



Center for Nonproliferation Studies
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CNS Special Report on North Korean Ballistic Missile Capabilities

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Recent North Korean flight-tests of a new short-range ballistic missile have reinforced concerns about North Korea's missile program and its ability to deliver weapons of mass destruction (WMD). North Korea has an array of short- and intermediate-range missile systems that can deliver conventional, chemical and possibly biological payloads. North Korea has not demonstrated the capability to deliver nuclear weapons with its ballistic missiles, but possibly could equip its medium-range Nodong missiles, which can reach Japan, with nuclear warheads. North Korea currently does not have an operational missile that can strike the United States.¹ However, U.S. intelligence estimates of the untested Taepodong-2's range have increased in recent years. According to a former director of the U.S. Defense Intelligence Agency, a two-stage Taepodong-2 could theoretically strike "portions of U.S. territory" and a three-stage version could strike "most of the continental United States."² At least two other mobile missiles are under development that would increase North Korea's military capabilities once they are deployed and operational. This special report answers key questions about North Korean ballistic missiles and presents CNS estimates of North Korea's ballistic missile capabilities. Although North Korea's cruise missile development poses an increasing threat, this report does not address Pyongyang's cruise missiles.

1. What can North Korea hit with its ballistic missiles?

a) Can North Korean missiles strike the continental United States? North Korea does not currently have an operational missile that can strike the United States. The U.S. intelligence community estimates that a two-stage version of the untested Taepodong-2 missile could reach Alaska, Hawaii, and parts of the western continental United States with a small high-explosive, biological or chemical payload, but probably not with a nuclear warhead. A three-stage version could theoretically strike all of the United

States.³ Given the probable inaccuracy of the Taepodong-2, these payloads would be militarily insignificant. However, this missile could possibly threaten the populations of a few large West Coast cities. North Korea has not demonstrated the capability to make a nuclear weapon small enough to be part of a missile warhead or the capability to produce a reentry vehicle. North Korea would probably require several years and additional flight-tests to develop a reliable ballistic missile system capable of delivering a nuclear warhead to the continental United States. There are reports that North Korea could develop an intercontinental ballistic missile (ICBM) that could strike most of the continental United States by 2015,⁴ but it is uncertain whether North Korea will have the resources and political will to sustain such a long-range development program.

b) Can North Korean missiles strike Japan? North Korea has two missiles, and possibly three, that can strike Japan. The Nodong could deliver conventional and WMD warheads throughout most of Japan (including several U.S. military bases). However, given the missile's relative inaccuracy, the Nodong is more useful as a "terror weapon" against population centers than as a significant military system—unless it is armed with a nuclear warhead. The Nodong is estimated to have a circular error probable (CEP) of 2-4 kilometers (km), which means half of the Nodongs fired would fall outside a circle of that radius.⁵ This poor accuracy means that North Korean efforts to strike U.S. bases in Japan would likely cause significant Japanese civilian casualties. The Paektusan-1 (also known as the Taepodong-1) is a two-stage missile with a Nodong as the first stage and a Scud variant as the second stage. The Paektusan-1 can strike anywhere in Japan's territory, but this system is even less accurate and less reliable than the Nodong. North Korea is also reportedly developing a new missile based upon the Soviet SS-N-6 (R-27) submarine-launched ballistic missile. The North Korean model, also known as the Taepodong-X, is a land-based mobile missile that uses liquid fuel and has an extended range of up to 4,000 km.⁶ In July 2004, South Korea's defense minister testified before the South Korean National Assembly that "North Korea was continuing engine tests and the development of this missile, and was in the middle of production and deployment."⁷ This new missile could strike anywhere in Japan, but Pyongyang has yet to demonstrate its reliability through a flight-test.

c) What threat do North Korea's missiles pose to South Korea? North Korea has deployed the Hwasŏng-5 (Scud-B), which is capable of striking targets in about two-thirds of South Korea, and the Hwasŏng-6 (Scud-C), which can strike anywhere in South Korea. Both missiles can be armed with

conventional or WMD warheads. Hwasŏng-5/6 missiles could strike U.S. military bases in South Korea, as well as densely-populated urban areas, industrial complexes, ports, and even South Korea's 20 nuclear reactors. North Korea's Hwasŏng-5/6 missiles would most likely be armed with high-explosive or chemical warheads. Estimates of missile CEPs are difficult to calculate, but these missiles likely have a CEP of about 1 km and 2 km, respectively. In May 2005, and in March 2006, North Korea conducted flight-tests of the KN-02, which is a new solid-fuel mobile ballistic missile based on the Soviet SS-21 Scarab.⁸ The North Korean model is an improved version with a range of 100-120 km, which would enable it to strike the U.S. military installations at Osan Air Base and Camp Humphreys in P'yŏngt'aek.⁹

