

DPRK nuclear weapons capability

【Overview】

The nuclear and missile capabilities of the Democratic People's Republic of Korea (North Korea) continue to become enhanced but there are varying estimates regarding their strengths. Kristensen and Korda put the figure at 35 warheads as of April 2020 (**Kristensen, Hans M. & Korda, Matt 2020**). SIPRI, in a September 2019 press conference held in South Korea, projected the North Korean stockpile to reach 30-40 warheads within 2020 (**Roh, Suk-jo 2019**). Albright says North Korea is increasing its nuclear ordnance at a rate of 3-5 warheads per year, likely resulting in 25-50 by 2020. Furthermore, according to Albright, Nyeongbyeon's light water reactor in operation could even push up the stockpile to 60 (**Albright, David 2018**). The U.S. Defense Intelligence Agency (DIA) estimates the maximum size of North Korean arsenal currently to be 60 warheads (**Nikitin, Mary Beth D. 2019**). Moreover, RAND Corporation, a U.S. thinktank, estimated North Korea's stockpile at 15-60 warheads as of 2019 and forecast its growth to 30-100 by 2020 (**Gentile, Gian et al. 2019**). Hecker, Carlin and Serbin of Stanford University, allowing for a tolerance of 20-60 warheads on publicly available estimates due to the lack of clarity about North Korea's highly enriched uranium (HEU), present 35-37 warheads as the most credible estimate (**Hecker, Siegfried S. Carlin, Robert L. & Serbin, Elliot A. 2019-1**). Our estimate here of the North Korean stockpile, as of April 2020, is 35 warheads.

North Korea, with its research facility in Nyeongbyeon as the hub, continues to produce plutonium and highly enriched uranium (HEU), fissile materials for nuclear weapons. The International Panel on Fissile Materials (IPFM), as of late 2016, saw the country's weapons-grade stockpile of plutonium at 60kg (**International Panel on Fissile Materials 2018**). Also, Hecker, Carlin & Serbin estimated North Korea's plutonium and HEU, as of April 2019, to be 25-48kg and 400-650kg, respectively (**Hecker, Siegfried S., Carlin, Robert L., & Serbin, Elliot A. 2019-2**). Others claim North Korea to be capable of annually manufacturing fissile materials for about seven warheads (**Arms Control Association 2018, Nikitin, Mary Beth D. 2019**). In any case, information surrounding the North Korean stockpile remains opaque.

North Korea has conducted six nuclear weapon tests: October 2006, May 2009, February 2013, January and September 2016 and September 2017. The last of these, a thermonuclear weapon, is estimated to have yielded 200kt.

There is no publicly disclosed information suggesting that they have operationally deployed nuclear warheads. Analysis by many governmental/non-governmental organizations, however, agrees that North Korea is already technically proficient in miniaturizing warheads. The Japanese Government, in its "National Defense Program Guidelines for FY2019 and Beyond" in late 2018, stated: "Given technological maturity obtained through a series of nuclear tests, North Korea is assessed to have already successfully miniaturized nuclear weapons to fit ballistic missile warheads" (**MOD 2018**).

During this period, North Korea frequently fired ballistic missiles likely capable of carrying nuclear warheads. It has been developing ground-launched ballistic missiles of different ranges: MRDM (1,000-3,000km), IRBM (3,000-5,000km), and ICBM (beyond 5,500km). Some of these are thought to have been deployed. It is also developing surface-launched ballistic missiles.

In light of diplomatic developments toward the denuclearization of the Korean Peninsula, mainly between North Korea and the United States, North Korea halted ballistic missile test launches of ballistic missiles after the last test, dated November 29, 2017, of the KN-22 (Hwasong-15). Following the subsequent doldrums in diplomacy, North Korea resumed test launches in May 2019. To date, while it has yet to breach the self-imposed moratorium on ICBMs and IRBMs, test launches continue quite frequently with short-range ballistic missiles and rocket artillery. Of the latter, two SRBM types, the KN-23 fired in May 2019 and the KN-24 in August, are both suspected of being nuclear-capable (e.g., **Van Diepen, Vann H. & Depetris, Daniel R. 2019**). On October 2, 2019, the country followed up with the test launch of Pukkuksong-3, a new SLBM which has the longest range for any solid-propellant missile in North Korean development (**Elleman, Michael 2019**). In late December 2019, in an address at a plenum of the Central Committee of the Workers' Party of Korea, Chairman Kim Jong Un declared, "the world will witness a new strategic weapon to be possessed by the DPRK in the near future," clearly promising further nuclear and missile developments.

