

NUCLEAR NOTEBOOK

Russian nuclear forces, 2008

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RUSSIA REDUCED ITS TOTAL nuclear weapon stockpile by about 1,000 warheads during the last year; however, it still has the largest arsenal in the world. As of early 2008, we estimate that Russia has approximately 5,200 nuclear warheads in its operational stockpile and 8,800 in reserve or awaiting dismantlement, for a total of 14,000 nuclear weapons.¹ Other nuclear-related developments in Russia include a resurgence of the importance of nuclear weapons in its security posture, an increase in force exercises and missile test-launches, and an upgrade to Moscow's air defenses.

Policy and posturing.

Russian officials continued and deepened what appears to be a revival of the prominence of nuclear weapons in Russian national security. Gen. Yuri Baluyevsky, chief of the general staff of the armed forces and first deputy minister of defense, said in January that Russia's "partners should clearly understand" that Russia would use force to protect its territory and allies, "including on a preventative basis, including the use of nuclear weapons," a declaratory policy that resembles that of the Bush administration.² In December 2007, First Deputy Prime Minister Sergei Ivanov, who at the time was considered a possible successor to President Vladimir Putin, declared an aggressive position on nuclear parity. "Military potential, to say nothing of nuclear potential, must be at the

proper level if we want ... to just stay independent," Ivanov said. "The weak are not loved and not heard, they are insulted, and when we have parity they will talk to us in a different way."³

U.S. plans for building missile defense sites in Poland and the Czech Republic provoked nuclear threats from the Russian military. Col. Gen. Nikolai Solovtsov, chief of Russia's Strategic Missile Command (SMC), repeatedly stated that such a system would be a potential target for Russian nuclear weapons.⁴ "We have to take

appropriate measures to prevent the weakening of Russia's nuclear deterrence under any circumstances. And I do not rule out that ... some intercontinental ballistic missiles could be aimed at these Polish and Czech facilities," he said in December 2007.⁵ Putin echoed this attitude in February 2008, warning that if Ukraine joined NATO and decided to host missile defense sites, "Russia will have to point its war-

heads at Ukrainian territory."⁶

However, Solovtsov hinted in December that Moscow's opposition could be softened if the United States limited the system's size. "If the Americans signed a treaty with us that they would only deploy 10 antimissile rockets in Poland and one radar in the Czech Republic and will never put anything else there, then we could deal with this," he said.⁷

Russia has intensified both the visibility and magnitude of its military exercises.

Russian strategic bombers resumed long-range exercises in the North Atlantic, Arctic, Pacific, and Black Sea, conducting more than 70 flights and 217 test-launches of air-launched missiles between August and December 2007.⁸ For the first time in 15 years, a Russian naval task force journeyed to the Mediterranean Sea and North Atlantic Ocean, headed by the aircraft carrier *Admiral Kuznetsov*. The nuclear-capable naval strike force conducted a two-month cruise that included the Slava-class guided-missile cruiser *Moskva*, launching nuclear-capable SS-N-12 cruise missiles and SA-N-6 surface-to-air missiles against simulated targets. The Russian Navy said the ships carried a full combat ammunition load; however, we do not believe this included nuclear weapons. The goal of the sorties was "to ensure a naval presence in tactically important regions of the world ocean," said Defense Minister Anatoly Serdyukov.⁹ Navy Commander-in-Chief Adm. Vladimir Vysotsky said Russia plans to carry out similar naval exercises every six months and "to do all we can to build up our presence where Russia has strategic interests."¹⁰

As the naval force made its way back to Russia in January 2008, more than 40 aircraft, including an unknown number of Tu-160 Blackjacks, six Tu-95 MS Bears, and eight Tu-22 M3 Backfires conducted simulated strikes against it in the Bay of Biscay.

On February 8, 2008, in the western Pacific south of Japan, a Tu-95 MS6 Bear bomber buzzed the U.S. carrier *Nimitz* twice, flying over it at the low altitude of about 2,000 feet as another bomber circled in the distance; both Russian aircraft were "escorted" by U.S. F/A-18 fighters. It was a type of action not uncommon during the Cold War, and U.S. Chief of Naval Operations Adm. Gary Roughead said, "I do not consider it to

SNAPSHOT

Russia reduced its operational nuclear arsenal to about 5,200 warheads.

During the past year, officials publicly stressed the role nuclear weapons play in Russia's security.

A new ICBM is under development.