2. How big is North Korea's missile arsenal? North Korea possesses more than 800 ballistic missiles, including "over 600 Scud missiles of various types and as many as 200 Nodong missiles."¹⁰ The distribution of Hwasŏng-5, Hwasŏng-6 and Scud-D missiles among this total is not clear. North Korea's historical production rate for Scud variant missiles is approximately seven to nine missiles per month. North Korea's historical production rate for Nodong missiles is one to three missiles per month. No reliable public data are available on the number of mobile launchers for North Korean Scud and Nodong missiles. North Korea flight-tested the Paektusan-1 on August 31, 1998, but the missile has not been deployed.¹¹ Furthermore, the Paektusan-1 has little strategic significance since it does not have the intercontinental range necessary to hit the United States. Pyongyang could have deployed a small number (less than 50) of North Korean SS-N-6 (R-27) or Taepodong-X missiles, but North Korea has not yet conducted a flight-test of this missile system. The Taepodong-2 is still in the research and development stage and has not been flight-tested. There is little public information on KN-02 deployments, but one analyst estimates the total number of deployed KN-02s and FROGs (free rocket over ground) as being "likely to exceed 150."¹²

3. How hard would it be to attack North Korea missiles? U.S. and South Korean forces would have a difficult time locating and destroying North Korean KN-02, Scud, Nodong, and Taepodong-X (SS-N-6) missiles because of their mobility, quantity, and relatively short launch preparation times. These missiles can be launched from mobile erector and launcher systems, which could potentially be sheltered in underground facilities to avoid attacks. The Paektusan-1 and Taepodong-2 would be launched from fixed sites that are known to U.S. and South Korean forces. These missiles must be stored near the launch site, making them vulnerable to attack. Launch preparations for the Paektusan-1 and Taepodong-

2 could be readily detected by satellite surveillance, because the missiles would need to sit on fixed launch pads for at least a day prior to actual launch for fueling. Some reports suggest that North Korea plans to base Paektusan-1 and Taepodong-2 missiles in underground facilities, possibly near North Korea's border with China, in order to protect them from attack.¹³ If underground missile launch sites are not detected by U.S. or South Korean intelligence, North Korea might be able to launch long-range missiles with little or no warning. However, launching missiles from concealed underground launch sites would add significantly to the difficulty of deploying an operational long-range missile capability. If the United States were to conduct a preemptive strike against North Korean missile bases, it would likely be executed with sea-launched cruise missiles and precision-guided munitions delivered by U.S. military aircraft. Furthermore, the United States could employ its nascent missile defense system against North Korean missiles. The United States has deployed a Patriot missile brigade to South Korea,¹⁴ and is deploying ground-based missile interceptors in Alaska and California.¹⁵

4. Who supplied missile technology to North Korea? North Korean missile development programs have clearly benefited from foreign assistance. Cooperation with the USSR began in the early 1960s with transfers to North Korea of various weapons systems, such as surface-to-air missiles and unguided artillery rockets.¹⁶ North Korea was eventually able to obtain Soviet Scud-B missiles, but the timing and source of the acquisition are controversial. The general consensus is that North Korea received a few Scud-B (R-17) missiles from Egypt between 1976 and 1981.¹⁷ However, there are unconfirmed reports that the USSR delivered 20 Scud missiles in 1972¹⁸ and about 240 Scud missiles between 1985 and 1988.¹⁹ The Hwasŏng-5 and Hwasŏng-6 are reverse-engineered versions of the Soviet Scud-B and Scud-C. China assisted North Korea's early missile development efforts through the transfer of surface-to-air and anti-ship missiles. In the mid-1970s, Beijing and Pyongyang cooperated on the development of a 600-km-range mobile ballistic missile, but the program was cancelled in 1978 after North Korean engineers had received some training in missile design and development.²⁰ Egypt and North Korea cooperated on the development of ballistic missiles in the 1970s and 1980s, but Cairo claims this cooperation has ended.²¹ North Korea has received missile technology or materials—directly, inadvertently, or illicitly—from Europe, China, Japan, Russia, and Syria. North Korea has also benefited from Russian missile expertise following the breakup of the Soviet Union.

