likely to achieve full operational status until 2017.[12]

Deployment of the first silo-based RS-24 regiment with 10 missiles was completed in late 2015 at the 28th Guard Missile Division in Kozelsk. The RS-24s replaced the SS-19s previously deployed in the silos. The upgrade started in 2012 and the first four RS-24s became operational towards the end of 2014. Upgrade of the next 10 silos began on completion of the first regiment. It is not yet known how many RS-24s will be installed at Kozelsk but it seems likely that there will be at least 30. Development of a rail-based version of the RS-24 has probably been delayed or cancelled because of budgetary pressures.[13]

Russia is developing a third modification of the RS-12M, known as the RS-26 (Yars-M). Like the RS-12M (Topol), the RS-26 has been test-launched over intercontinental and shorter ranges. The RS-26 is a lighter version of the RS-24.[14] The RS-26 will be deployed first with the 51st Guards Missile Division at Irkutsk, where preparations are under way. A test-launch is scheduled for 2016.

Russia is also developing a new liquid-fuel, silo-based 'heavy' ICBM, known as the RS-28 (Sarmat), as a replacement for the RS-20V. The first test-launch of the 100-tonne missile is scheduled to take place in the second half of 2016, and serial deliveries are expected to begin in 2018–19.[15] The missile can carry up to 10 MIRVed warheads and reportedly will be equipped with advanced countermeasures, possibly including new types of warheads such as manoeuvrable warheads, designed to penetrate US missile defence systems.[16] The RS-28 will probably be deployed in two divisions—in Dombarovsky and Uzhur—which are presently armed with RS-20V ICBMs.[17]

Ballistic missile submarines and sea-launched ballistic missiles

The Russian Navy has a fleet of 11 operational nuclear-armed nuclear-powered ballistic missile submarines (SSBNs). A new class is under construction that will gradually replace all Soviet-era SSBNs by the end of the next decade.

The current backbone of the Russian SSBN fleet is made up of six Project 667BDRM Delfin (Delta IV class) submarines assigned to the Northern

[12] Falichev (note 11).

[13] Novichkov, N., 'Russian rail-mobile ICBM project set to be axed', *Jane's Defence Weekly*, 7 Feb. 2016.

[14] 'Russia designing "new" rail-mobile ICBM system, troops getting new missiles', Interfax, 18 Dec. 2013, Translation from Russian, Open Source Center.

[15] 'Sarmat strategic missile to be test-fired from Plesetsk in 2016', Interfax, 12 Jan. 2016.

[16] Falichev (note 11); and Shepovalenko, M., 'Hypersonic warheads for ballistic missiles', Russian International Affairs Council, 30 July 2015.

[17] 'Russia to design new liquid-fuel ICBM by 2020: expert', Interfax, 25 Feb. 2014, Translation from Russian, BBC Monitoring.

Fleet. Each is equipped to carry 16 liquid-fuel RSM-54 Sineva (SS-N-23 M1) submarine-launched ballistic missiles (SLBM), each of which can carry four MIRVs. One of the Delfins is in overhaul at any given time and is not loaded with missiles or warheads. The *Tula* (K-114) entered overhaul in 2014 and will return in 2017.

The Sineva SLBM replaced the original RSM-54 (SS-N-23 Skiff) on the Delfin SSBNs between 2007 and 2012, and a third modification of the missile, known as Layner, is now being fielded. Layner appears to be a 'modest' modification of the Sineva with a similar payload but possibly designed to improve the missile's capability to penetrate missile defence systems.[18]

Two old Project 667BDR Kalmar (designated Delta III class by NATO) submarines are operational with the Pacific fleet, each carrying 16 RSM-50 Volna (SS-N-18 M1) SLBMs. The liquid-fuel RSM-50 is armed with three MIRVs. The Kalmar submarines will be retired in the near future.

To replace the ageing Soviet-era SSBNs, Russia is building eight Borei class SSBNs (Project 955), of which three had entered service as of late-2015. The hulls of subsequent Borei class submarines will be an improved design known as Borei-A (Project 955A). Delivery of the first Borei-A boat to the navy has been delayed from 2016 until 2018. The construction of three additional Borei-A submarines began in 2014–15, and the keel laying for the fifth and final Borei-A is planned for 2016. This schedule will probably delay the project beyond 2020, which was originally planned to be the year of completion. There are unconfirmed rumours that Russia is considering construction of more Borei-class SSBNs for a total of 10 or 12 hulls.[19]

Technical problems with its solid-fuelled RSM-56 Bulava-30 (SS-N-32) SLBM delayed operational service of the Borei class but the issues now appear to have been resolved. Each Borei SSBN is equipped with 16 launch tubes for the Bulava. The missile is estimated to carry up to six warheads, as opposed to the four on the RSM-54 Sineva and three on the RSM-50 Volna. This means that a future fleet of eight Borei SSBNs will be able to carry significantly more warheads than the Delta III/IV submarines currently in service.

Non-strategic nuclear weapons

Like the United States, Russia does not provide information about the number, locations and types of its non-strategic nuclear weapons. As a result, considerable uncertainty exists about the size, composition and location of

[18] See e.g. 'Russian navy takes into service Layner ICBM', Interfax, 2 Apr. 2014, Translation from Russian, BBC Monitoring.

[19] See 'Russia to continue building Borei submarines after 2020: Navy's commander', TASS, 2 July 2015; and Gorenburg, D., 'Russian naval shipbuilding plans: Rebuilding a blue water navy', Russian Military Reform, 23 Jan. 2015.