THE RUSSIAN ARSENAL

STRATEGIC OFFENSIVE WEAPONS

ICBMs	TYPE	NAME	NO.	YEAR DEPLOYED	WARHEADS X YIELD (KILOTONS)	TOTAL WARHEADS
	SS-18	Satan	75	1979	10 x 550/750	750
	SS-19	Stiletto	100	1980	6 x 550/750	600
	SS-25	Sickle	201	1985	1 x 550	201
	SS-27	Topol-M (SILO)	48	1997	1 x 550	48
	SS-27	Topol-M (MOBILE)	6	2006	1 x 550 (?)	6
	SS-27	Topol-M (RS-24)	0	(2009)	6 x 550 (?)	0
			430			1,605
SLBMs	TYPE	NAME	NO.	YEAR DEPLOYED	WARHEADS X YIELD (KILOTONS)	TOTAL WARHEADS
	SS-N-18 M1	Stingray	5/80*	1978	3 x 200, MIRV	240
	SS-N-23	Skiff	4/64	1986	4 x 100, MIRV	256
	SS-N-23 M1	Sineva	2/32	2007	4 x 100, MIRV**	128
	SS-NX-30	Bulava	0	(2008)	6 x 100, MIRV	0
			11/176			624
Bombers/weapons	TYPE	NAME	NO.	YEAR DEPLOYED	WEAPONS	TOTAL WARHEADS
	Tu-95 MS6	Bear H6	32	1984	6 x AS-15A ALCMs OR BOMBS	192
	Tu-95 MS16	Bear H16	32	1984	16 x AS-15A ALCMs OR BOMBS	512
	Tu-160	Blackjack	15***	1987	12 x AS-15B ALCMs, AS-16 SRAMs, BOMBS	180
			79			884
						3,113

NONSTRATEGIC AND DEFENSIVE WEAPONS

Missile defense	TYPE	NAME	NO.	YEAR DEPLOYED	WARHEADS X YIELD (KILOTONS)	TOTAL WARHEADS
	51T6/53T6	Gorgon/Gazelle	32/68	1989/1986	1 x 1,000/10	100†
	SA-10	Grumble	1,900	1980	1 x low yield	633
Land-based air	TYPE	NAME	NO.	YEAR DEPLOYED	WEAPONS	TOTAL WARHEADS
	Bombers/fighters		~524		ASMs OR BOMBS	648
Naval	TYPE	NAME	NO.	YEAR DEPLOYED	WEAPONS	TOTAL WARHEADS
	Submarines/surface ships/air				SLCMs, ASWs, SAMs, ASMs, DBs, OR TORPEDOES	698
						2,079
						GRAND TOTAL 5,192††

* One Pacific-based Delta III has been converted to missile test-launch platform.

** As a Skiff replacement, the Sineva probably carries four MIRVs, but U.S. intelligence sets the capability at "up to 10" warheads per missile.

*** A sixteenth Tu-160 is undergoing trials.

† Two Gorgon launch sites may no longer be operational, in which case 84, not 100, ABM warheads remain.

†† An additional 8,808 intact warheads are estimated to be in reserve or awaiting dismantlement, making the total stockpile approximately 14,000 weapons.

ABM: Antiballistic missile

ACM: Advanced cruise missile

ALCM: Air-launched cruise missile

ASM: Air-to-surface missile

ASW: Antisubmarine weapon

DB: Depth bomb

ICBM: Intercontinental ballistic missile

MIRV: Multiple independently targetable reentry vehicle

SAM: Surface-to-air missile

SLBM: Submarine-launched ballistic missile

SLCM: Sea-launched cruise missile

SRAM: Short-range attack missile

be provocative." "What we are seeing is a Russian military or Russian Navy that is emerging and, in the case of the navy, desiring to emerge as a global navy," he said. Vice Chairman of the Joint Chiefs of Staff Gen. James Cartwright called the operations a "return to a Cold War mind-set" and said the Pentagon was assessing "what message was intended by this overflight."¹¹ Between August and December 2007, more than 120 NATO planes intercepted Russian aircraft.¹²

Despite the Russian government's nuclear rhetoric and posturing, an independent 2007 poll conducted for the University of Maryland found that 63 percent of Russians support elimination of nuclear weapons and that 59 percent support the removal of Russian and U.S. nuclear weapons from high alert.¹³

Intercontinental ballistic missiles (ICBMs). Putin described successful ICBM and submarine-launched ballistic missile (SLBM) flight-tests as "pleasant and spectacular holiday fireworks," and the SMC announced that Russia will increase flight-testing of long-range ballistic missiles in the future.¹⁴ "The number of launches will almost double after 2009 or 2010," according to Solovtsov.¹⁵ Russia plans 11 ICBM test-launches for 2008, and if that doubles, it is far more than the handful of similar tests the United States conducts. With this many scheduled tests, the Russian military might be trying to highlight its capabilities—or it could indicate that Russian missiles require more test-launches for development and certification than do U.S. missiles.

