

# THE ICE CURTAIN

## BRINGING TRANSPARENCY TO THE ARCTIC

### *Modernization on the Kola Peninsula*

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*The Ice Curtain: Bringing Transparency to the Arctic* is an ongoing collaborative series between the CSIS Europe Program and NGA.

#### THE ISSUE

*The Kola Peninsula is the crux of Russia's military establishment in the western Arctic, and its air and maritime capabilities are essential to Russia's homeland defense, Arctic dominance, and global power projection capabilities. Russia's modernization and expansion efforts at Severomorsk-1 air base, Gadzhiyevo submarine base, and Okolnaya submarine support base have significantly improved Russia's operational readiness and its ability to control the surrounding maritime space in the Arctic. The Kola Peninsula is also home to systems such as the RS-24 YARS, located at the Plesetsk Cosmodrome, which pose a significant challenge to U.S. and allied defense systems. Russia's willingness to use its arsenal of ballistic and cruise missiles to defend its position in the Arctic was on display during the Grom-2019 exercise. The expansion of Russia's military presence in the Arctic is far from over—Russia will continue to deepen its military presence in the Arctic to protect Russian strategic interests well into the future.*

#### INTRODUCTION

Russia's western Arctic features a great concentration of advanced conventional capabilities for defensive and potentially offensive purposes centered on the Kola Peninsula and serves as home to Russia's Northern Fleet headquarters, which hosts Russia's most advanced Arctic land, air, and naval assets, notably including its nuclear arsenal and second-strike capabilities. The peninsula's location—a gateway between the Arctic and the North Atlantic—and its extensive military assets make it central to Russia's homeland defense and power projection capabilities.

Russian military modernization efforts and new construction on the Kola Peninsula have centered around the refurbishment of air bases and expansion of naval

bases. Severomorsk-1 air base, Gadzhiyevo submarine base, and Okolnaya submarine support base are particularly important because they expand and Russia's defenses while ensuring Russia's freedom of navigation and air sovereignty. Neighboring sites, such as the Plesetsk Cosmodrome, located at the Kura Missile Test Range in Arkhangelsk, enhance Russia's Arctic military capabilities, as the recent Grom-2019 exercise demonstrated. The Plesetsk Cosmodrome is a particularly noteworthy site for testing advanced weapons such as the RS-24 Yars ICBM.

Military exercises and weapons testing in and around the Kola Peninsula is frequent and reveals Russia's operational readiness to engage its nuclear forces to deter adversaries in a potential conflict. Exercises such as Ocean Shield and Grom-

2019 also demonstrate Russia's calculation that the Arctic is a critical domain to its national security, power projection capabilities, and economic interests. Russia's modernization and expansion efforts will likely continue on and around the Kola Peninsula well into the future, with the ultimate aim of asserting Russian sovereignty across the region.

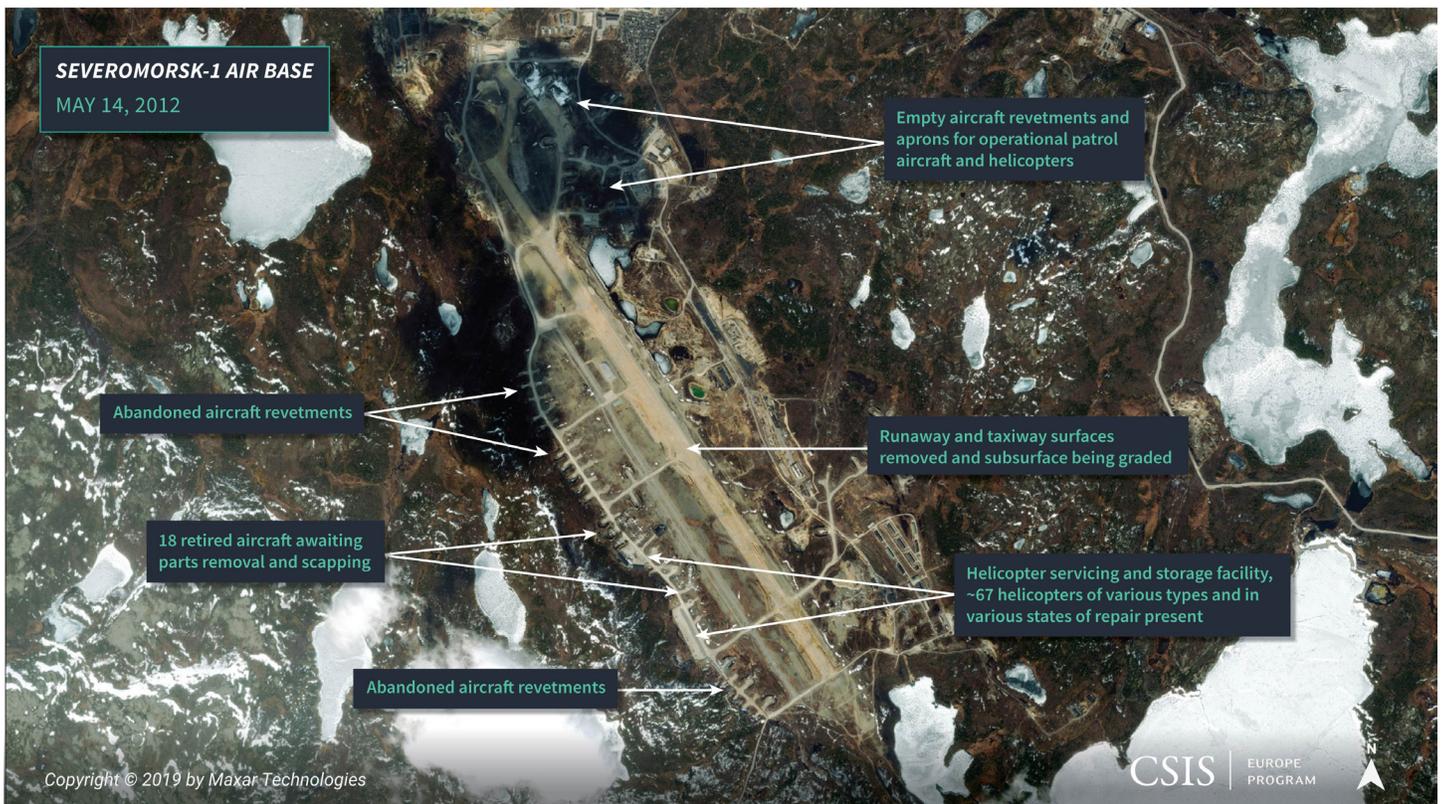
## MODERNIZATION OF SEVEROMORSK-1 AIR BASE

