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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 UN Security Council sanctions and high-level diplomatic efforts. North Korea is observing a self-imposed moratorium on nuclear and long-range missile testing. Recent ballistic missile tests and an October 2020 military parade 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 choose to examine U.S. policy in light of these advances.

In the April 2018 Panmunjom Declaration by North and South Korea and the June 2018 U.S.-North Korea Joint Statement, Kim Jong Un pledged to improve relations and “work toward complete denuclearization of the Korean Peninsula.” However, the Director of National Intelligence (DNI) said in his 2019 threat assessment to Congress that “North Korea is unlikely to give up all of its nuclear weapons and production capabilities, even as it seeks to negotiate partial denuclearization steps to obtain key US and international concessions.” Trump and Kim held a second summit in 2019 but were unable to reach agreement.

North Korean statements describe North Korea's nuclear arsenal as a deterrent to U.S. “nuclear war threats.” The U.S. intelligence community's 2021 annual threat assessment said North Korean leaders view nuclear weapons as “the ultimate deterrent against foreign intervention.” Kim Jong Un said at the 2016 Workers' Party Congress that “nuclear weapons of the DPRK can be used only by a final order of the Supreme Commander of the Korean People's Army [Kim Jong Un] to repel invasion or attack from a hostile nuclear weapons state and make retaliatory strikes.”

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 prior to the first Trump-Kim summit in front of a group of journalists. In an October 2018 meeting with Secretary of State Mike Pompeo, Kim Jong Un “invited inspectors to

visit the [test site] to confirm that it has been irreversibly dismantled,” but this has not yet occurred.

Nuclear Material Production and Warheads

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 at least one centrifuge enrichment plant at its Yongbyon nuclear complex. During the September 2018 North-South Korea Pyongyang Summit, the North stated it would “permanently disable” the Yongbyon facilities if the United States took “corresponding measures.” U.S. officials have said that other clandestine enrichment facilities likely exist. News reports in August 2017 said that one component of the intelligence community (IC), the U.S. Defense Intelligence Agency (DIA), estimated a stockpile of up to 60 nuclear warheads. Some experts have estimated that North Korea could produce enough nuclear material for an additional seven warheads per year.

According to the U.S. IC, North Korea aims to develop a nuclear warhead that is “miniaturized,” or sufficiently lightweight and small enough to mount on a long-range ballistic missile. As of July 2017, a DIA assessment and some outside observers believed North Korea had achieved the level of miniaturization required to fit a nuclear device on weapons ranging across the spectrum of its missiles, from short-range ballistic missiles (SRBM) to intercontinental ballistic missiles (ICBM).

Delivery Vehicles

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 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. They are categorized as short-range, medium-range, or intercontinental based on the distance from the launch site they can strike a target. Ballistic missiles can deliver nuclear and large conventional payloads at high speed and over great distances.

North Korea is developing nuclear weapons and 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.

Intercontinental Ballistic Missiles

North Korea improved its ability to strike the entire continental United States with an ICBM through a series of tests in 2017. The successful launches of the liquid-propellant, multistage Hwasong-14 (U.S. designated KN-20) and Hwasong-15 (U.S. designated KN-22) in July and November 2017 demonstrated significant advances in North Korean missile technology. Despite these improvements, reliability of these systems remains uncertain. Without further testing, neither the North Koreans nor others can assess whether the missiles will function as designed in combat. The absence of ICBM tests since the only successful launch of the Hwasong-15 in November 2017 may also suggest that the North Korean missile force possesses only a small quantity of these weapons or that it is continuing its test moratorium for nontechnical reasons. North Korea displayed a larger new Hwasong ICBM at an October 2020 military parade but has not flight tested it. Experts debate whether the missile is intended for multiple warheads (MIRV).

Short- and Medium-Range Missiles

In 2019 and 2020, North Korea increased the pace of short-range ballistic missile (SRBM) test launches. There was a break in testing between March 2020 and 2021, but a March 25 test launch of a short-range system ended the pause. These launches violate United Nations Security Council resolutions. 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 the North Korean 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 potency and precision on target.

In the MRBM category, the KN-15 poses the greatest threat to North Korea's regional adversaries and exhibits advanced technology. Known in North Korea as the Pukguksong-2, 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 exemplifies the most notable advance to the North Korean inventory in the smaller category of weapons. The May 2019 tests of two KN-23 missiles revealed an atypical flight path in which the weapon flew much closer to the ground than a traditional ballistic missile. 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 to the target. The KN-23 can strike any location on the Korean peninsula with either a conventional or nuclear payload and uses a solid-propellant. A March 25, 2021,

launch may have tested a variant of the KN-23, according to observers, and was called a “new-type tactical guided projectile” by official North Korean press statements.

North Korea has committed to expanding the performance of its precision guided *tactical* weapons. The newly developed 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 newest crop of North Korean weapons—including the Hwasong-14, Hwasong-15, KN-15, KN-23, KN-24, and KN-25—demonstrates mobility, potency, precision, and has characteristics that make the missiles difficult to defeat in flight. These traits suggest that the North Korean test program may seek to achieve more than a simple political statement, and that it may be intended to increase the reliability, effectiveness, and survivability of their ballistic missile force. 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.

The recent advances in North Korea's ballistic missile test program 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 Pukguksong-3 SLBM was successfully tested in late 2019. In an October 2020 parade, North Korea unveiled a longer-range SLBM (Pukguksong-4) but has not yet tested the weapon.

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