The total number of Russian ICBMs dropped by 63 compared with a year ago; Russia now deploys approximately 1,600 nuclear warheads on 430 ICBMs of five types. The number of silo-based Topol-M ICBMs reached 48 across five regiments; deployment will be completed in 2010 with a total of 50 missiles.¹⁶ Slow deployment of the mobile Topol-M missiles continued at the 54th missile regiment in Teykovo northeast of Moscow, with a total of six operational single-warhead missiles. By 2015, the Russian government plans an operational force of 34 mobile Topol-Ms, which will require the yearly deployment (on average) of four missiles.¹⁷

Russia announced in 2007 that it would begin deploying a new ICBM with multiple independently targetable reentry vehicles (MIRVs) in a few years. It conducted two flight-tests of MIRVed Topol-Ms in 2007. In order to avoid violating START, which prohibits increasing the number of warheads on existing missiles but not building new missiles, Russia calls the modified Topol-M the "RS-24," instead of RS-12M1 or RS-12M2, its respective names for the mobile- and silo-based Topol-Ms. The MIRVed Topol-M is scheduled to become operational in 2009.

Russia continued to downsize its SS-25 ICBM force in 2007, withdrawing about 40 missiles from service and leaving approximately 200 deployed. The weapon may remain in operation till 2015. Russia conducted two SS-25 service life extension flight-tests in 2007, on October 18 and December 8, as well as an SS-19 test-launch late in the year.

In March 2006, U.S. intelligence reported that Russia was developing a new ICBM that has not been test-launched but could be deployed in both land- and sea-based versions.¹⁸ In December 2007, an SMC spokesman said that the forces "may adopt a new, more advanced [than the Topol-M] ballistic missile system" for possible deployment by 2017.¹⁹

Nuclear-powered ballistic missile submarines (SSBNs). Russia has 11 Delta-class SSBNs of two types, Delta IV and Delta III, which are deployed in two of Russia's four fleets. We estimate that these boats are equipped with 176 SLBMs carrying a total of 624 warheads.

Deputy Defense Minister Gen. Nikolai Makarov declared in December 2007 that after more than a decade under construction, the first Borey-class SSBN, *Yuri Dolgoruki*, will finally become operational in 2008. "At the moment, routine tests are under way, they are finishing," he said.²⁰ Russia aims to someday have six Borey-class SSBNs, but the second one will probably not be ready until 2010.

Each Borey-class submarine will be equipped with 16 Bulava SLBMs, which are not operational but will have a range of 8,000–9,000 kilometers (5,000–5,600 miles) and are declared by Russia under START to carry six warheads.

In early 2008, the *Bryansk*, a Delta IV sub, completed a six-year upgrade to the Sineva SLBM, which is a modernized version of the SS-N-23 Skiff. The Sineva first became operational in July 2007 on the Delta IV sub *Tula*, which later test-launched two Sinevas on December 17 and 25, 2007. All Delta IVs will be upgraded to carry the Sineva.

According to *Defense News*, in late 2007 Norwegian military intelligence saw "an increase in submarine activity" out of Russia's Northern Fleet base in Murmansk.²¹ But new information that we obtained from U.S. naval intelligence under the Freedom of Information Act shows that Russia's general-purpose submarine patrols increased only slightly, from four in 2006 to seven in 2007—significantly fewer than the average of twelve patrols conducted each year during the 1990s.²² The same information indicates that SSBN patrols decreased to only three in 2007, down from five in 2006 (and none at all in 2002), suggesting that Russia does not maintain continuous SSBN patrols like the United States, Britain, and France, but rather occasionally deploys a few SSBNs for training purposes.

Strategic bombers. Russia's inventory of long-range bombers increased by one Tu-160. Another may be under construction. Unconfirmed plans were reported for a fleet of 30 Tu-160 aircraft by 2030.²³ Putin declared in October 2007 that the Tu-95 MS will also be modernized.²⁴

Nonstrategic weapons. Russia has a large inventory of shorter-range nonstrategic (tactical) nuclear weapons that the military says will be retained for two primary reasons: various nuclear powers on Russia's southern border, and U.S. nuclear weapons deployed in Europe.²⁵ Moreover, a recent assessment by the U.S. intelligence community indicates that Russia "will continue to maintain a relatively large stockpile of nonstrategic nuclear warheads."²⁶ However, Russia's nonstrategic stockpile has decreased by more than two-thirds in the last 16 years.

In 1992, President Boris Yeltsin committed to significant reductions in Russia's nonstrategic nuclear arsenal.