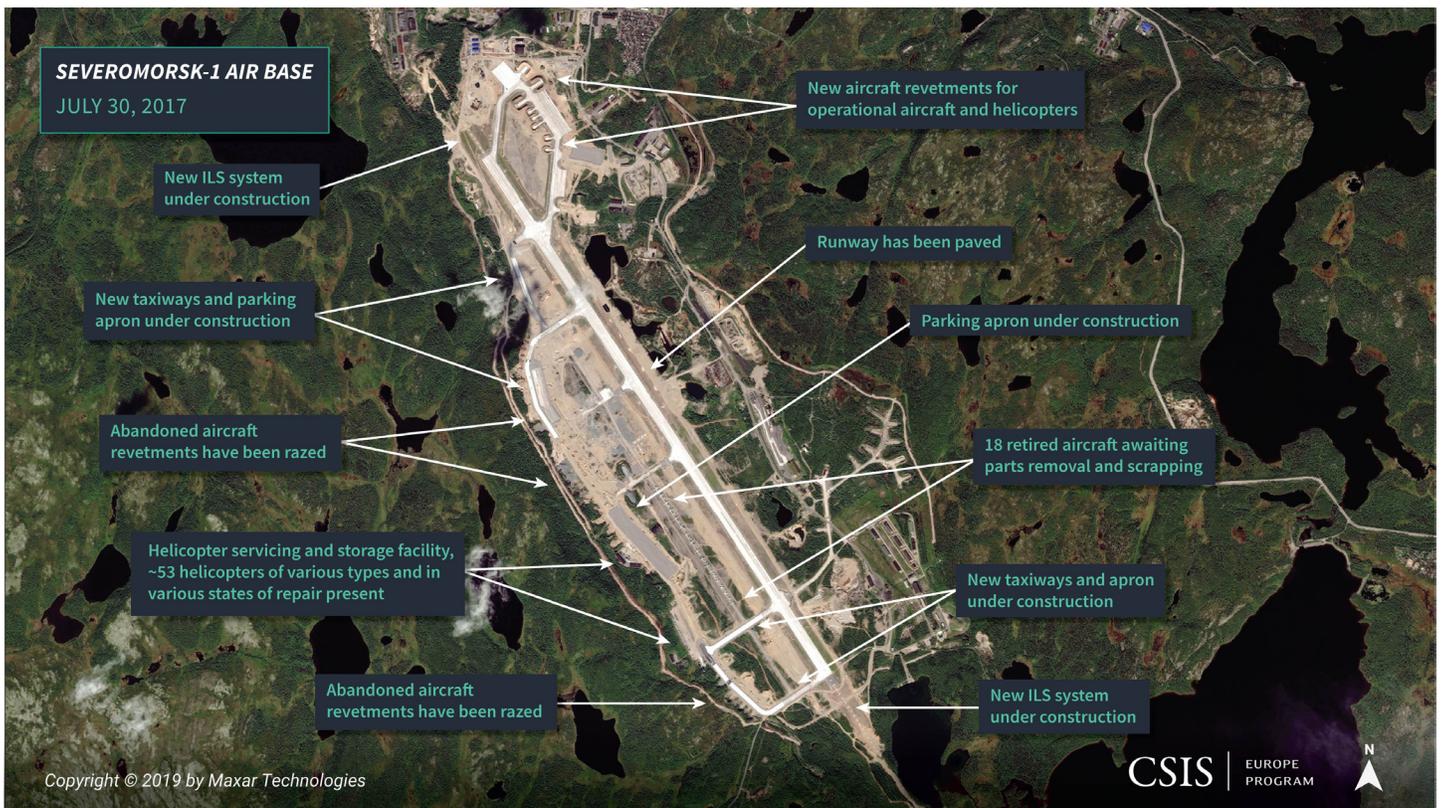
Located on the southern outskirts of Severomorsk and approximately 15.5 km northeast of Murmansk on the Kola Peninsula (Murmanskaya Oblast) is the Severomorsk-1 air base. Severomorsk-1 dates to World War II, when it was known simply as Severomorsk air base, protecting the Soviet Union's northern flank and providing air protection for both navy facilities on the Kola Peninsula and Allied supply convoys destined for the port of Murmansk.<sup>1</sup> During the Cold War, Severomorsk-1's strategic importance increased, along with that of its two sister air bases, Severomorsk-2 and Severomorsk-3. Strategic bomber (e.g., Tu-16/-95), strike (e.g., Su-24), and patrol aircraft (e.g., Il-38) based or staged at the bases were tasked with protecting the Soviet Union's northwestern Arctic flank and providing strategic strike capability against the United States. With the collapse of the Soviet Union in 1991, the serviceability and capabilities of the Severomorsk air bases declined precipitously.

The strategic importance of Severomorsk-1 reemerged, however, during late 2011 or early 2012. During that time the Russian military began an extensive multi-year modernization project of the base in advance of the Russian Defense Ministry's 2013 announcement that it was reengaging in the Arctic to guard its northern approaches, protect mineral and energy resources, and monitor shipping on the Northern Sea Route (NSR).<sup>2</sup> Since 2014, the air base has fallen under the command of the Northern Fleet.<sup>3</sup>

Satellite imagery of Severomorsk-1 (69.030776 N, 33.42271 E) from May 14, 2012 shows that the base ceased to be operational as the modernization project was underway. Noticeable developments include:

- The concrete on the main runway and taxiways had been removed and the sub-surface was being graded.
- All operational aircraft had been moved to other air bases (likely Severomorsk-2 and -3).
- The remaining non-operational retired aircraft awaiting parts recovery and scrapping had been concentrated along the southwest side of the base in abandoned revetments, with 18 aircraft visible.
- The helicopter servicing and storage facility (also used for parts removal and scrapping) in the southwest corner remained operational, with at least 67 helicopters of several types and in various states of repair.