Russia's non-strategic nuclear weapon inventory. The estimate made here is that there are nearly 2000 warheads assigned for potential use by Russian non-strategic forces. Many more warheads have been retired and are awaiting dismantlement.[20]

Most of the Russian non-strategic nuclear arsenal consists of weapon systems developed and fielded during the Soviet era, and many could be retired over the next decade. Nonetheless, the Russian military continues to attribute importance to non-strategic nuclear weapons, partly to compensate for its inferior conventional forces compared with NATO. As a result, the modernization of several non-strategic nuclear weapon systems is under way.

This modernization includes the Iskander-M (SS-26) short-range ballistic missile (SRBM), which is replacing the Tochka (SS-21) SRBM in 10 missile brigades. Deployment started in 2004 and by the end of 2015 the army had received six Iskander brigades, although not all of these are fully operational.[21] Rumours that the Iskander-M has been permanently deployed to the Kaliningrad oblast are inaccurate.[22] However, several 'snap' exercises involving temporary deployment to Kaliningrad occurred in 2014 and 2015.[23] It is estimated here that there are approximately 140 warheads assigned to Russian SRBMs.

Non-strategic nuclear aircraft modernizations include upgrading the old Tu-22M3 (Backfire) intermediate-range bomber, upgrading the Su-24M (Fencer-D) fighter-bomber and introduction of the new Su-34 (Fullback) fighter-bomber. The Su-34, which will eventually replace the Su-24M, is already being deployed in western military districts and participates in military exercises and operations. All three types can carry nuclear bombs but the Tu-22M3 can also carry nuclear AS-4 air-launched cruise missiles. It is estimated here that approximately 568 warheads are assigned to Tu-22M3 bombers.

There is considerable uncertainty about the extent to which Russia still uses nuclear warheads on defensive forces, such as anti-aircraft missiles,

[20] For more information see Kristensen, H. M., *Non-Strategic Nuclear Weapons*, Federation of American Scientists (FAS) Special Report no. 3 (FAS: Washington, DC, May 2012), pp. 51–65. See also Kristensen, H. M., *Trimming Nuclear Excess: Options for Further Reductions of US and Russian Nuclear Forces*, Federation of Atomic Scientists (FAS) Special Report no. 5 (FAS: Washington, DC, Dec. 2012), pp. 26–27.

[21] 'Russian troops get brigade set of Islander-M missile system', Interfax, 16 July 2015, Translation from Russian, BBC Monitoring.

[22] For claim and rebuttal of rumours about Iskander-M missiles in Kaliningrad see Solms-Laubach, F., 'Putin stationiert Raketen für Atomprengköpfe [Putin deploys missiles for nuclear warheads]', Bild, 14 Dec. 2013; and 'Putin Says No Iskanders Deployed in Kaliningrad', RIA Novosti, 19 Dec. 2013.

[23] 'Ballistic missile systems to be redeployed to Russia's westernmost region: source', TASS, 17 Mar. 2015; 'Iskanders missiles pulled back from Russia's westernmost region after drill', RIA Novosti, 16 Dec. 2014, Translation from Russian, BBC Monitoring.

ballistic missile defence interceptors and coastal defence missiles.[24] Some analysts have suggested that anti-aircraft missiles may either no longer have nuclear warheads, or have only a few (less than 100).[25] The Soviet Union deployed several nuclear-tipped anti-aircraft missiles during the cold war. There are no official numbers but analysts estimated 4000 air-defence warheads in 1988; and 3000, or possibly significantly fewer, remaining in 1991.[26] It is estimated here that approximately 480 warheads exist for S-300 air-defence units, the A-135 anti-ballistic missile defence system around Moscow and coastal-defence missile units.

The Russian Navy appears to be the service that relies most heavily on non-strategic nuclear weapons. An estimated 760 warheads are assigned to submarines, aircraft carriers, cruisers, destroyers, frigates, corvettes and maritime aircraft and helicopters. Modernizations under way include the new Project 885M (Yasen) attack submarine, the first of which entered service in 2015. The Yasen is thought to be equipped with the new long-range, land-attack Kalibr sea-launched cruise missile, which exists in both a nuclear (SS-N-30A) and a conventional (SS-N-30) version. The SS-N-30A is likely to replace the SS-N-21 on select attack submarines. Modernization is also under way of existing nuclear-capable attack submarines, including Project 945 (Sierra), Project 949A (Oscar II) and Project 971 (Akula).

The United States has accused Russia of violating the 1987 Soviet–US Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty) by developing and testing a new ground-launched cruise missile to a range banned by the treaty since 2008. Russia has rejected the accusation. The new cruise missile, which has not been identified by the US Government, is yet to be deployed but is apparently far enough developed that it could be deployed if a decision were made to do so.[27]

[24] For alternative assessments see Sutyagin, I., *Atomic Accounting: A New Estimate of Russia's Non-Strategic Nuclear Forces* (Royal United Services Institute: London, Nov. 2012), pp. 18–25; Cochran, T. B. et al., *Nuclear Weapons Databook* Vol. 4, *Soviet Nuclear Weapons* (Harper & Row: New York, 1989), p. 32; and Arbatov, A., 'Deep cuts and de-alerting: a Russian perspective', ed. H. A. Feiveson, *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons* (Brookings Institution Press: Washington, DC, 1999), p. 319.

[25] Sutyagin, (note 24), p. 19.

[26] Arbatov (note 24); and Cochran et al. (note 24).

[27] On the INF Treaty compliance controversy see Kile, S. N., 'Russian-US nuclear arms control', *SIPRI Yearbook 2015*, pp. 540–45.