In October 2007, a Ministry of Defense spokesman provided an update, stating that 100 percent of ground forces warheads (tactical missiles, artillery shells, mines) had been eliminated, as had 60 percent of missile defense warheads (10 percent more than Yeltsin pledged), 50 percent of air force warheads, and 30 percent of naval warheads.

Russia's nonstrategic warhead stockpile, in mid-1991, was approximately 15,000.²⁷ Using this number as a baseline, if the Yeltsin initiative was implemented as the ministry spokesman outlined, Russia would have an estimated 5,390 warheads in its nonstrategic arsenal today. Of these, we estimate that about 2,080 are operational for delivery by antiballistic missiles, air-defense missiles, tactical aircraft, or naval cruise missiles and torpedoes.²⁸ The remaining 3,310 weapons are in reserve or awaiting dismantlement.

Of the approximately 2,000 nonstrategic warheads for delivery by aircraft, we estimate that roughly 650 are operational. This includes air-to-surface missiles and bombs for delivery by Tu-22 M3 Backfire bombers, and bombs for delivery by Su-24 Fencer fighter-bombers and possibly other tactical aircraft.

Unlike other nuclear weapon states, Russia retains a relatively large inventory of nonstrategic nuclear weapons for delivery by naval vessels and land-based maritime aircraft. We estimate that approximately 698 of 2,270 naval warheads are operational for delivery by approximately 280 submarines, major surface ships, and naval aircraft. The warheads arm cruise missiles, antisubmarine rockets, anti-air missiles, torpedoes, and depth bombs. The number of nuclear-capable ships and submarines has declined from approximately 400 in the 1990s to slightly more than 100 today. We no longer believe that surface ships are assigned nuclear torpedoes, and tactical naval nuclear weapons are not thought to be carried onboard ships and submarines under normal circumstances.

We estimate that Russia has about 1,120 warheads under the "missile defense" category, for use with its A-135 antiballistic missile system surrounding Moscow and the SA-10 Grumble (S-300) air-defense system; however, only about

730 of these warheads are estimated to be operational. Uncertainty abounds about the operational status of parts of the A-135 system; rumors persist that at least two of four Gorgon missile launch sites are no longer operational. All five Gazelle launch sites appear operational, however, and test-launches of the Gazelle, an interceptor missile with a range of 80 kilometers (50 miles), were conducted in 2006 and 2007.

Moreover, in early 2008 the Russian military announced that at sites in northwest Russia, the SA-10 Grumble will soon be replaced by the SA-21 Growler (S-400), which has a range of 400 kilometers (250 miles) and a reported antiballistic missile capability.²⁹ One Growler regiment is already deployed outside Moscow, with a second to become operational in 2008. Each SA-21 system has about eight launchers, 32 missiles, and a command center; Russia wants at least 18 systems to form the core of its anti-air and missile defenses through at least 2020.³⁰

Nuclear force projection. In May 2006, Putin said, "Over the next five years, we will have to significantly increase the number of modern long-range aircraft, submarines, and launch systems in our strategic nuclear forces."³¹ But public statements from Russian military officials suggest growth far less robust than that described by Putin.

Based on these statements, it is possible to make a best estimate of the likely evolution of Russia's strategic nuclear forces over the next 12 years (with the caveat that such projections are fraught with uncertainties). We estimate that in 2015, Russia will have a total of 2,490 strategic nuclear weapons, a 20 percent decrease from today. This comprises 844 ICBM warheads (depending on future warhead loadings), which is a 47 percent reduction; 896 SLBM warheads, a 23 percent increase; and 878 warheads on the bomber force, a slight decrease. ■

FOR NOTES, PLEASE SEE P. 62.

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Control Today, vol. 37, no. 2, pp. 6–11.

4. David Albright, Paul Brannan, and Jacqueline Shire, "North Korea's Plutonium Declaration: A Starting Point for an Initial Verification Process," Institute for Science and International Security, January 10, 2008, available at www.isis-online.org/publications/dprk/NorthKoreaDeclarationofJan2008.pdf.

5. The initial action plan for the implementation of the September 19, 2005 Joint Statement was released on February 13, 2007, available at www.state.gov/r/pa/prs/ps/2007/february/80479.htm.

6. David Albright and Kevin O'Neill, eds., *Solving the North Korean Nuclear Puzzle* (Washington, D.C.: Institute for Science and International Security, 2000).

7. "Six-Party Talks—Second-Phase Actions for the Implementation of the September 2005 Joint Statement," State Department, October 3, 2007, available at www.state.gov/r/pa/prs/ps/2007/oct/93217.htm.

