

# BACKGROUND

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## Allies Should Confront Imminent North Korean Nuclear Threat

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### Abstract

*U.S. policy toward North Korea has been complacent, based on a benign assessment of Pyongyang's nuclear and missile capabilities. Because most experts assess that North Korea still requires several more years before being able to put a nuclear warhead on a missile, policymakers believe they can continue to timidly pursue incremental sanctions and prepare defenses. But North Korea likely already has nuclear-tipped missiles that can reach Japan and U.S. bases there and a preliminary ability to reach the United States, although not with a warhead. With Pyongyang vowing never to abandon its nuclear weapons, Washington and its allies should immediately begin to augment their missile defenses.*

Experts predominantly assess that North Korea has developed several nuclear devices, but not yet mastered the ability to miniaturize a warhead or deliver it via missile. Media reports habitually declare that North Korean missiles cannot yet reach the United States. Based on this benign conclusion, policymakers presume the United States and its allies still have several years to diplomatically constrain North Korea's nuclear program, timidly pursue incremental sanctions, and prepare military defenses. This has led to U.S. policy complacency toward the North Korean threat.

This analytic construct is flawed because the available unclassified evidence indicates North Korea has likely already achieved warhead miniaturization, the ability to place nuclear weapons on its medium-range missiles, and a preliminary ability to reach the continental United States with a missile. As such, the United States and its allies face a greater threat today than is widely construed. North Korea also poses a global nuclear and missile proliferation threat.

This paper, in its entirety, can be found at <http://report.heritage.org/bg2913>

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### KEY POINTS

- Experts predominantly assess that North Korea has developed several nuclear devices, but not yet mastered the ability to miniaturize a warhead or deliver it via missile. U.S. and South Korean policymakers presume they still have several years to constrain North Korea's nuclear threat.
- Yet available unclassified evidence indicates North Korea has likely already achieved warhead miniaturization, the ability to place nuclear weapons on its medium-range missiles, and a preliminary ability to reach the continental United States with a missile.
- The United States and its allies face a greater threat today than is widely construed.
- North Korea now claims that it can strike the United States and its allies with nuclear weapons. Pyongyang has declared it will never negotiate away its nuclear arsenal.
- Washington and Seoul need to augment missile defenses to better protect against Pyongyang's more credible and deadly nuclear arsenal.

Pyongyang has clearly shown that it will not negotiate away its nuclear arsenal, and it even revised the North Korean constitution to enshrine itself as a nuclear nation. The regime now claims it can strike the United States and its allies with nuclear weapons.

The always dangerous North Korea seems even more so under its new leader Kim Jong-un. He has maintained his father's foreign policy—in a more reckless and unpredictable manner. Kim Jong-un's actions have poisoned the well, denying North Korea from receiving the level of resources and benefits necessary to improve the national economy. As a result, the regime's inability to achieve its diplomatic and economic objectives through its current "charm offensive" will lead it to return to more high-risk confrontational measures.

In the meantime, the U.S. is slashing its defense budget, and its allies are increasingly questioning the Obama Administration's resolve to defend them against the growing North Korean and Chinese threats. Washington and Seoul need to implement several military measures to better protect them against Pyongyang's more credible and deadly nuclear arsenal.

### **North Korean Capabilities Frequently Underestimated**

In December 2012, North Korea successfully put a satellite into orbit. The same technology can send a nuclear warhead to any point on Earth. Three months later, North Korea conducted its third nuclear test. These events clearly signaled that Kim Jong-un was continuing North Korea's decades-long quest to develop nuclear weapons and the means to deliver them.

Long ridiculed for repeated failures, North Korea's missile and nuclear programs now directly threaten the United States and its allies. Yet, the majority of analysts and policymakers still downplay the possibility that North Korea could have nuclear-tipped missiles or a preliminary ability to reach the United States.

This is due partly to the difficulty of gathering reliable information on North Korea's secret military programs. Even the U.S. Intelligence Community refers to North Korea as the "hardest of the hard targets."