5. Which countries have imported North Korea missiles? Missile exports are a major source of foreign exchange for the North Korean government. According to a U.S. military source, North Korean

missile exports to the Middle East during 2001 totaled about \$580 million;²² however, this figure has probably declined in recent years. North Korea's earliest and most loyal customer for missiles and missile technology has been Iran. In 1983 the two countries reached an agreement whereby North Korea provided Iran with technical assistance to establish a missile production facility.²³ Between the late 1980s and mid-1990s, Pyongyang sold about 200-300 Scud missiles to Tehran, along with transporter erector launchers (TELs) and anti-ship missiles.²⁴ North Korea also supplied Iran with a small number of Nodong missiles.²⁵ Egypt has also received North Korean missiles and related technologies. Cairo reportedly acquired missile parts and production capabilities for the Scud-B (Hwasŏng-5) system from Pyongyang during the 1980s and 1990s.²⁶ Unconfirmed reports from 2000 and 2001 claimed that Egypt purchased complete Nodong systems and missile engines from North Korea.²⁷ Pakistan has purchased North Korean missiles and technology; the Pakistani "Ghauri" missile is actually a renamed Nodong. Other countries that have purchased North Korean missiles, missile components, or missile technology include Libya, Syria, and Yemen.²⁸

6. Did North Korea trade missile technology to Pakistan for nuclear weapons assistance? Reports indicate that in exchange for Nodong missile systems and technology, Islamabad provided Pyongyang with materials and/or technology for a secret program to produce highly enriched uranium (HEU), which can be used as the fissile material in nuclear weapons.²⁹ North Korea delivered the missiles during 1997-98,³⁰ and Pakistan provided HEU materials and/or technologies as late as summer 2002.³¹ There are concerns that Dr. A. Q. Khan, the so-called "father of the Pakistani bomb," may have transferred nuclear weapons technology, particularly centrifuges, during a series of visits to North Korea beginning in the early 1990s.³²

7. Will North Korea conduct more missile tests? North Korea has the capability to launch KN-02, Scud, Nodong and Taepodong-X missiles with little or no advance warning; however, flight-tests of the Paektusan-1 or Taepodong-2 missiles would require lengthy preparations that would be detected by U.S. and South Korean intelligence. Based on past North Korean behavior, any ballistic missile flight-tests would probably be timed to maximize their political impact on the United States, Japan, and South Korea. Additional flight-tests would be necessary to develop and deploy reliable long-range missile systems. Some analysts believe North Korea may be reluctant to flight-test its long-range missiles because a test failure (such as the failure of the third stage that occurred during the last test in 1998) might undermine the credibility of threats to use long-range missiles. Others believe Pyongyang is

concerned that long-range missile tests will alienate key aid donors such as China and South Korea. In September 1999, North Korea agreed to suspend all ballistic missile flight tests while bilateral negotiations to improve U.S.-DPRK relations were underway.³³ However, the talks were suspended with the change of U.S. administrations in January 2001. Under the “Pyongyang Declaration” signed by Kim Jong Il and Japanese Prime Minister Koizumi in September 2002, North Korea “expressed its will to extend its moratorium on missile tests during 2003 and beyond.”³⁴ However, North Korean diplomats have announced on occasion that the moratorium might be lifted or that it is no longer in effect.³⁵ It is unclear whether these statements indicate a reversal of policy or are part of North Korea’s negotiation strategy.

8. What are the motives behind North Korea’s development of missiles? North Korea’s original motive for developing ballistic missiles likely followed Soviet doctrine by viewing missiles as a form of extended range artillery that can strike an enemy’s rear area during a conflict. Because North Korean doctrine envisions the use of chemical weapons in a major war, some of North Korea’s Scud missiles and artillery are probably equipped with chemical warheads. North Korea’s longer-range missiles—such as the Nodong, Paektusan-1, Taepodong-X (SS-N-6/R-27), and Taepodong-2—play a different role. By holding Japan at risk, North Korea probably hopes its missiles will prevent U.S. forces from using Japanese bases in the event of a future conflict. North Korea’s efforts to develop nuclear weapons and ICBMs capable of striking the continental United States are likely intended to deter possible U.S. intervention or use of nuclear weapons against North Korea. In addition, exports of ballistic missiles and missile technology are one of North Korea’s principal sources of hard currency. North Korea’s past discussions with the Clinton administration about ending its missile exports and long-range missile development programs suggest that North Korea also regards its missile programs as bargaining chips that might be traded for economic assistance or security guarantees.³⁶