Updated: June 1, 2020

- Nuclear warheads

35

Breakdown

Ground-launched ballistic missile	?
Sea-launched ballistic missile	?

- Nuclear weapons delivery vehicles ^{1) 2)}

Name	Range (km)	Payloads (kg)	Deployment year	Remarks
Ground-launched ballistic vehicles				
KN-04(Scud-ER, Hwasong-9)	1,000	500	1994	3)
Nodong (Hwasong-7)	> 1,200	1,000	1994	4)
KN-15 (Pukkuksong-2)	1,000	?	2018- 19	5)
KN-07(Musudan, Hwasong-10, BM-25)	> 3,000	1,000	2017?	6)
KN-17 (Hwasong-12)	3,300 ~ 4,500	1,000	In development	7)
KN-18 (Hwasong-13)	> 5,500	?	In development	8)
Taepodong 2 (Paektusan-2, Unha-2, Unha-3)	12,000	> 800	2012?	9)
KN-20 (Hwasong-14)	6,700 ~ 10,400	500 ~ 1,000	In development	10)
KN-22 (Hwasong-15)	13,000	1,000 ~ 1,500	In development	11)
KN-23	690	500	In development	12)
KN-24	410	400 ~ 500	In development	13)
Sea-launched ballistic missile				
KN-11 (Pukkuksong-1)	?	?	In development	14)
Pukkuksong-3	?	?	In development	15)

【Notes】

- 1) The nuclear capabilities of all the North Korean missiles are unclear. Unless otherwise specified the source for the range of nuclear weapons delivery and payload is **Kile, Shannon N. & Kristensen, Hans M. 2019**. For deployment details, we referenced **Missile Defense Project's "Missile Threat"**.
- 2) Except a Taepodong-2 missile which is launched from a silo, all ground-based ballistic missile are launched from road-mobile platforms.

- 3) Single-stage, liquid fuel, with an extended range (ER). North Korea is believed to have fired three consecutive missiles on September 5, 2016 (**Schiller, Markus & Schmucker, Robert H. 2016**). The latest test, dated March 6, 2017, was a near-simultaneous quadruple launch. Three of these, flying at a height of 260km and over 1,000km, landed within Japan's exclusive economic zone (EEZ) (**Wright, David 2017-1**).
- 4) Single-stage. Road-mobile. liquid fuel. The first test launch dates back to 1993 (**Kristensen, Hans M. & Norris, Robert S. 2018**). Launch platforms are seen to number 100 or less (**Kristensen, Hans M. & Norris, Robert S. 2018**), with 175-200 vehicles in deployment (**NTI 2018**). In the recent past, on August 3, 2016, North Korea launched two (Nodong) ballistic missiles. One of these, flying some 1,000km, landed within Japan exclusive economic zone (EEZ) 250km off the coast of Akita Prefecture (the other exploded upon launch). Three more Nodongs were fired on September 3, 2016, striking Japan's EEZ some 200-250km west of Okushiri Island (**Defense Ministry of Japan 2017**).
- 5) Two-stage, solid fuel. The KN-15 is understood to be a ground-launched variant of the KN-11. Its first test launch took place on February 12, 2017, flying 500km (**Missile Defense Project 2020-2**). On May 21 of the same year, North Korea test-launched the KN-15 for a second time (**Missile Defense Project 2017**).
- 6) Single-stage, liquid fuel, based on the Soviet-manufactured R-27 (SS-N-6, a liquid fuel SLBM) (**NTI 2018**). Platforms number less than 50(**Kristensen, Hans M. & Norris, Robert S. 2018**). It marked its public debut in a military parade in 2010 (**NTI 2018**). Six tests were conducted between April and June of 2016 (the first five failing and the last understood to have been partially successful) (**NTI 2018**).
- 7) Single-stage, liquid fuel. The first test launch, on April 5, 2017, was a failure. On April 16 and 29 of the same year, North Korea continued to fail. Success was finally attained on May 14, with a lofted trajectory, at an altitude of 2,000km and a range of 700km. The missile flew into the Sea of Japan, outside of Japan's exclusive economic zone (EEZ). The flight duration was about 30 minutes. This would have translated into a normal ballistic trajectory of 4,500km (**Wright, David 2017-2**). On August 28 of the same year, a test launch succeeded at a normal trajectory (550km in altitude and 2,700km in range)(**Wright, David 2017-5**), scaling outer space above Japan's Tsugaru Strait and striking the Pacific Ocean. A test on September 15 of the same year also succeeded at a normal trajectory (770km in altitude and 2,700km in range)(**Wright, David 2017-6**), scaling outer space above Japan's Tsugaru Strait and striking the Pacific Ocean.
- 8) Three-stage. Liquid-propellant. It marked its public debut in a military parade on April 15, 2012. There are no reports to date of its test launch. Even though it was initially considered a parade mockup, some observers suggest actual development in progress (**Missile Defense Project 2018**).
- 9) Three-stage. Liquid-propellant. The first launch test in 2006 was a failure. It is thought that North Korea attempted test launches of a projectile with the aim of launching an artificial satellite on April 5, 2009 and April 13, 2012, both of which ended in failure. They announced that they had succeeded in launching a satellite on December 12, 2012. The US has identified "some sort of flying object" in orbit. On February 7, 2016, North Korea announced it enjoyed a successful launch of the Kwangmyongsong (KMS) 4, an earth observation satellite.
- 10) Two-stage, liquid fuel. The first test launch, on July 4, 2017, traced a lofted trajectory of 2,800km in altitude and 950km in range, landing within Japan's EEZ. The flight time logged was 39 minutes, equivalent to a normal trajectory of 6,700km (**Wright, David 2017-3**). This was followed by another test on July 28 with a lofted trajectory (3,700km in altitude and 1,000km in range), again falling in Japan's EEZ. The flight time was 47 minutes, equivalent to a normal trajectory of 10,400km (**Wright, David 2017-4**).