For several decades, however, experts have tended to downplay progress in North Korean nuclear and missile programs. They have frequently under-

estimated North Korea's nuclear and missile programs due to ideologically driven analysis, political expediency, and the belief that a technologically and economically backward nation could not achieve the necessary breakthroughs.

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### **North Korea's missile and nuclear programs now directly threaten the United States and its allies.**

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Skeptics initially dismissed evidence of North Korea's plutonium-based nuclear weapons, highly enriched uranium (HEU) program, involvement in constructing a Syrian nuclear reactor, and ability to develop long-range missiles. U.S. intelligence estimates of these programs were dismissed as politically motivated, until they were proven indisputably correct.

Enough information is available to conclude that North Korea has the ability to deliver nuclear weapons via No-Dong medium-range ballistic missiles, which can reach Japan, and has achieved greater progress in its uranium-based nuclear weapons program than commonly assumed. Factors for such an assessment include:

1. The decades-long duration of North Korea's nuclear and missile programs;
2. The technology, expertise, and components acquired from collaborative involvement with Pakistan, the A. Q. Khan network, and Iran;
3. Pakistan, which received assistance *from* North Korea, is unquestioningly assessed by experts as having nuclear-capable short-range missiles;
4. The scope and sophistication of the uranium enrichment program revealed to a U.S. scientist;
5. Repeated instances of experts underestimating North Korean nuclear and missile capabilities;
6. North Korean declarations of its ability to hit the U.S. and its allies with nuclear weapons; and
7. Recent U.S. and South Korean government assessments of North Korean breakthroughs.

## North Korea's Nuclear and Missile Programs

North Korea's missile and nuclear successes raise questions as to how a technologically backward nation could achieve what few other nations have done. While many assume China was a secret supplier, the reality is that North Korea's programs are indigenous, although reliant on foreign technology and components. Pyongyang's success is chilling because that means other countries could pursue a similar path. Pyongyang's achievements should provide compelling motivation for the international community to take steps to curtail these programs.

**Plutonium Weapons Program.** North Korea's quest for nuclear weapons began more than half a century ago. In the late 1950s, North Korea signed a nuclear cooperation agreement with the Soviet Union for a small research reactor, which became the predecessor to reactors at the Yongbyon nuclear facility. Moscow also agreed to train North Korean scientists and engineers, which continued until the demise of the Soviet Union.

In the 1960s, North Korea questioned the reliability of Soviet and Chinese military support after Moscow abandoned Fidel Castro during the Cuban Missile Crisis and after Beijing refused to share its nuclear secrets. Pyongyang decided it needed to develop independent missile and nuclear capabilities.

By the 1990s, the U.S. Intelligence Community assessed that North Korea had produced one or two plutonium-based nuclear weapons.<sup>1</sup> However, A. Q. Khan, father of Pakistan's nuclear weapons program, claimed that during a 1999 visit to North Korea he was shown components for three finished nuclear warheads ready for deployment on missiles.<sup>2</sup>

In 2005, Pyongyang declared that it had "manufactured nuclear weapons and was compelled to bolster its nuclear weapons arsenal."<sup>3</sup> Pyongyang conducted nuclear tests in 2006, 2009, and 2013 and is

now estimated to have enough fissile material for six to eight plutonium-based nuclear weapons.

**Uranium Weapons Program.** Even as Pyongyang signed several agreements to never pursue a nuclear weapons program,<sup>4</sup> the regime was developing a second, parallel path to augmenting its nuclear weapons arsenal.

Successive U.S. Administrations had a growing sense that Pyongyang was pursuing an HEU program, although information remained scarce. U.S. suspicions grew to the point that in 1999 and 2000 the Clinton Administration could no longer certify to Congress that North Korea was not pursuing a uranium-enrichment capability.