Five years later, on July 30, 2017, satellite imagery shows that considerable, albeit very slow, progress was made:

- While the base was still not operational, the paving of the 3,500-meter-long runway appeared to have been finished.
- Several new taxiways were under construction.
- The revetments and parking aprons for operational aircraft at the north end of the runway had been completed.
- The infrastructure for the instrument landing system (ILS) was under construction.
- The 18 retired aircraft awaiting parts recovery and scrapping that were previously in abandoned revetments on the southwest perimeter had been repositioned to an unimproved taxiway in the center of the air base.
- The number of helicopters at the helicopter servicing and storage facility declined to approximately 53 of several types and in various states of repair.
- Many of the previously abandoned aircraft revetments had been razed.

More recently, a September 4, 2019 satellite image shows that while the air base has once again become operational, the modernization project is not complete, as much of the work on parts of the infrastructure (e.g., completion of

taxiways and aprons) remains to be completed. Among the indications that the base is operational include:

- Patrol and transport aircraft and helicopters were deployed on aprons and in revetments at the north end of the runway.
- A transport aircraft was present on the taxiway leading to the runway.
- Tire tracks from landings were visible on either end of the runway.
- The taxiways and aprons have continued to be slowly expanded.
- The number of helicopters at the helicopter servicing and storage facility have continued to decline, with approximately 36 of several types and in various states of repair being present.
- Only 12 of the approximately 18 retired aircraft awaiting parts recovery and scrapping remained. Several of which showed recent signs of being disassembled (e.g., wings sections laying on the ground).

Throughout this modernization, minor improvements have been undertaken among the air base's supporting infrastructure, including housing, warehouses, machines shops, and support areas on the north side of the base.



However, the modern Murmansk-BN electronic warfare (EW) system, which had been reported as being deployed in the Severomorsk area, was not readily identified in the area immediately around Severomorsk-1 in the most recent satellite image.<sup>4</sup> Given the relatively slow pace of construction observed during the past seven years, it is unclear when the entire modernization project will finally be complete.

### ANALYSIS

Upgrades to Severomorsk-1 increase Russian operational readiness, presence, and capabilities in the northwest Arctic region, particularly improving domain awareness and operational capacity around the Kola Peninsula. Increased numbers of patrol aircraft tasked for search-and-rescue operations improve the viability of the NSR as a maritime commercial route. With further upgrades to the base, operational capacity could **expand** further into the Barents Sea, Greenland Sea, North Atlantic, and an increasingly ice-free Arctic Ocean. In anticipation of receding ice and increased human activity in the Far North, Severomorsk-1 can deepen Russia's strategic reach and propel its forward line of defense further from its coastline, enhancing anti-access/aerial denial capabilities near the Kola Peninsula.

If the Murmansk-BN EW system is deployed (none of the satellite imagery currently shows the Murmansk-BN

system), it would further bolster Russia's Arctic capabilities by improving safety along the NSR and providing early-warning capabilities. With a reported range of **5,000-8,000 km**, Russia could theoretically monitor and disrupt communications across the entirety of the NSR and Scandinavia as well as deep into the Central Arctic Ocean. In May, the Northern Fleet **reportedly** completed its new Center for Radio-Electronic Warfare, which will oversee systems on Severomorsk. The Murmansk-BN and complimentary EW systems add another layer to Russia's defense capabilities on the Kola Peninsula, potentially **disabling foreign ships, submarines, or aircraft** traveling toward the eastern entrance of the Russian Arctic. These EW assets would essentially render an intruder "**deaf, numb, and blind.**" Russia's EW capabilities were on display during NATO's Trident Juncture 2018 exercise, when both Norway and Finland were the **victims** of Russian GPS jamming and interference, an increasingly important tool used frequently by Russia.

### NEW MISSILE STORAGE FACILITY AT OKOLNAYA SUBMARINE SUPPORT BASE

The Okolnaya submarine support base (69.095773° 33.450602°) is located on the eastern shores of Guba Okolnaya (Okolnaya Bay), Murmanskaya Oblast, and serves as one of several strategically important Russian Navy submarine bases and submarine-launched ballistic missile (SLBM) storage

and loading facilities on the Kola Peninsula. Other SLBM loading facilities include the Gadzhiyev submarine base and Severodvinsk submarine base.<sup>5</sup> In addition to housing and maintaining SLBMs, Okolnaya likely stores nuclear warheads. While most often described as a submarine support base, it likely also supports the cruise missile requirements of other Northern Fleet surface combatants, such as the warships based across the bay at the Severomorsk navy base.

The Okolnaya submarine support base has been associated with nuclear-armed SLBMs since the late-1950s. As a historical footnote, the base appears to have played a minor but important role during the 1962 Cuban Missile Crisis, when nuclear weapons may have been transported from Okolnaya to Cuba and back again during October-November 1962 by the merchant vessel *Aleksandrovsk*. The voyage of the *Aleksandrovsk* was unique in several ways: it was the only merchant vessel known to have carried missile-related equipment from Cuba to the Soviet Arctic, and it was one of the first to depart after the Soviet decision had been made to remove strategic weapons from Cuba. The vessel may have carried nuclear warheads to and from Cuba, perhaps without ever having offloaded them. By transferring nuclear warheads via this Arctic facility, the Soviets probably hoped to avoid any possible radiological monitoring or surveillance in either the Danish or Turkish Straits,” underscoring the importance of the Arctic as an avenue of approach to the United States.<sup>6</sup>

During 2013, media reports indicated that the Okolnaya submarine support base would be expanded by the construction of a large storage facility for “. . . more than 100” RSM-56 Bulava SLBMs (NATO reporting name: SS-NX-30 or SS-N-32). The Bulava equips the Project 955/955A Dolgorukiy-class (also known as Borei-class) nuclear-powered ballistic missile submarines (SSBN), each of which can carry 16 missiles. The Dolgorukiy-class SSBNs are expected to eventually replace the Delta III- and Delta IV-class SSBNs currently in service with the Northern Fleet.<sup>7</sup>

The location chosen for the new storage facility (69.114642° 33.525728°) is 3.7 km northeast of the main Okolnaya facilities on the site of an old open storage facility that consisted of 14 large revetments, several support buildings, and a large parking area. Satellite imagery shows that by May 2014 construction started and that by August 2015 there were a total of 31 weapons storage bunkers under construction (none of which were completed), with excavations underway on others.<sup>8</sup>

By July 30, 2017, the number of bunkers completed or under construction rose to 38, and construction of what appears to be a triple fence security perimeter began.<sup>9</sup>

(The following images on pages 6 & 7 correspond with the information mentioned in the paragraphs above.)