9. What are the Chinese, Japanese, South Korean, and U.S. concerns about the North Korea missile threat?

Japan: Pyongyang’s ballistic missile program has been regarded as a growing threat to Japan’s national security since North Korea test-fired Nodong and Paektusan-1 missiles in 1993 and 1998, respectively.³⁷ In 2003, North Korea was reportedly building two new missile bases for a modified land-based version of the Soviet SS-N-6 (R-27), or so-called Taepodong-X.³⁸ The bases were said to be 70-80 percent complete in May 2004, but it is unclear if the missile systems expected to be deployed at these bases are

operational since they have never been flight-tested.³⁹ When Prime Minister Koizumi traveled to Pyongyang for a summit meeting with Kim Jong Il in September 2002, North Korea promised to extend its missile flight-test moratorium beyond 2003. However, during bilateral talks in February 2006 aimed at normalizing relations between the two countries, a North Korean delegate suggested that Pyongyang might scrap the moratorium.⁴⁰

In general, the Japanese government has been cautious in its reactions to North Korea's rhetoric and brinkmanship; however, Tokyo's patience has worn thin, partly because the Japanese public is upset at past North Korean abductions of Japanese citizens. Tokyo has demanded that the abduction issue be resolved before relations are normalized. Japanese leaders believe that, in the event of a military conflict, their country would be the primary target for North Korean missiles. Even without nuclear warheads, North Korean missiles could cause significant damage to Japan. Concerns about the North Korean missile threat have spurred Japanese interest in the possible development of offensive capabilities that could be used for preemptive strikes if a North Korean missile attack were imminent. A debate has emerged in Japan about possible efforts to amend Japan's constitution to allow the defense forces more flexibility, and even to reopen discussions about the once-taboo subject of a Japanese nuclear option. At the very least, Japan will continue its cooperation with the United States to develop and deploy missile defenses.

United States: Although North Korean ballistic missiles have been cited as a primary justification for the development and deployment of missile defense systems, North Korea's current missile force does not yet pose a substantial threat to U.S. territory. The untested Taepodong-X (SS-N-6) could strike U.S. military bases in Okinawa and possibly Guam, and although the untested Taepodong-2 has the potential to hit the continental United States, its ability to inflict major damage is doubtful because it could deliver only a small warhead with poor accuracy at this range. A three-stage version of the Taepodong-2 could conceivably deliver a larger warhead, and possibly a nuclear warhead, to the continental United States, but the reliability of this missile system is unproven. Furthermore, the preparation time for a Taepodong-2 launch is long enough to preclude a surprise attack, and North Korean launch facilities are vulnerable to a preemptive strike by U.S. forces. U.S. military planners are more concerned about attacks on U.S. forces based in Japan and South Korea, which are obvious targets for North Korean missiles and heavy artillery. The United States has about 32,000 military personnel in South Korea and about 47,000 troops

in Japan. Washington is concerned that North Korea might target U.S. forces or U.S. allies in Asia with missiles in the event of a military conflict, potentially limiting the U.S. ability to respond to a North Korean conventional attack. If North Korea could target the United States with nuclear weapons, U.S. military planners fear that Pyongyang might believe Washington would be deterred from fulfilling its alliance commitments, thus enabling aggressive North Korean military actions. North Korea's ability to strike South Korea and Japan with ballistic missiles also inhibits a U.S. preemptive strike against North Korean nuclear facilities. In addition to concerns about the political and military impact of North Korean missile capabilities, the United States is also concerned about exports of North Korean missiles and missile technologies to hostile states in other regions such as the Middle East.