Deputy Secretary of State Richard Armitage described that in July 2002 the United States "received very good intelligence which made us dramatically change our assessment from [North Korea] being involved in just an R&D program... an order of magnitude difference in the estimate... which showed that they were receiving many, many more [centrifuges] than it was originally thought." This led the Intelligence Community to conclude that North Korea had "embarked on a production program, no longer an R&D program."<sup>5</sup>

In an October 2002 meeting, the U.S. accused Pyongyang of pursuing a covert uranium nuclear weapons program. Initially, North Korean officials privately admitted to the uranium program, but the regime subsequently recanted the admission. When the U.S. accusation became public, many experts initially dismissed the U.S. intelligence reports, either because they believed that the Bush Administration had hyped the intelligence or because catching North Korea cheating on international agreements would undermine the analysts' own advocacy for engaging Pyongyang.

U.S. Assistant Secretary of State for East Asia Christopher Hill dismissed Pyongyang's ability

1. Central Intelligence Agency, estimate for Congress, November 19, 2002, <http://www.fas.org/nuke/guide/dprk/nuke/cia111902.html> (accessed May 1, 2014), and National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat Through 2015: Unclassified Summary of a National Intelligence Estimate," December 2001, <http://www.fas.org/irp/nic/bmthreat-2015.htm> (accessed May 1, 2014).
2. R. Jeffrey Smith and Joby Warrick, "Pakistani Scientist Depicts More Advanced Nuclear Program in North Korea," *The Washington Post*, December 28, 2009, <http://www.washingtonpost.com/wp-dyn/content/article/2009/12/27/AR2009122701205.html> (accessed May 1, 2014).
3. Korean Central News Agency, "DPRK Foreign Minister on Its Stand to Suspend Its Participation in Six-Party Talks for Indefinite Period," February 10, 2005, <http://www.kcna.co.jp/item/2005/200502/news02/11.htm> (accessed May 1, 2014).
4. The 1992 North-South Korean Joint Declaration of the Denuclearization of the Korean Peninsula, the 1994 U.S.-North Korea Agreed Framework, the Non-Proliferation Treaty, and International Atomic Energy Agency's Safeguards Agreement.
5. Jeffrey Lewis, "Nuke Cheating: Size Matters," *Wired*, March 5, 2007, [http://www.wired.com/2007/03/well\\_after\\_amer/](http://www.wired.com/2007/03/well_after_amer/) (accessed May 1, 2014).

to enrich uranium for nuclear weapons. As he colorfully described, “Some people imagine there is a building somewhere with a secret door they can open and find a group of scantily clad women enriching uranium.”<sup>6</sup>

Subsequently acquired information indicated that North Korea began its uranium program in the late 1980s, when North Korea initiated an extensive procurement effort to acquire the necessary expertise, material, and components.

Pakistan—or Pakistan nuclear scientist A. Q. Khan acting on his own—provided a nuclear package deal to Pyongyang in the 1990s that included centrifuges, uranium hexafluoride (UF<sub>6</sub>) nuclear fuel, and one or more warhead designs.<sup>7</sup> In 1993, Pakistan Prime Minister Benazir Bhutto directly provided North Korea with sensitive centrifuge data.<sup>8</sup> With centrifuges and UF<sub>6</sub>, North Korea had the means and material to produce fuel-grade and even weapons-grade uranium.

The U.S. eventually assessed that North Korea–Pakistan links had been greater than previously thought. The CIA concluded that Pyongyang had received a nuclear package from Pakistan similar to that provided to Libya, including detailed, step-by-step instructions to produce a Chinese-designed nuclear warhead that could be delivered by North Korea’s No-Dong missile.<sup>9</sup>

In 2004, Khan stated that North Korea’s nuclear weapons were “the perfect nuclear weapons, technologically more advanced than ours.”<sup>10</sup> Khan

described how, in return for Pakistani assistance to Pyongyang’s centrifuge program, “North Korea would help Pakistan in fitting the nuclear warhead into the Ghauri missile.”<sup>11</sup>

The Ghauri is Pakistan’s version of the No-Dong missile, which it originally purchased from North Korea. Khan’s assertion is important because analysts continue to assert that North Korea has not yet developed the ability to mount nuclear warheads on its No-Dong missile while unequivocally accepting Pakistan has that ability.

