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# North Korea's Nuclear and Ballistic Missile Programs

## Overview

North Korea continues to advance its nuclear weapons and ballistic missile programs. In 2016, North Korea conducted two nuclear weapons tests and 26 ballistic missile flight tests on a variety of platforms. North Korea continues this trend and has flight-tested a number of missiles, including what many ascribe as ICBM (intercontinental ballistic missile) tests. These tests and official North Korean statements suggest that North Korea is striving to build a credible regional nuclear warfighting capability that can evade regional missile defenses. Such an approach may reinforce their deterrent strategy—lending more credibility as it demonstrates capability—but it would also raise serious questions about crisis stability and escalation control over the next decade. Congress may further examine these advances' possible impacts on U.S. policy.

## Nuclear Tests

On September 9, 2016, North Korea announced that it had successfully tested a “nuclear warhead explosion test” (its fifth nuclear test). North Korea has tested a nuclear explosive device four other times since 2006. Open-source reporting based on satellite imagery showed an increase in activity at the Punggye-ri nuclear test site in late March. According to U.S. and international estimates, each test produced underground blasts that were progressively higher in magnitude and estimated yield.

At 9:00 a.m. local time on September 9, the U.S. Geological Survey detected a seismic event deep in the mountains at the Punggye-ri site with a magnitude of 5.3. The Comprehensive Test-Ban Treaty Organization (CTBTO) results were similar. Norwegian seismic authorities estimated the test had an approximate yield of 20 kilotons TNT. The Air Force deployed a WC-135 Constant Phoenix “sniffer” aircraft to test for any atmospheric radiation.

The North Korean statement announcing the September test emphasized that North Korea had “standardized” its nuclear warhead and would continue to advance the quality and quantity of its “nuclear force.” A White House statement reiterated its policy that “the United States does not, and never will, accept North Korea as a nuclear state.”

According to the North Korean announcement, “the standardization of the nuclear warhead will enable the DPRK to produce at will and as many as it wants a variety of smaller, lighter and diversified nuclear warheads of higher strike power with a firm hold on the technology for producing and using various fissile materials. This has definitely put on a higher level the DPRK’s technology of mounting nuclear warheads on ballistic rockets.” Some experts interpret the reference to “various” nuclear materials to mean that this test may have used highly

enriched uranium or both plutonium and highly enriched uranium in the tested weapon design, instead of previously tested plutonium-based weapons. The statement also refers to “smaller, lighter and more diversified” warheads, perhaps signaling a move to produce and deploy nuclear weapons that can be delivered on shorter range missiles. North Korea did not repeat a January 2016 assertion that it had tested a hydrogen weapon. The White House said that the January test was “not consistent” with a hydrogen bomb.

## Nuclear Material Production

North Korea is actively developing its nuclear weapons program through continued production of fissile material. According to official assessments, North Korea has both a plutonium production and a uranium enrichment program for nuclear weapons. North Korea has restarted its plutonium production facilities at the Yongbyon nuclear complex and is operating at least one centrifuge enrichment plant. U.S. officials have said that it is likely other clandestine enrichment facilities exist.

There are no public official U.S. government estimates of North Korea’s fissile material stockpiles. Nongovernmental open source estimates are based on material production activities at the Yongbyon site as well as past stockpile estimates. Some experts believe that North Korea could have potentially produced enough material for 13-21 nuclear weapons, and that North Korea could now potentially produce enough nuclear material for an additional 7 warheads per year.

## Doctrine

Recent statements, taken at face value, appear to describe North Korea’s nuclear arsenal as a deterrent to the U.S. “nuclear war threats.” In his 2017 New Year’s address, North Korean leader Kim Jong Un stated that the North had “achieved the status of a nuclear power,” and promised to continue to “build up our self-defense capability, the pivot of which is the nuclear forces, and the capability for preemptive strike ... to defend peace and security of our state.” Kim also said at the 2016 Workers’ Party Congress that North Korea “will not use a nuclear weapon unless its sovereignty is encroached upon by an aggressive hostile force with nukes.” The statement also said that the “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.”

On February 9, 2016, Director of National Intelligence James Clapper testified that the United States knew little of North Korea’s nuclear doctrine, but he reiterated previous assessments that “Pyongyang’s nuclear capabilities are intended for deterrence, international prestige, and coercive

diplomacy.” Later that month, General Scaparrotti, then Commander of U.S. Forces Korea, said that Kim’s stated purpose is to protect his regime, and if he perceived that to be threatened, he may decide to use nuclear weapons.