8. A detailed description of the disablement steps and photos of the disabled equipment was posted by Siegfried S. Hecker at cisac.stanford.edu/news/hecker.

9. All three reactors are gas-graphite reactors patterned after the British reactor first built at Calder Hall, Britain. However, design and construction of all three was done indigenously. These reactors are able to burn natural uranium fuel, thus not requiring uranium enrichment, which was beyond the Democratic People's Republic of Korea's technical means in the 1980s. Only the 200-megawatt-electric reactor would have had substantial electricity generating capacity, but all three of them would make very good bomb-grade plutonium if the reactor burn cycle is kept to less than approximately four years.

10. Larry A. Niksch, "North Korea's Nuclear Weapons Development and Diplomacy," Congressional Research Service, January 21, 2008.

11. Pervez Musharraf, *In the Line of Fire: A Memoir* (New York: Free Press, 2006).

12. David Albright et al., "Syria Update: Suspected Reactor Site Dismantled," available at www.isis-online.org/publications/SyriaUpdate25Octob2007.pdf.

13. The IRT-2000 research reactor is a light water cooled and moderated pool-type reactor supplied by the Soviet Union in the 1960s. The reactor's fuel was gradually upgraded from low-enriched uranium to highly enriched uranium over the years. The reactor has only operated sparingly in the past 16 years because North Korea has not been able to obtain new fuel. The reactor is not part of the current negotiations process, although it had been monitored by the International Atomic Energy Agency in the past.

14. Under the January 19, 1992 Joint Declaration, the Democratic People's Republic of Korea and the Republic of Korea agreed not to test, manufacture, produce, receive, possess, store, deploy, or use nuclear weapons; to use nuclear energy solely for peaceful purposes; and not to possess facilities for nuclear reprocessing and uranium enrichment.

In review: Genetic sequencing

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2. Brian E. Chen et al., "The Molecular Diversity of Dscam Is Functionally Required for Neuronal Wiring Specificity in *Drosophila*," *Cell*, vol. 125, pp. 607–20 (2006).

3. E. S. Lander, et al., "Initial Sequencing and Analysis of the Human Genome," *Nature*, vol. 409, pp. 860–921 (2001).

4. M. Zwolak and M. Di Ventra, "Physical Approaches to DNA Sequencing and Detection," *Reviews of Modern Physics*, vol. 80, p. 141–65 (2008).

5. Ibid.

6. Jin He et al., "Identification of DNA Base-Pairing Via Tunnel-Current Decay," *Nano Letters*, vol. 7, pp. 3,854–58 (2007).

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1. Essential resources for tracking Russian nuclear forces include: START memorandums of understanding; the website of Russia's Ministry of Defense (www.mil.ru/eng/); the U.S. Open Source Center, Russian news articles; Pavel Podvig's website (www.russianforces.org); and the database on "Russia: General Nuclear Weapons Developments," maintained by the Monterey Institute's James Martin Center for Nonproliferation Studies (www.nti.org/db/nisprofs/russia/weapons/gendevs.htm).

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3. Dmitry Solovyov, "Russia Says It Must Have Nuclear Parity with U.S.," *Reuters*, December 7, 2007.

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6. "Russia Could 'Point Warheads' at Ukraine," *Der Spiegel Online*, February 13, 2008.

7. "Russian General Says Missiles Could Target U.S. Shield: Report," *AFP*, December 17, 2007.

8. "At Least 120 NATO Interceptor Aircraft Had Escorted Russian Bombers," Russian Ministry of Defense, press release, December 5, 2007.

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10. "Russia to Build up Presence in Global

Ocean—Navy Commander," *RIA Novosti*, February 2, 2008.

11. Richard Cowan, "U.S. Military Weighing If Russia in Cold War Pose," *Reuters*, February 12, 2008.

12. "At Least 120 NATO Interceptor Aircraft Had Escorted Russian Bombers," Russian Ministry of Defense press release, December 5, 2007.

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26. Lt. Gen. Michael D. Maples, "Current and Projected National Security Threats to the United States," prepared statement for the record before the Senate Select Committee on Intelligence Committee, 110th Cong., 1st sess., January 11, 2007, p. 14.

27. Robert S. Norris and William M. Arkin, "Nuclear Notebook: Estimated Soviet Nuclear Stockpile (July 1991)," *Bulletin of the Atomic Scientists*, July/August 1991, p. 48.

28. Our estimate for nonstrategic warheads is 250 warheads fewer than last year, reflecting a recount of platforms rather than an actual decrease in warheads.

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31. Vladimir Putin, "Annual Address to the Federal Assembly of the Russian Federation," May 10, 2006, available at www.kremlin.ru/eng/.