- 11) Two-stage, liquid propellant. The very first launch, on November 29, 2017, scaled a lofted trajectory of 4,500km in altitude and 960km in range, landing 250km off the west coast of Japan's Aomori Prefecture, within the country's EEZ. An equivalent normal trajectory would have been 13,000km (**Wright, David 2017-7**). This is North Korea's largest missile ever among all those test-launched and its range is said to cover the United States mainland.
- 12) Range and payload data from "Single-stage, road-mobile, solid propellant" in **Missile Defense Project 2020-1**. It made its first appearance on February 8, 2019, in a military parade, followed by its first (single missile) test launch on May 4. Further tests ensued, two missiles on May 9, two more on July 25, and another two on August 6, a total of four times. North Korea refers to it as a "new-type tactical guided weapon." In design it closely resembles the Iskander-M, Russia's SRBM, as many observers have pointed out. Flying in a "quasi-ballistic trajectory" at a low altitude of about 50km, it is similarly capable of breaching missile defense (**Lewis, Jeffrey 2019**).
- 13) Range and payload data from "Single-stage, road-mobile, solid propellant," **Missile Defense Project 2020-1**. The first test launch took place on August 10, 2019. Two more tests followed, on August 16 and March 21, 2020. Like the KN-23, it flies in a "quasi-ballistic trajectory." According to a release from South Korea's Joint Chiefs of Staff (JCS), the March 31 launch flew "around 410 kilometers, reaching a maximum altitude of around 50 km" (**Oh, Seok-min 2020**). Though larger in size, the KN-24 resembles the US MGM-140 Army Tactical Missile System (ATACMS) in design and may be capable of housing a nuclear warhead (**Elleman, Michael 2020**). North Korea calls it a "tactical guided weapon".
- 14) Two-stage (**Missile Defense Project 2019**), solid propellant (originally thought of as a sea-faring variant of the liquid-fueled Musudan (Hwasong-10), but categorized subsequently as a unique type due to its solid propellant). An underwater launch into the air is believed to have been conducted in April 2015. According to North Korea, it was launched by a submarine. Two failures are dated May 8 and November 28 of the same year. A similar launch test on December 21 is believed to have been underwater (**Umebayashi, Hiromichi 2016**). The very first SLBM launch from a submarine took place on April 23, 2016, in the waters near Sinpo. The range then attained, 30km, is thought to have been a failure. Similar SLBM tests took place on July 9 and August 24 in the same year. It is reported that a third test achieved a flight distance of 500km (**NTI 2018**).
- 15) Two-stage (**Elleman, Michael 2019**), solid propellant. The very first launch, on October 2, 2019. Believed to have been fired from a submersible barge, not a submarine (**Elleman, Michael 2019**). Scaling an altitude of 950km and covering 450km, the test launch touched down in Japan's exclusionary economic zone (EEZ). In a design trajectory, its maximum range is said to be 1,900km (**Panda, Ankit 2019**), which will be the longest range for any solid-fueled missile ever test-fired by North Korea to date (**Elleman, Michael 2019**). "The successful new-type SLBM test-firing is of great significance as it ushers in a new phase in containing the outside forces' threat to the DPRK and further bolstering its military muscle for self-defense," according to the Korean Central News Agency (KCNA) (**Lee, Joyce 2019**).

