Jane's Intelligence Review

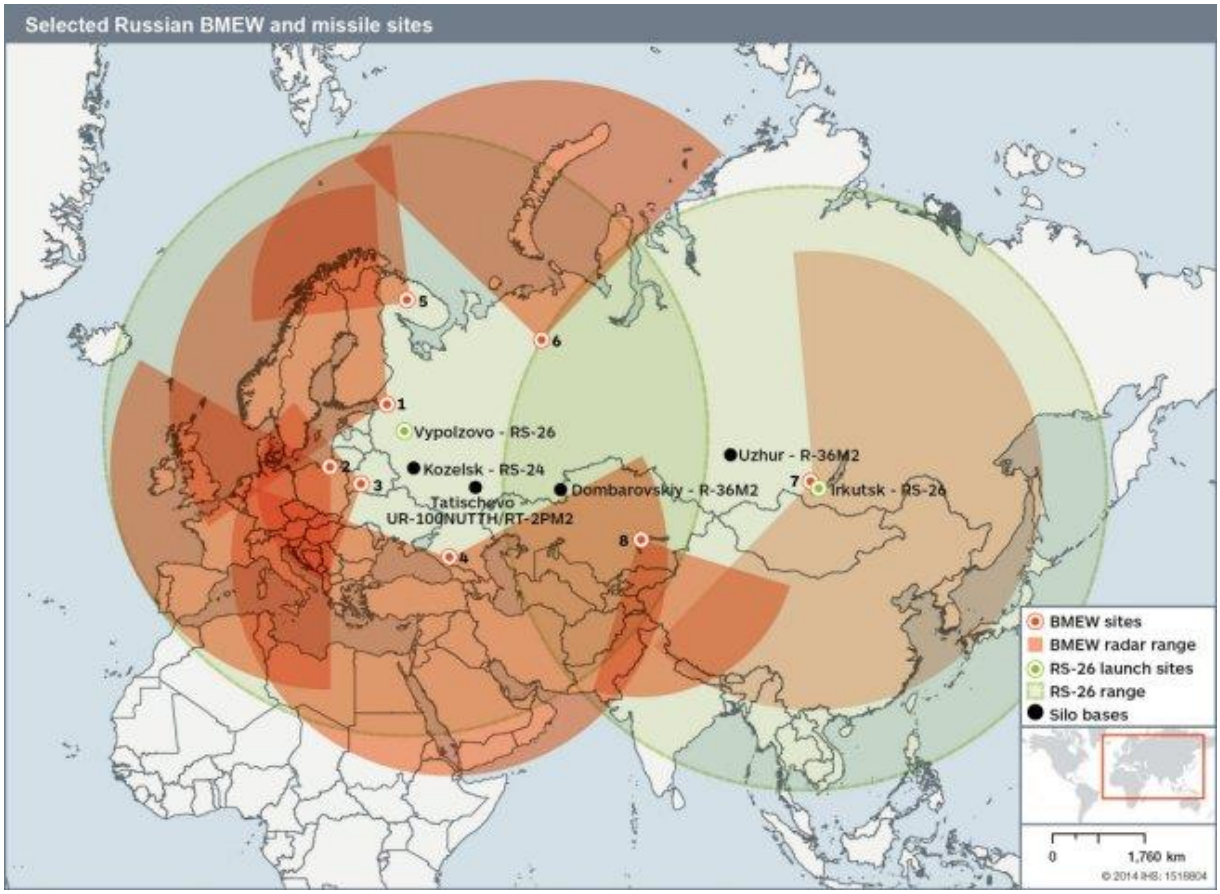
Russia upgrades its missile arsenal

Russia's foreign policy is currently under heavy scrutiny, but Moscow is determined to maintain a credible deterrent missile force. *Sean O'Connor* examines the progress of these upgrades and how they are restricted by the New START missile treaty with the US.

As the tense relationship between Russia and the United States is tested by Moscow's intervention in eastern Ukraine, Russia's missile modernisation programme is continuing. The size of Russia's current and near-future strategic nuclear arsenal is governed by the New Strategic Arms Reduction Treaty (New START) with the US, which limits the amount of strategic arms each country can have.