**NEW MISSILE STORAGE FACILITY AT  
OKOLNAYA SUBMARINE SUPPORT BASE**  
OCTOBER 1, 2013

Old storage revetments

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**NEW MISSILE STORAGE FACILITY AT  
OKOLNAYA SUBMARINE SUPPORT BASE**  
AUGUST 11, 2015

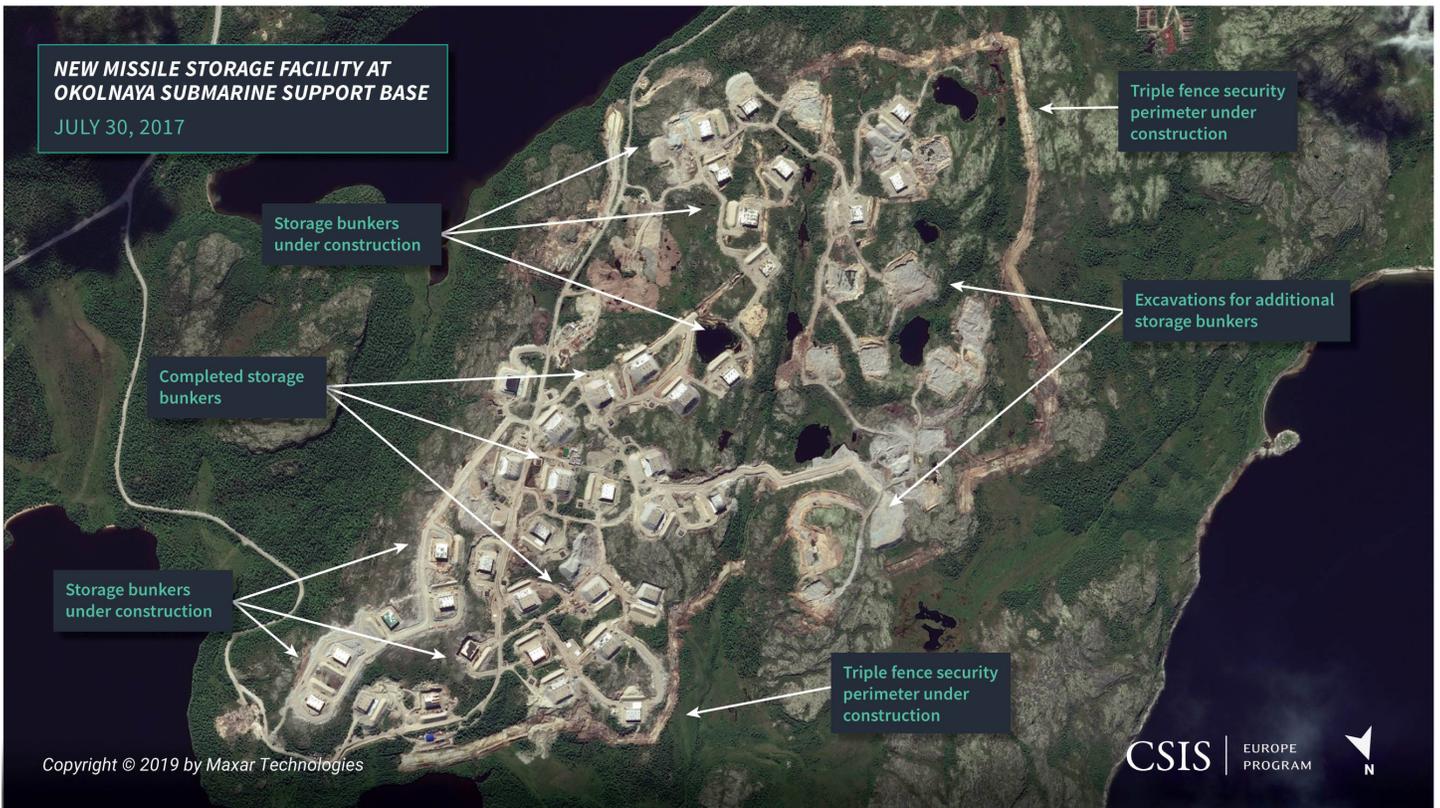
Storage bunkers  
under construction

Excavations for additional  
storage bunkers

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Information regarding the above image is on the following page.

Most recently, in satellite imagery from September 4, 2019, there are a total of 41 weapons storage bunkers (35 completed and 6 under construction) and excavations underway for at least 9 more. Additionally, there are several new small support buildings, and construction work on the triple fence security perimeter appears to slowly continue. Media reports indicate that construction of the facility is scheduled to be completed during 2020, and given the current rate of progress, and barring unforeseen circumstances, this projected date appears feasible.<sup>10</sup>

All of the storage bunkers observed to date consist of an approximately 40-meter-by-32-meter concrete structure that is protected on three sides by earthen berms, with an approximately 52-meter-by-20-meter concrete pad on the fourth open side and a final 75-meter-by-18-meter protective berm in front of it. Thus, each storage bunker occupies a footprint of approximately 75-meters-by-90-meters. Internally, each bunker consists of four approximately 20-meter-by-32-meter storage bays. Adjacent to all the weapons storage bunkers is a smaller auxiliary bunker of varying sizes for unidentified purpose (potentially for power and environmental controls).