【Source】

Arms Control Association 2018: "Arms Control and Proliferation Profile: North Korea," Last Reviewed June 2018, <https://www.armscontrol.org/factsheets/northkoreaprofile#Nuclear> (accessed May 13, 2020)

Albright, David 2018: "Understanding North Korea's Nuclear Weapon Capabilities," 9 May 2018, http://isis-online.org/uploads/isis-reports/documents/Albright_North_Korea_slides_for_CTR_talk_may_9%2C_2018_final_pdf.pdf (accessed May 13, 2020)

Elleman, Michael 2020: "Preliminary Assessment of the KN-24 Missile Launches," 38 North, 25 March 2020, <https://www.38north.org/2020/03/melleman032520/> (accessed May 18,2020)

Elleman Michale 2019: "North Korea's New Pukguksong-3 Submarine-Launched Ballistic Missile," 39 North, 33 October 2019, <https://www.38north.org/2019/10/melleman100319/> (accessed May 18, 2020)

Gentile, Gian et al. 2019: "Four Problems on the Korean Peninsula—North Korea's Expanding Nuclear Capabilities Drive a Complex Set of Problems," RAND Corporation, January 2019, <https://www.rand.org/pubs/tools/TL271.html#download> (accessed May 13, 2020)

Hecker, Siegfried S., Carlin, Robert L. & Serbin, Elliot A. 2019-1: "A Comprehensive History of North Korea's Nuclear Program: 2018 Update," https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/2018colorchartnarrative_2.11.19_fin.pdf (accessed May 13, 2020)

Hecker, Siegfried S., Carlin, Robert L. & Serbin, Elliot A. 2019-2: "North Korea's Denuclearization: Status and Prospects," https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/april_2019_dprk_report_v3.pdf (accessed May 13, 2020)

International Panel on Fissile Materials (IPFM) 2018: "Fissile material stocks: North Korea," http://fissilematerials.org/countries/north_korea.html (accessed May 13, 2020)

Kile, Shannon N. & Kristensen, Hans M. 2019: "North Korea's nuclear forces," SIPRI Yearbook 2019: Armaments and Disarmament and International Security," pp.341-348.

Kristensen, Hans M. & Korda, Matt 2020: "Status of World Nuclear Forces," Federation of American Scientists. <http://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/> (accessed May 13, 2020)

Kristensen, Hans M. & Norris, Robert S. 2018: "North Korea nuclear capabilities, 2018," Bulletin of the Atomic Scientists, 74:1, 41-51, DOI: 10.1080/00963402.2017.1413062

Lee, Joyce 2019: "North Korea says it successfully tested new submarine-launched ballistic missile," Reuters, 3 October 2019, <https://www.reuters.com/article/us-northkorea-missiles-idUSKBN1WH2GS> (accessed May 13, 2020)

Lewis, Jeffrey 2019: "Preliminary Analysis: KN-23 SRBM," 5 June 2019, <https://www.nonproliferation.org/preliminary-analysis-kn-23-srbm/> (accessed May 18, 2020)

Masterson, Julia 2020: "North Korea Spurs Diplomacy With United States," Arms Control Today, May 2020, <https://www.armscontrol.org/act/2020-05/news/north-korea-spurns-diplomacy-united-states> (accessed May 13, 2020)

Missile Defense Project 2020-1: "KN-23," Missile Threat, Center for Strategic and International Studies, 1 July 2019, last modified 25 March 2020, <https://missilethreat.csis.org/missile/kn-23/> (accessed May 18, 2020)

Missile Defense Project 2020-2: "Pukguksong-2 (KN-15)," Missile Threat, Center for Strategic and International Studies, March 5, 2017, last modified April 15, 2020, <https://missilethreat.csis.org/missile/pukkuksong-2/> (accessed May 13, 2020)

Missile Defense Project 2020-3: "KN-24," Missile Threat, Center for Strategic and International Studies, 15 April 2020, last modified 28 April 2020, <https://missilethreat.csis.org/missile/kn-24/> (accessed May18, 2020)

Missile Defense Project 2019: "Pukguksong-1 (KN-11)," Missile Threat, Center for Strategic and International Studies, August 29, 2016, last modified November 1, 2019, <https://missilethreat.csis.org/missile/kn-11/> (accessed May 18, 2020)