However, as the US continues to increase its own strike capability, and plans to place anti-ballistic missile (ABM) facilities in Europe, Russia is looking to update and overhaul its own arsenal.

For example, Russian military sources cited in *The Moscow Times* in November 2014 said Russia could deploy its railway-based intercontinental ballistic missiles (ICBMs) by 2019 in a "best-case scenario". Moscow's interest in relaunching these 'missile trains' has been rising over the past two years in reaction to increases in US strike capability. As long ago as April 2013, at a Russian Ministry of Defence (MoD) roundtable event, Russian deputy minister of defence Yury Borisov confirmed reports that Moscow was interested in the return of the missile train. In December 2014, Interfax-AVN reported the announcement of the Barguzin rail-mobile ICBM, with development scheduled for completion as early as 2018.



Selected Russian BMEW and missile sites. (IHS)

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Given Russia's arsenal of silo-protected, road-mobile, and submarine-launched ballistic missiles, the reintroduction of missile trains would primarily send a signal of Moscow's displeasure at the US's increasing capabilities, and highlights the continued political importance of missile modernisation to Moscow.

Russia's strategic missile inventory is already in the midst of a significant upgrade, in which various delivery systems are being modernised or replaced outright. The country's strategic nuclear deterrent is currently based on a triad of land-based ICBMs; sea-based submarine-launched ballistic missiles (SLBMs); and strategic bombers capable of delivering nuclear-armed gravity bombs or cruise missiles.

ICBMs remain the most numerously deployed systems, and the bulk of the upgrade process is centred on the Russian Strategic Rocket Forces (Raketnaya voyska strategicheskogo naznacheniya: RVSN).

The service lives of numerous existing ICBM systems will expire within the next decade due to material factors, such as the expiration of solid rocket motors. However, Moscow is also upgrading the other legs of the triad, such as by introducing new submarine classes and accompanying SLBMs, new aircraft, and air-launched cruise missiles (ALCM).

Furthermore, Russia's ongoing deployment programmes are fielding increasing numbers of defensive assets, such as ballistic missile early warning (BMEW) sensors across Russia and ABM systems in the Moscow region.

New START entered into force in February 2011 and will remain in effect for at least 10 years, pending signatory withdrawal or implementation of an already agreed extension of up to five years. Treaty limits on the number of missiles each side can have must be met within seven years of the entry into force date, by February 2018.

The treaty limits for each side are 700 deployed strategic missile launchers, 1,550 deployed strategic warheads, and 800 strategic missile launchers (the total includes both deployed and non-operational). Under the terms of the treaty, a missile launcher is considered to be a strategic bomber, ground-based missile transporter erector launcher, silo, or nuclear-powered ballistic missile submarine (SSBN) missile tube. A missile launcher is deemed to have been 'deployed' when it contains an operational ICBM or SLBM. Strategic bombers are defined under New START as having a range exceeding 8,000 kilometres, or the ability to launch nuclear-armed ALCMs.

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Strategic rocket forces

The RVSN currently operates five ICBM types, with a mixture of 'heavy' and 'light' systems. Heavy ICBMs offer increased throw weights that permit either larger warheads, greater numbers of warheads per missile, or an increased number of penetration aids per missile when compared with light ICBMs. Light ICBMs are force multipliers, complementing the more expensive heavy systems and providing a comparatively cheaper method of reaching parity with US delivery capabilities.

Russia's only heavy ICBM is the R-36M2, which is currently configured to carry up to 10 MIRVs. The oldest light ICBM in service is the UR-100NUTTH (SS-19 'Stiletto'), which first entered into service in 1979 but is in the process of being replaced. Its silos at Kozelsk are the first to undergo modernisation for the multiple warhead variant of the Topol-M ICBM, known as the RS-24 Yars.