## Warheads and Delivery Systems

According to the U.S. intelligence community, the prime objective of North Korea’s nuclear weapons program is to develop a nuclear warhead that is “miniaturized” or sufficiently small to be mounted on long-range ballistic missiles. The Director of National Intelligence stated in 2013 that “North Korea has not yet demonstrated the full range of capabilities necessary for a nuclear armed missile.” Miniaturization likely would require additional nuclear and missile tests. One of the most acute near-term threats to other nations may be from the medium-range Nodong missile, which could reach all of the Korean Peninsula and some of mainland Japan. Outside the intelligence community, U.S. officials have articulated conflicting assessments of North Korea’s ability to produce a nuclear warhead for its intercontinental-range missiles. A Pentagon spokesman said in March 2016 that North Korea had not shown such capability, while Admiral William Gortney in April 2016 affirmed a South Korean assessment that North Korea could weaponize a medium-range Nodong missile. The intelligence community believes that North Korea has an ICBM capability, but that it has not been tested and that neither North Korea nor the United States knows whether that capability will work.

A December 2015 Department of Defense (DOD) report said that “North Korea is committed to developing a long-range nuclear-armed missile that is capable of posing a direct threat to the United States.” The report outlined two hypothetical ICBMs on which North Korea could mount a nuclear warhead and deliver to the continental U.S.: the KN-08 and the Taepodong-2, which was the base rocket for the Unha-2 space launch vehicle. North Korea has paraded what are widely considered mock-ups or engineering models of the KN-08 and KN-14 ICBMs. In 2016, the intelligence community assessed that “North Korea has already taken initial steps toward fielding this [ICBM] system, although the system has not been flight-tested.” In July 2017, the DPRK conducted what most have now assessed as two ICBM tests.

In December 2012, North Korea launched an Unha-3 to deliver a satellite into space. The DOD noted that although this space launch vehicle “contributes heavily to North Korea’s long-range ballistic missile development,” the country did not test a reentry vehicle (RV), and absent an effective RV, “North Korea cannot deliver a weapon to target from an ICBM.” North Korea launched the Unha-3 again in February 2016, placing a satellite into earth orbit. Some observers assert that the Unha-3 could be used as an ICBM, but no other country has deployed a space launch vehicle as a nuclear-armed ICBM or developed an ICBM from the technology base of a space launch program alone. Recent static engine tests of a large rocket engine in late 2016 and early 2017 suggest to some progress in their ICBM program, and to others progress in developing a larger space launch vehicle.

North Korea has increased ballistic missile testing in recent years and tested with even greater frequency in 2016. These tests demonstrate 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.

North Korea has demonstrated limited but growing success in its medium-range ballistic missile (MRBM) program and its submarine-launched ballistic missile (SLBM) test program. Moreover, North Korea appears to be moving slowly toward solid rocket motors for its ballistic missiles. Solid fuel is a chemically more stable option that also allows for reduced reaction and reload times. Successful tests of the Pukguksong-2 (KN-15) solid fuel MRBM in 2017 led North Korea to announce it would now mass produce those missiles.

Furthermore, mobile ballistic missiles, which North Korea is developing, and other measures also reduce U.S. detection abilities. These things together suggest that their test program may be more than just for show or to make a political statement—that it may be intended to increase the reliability, effectiveness, and survivability of their ballistic missile force.

A recent focus in North Korea’s ballistic missile test program appears to be directed at developing a capability to defeat or degrade the effectiveness of missile defenses, such as Patriot, Aegis BMD, and THAAD, all of which are or will be deployed in the region. Some of the 2016 missile tests were lofted to much higher altitudes and shorter ranges than an optimal ballistic trajectory. On reentry, a warhead from such a launch would come in at a much steeper angle of attack and at much faster speed to its intended target, making it potentially more difficult to intercept with missile defenses. North Korea has demonstrated in 2017 the ability to launch a salvo attack with more than one missile launched in relatively short order. This is consistent with a possible goal of being able to conduct large ballistic missile attacks with large raid sizes, a capability that could make it more challenging for a missile defense system to destroy each incoming warhead. Finally, North Korea’s progress with SLBMs might suggest an effort to counter land-based THAAD missile defenses by launching attacks from positions at sea that are outside the THAAD system’s radar field of view, but not necessarily outside the capabilities of Aegis BMD systems deployed in the region.

Taken together, North Korea’s progress in nuclear testing, its declared standardization of warhead designs and potential to put those warheads on MRBMs, increased confidence in the reliability of its short-range missile, and efforts seemingly designed to degrade regional ballistic missile defense systems suggest that North Korea may be building a credible regional nuclear warfighting and ICBM nuclear deterrent capability. For many, this has now become a game changer in the U.S.-DPRK relationship.

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