Missile Defense Project 2018: "KN-08/Hwasong 13," <https://missilethreat.csis.org/missile/kn-08/#easy-footnote-bottom-8-271> (accessed May 13, 2020)

Missile Defense Project 2017: "North Korea Tests KN-15, says missile is ready for production," 21 May 2017. <https://missilethreat.csis.org/north-korea-tests-kn-15-says-missile-is-ready-for-production/> (accessed May 13, 2020)

Nikitin, Mary Beth D. 2019: "In Focus: North Korea's Nuclear and Ballistic Missile Programs," Congressional Research Service, January 29, 2019, <https://fas.org/sgp/crs/nuke/IF10472.pdf> (accessed May 13, 2020)

NTI 2018: "Country Profiles: North Korea: Missile," July 2017. <http://www.nti.org/learn/countries/north-korea/delivery-systems/> (accessed May 13, 2020)

Oh, Seok-min 2020: "N. Korea fires 2 short-range ballistic missiles toward East Sea: JCS," Yonhap News Agency, 21 March 2020, <https://en.yna.co.kr/view/AEN20200321000453325?section=nk/nk#none> (accessed May 18, 2020)

Panda, Ankit 2019: "North Korea Finally Unveils the Pukguksong-3 SLBM: First Takeaways," The Diplomat, 3 October 2019, <https://thediplomat.com/2019/10/north-korea-finally-unveils-the-pukguksong-3-slbm-first-takeaways/> (accessed May 13, 2020)

Roh, Suk-jo 2019: "N.Korea 'Could Have 30-40 Nukes Next Year'," The Chosun Ilbo, 17 September 2019, http://english.chosun.com/site/data/html_dir/2019/09/17/2019091701515.html (accessed May 13, 2020)

Schiller, Markus & Schmucker, Robert H. 2016: "Flashback to the Past: North Korea's "New" Extended-Range Scud," 8 November, 2016, <http://www.38north.org/2016/11/scuder110816/> (accessed May 13, 2020)

Van Diepen, Vann H. & Depetris, Daniel R. 2019: "Putting North Korea's New Short-Range Missiles Into Perspective," 38 North, 5 September 2019, <https://www.38north.org/2019/09/vvandiependdepetris090519/> (accessed May 18, 2020)

Wright, David 2017-1: "North Korea Launches Four Missiles "Simultaneously"," March 6, 2017. <https://allthingsnuclear.org/dwright/north-korea-launches-four-missiles-simultaneously> (accessed May 13, 2020)

Wright, David 2017-2: "North Korea's Missile in New Test Would Have 4,500 km Range," May 13, 2017. <http://allthingsnuclear.org/dwright/north-koreas-missile-in-new-test-would-have-4500-km-range> (accessed May 13, 2020)

Wright, David 2017-3: "North Korea Appears to Launch Missile with 6,700 km Range," July 3, 2017. <https://allthingsnuclear.org/dwright/north-korea-appears-to-launch-missile-with-6700-km-range> (accessed May 13, 2020)

Wright, David 2017-4: "North Korean ICBM Appears Able to Reach Major US Cities," July 28, 2017. <https://allthingsnuclear.org/dwright/new-north-korean-icbm> (accessed May 13, 2020)

Wright, David 2017-5: "North Korea's Missile Test over Japan," August 28, 2017. <http://allthingsnuclear.org/dwright/north-koreas-missile-test-over-japan> (accessed May 8, 2019)

Wright, David 2017-6: "North Korea's Sept. 15 Missile Launch over Japan," September 14, 2017. <http://allthingsnuclear.org/dwright/nk-sept-15-launch-over-japan> (accessed May 13, 2020)

Wright, David 2017-7: "North Korea's Longest Missile Test Yet," November 28, 2017. <https://allthingsnuclear.org/dwright/nk-longest-missile-test-yet> (accessed May 13, 2020)

Umebayashi, Hiromichi 2016: "Nuclear Delivery Means of DPRK," Peace Depot Working Paper No.3J, September 25, 2016, <http://www.peacedepot.org/wp-content/uploads/2016/12/WorkingPaper3J.pdf> (accessed May8, 2019)

Defense Ministry of Japan 2017: "North Korean missile launches in 2016," http://www.mod.go.jp/j/approach/surround/pdf/dprk_bm_20160909.pdf (accessed June 2, 2017)

Defense Ministry of Japan 2018: "National Defense Program Guidelines for FY2019 and beyond," <https://www.mod.go.jp/j/approach/agenda/guideline/2019/pdf/20181218.pdf> (accessed May 13, 2020)

©RECNA Nuclear Warhead Data Monitoring Team