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The Topol family of missiles (itself based on the RS-12M Topol SS-25 'Sickle' road-mobile system) comes in three types: the single warhead baseline (the RT-2PM Topol), a modified version (the RT-2PM2 Topol-M), and the RS-24 Yars multiple warhead version. All are road-mobile, but the more advanced versions have also been selected for silo protection.

A Russian Topol ICBM on a mobile rocket launcher. The Topol's service life will expire by 2025, and it will be replaced by RS-24 Yars systems. (PA)

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The Topol road-mobile ICBM numbers continue to decline as their service lives expire and newer systems enter service. The Topol-M serves in both road-mobile and silo-based forms, although the multiple-warhead RS-24 Yars has now replaced the single-warhead Topols on the production line, in both road-mobile and silo-based forms.

The service lives of the R-36M2, UR-100NUTTH, and Topol ICBMs will expire by 2025. RS-24 Yars deployments are replacing UR-100NUTTH and Topol systems, while a new heavy ICBM called Sarmat will replace the Voevoda by 2020, according to former RVSN commander General-Colonel (retired) Viktor Yesin speaking at a press conference in Moscow in February 2014. VPK News reported in December 2014 that the first Sarmat ICBM will be ready for trials in 2015.

The Russian Navy has three SSBN types. The Pacific Fleet's seagoing nuclear deterrent is currently comprised of two 1970s-era Project 667BDR (Delta III) SSBNs, each armed with 16 R-29R (SS-N-18 'Stingray') SLBMs. The Northern Fleet has six Project 667BDRM (Delta IV) SSBNs from the 1980s, each armed with 16 R-29RM Sineva/Liner (SS-N-23 'Skif') SLBMs. The third SSBN type is the Project 955 (Borei class) SSBN, which is designed to replace the Delta classes still in service. The first two Borei-class submarines, *Yuri Dolgorukiy* and *Aleksandr Nevskiy* , entered service in 2013. *Yuri Dolgorukiy* is assigned to the Northern Fleet, while *Vladimir Monomakh* , the third of that class, is scheduled to join the Pacific Fleet with the *Aleksandr Nevskiy* in 2015 to replace the Delta IIIs.

The *Aleksandr Nevskiy* , which is currently with the Northern Fleet, is waiting for SLBMs once the new Bulava missiles enter into service. The Project 955 SSBN will be armed with 16 R-30 Bulava SLBMs. The fourth Borei-class hull - *Knyaz Vladimir* - and following hulls will be improved and will be known as Project

955A. Whereas the original hulls re-use existing hulls, the further hulls will be completely new. As yet, there is no expected completion date for Project 955A.

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Treaty obligations

Russia's current strategic weapons programmes are not geared to provide an increase in the number of its deployed nuclear weapons, which would violate New START. In September 2014, Russia had 1,643 deployed warheads on 528 deployed launchers. Rather, Moscow's current efforts are consistent with its historical efforts to upgrade large portions of its nuclear arsenal, with the number of increases caused by the overlap of modernisation programmes.

According to RVSN commander Lieutenant General Sergei Karakayev, the forthcoming RS-26 Rubezh missile (modelled on the RS-24 Yars) has demonstrated a range of at least 5,800 km during trials, placing it just into the ICBM category for arms control purposes, even though its range is not sufficient to threaten the continental US. This suggests the Rubezh is a system designed to circumvent the Intermediate-Range Nuclear Forces (INF) Treaty, which was signed in 1987 between the US and the Soviet Union, restrictions banning theatre-level weapon systems with ranges between 500 and 5,500 km.

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However, RS-26 Rubezh deployment sites do provide the RVSN with a weapon that is capable of striking targets in Europe or Asia and overtly allowing nuclear-missile targeting. Existing weapon systems such as the Topol are capable of striking the same regions when employed at a reduced range. However, because the RS-26 Rubezh is tested at a range shorter than that needed to target the US, it is clearly designed for a closer target to Russia.

