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North Korea's Nuclear Weapons and Missile Programs

Overview

North Korea continues to advance its nuclear weapons and missile programs despite U.N. Security Council sanctions and high-level diplomatic efforts. The country's ballistic missile testing, military parades, and policy statements suggest that North Korea is continuing to build a nuclear warfighting capability designed to evade regional ballistic missile defenses. Such an approach likely reinforces a deterrence and coercive diplomacy strategy—lending more credibility as it demonstrates capability—but it also raises questions about crisis stability and escalation control. Congress may wish to examine U.S. policy toward North Korea.

U.S. policy as well as U.N. resolutions call on North Korea to abandon its nuclear weapons and missile programs. Kim Jong Un has repeatedly rejected "denuclearization" talks. According to the U.S. intelligence community's 2024 annual threat assessment (ATA), North Korean leader Kim Jong-un views nuclear weapons as a "guarantor of regime security."

The Korea People's Assembly adopted a new law in September 2022 that reportedly expands the conditions under which North Korea would use nuclear weapons to include possible first use in situations that threaten the regime's survival. In September 2023, Kim promised to boost nuclear weapons production "exponentially" and diversify nuclear strike options.

In response to these developments, the United States and South Korea have conducted joint military drills and convened the bilateral Extended Deterrence Strategy and Consultation Group and Nuclear Consultative Group to "to strengthen extended deterrence, discuss nuclear and strategic planning, and manage the threat the DPRK poses to the global nonproliferation regime." The Biden Administration's 2022 Nuclear Posture Review said, "Any nuclear attack by North Korea against the United States or its Allies and partners is unacceptable and will result in the end of that regime."

Nuclear Testing

North Korea has tested a nuclear explosive device six times since 2006. Each test produced underground blasts progressively higher in magnitude and estimated yield. North Korea conducted its most recent test on September 3, 2017. A North Korean press release stated it had tested a hydrogen bomb (or two-stage thermonuclear warhead) that it was perfecting for delivery on an intercontinental ballistic missile.

In April 2018, North Korea announced that it had achieved its goals, would no longer conduct nuclear tests, and would close down its Punggye-ri nuclear test site. It dynamited the entrances to two test tunnels in May 2018. International Atomic Energy Agency (IAEA) reports say North Korea began restoring test tunnels in March 2022 and the test site "remains prepared to support a nuclear test."

Nuclear Material Production

North Korea reportedly continues to produce fissile material (plutonium and highly enriched uranium) for weapons. North Korea restarted its plutonium production facilities after it withdrew from a nuclear agreement in 2009, and is operating centrifuge uranium enrichment plants at the Yongbyon nuclear complex and possibly at Kangson. In November 2024, the IAEA reported construction and operations at the Yongbyon uranium centrifuge enrichment plant, Radiochemical Laboratory plant and Experimental Light Water 5MW(e) Reactor. Spent fuel from that reactor is reprocessed at the Radiochemical Laboratory to extract plutonium for weapons. The IAEA also reported ongoing uranium mining, milling, and concentration activities at Pyongsan. Fissile material production in large part determines the number and type of nuclear warheads a country is able to build.

Nuclear Warheads

North Korean government statements show that the country is aiming to increase its stockpile of nuclear warheads and improve their design for a variety of delivery systems. Some nongovernmental experts estimate that North Korea has produced enough fissile material for between 20 to 60 warheads. Another goal of a nuclear weapon program is to lower the size and weight of a nuclear warhead for deployment on missiles, called "miniaturization." A July 2017 DIA assessment asserted North Korea had achieved the level of miniaturization required to fit a nuclear device on weapons ranging from short-range ballistic missiles (SRBM) to intercontinental ballistic missiles (ICBM). Kim Jong-un in January 2021 said that the country was able to "miniaturize, lighten and standardize nuclear weapons and to make them tactical ones."

In his January 1, 2023, speech, Kim said the country would expand its nuclear arsenal and "mass produce" tactical nuclear weapons. The 2024 ATA said that Kim ordered a "an increase in the nuclear weapons stockpile and the expansion of weapon-grade nuclear material production" in March 2023. The ATA said that "North Korea also unveiled a purported tactical nuclear warhead and claimed it could be mounted on at least eight delivery systems, including an unmanned underwater vehicle and cruise missiles."

Missile Testing

North Korea has conducted over 80 ballistic missile test launches since 2022, according to U.S. government officials. U.N. Security Council (UNSC) resolutions prohibit North Korea's development of the means of delivering conventional and nuclear payloads, in addition to the nuclear weapons themselves. UNSC resolutions specifically ban "all ballistic missile tests" by North Korea.

A ballistic missile is a projectile powered by a rocket engine until it reaches the apogee of its trajectory, at which point it falls back to earth using earth's gravity. Ballistic missiles can deliver nuclear and large conventional payloads at high speed and over great distances. They are categorized as short-range, medium-range, or long-range (intercontinental) based on the distance from the launch site to the target.