It is assumed that when completed the facility will consist of a total of 50 storage bunkers, each with four storage bays, with the potential to house a total of 200 RSM-56 Bulava SLBMs, corroborating media reports from 2017.<sup>11</sup> While

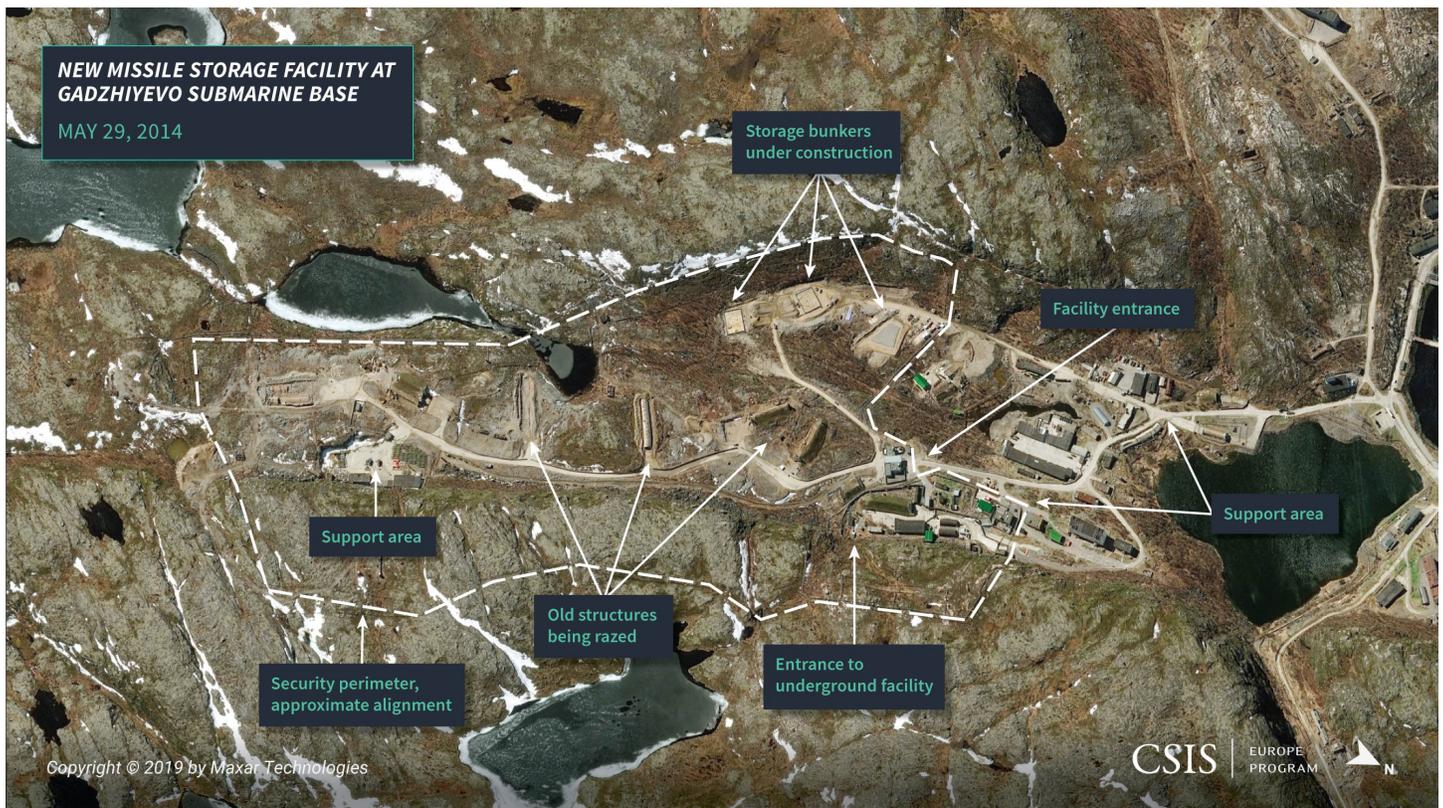
almost all media reports describe the new storage facility as being for nuclear-armed RSM-56 Bulava SLBMs, there is nothing to prevent sensitive non-nuclear munitions (e.g., cruise missiles) from also being stored. It is also likely that aside from ballistic and cruise missile support, the base provides other submarine-related support services.

Likely in support of the larger role of the RSM-56 Bulava SLBMs stored at Okolnaya, and the slowly increasing number of Dolgorukiy-class SSBNs in the Northern Fleet, a second missile loading facility was built during 2012-2018.<sup>12</sup>

## NEW MISSILE STORAGE FACILITY AT GADZHIYEVO SUBMARINE BASE

The Gadzhiyevo submarine base (69.258878° 33.335251°) is located on the eastern shore of Guba Sayda (Sayda Bay), Murmanskaya Oblast, and serves as one of several strategically important Russian Navy submarine bases and SLBM storage and loading facilities on the Kola Peninsula.<sup>13</sup> It reportedly is the primary home port for the Northern Fleet's Project 667BDRM Delfin (Delta IV) and Project 955/955A Dolgorukiy-class SSBNs.<sup>14</sup> As such, the base not only houses and maintains the R-29MU2 Liner (NATO reporting name: SS-N-23) SLBMs for the Delta IV and RSM-56 Bulava (NATO reporting name: SS-NX-30 or SS-N-32) SLBMs for the Project 955/955A Dolgorukiy-class SSBNs but also the nuclear warheads they support. The base may also support the cruise missile requirements of Northern Fleet surface combatants.





During 2013, media reports indicated that the Gadzhiyevo submarine base would expand to include the construction of a new SLBM storage facility.<sup>15</sup> The location chosen for the new storage facility (69.251165° 33.357418°) is one kilometer south of the main Gadzhiyevo facilities on the site of an existing storage facility. The existing facility consists of several vehicle maintenance and storage facilities and yards, bunkered storage facilities, open storage yards, and a number of support buildings. All but the bunkered storage facilities and open storage yards would be retained for the new facility.

Satellite imagery shows that construction had started by May 29, 2014 and that there was a total of three weapons storage bunkers under construction, with excavations underway for others.

By May 23, 2016, the number of bunkers under construction (none of which were completed at the time) rose to 10, and excavation work for a new support building began.