South Korea: North Korean missiles are an immediate threat to South Korea's national security. One objective of Pyongyang's ballistic missile program was to obtain a missile capability that puts all of South Korea within range. South Korea has been exposed to the threat of Hwasŏng-5 and Hwasŏng-6 missiles since the 1980s. However, South Korea is equally concerned about North Korea's long-range artillery, which could inflict tremendous damage on Seoul with high-explosive or chemical shells. South Korea relies partly on the U.S. nuclear umbrella to deter a North Korean missile attack, but Seoul is also interested in developing independent capabilities to deter or respond to the North Korean threat. South Korea's missile development was limited by a 1979 agreement with the United States that prohibited the development of missile systems with a range greater than 180 km.⁴¹ In 2001, South Korea and the United States reached a new agreement that allowed Seoul to build and deploy missiles with ranges up to 300 km and to conduct research and development on missiles with a range of more than 300 km. South Korea joined the Missile Technology Control Regime (MTCR) in March of the same year.⁴² South Korea has not been especially interested in acquiring ballistic missile defense systems, partly because these systems are expensive and they would do nothing to reduce Seoul's vulnerability to attack by North Korean artillery.

China: Although China still sees North Korea as an important security buffer, relations between Beijing and Pyongyang have cooled significantly over the last three decades. While it is highly unlikely that the DPRK would use its missiles against China, leaders in Beijing probably view the North Korean missile program with unease. The Chinese leadership is concerned that North Korean missile flight-tests will encourage the United State and Japan to accelerate efforts to deploy missile defenses in Northeast Asia. China is particularly worried about any missile defense system being extended for Taiwan's protection

because Beijing fears this might embolden pro-independence forces in Taiwan. China has about 600 short-range ballistic missiles located in Fujian and Zhejiang Provinces opposite Taiwan in the belief that the missiles are a deterrent against a Taiwanese declaration of independence.⁴³ China is also concerned that North Korean missile development could trigger an arms race and increased militarization in the region.

Russia: Russia is committed to a peaceful solution to the Korean Peninsula crisis. However, Russian military officials have quietly made it clear that they do have relevant forces to bring to bear against North Korea should Pyongyang's actions threaten Russian security. In mid-2003, for example, in an interview with the newspaper *Izvestiya*, a Russian Pacific Fleet officer mentioned that Russian sea-launched cruise missiles would be highly effective in a preemptive strike against North Korea's missile sites, if Russia believed that Pyongyang intended to use nuclear weapons.⁴⁴ An ongoing Russian concern is that its Far Eastern region would suffer from radioactive fallout (or unintended strikes) if North Korea actually attacked the United States and Washington responded with nuclear weapons. Whether or not Moscow would in fact engage North Korean targets in such a crisis would likely depend on the specifics of the scenario. But the fact that Russian military officers have apparently discussed possible scenarios suggests that Moscow would not necessarily be a passive observer, as many observers might think, particularly if Pyongyang were the aggressor. The Russian military-to-military relationship with North Korea is no longer close and, through such activities as the Proliferation Security Initiative, Russian forces are gaining more experience in cooperative maneuvers with the U.S. military. On the other hand, Russian officials have made it clear that they would oppose any *unprovoked* U.S. strikes against North Korean missile sites or nuclear targets.

CNS Technical Assessments of North Korean Ballistic Missile Capabilities

	Range (km)	Payload (kg)	Warhead	CEP* (meters)	Launcher /Fuel	Likely Targets	Status
KN-02 (modified SS-21 Scarab)	100-120	250	conventional	250-300	mobile, solid fuel	tactical targets in South Korea	testing
Hwasŏng-5 (Scud-B)	300	987-989	conventional; possible nuclear, biological, or chemical	800-1,000	mobile, liquid fuel	South Korea	deployed exported
Hwasŏng-6 (Scud-C)	500 (calculated)	770	conventional; possible nuclear, biological, or chemical	2,000	mobile, liquid fuel	South Korea	deployed exported
Scud-D	700 (calculated)	500	conventional; no information on other types	unknown	mobile, liquid fuel	South Korea	deployed exported
Nodong	1,000 (calculated)	700	conventional; possible nuclear, biological, or chemical	2,000-4,000	mobile, liquid fuel	Japan	deployed exported
Taepodong-X (R-27/SS-N-6)	2,500-4,000 (estimated)	unknown	conventional; possible nuclear, biological, or chemical	1,000-2,000	mobile, liquid fuel	Japan, Okinawa, Guam,	deployed? exported?
Paektusan-1 (Taepodong-1; two-stages)	2,200 (calculated)	unknown	conventional; possible nuclear, biological, or chemical	unknown	fixed, liquid fuel	Japan, Okinawa, Guam,	testing deployed? exported?
Taepodong-2	5,000-6,000?	unknown	conventional; possible nuclear, biological, or chemical	unknown	fixed, liquid fuel	United States	R&D prototype testing

* CEP = circular error probable. CEPs for Hwasŏng-5 (Scud-B) and Hwasŏng-6 (Scud-C) are based on flight-test data. CEPs for other missiles are estimates with less reliability.