According to Russian news agency ITAR-TASS, the first RS-26 Rubezh deployment is scheduled for 2015, replacing the Topol in service with the 29th Guards Missile Division (GMD) at Irkutsk in southern Russia. In 2011, VPK News also reported a scheduled deployment to replace Topol ICBMs within the 7th GMD at Vypolzovo in the west. Irkutsk is oriented to perform targeting of the Asia-Pacific region, notably China, while Vypolzovo can provide coverage of the European theatre.

By testing the RS-26 Rubezh to an ICBM range, it falls under the New START treaty for arms control accountability purposes. However, the RS-26 Rubezh cannot threaten the US mainland, so deploying it as an ICBM accounted for under a US-Russia arms control agreement is illogical, unless Russia feels it requires a nuclear strike capability against a closer state and can effectively deter the US with its remaining nuclear arms.

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Project 4202 and Sarmat

A further significant development in Moscow's missile modernisation programme is Project 4202, which involves developing a manoeuvring hypersonic warhead. This is as a direct result of Russian concerns about

Washington's ABM deployments in Europe, and would limit the effectiveness of US ABMs against Russian nuclear delivery systems, because the warhead can potentially manoeuvre in flight and therefore make targeting harder.

According to Pavel Podvig, director of the non-governmental organisation Russian Nuclear Forces Project (RNFP), initial trial deployment of the system will occur at a former R-36M2 silo (Object 370) at Dombarovskiy air base near the border with Kazakhstan. According to the RNFP website, in February 2013 Podvig identified documentation connecting the Object 370 silo modernisation at Dombarovskiy to the UR-100NUTTH delivery system, indicating that Russia will use an existing delivery vehicle for the initial deployment of the new warhead.

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However, as the new warhead is larger than that currently employed by the UR-100NUTTH, existing silos at Tatischevo or Kozelsk air bases in southwest and west Russia respectively will not be able to support deployment of the system. Instead, silos used for heavy missiles may have to be used, although this raises questions about the deployment of the forthcoming Sarmat heavy ICBM, which is currently slated to replace the 52 Voevodas, as it would reduce the availability of heavy ICBM silos.

Using the obsolescent UR-100NUTTH as an initial deployment platform may indicate the warhead's availability ahead of Sarmat's deployment. Although the UR-100NUTTH has been identified as an interim replacement, as long ago as 2003 a report by Interfax news agency claimed that the RVSN retained a small number of disarmed Voevoda silos at Uzhur (12 silos) and Dombarovskiy (6 silos) for possible future use. These are accounted for under New START within the total launchers category.

Sarmat's deployment itself has the potential to increase the number of heavy ICBMs in service beyond the declared total of 52 R-36M2s currently fielded. By increasing the total of heavy ICBMs available and arming them with a single warhead or reduced payload, Russia could field a breakout capability within New START guidelines. Following treaty expiration or failure to negotiate an extension or new agreement, additional warheads could be uploaded to existing Sarmat airframes to increase the RVSN's deployed striking power.

Strategic defences

Ballistic missile early warning and ABM systems are subordinate to the Russian military's Aerospace Defence Forces, a new service branch established in 2011 under State Armament Programme (SAP) 2020.

At present, Russia operates a network of BMEW sensors and maintains a limited ABM system for defending Moscow. The primary BMEW sensors are variants of the 77Ya6 Voronezh family. There are three Voronezh-series radar types in operation: -M, -DM, and -VP. The Voronezh radar systems are designed to be cheaper to deploy and operate than previous BMEW sensors such as Daryal, which are being phased out. This in turn allows for more numerous deployments.

Initial very high frequency (VHF)-band Voronezh-M deployment occurred at Lekhtusi near St Petersburg in 2006, and achieved operational status in 2012 after a trial period. The Voronezh-VP is an expanded-width system with a wider array, apparently supplanting the earlier Voronezh-M, as only one example of the latter has been fielded.

Two Voronezh-VP arrays are active at Mishelevka in the south, replacing an earlier Daryal BMEW radar. Additional arrays are under construction at Orsk, near the border with Kazakhstan, and Vorkuta in the north. The array at Vorkuta is intended as a replacement for the nearby Daryal-model radar based at

Pechora. A Voronezh-VP is also the planned replacement for the existing Dnepr/Daugava combination at Olenegorsk in the northwest.