Most recently, satellite imagery from June 30, 2019, shows that there is a total of 10 weapons storage bunkers with 5 completed and 5 under construction.

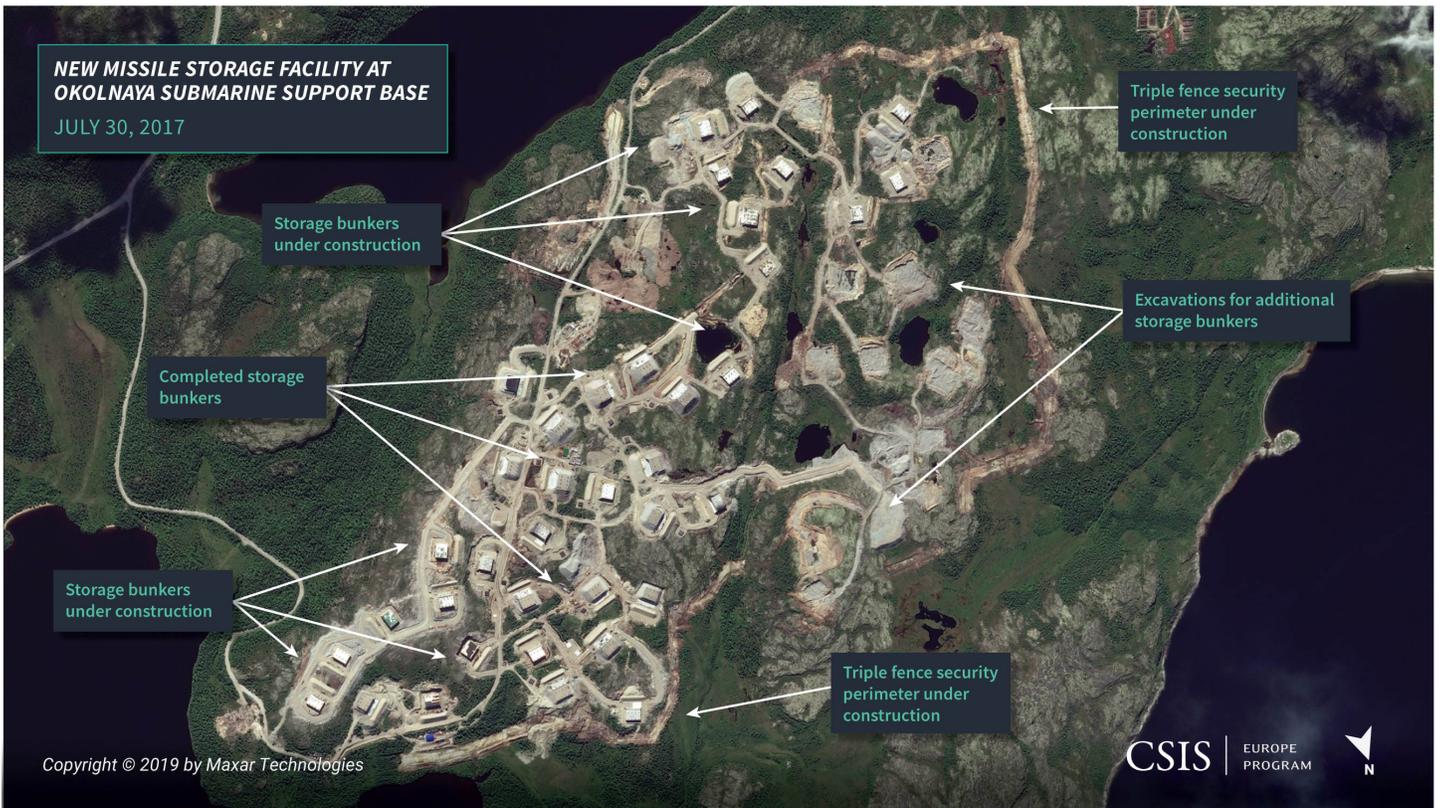
Space within the existing storage facility remains for additional storage bunkers should the Russians decide to build them. Media reports suggest that construction of the facility is scheduled to be completed during 2020 to coincide with the launch of the eighth Dolgorukiy-class SSBN.<sup>16</sup>

Given the current rate of progress, and barring unforeseen circumstances, this projected date appears feasible.

All of the storage bunkers observed to date are similar to those built at the Okolnaya submarine support base and consist of an approximately 40-meter-by-32-meter concrete structure that is protected on three sides by protective berms, with an approximately 55-meter-by-20-meter concrete pad on the fourth open side and a final 65-meter-by-20-meter earthen berm in front of it. Thus, each storage bunker site occupies approximately a 90-meter-by-80-meter footprint. Internally, each bunker consists of four approximately 20-meter-by-32-meter storage bays. Adjacent to all the weapons storage bunkers is a smaller auxiliary bunker of varying sizes for unidentified purposes (potentially for power and environmental controls).

At present, there are a total of 10 storage bunkers, each with four storage bays, which would imply that the facility has the potential to house a total of 40 RSM-56 Bulava or R-29MU2 Liner SLBMs, although most reports state that they will be used for the nuclear-armed RSM-56 Bulava. Regardless, there is nothing to prevent sensitive or non-nuclear munitions (e.g., cruise missiles) from also being stored here.

Unlike the Okolnaya submarine support base, no second missile loading facility has yet to be built at the Gadzhiyevo submarine base.



## ANALYSIS

Russia's 2017 updated Naval strategy elevated the role of its maritime forces in securing Russia's Arctic domain. The strategy builds on President Putin's [promise](#) in 2010 to spend more than 20 trillion rubles to modernize 70 percent of all Russian military equipment by 2020. Under this modernization plan, Russia's naval forces are a priority, harkening back to the Cold War when Soviet maritime capabilities posed a formidable challenge to NATO. Upgrades at Gadzhiyevo and Okolnaya reinforce defensive and offensive capabilities around the Kola Peninsula.