North Korea is developing delivery systems that possess certain critical features: mobility, reliability, potency, precision, and survivability. Mobile weapons have increased survivability compared with fixed launch sites and static stockpiles. Reliability, potency, precision and in-flight maneuverability work together to maximize the impact of North Korea's limited quantity of weapons, launchers, and warheads. A key element to North Korean missile doctrine, therefore, is continued testing to develop, ensure, and demonstrate these features.

The North Korean test program may be intended to increase the reliability, effectiveness, and survivability of its ballistic missile force. The 2023 ATA says North Korea will continue testing a variety of missiles "to validate technical objectives, reinforce deterrence, and normalize Pyongyang's missile testing."

Intercontinental Ballistic Missiles

North Korea has been improving its ability to strike the continental United States with an ICBM through a series of tests, first in 2017, then in 2022, four times in 2023, and most recently in October 2024. The DPRK first successfully test-launched two liquid-propellant, road-mobile ICBMs in 2017: the Hwasong-14 (U.S. designated KN-20) and Hwasong-15 (U.S. designated KN-22). North Korea displayed a larger Hwasong-17 ICBM at an October 2020 military parade and began test launching it in 2022. In December 2022, North Korea static (or ground) tested an ICBM solid-propellant rocket motor, potentially for a land-based or submarine-based ICBM. On April 13, July 12, and December 17, 2023, North Korea flight tested its solid-fuel ICBM, the Hwasong-18. The October 31, 2024, test was assessed as a Hwasong-19 solid-propellant ICBM with multiple independently targetable reentry vehicle (MIRV) capability. These systems may require further testing to improve reliability.

Short- and Medium-Range Missiles

North Korean SRBMs and medium-range ballistic missiles (MRBM), precision-guided multiple launch rocket systems (MLRS), and artillery pose the most acute near-term threats to other nations. Advances in these systems demonstrate a shift toward solid propellants and satellite guidance systems; advances that could carry over to larger, more potent systems like the Hwasong series ICBMs. These developments provide the projectiles greater mobility and survivability prior to launch and greater precision on target.

In the MRBM category, the Pukguksong-2 (KN-15) poses the greatest threat to North Korea's regional adversaries and exhibits advanced technology. The KN-15 is a solid-propellant missile capable of striking mainland Japan and carrying a nuclear or conventional payload—known as dual capable. The North Koreans fire the missile from a tracked vehicle, which gives the system mobility and makes prelaunch targeting of the system difficult.

The KN-23 SRBM exemplified a notable advance to the North Korean inventory. The May 2019 tests of two KN-23 missiles revealed an atypical flight path. On terminal approach to its target, the KN-23 conducted a "pull-up" maneuver, intended to complicate the ability of ground-based interceptors to destroy the hostile missile in flight by increasing its speed and angle of attack. The KN-23 can strike any location on the Korean peninsula with either a conventional or nuclear payload and uses a solid-propellant.

North Korea has committed to expanding the performance of its precision guided *tactical* weapons. The KN-24 and KN-25 pose significant threats to South Korea and U.S. assets on the peninsula. The KN-24 is a tactical system with a mobile launcher, solid propellant, and relatively large payload. The KN-24 demonstrates the guidance system and in-flight maneuverability to achieve precision strikes. Outside experts assess that the North Koreans may ultimately intend the KN-24 to serve as a dual capable system.

The KN-25 blurs the line between rocket and missile; however, it achieves the same effect as a traditional SRBM by delivering destructive effects on a precision target at significant range thanks to advanced avionics, inertial and satellite guidance systems, and aerodynamic structures. The KN-25 carries a conventional payload up to 380 km, allowing it to strike any target in South Korea. Tests in 2019 and 2020 demonstrate that a crew can launch the four rockets composing the KN-25 system at 20-second intervals. Since the KN-25 is a more economical system than traditional SRBMs, the North Koreans may seek to fire large numbers of these rockets in salvos to overwhelm the ability of an adversary's missile defense systems to successfully engage all incoming projectiles. Salvo firing projectiles gives them the greatest likelihood of accomplishing their intended effect in the face of even the most advanced missile defense systems.

The recent advances in North Korea's ballistic missile testing program also appear to be directed at developing capabilities to defeat or degrade the effectiveness of missile defenses deployed in the region: Patriot, Aegis Ballistic Missile Defense (BMD), and Terminal High Altitude Area Defense (THAAD). In addition, North Korea's progress with submarine-launched ballistic missiles (SLBM) suggests an effort to counter land-based THAAD missile defenses by launching attacks from positions at sea outside the THAAD's radar field of view, although local Aegis BMD systems could likely still track these projectiles. The Pukgugsong-3 SLBM was successfully tested beginning in late 2019. According to a 2021 DIA report, North Korea has said this SLBM, to be launched from a ballistic missile submarine, will be cold-launched, solid-fueled and "will carry a nuclear warhead." North Korea has also unveiled longer-range SLBMs, the Pukguksong-4 and -5.

North Korean tests have demonstrated growing success and, coupled with increased operational training exercises, suggest a pattern designed to strengthen the credibility of North Korea's regional nuclear deterrent strategy.

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