The Voronezh-DM uses a different array and operates in the ultra high frequency (UHF) band. Whereas the Voronezh-M and Voronezh-VP use exposed array-elements mounted on a slanted framework, the elements of the Voronezh-DM are housed in a small structure and aligned vertically, which distinguishes them in satellite imagery.

Their initial deployment, with two Voronezh-DM systems, occurred at Armavir in southwest Russia. A second site appeared in Kaliningrad near Dunaevka, with subsequent sites currently under construction near Barnaul in the south and Yeniseysk in central Russia. Additional BMEW sensors in operation include older Daryal, Daugava, Dnepr, and Volga systems.

Airbus Defence and Space imagery shows the Voronezh-DM BMEW radar complex near Barnaul, which is under construction. Russia is expanding its strategic detection and strike capabilities.

Airbus Defence and Space imagery shows the Voronezh-DM BMEW radar complex near Barnaul, which is under construction. Russia is expanding its strategic detection and strike capabilities. (CNES 2014, Distribution Airbus DS/IHS)

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The Olenegorsk Dnepr/Daugava hybrid system and the Pechora Daryal system are currently scheduled for replacement by Voronezh-series radars. A final sensor possibly performing in a BMEW capacity is the 29B6 Container bi-static over-the-horizon backscatter (OTH-B) radar system. SAP 2020 called for the fielding of an OTH system capable of detecting exoatmospheric objects, such as satellites or ballistic missiles.

In June 2014, the commander of the Air and Space Defence Forces, Lieutenant General Alexander Golovko, announced plans to upgrade and return to service an older Dnepr system in Sevastopol, suggesting a return-to-service date of 2016. Returning the Dnepr system to service status may prove problematic due to the degraded state of the Sevastopol complex, which was only operated intermittently by Ukraine following Russian withdrawal from the site's operating agreement in 2008.

A more likely scenario involves the replacement of the short-range Dnepr arrays with Voronezh-series systems while maintaining the complex to support the new radars. However, the coverage gap opened by deactivating the Sevastopol Dnepr system was closed with the activation of the Armavir BMEW site near the Georgian border.

Given that the Sevastopol site is located approximately 600 km west of the Armavir site, emplacing a new system or reactivating the Dnepr will not provide a substantial increase in BMEW coverage. In this light, a Sevastopol radar complex may serve as a dedicated space surveillance system rather than as part of the BMEW network.

ABM defence in the Moscow region uses the A-135 system, which has been officially operational since 1995. Preliminary early-warning cueing for the Don-2N engagement radar complex located near Sofrino, north of Moscow, can be provided by the existing BMEW network, or the Dunai-3U radar complex, located south of the capital near Chekhov. The interceptor component of the A-135 system is the 53T6 endoatmospheric missile. The complementary 51T6 exoatmospheric interceptor was withdrawn from use in 2006. In addition, 53T6 missiles are deployed in silos at five locations around Moscow.

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Conclusion

The upgrade programmes currently under way within Russia's strategic nuclear forces are in part designed to offer new capabilities to counter US ABM systems in Europe without violating the letter of the INF treaty.

As US efforts to deploy such systems in Eastern Europe increase, Russia's response is coming through technological development of its strategic missile force.

Project 4202, for example, is designed to produce a warhead more capable of penetrating a target environment defended by ABM systems.

Additionally, regionally orientated weapons such as the RS-26 Rubezh provide a threat to Washington's European ABM efforts because, with the velocity of an ICBM, the RS-26 Rubezh is inherently more survivable against such an ABM network than any shorter-range system.

Russia appears to be hedging its bets and budget. Should the ground-based Aegis system fail to field true ABM-class weapons and instead rely on current Standard Missile iterations capable of intercepting short- and intermediate-range threat systems, the potential exists for conventionally armed RS-26s to threaten the ABM sites and retain the option of targeting the continental US.