Naval bases housing Delta IV-class and Dolgorukiy-class SSBNs are a key component of Russia's bastion defense concept. These SSBNs, when equipped with SLBMs, are the backbone of Russia's sea-based component of its nuclear triad. Importantly, the SSBNs represent Russia's second-strike capabilities and serve as a deterrent against potential adversaries. The Dolgorukiy-class in particular boasts improved stealth capabilities as well as [increased](#) SLBM payload, adding to Russia's "defense in depth" of the Kola Peninsula. Stealthier submarines such as these enhance the regime's survivability and pose a challenge to NATO's sea lines of communication in the North Atlantic as NATO is increasing its anti-submarine warfare capabilities.

While the primary objective of the SSBNs is defensive, they also serve as a tool of power projection beyond the

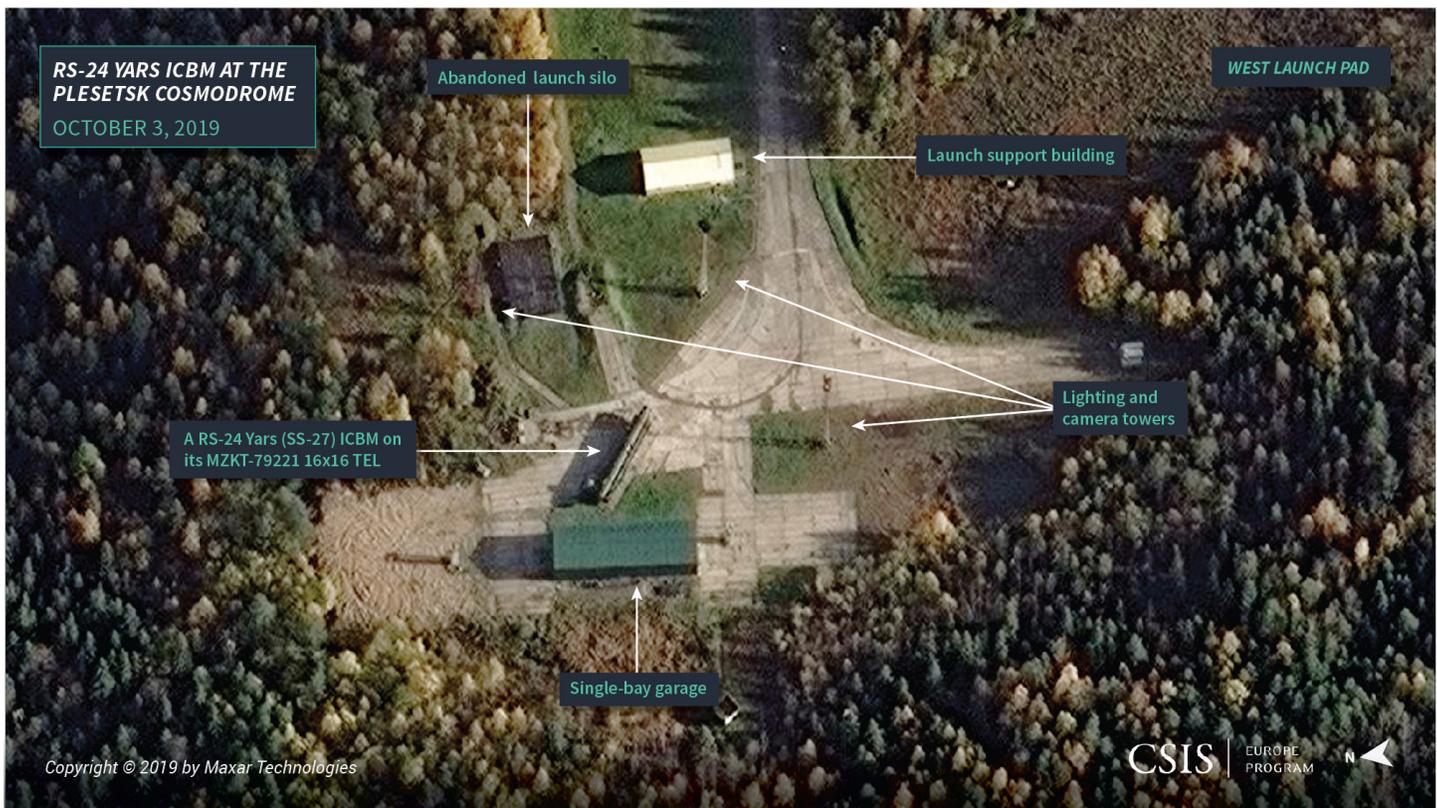
Kola Peninsula. Admiral James Foggo, commander of Allied Joint Force Command Naples, [warned](#) about Russia's renewed capabilities in the North Atlantic and the Arctic. Of particular concern is the ability of Russian submarines to project power through the Greenland-Iceland-United Kingdom (GIUK) Gap. In October 2019, NATO tracked [10 Russian submarines](#) south of Iceland testing their stealth abilities and demonstrating their capacity to threaten the strategic maritime route between the United States and Northern Europe. The exercise also exposed Russia's ability to break out into the North Atlantic and threaten the east coast of the United States. Russia's defense of its western Arctic territory is determined by its ability to control the surrounding maritime space and assert its presence in maritime choke points like the Greenland-Iceland-United Kingdom-Norway (GIUK-N) Gap. To this end, Gadzhiyevo and Okolnaya are critical staging grounds and house Russia's most advanced capabilities.

## PLESETSK COSMODROME: TESTING RS-24 YARS ICBMS DURING GROM-2019

Between October 15-17, 2019 Russia held its annual Grom (Thunder) strategic nuclear forces exercise (Grom-2019). Among the elements that participated in the exercise were units from the Strategic Rocket Forces, Long-Range Aviation, Military Transport Aviation, and Russian Navy. Included







within the exercise was the launch of a road-mobile RS-24 Yars (NATO reporting name: SS-29 or SS-27) ICBM from the Plesetsk Cosmodrome, in Mirny, Arkhangelsk Oblast, at the Kura Missile Test Range, originally known as Kama, in Kamchatskiy Kray (eastern Russia).<sup>17</sup>

On October 3, 2019, just 12 days before the start of the Grom-2019 exercise, a satellite image was collected of the Plesetsk Cosmodrome. This image covered what is reported to be “Launch Complex 158” (63.008134° 41.551304°), 52 km east of the main facility.<sup>18</sup> The complex encompasses approximately 148,350 square meters and is surrounded by a security fence. The site’s launch pads, single-bay garage, and support buildings occupy a T-shaped area lying on a generally east-west axis. The maximum east-west width is 365 meters and maximum north-south height is 240 meters.