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¹ North Korea is developing a new land-based version of the SS-N-6, a Soviet submarine-launched ballistic missile. The estimated range of the North Korean model is 2,500-4,000 km. A North Korean missile would need a range of about 3,500 km to strike Guam.

² These claims are unsubstantiated and cannot be verified since the missile is untested. See John J. Lumpkin, "Defense Official Says North Korea Can Arm Missile with Nuclear Weapon," Associated Press, April 28, 2005, in Lexis-Nexis, <http://www.lexis-nexis.com>; David S. Cloud and David E. Sanger, "U.S. Aide Sees Arms Advance By North Korea," *New York Times*, April 29, 2005, p. 1, in Lexis-Nexis, <http://www.lexis-nexis.com>; Bradley Graham and Glenn Kessler, "N. Korean Nuclear Advance Is Cited; on Hill, Admiral Says Nation Can Arm Missiles," *Washington Post*, April 29, 2005, p. A1, in Lexis-Nexis, <http://www.lexis-nexis.com>.

³ National Intelligence Council, *Foreign Missile Developments and the Ballistic Missile Threat Through 2015*, December 2001, http://www.cia.gov/nic/special_missilethreat2001.html; Vice Admiral Lowell E. Jacoby, "Current and Projected National Security Threats to the United States," Testimony before the Senate Armed Services Committee, March 17, 2005, <http://www.dia.mil/publicaffairs/Testimonies/statement17.html>; Office of the Secretary of Defense, *Proliferation: Threat and Response*, January 2001, p. 11, <http://www.defenselink.mil/pubs/ptr20010110.pdf>.

⁴ General B.B. Bell, Testimony before the Senate Armed Services Committee, March 7, 2006, <http://armed-services.senate.gov/statemnt/2006/March/Bell%2003-07-06.pdf>; National Intelligence Council, *Foreign Missile Developments and the Ballistic Missile Threat Through 2015*, December 2001, http://www.cia.gov/nic/special_missilethreat2001.html.

⁵ David C. Wright, "An Analysis of the North Korean Missile Program," Roundtable Paper, Appendix III, *Commission to Assess the Ballistic Missile Threat to the United States (Rumsfeld Commission Report)*, July 15, 1998, http://www.fas.org/irp/threat/missile/rumsfeld/pt2_wright.htm; David C. Wright and Timur Kadyshev, "An Analysis of the North Korean Nodong Missile," *Science and Global Security*, Volume 4, 1994, http://www.princeton.edu/~globsec/publications/pdf/4_2wright.pdf.

⁶ Joseph S. Bermudez, "North Korea Deploys New Missiles," *Jane's Defence Weekly*, August 4, 2004, <http://jdjw.janes.com>; Andrew Feickert, "Missile Survey: Ballistic and Cruise Missiles of Foreign Countries," *CRS Report for Congress*, March 5, 2004, <http://fpc.state.gov/documents/organization/31999.pdf>; Yu Yong-wŏn, "Puk, 4000km sinhyŏng misail silchŏnbaech'i," *Chosun Ilbo*, May 4, 2004, <http://nk.chosun.com>.

⁷ Yu Yong-wŏn, "Puk, 3000~4000km sinhyŏng misail silchŏnbaech'i," *Chosun Ilbo*, July 7, 2004, <http://nk.chosun.com>.

⁸ "North's Missile a Modified SS-21," *Joongang Ilbo*, May 5, 2005, <http://joongangdaily.joins.com/200505/04/200505042259510109900090309031.html>; Yonhap News Agency, March 9, 2006 in "ROK's Yonhap: N. Korean Missiles Merely Part of Regular Drill: Officials," OSC Document: KPP20060309971049; Kim Kwi-gŭn, "<Puk tonggyehullyŏn chung tan'gŏrimisail palsa>," Yonhap News Agency, March 9, 2006, <http://www.yonhapnews.co.kr>; "Hanmi, puk misail chŏngbopandan sigakch'a," *Chosun Ilbo*, May 6, 2005, <http://nk.chosun.com>.

⁹ "Pukpalsa misail p'yŏngt'aekkkaji sajŏnggwŏn," *Chosun Ilbo*, May 4, 2005, <http://nk.chosun.com>.

¹⁰ General B. B. Bell, "Statement before the Senate Armed Services Committee," March 7, 2006.

¹¹ Yu Yong-wŏn, "Puk, 4000km sinhyŏng misail silchŏnbaech'i," *Chosun Ilbo*, May 4, 2004, <http://nk.chosun.com>.

¹² Joseph S. Bermudez, "Moving Missiles," *Jane's Defence Weekly*, August 3, 2005.

¹³ "Pukhan chiha misail kiji chunggukkyŏng pu'gŭn'e kŏnsŏl," *Chosun Ilbo*, July 7, 1999, in KINDS, <http://www.kinds.or.kr>; Kevin Sullivan and Mary Jordan, "North Korea Building New Missile Site, South Says," *Washington Post*, July 8, 1999, in Lexis-Nexis, <http://www.lexis-nexis.com>.

¹⁴ Franklin Fisher, "Rossi Takes Command of Army Patriot Missile Brigade," *Pacific Stars and Stripes*, July 17, 2005, <http://www.estripes.com>; Franklin Fisher, "Deployment of Patriot Missile Battalion to S. Korea Is Complete," *Pacific Stars and Stripes*, December 1, 2004, <http://www.estripes.com>.

¹⁵ Wade Boese, "Missile Defense Funding Soars to New Heights," *Arms Control Today*, March 2006, http://www.armscontrol.org/act/2006_03/MARCH-missiledefense.asp; U.S. Missile Defense Agency, "A Day in the Life of the BMDS," March 15, 2005, <http://www.mda.mil/mdalink/pdf/bmdsbook.pdf>.

¹⁶ Joseph S. Bermudez, Jr., "The North Korean 'Scud B' Program," *Jane's Soviet Intelligence Review*, May 1989, pp. 203-207; Joseph S. Bermudez, Jr., "A History of Ballistic Missile Development in the DPRK," Occasional Paper No. 2, Center for Nonproliferation Studies, November 1999, pp. 3-5; Chang Chun-ik, *Pukhan haek-misail chŏnjaeng* (Seoul: Sŏmundang, May 1999), pp. 246-247.

¹⁷ Yonhap News Agency, June 24, 1993, in "Defense Ministry Says Nodong-1 Test in May Successful," JPRS-TND-93-020, June 28, 1993, p. 1; Joseph S. Bermudez, Jr., "A History of Ballistic Missile Development in the DPRK," Occasional Paper No. 2, Center for Nonproliferation Studies, November 1999, p. 10; Joseph S. Bermudez, Jr., "Ballistic Ambitions Ascendant," *Jane's Defence Weekly*, April 10, 1993, pp. 20, 22; Chang Chun-ik, *Pukhan haek-misail chŏnjaeng* (Seoul:

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¹⁸ Interview with North Korean defector by Daniel A. Pinkston, senior research associate, Center for Nonproliferation Studies, November 1, 2000, Seoul.

¹⁹ SIPRI, *SIPRI Yearbook 1989: World Armaments and Disarmament* (Oxford: Oxford University Press, 1989), p. 256.

²⁰ Chang Chun-ik, *Pukhan haek-misail chönjaeng* (Seoul: Sömundang, May 1999), pp. 248-249, 265-266; John Wilson Lewis and Hua Di, "Beijing's Defense Establishment: Solving the Arms Export Enigma," *International Security*, Fall 1992, pp. 5-40; Yi Chöng-hun, "FROGesö taepodong kkaji: pukhan misail geim," *Sindonga*, August 1999, pp. 201-202.

²¹ "Cooperation," *Middle East Newslite*, Vol. 3, No. 244, June 22, 2001, <http://www.menewslite.com>; Janine Zacharia, "Mubarak Sees Hope for Progress under Sharon," *Jerusalem Post*, April 5, 2001, p. 2; "Speech by Egyptian President Mubarak to the Ad Hoc Committee of Arab American and American Jewish Leaders," Federal News Service, April 4, 2001, in Lexis-Nexis, <http://www.lexis-nexis.com>.

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