(The images on page 12 correspond with the information mentioned in the paragraphs above and below.)

Visible in the October 3, 2019 image of Launch Complex 158 are two RS-24 Yars ICBMs resting on their MZKT-79221 16x16 Transporter-Erector-Launchers (TEL). These TELs are positioned, one apiece, on the complex’s east and west launch pads. Also visible are several support vehicles on the east launch pad and additional support vehicles in the complex’s parking area. From ground imagery released by the Russian Defense Ministry, the

TEL at the western launch is the one that subsequently conducted the training launch during the exercise.<sup>19</sup> The TEL at the east launch pad was likely present as a backup in case of mechanical issues. It is unknown from which of the five reported rocket divisions these two RS-24 systems came from.

### ANALYSIS

The RS-24 YARS is an ICBM capable of carrying multiple thermonuclear warheads. It has an estimated range of **10,500 km**, allowing Russia to escalate a regional conflict to a global context. The system is a cornerstone of Russia’s land-based nuclear deterrent, and its road-mobile delivery system increases its survivability. Other factors, including the missile’s ability to maneuver during flight, deploy active and passive decoys, and its reported seven minute launch time, pose significant **challenges** to U.S. and allied missile defense systems.

Russia exercised both its strategic and tactical nuclear forces during Grom-2019. The exercise included naval assets from all four Russian fleets, showing the extent to which Russia will mobilize across its military districts to defend its Arctic interests. As other analysts have **noted**, Grom highlighted Russia’s willingness to defend its Arctic territory with a growing arsenal of ballistic and cruise missiles. It also demonstrated the extent to which Russia has already integrated intermediate-range and

shorter-range missiles in its nuclear strategy in light of the uncertain future of arms control.<sup>20</sup>

Grom also offers insight into Russia's evolving nuclear doctrine. Major General Evgeny Ilyin [described](#) the exercise as one where the preservation of borders and the sovereignty and territorial integrity of the Russian Federation is threatened, thus warranting the use of nuclear weapons. President Putin noted in October 2018 [that](#) Russia would only use nuclear weapons when the country is "under attack."

## CONCLUSION

The Kola Peninsula is the centerpiece of Russia's military establishment in the western Arctic, and its air and maritime capabilities are essential to homeland defense, Arctic dominance, and global power projection capabilities. The concentration and range of multi-domain assets—from SLBMs and ICBMs to EW—deployed on and around the Peninsula underscores the Arctic's strategic value to Russian national interests. As Arctic nations increase their capabilities in a more accessible Arctic and as non-Arctic nations such as China seek greater access to the Arctic, we can expect Russia's military presence to expand to include conventional and dual-use assets. As the head of the Northern Fleet [noted](#) on December 8, "In the near future, we should expect a further increase in the military presence of the combined armed forces and, as a result, an increase in the likelihood of conflict." Although Admiral Moiseev was referring to NATO as well as Sweden and Finland, his comment could easily refer to Russia's military presence in the Arctic. ■

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## ENDNOTES

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2. Atle Staalesen, "Russia establishes new Arctic air squadron to protect its Northern Sea Route," *Barents Observer*, July 19, 2019, <https://thebarentsobserver.com/en/security/2019/07/russia-establishes-new-arctic-air-squadron-protect-its-northern-sea-route>; Atle Staalesen, "Upgrade for Northern Fleet air base," *Barents Observer*, July 3, 2018, <https://thebarentsobserver.com/en/security/2018/07/upgrade-northern-fleet-air-base>; "A Northern Fleet Exercise in Protecting Russia's Island Zone and Sea Coast Has Taken Place in the Arctic," Ministry of Defense of the Russian Federation, September 17, 2016, [https://function.mil.ru/news\\_page/country/more.htm?id=12096325@egNews](https://function.mil.ru/news_page/country/more.htm?id=12096325@egNews); Dmitry Boltenkov, "A Cold Hotspot," *VPK Voyenno-Promyshlenny Kur'yer*, June 27, 2016, <https://vpk-news.ru/articles/31210>; "Sneak Peak at Russia's 'Under Renovation' Arctic Base," RT, September 18, 2014, <https://www.rt.com/news/188712-arctic-russia-military-base/>; and Bruce Jones, "Russia Sets Up New Arctic Base," *Jane's Defence Weekly*, September 19, 2013.
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5. It is unclear, but the Okolnaya support facility may actually date to World War II; however, it only became associated with cruise and ballistic missiles during the 1950s. Central Intelligence Agency, *The USSR's Guba Okolnaya Submarine Support Facility* (Langley, VA: May 1963), <https://www.cia.gov/library/readingroom/docs/CIA-RDP79-00927A004000080005-7.pdf>.
6. *Ibid.*
7. Trude Pettersen, "Russia Builds Huge Nuclear Missile Depot in Severomorsk," *Barents Observer*, December 13, 2013, <https://barentsobserver.com/en/security/2013/12/russia-builds-huge-nuclear-missile-depot-severomorsk-13-12>.
8. *Ibid.*
9. Thomas Nilsen, "Satellite images reveal Russian Navy's Massive Rearmament on Kola Peninsula," *Barents Observer*, September 16, 2018, <https://thebarentsobserver.com/en/node/4370>.
10. Thomas Nilsen, "Satellite images show expansion of nuclear weapons sites on Kola," *Barents Observer*, May 8, 2017, <https://thebarentsobserver.com/en/content/satellite-images-show-expansion-nuclear-weapons-sites-kola>.
11. *Ibid.*
12. *Ibid.*
13. Other SLBM loading facilities include the Okolnaya submarine support base and Severodvinsk submarine base. The Gadzhiyevoy submarine base is sometimes referred to as the Guba Yagelnaya (Yage'naya Bay) or Guba Sayda (Sayda Bay) submarine base.
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