The extent of North Korea’s nuclear weapons program became apparent in November 2010 when the regime disclosed a facility with 2,000 centrifuges to visiting U.S. scientist Dr. Siegfried Hecker, former head of the Los Alamos nuclear laboratory. Hecker was stunned by the size and sophistication of the facility, which exceeded all predictions of North Korean progress on a uranium program.<sup>12</sup> Prior to his visit, Hecker—like many U.S. experts—had dismissed such potential capabilities. In 2008, he assessed, “it is highly likely that North Korea had a research and development uranium enrichment effort, but there is little indication that they were able to bring it to industrial scale.”<sup>13</sup> After reversing his assessment, Hecker cautioned, “It was another lesson that one should not underestimate the skill and determination of the North Koreans.”<sup>14</sup>

The scope of the uranium program is likely even more extensive than that revealed in 2010. A. Q. Khan assessed that North Korea had 3,000 or more centri-

6. Ed Royce, “Enriching Knowledge of North Korea,” Office of U.S. Representative Ed Royce, November 22, 2010, <http://royce.house.gov/newsblog/documentsingle.aspx?DocumentID=215661> (accessed May 1, 2014).
7. David E. Sanger, “U.S. Sees More Arms Ties Between Pakistan and Korea,” *The New York Times*, March 14, 2004, <http://www.nytimes.com/2004/03/14/international/asia/14KORE.html> (accessed May 1, 2014); Smith and Warrick, “Pakistani Scientist Depicts More Advanced Nuclear Program in North Korea”; and Pervez Musharraf, *In the Line of Fire: A Memoir* (New York: Free Press, 2006), p. 296.
8. Shyam Bhatia, *Goodbye Shahzadi, A Political Biography of Benazir Bhutto* (New Delhi: Lotus Rolli Books, 2008).
9. Joby Warrick and Peter Slevin, “Libyan Arms Designs Traced Back to China,” *The Washington Post*, February 15, 2004, and Sanger, “U.S. Sees More Arms Ties Between Pakistan and Korea.”
10. David Albright, “North Korean Miniaturization,” 38 North, February 13, 2013, <http://38north.org/2013/02/albright021313/> (accessed May 1, 2014).
11. Smith and Warrick, “Pakistani Scientist Depicts More Advanced Nuclear Program in North Korea” (emphasis added).
12. Siegfried S. Hecker, “What I Found in North Korea,” *Foreign Affairs*, December 9, 2010, at <http://www.foreignaffairs.com/articles/67023/siegfried-s-hecker/what-i-found-in-north-korea> (accessed May 1, 2014).
13. Siegfried S. Hecker, “Denuclearizing North Korea,” *Bulletin of the Atomic Scientists*, Vol. 64, No. 2 (May/June 2008), <http://uskoreainstitute.org/pdf/HeckerDenuclearizingNK.pdf> (accessed May 1, 2014).
14. Barbara Demick, “North Korea Not a Nuclear Threat to U.S. Yet, Scientist Says,” *Los Angeles Times*, February 14, 2013, <http://articles.latimes.com/2013/feb/14/world/la-fg-north-korea-nuclear-scientist-20130215> (accessed May 3, 2014).

fuges<sup>15</sup> by 2002, eight years before the Hecker visit. Olli Heinonen, former Safeguards Director at the International Atomic Energy Agency (IAEA), estimated that North Korea was likely developing a 5,000 centrifuge enrichment facility.<sup>16</sup> North Korea has sought enough components for 10,000 centrifuges.<sup>17</sup>

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## “One should not underestimate the skill and determination of the North Koreans.”

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In November 2013, South Korean Minister of Defense Kim Kwan-jin testified that North Korea had the ability to build uranium-based nuclear weapons.<sup>18</sup> The lengthy tenure of North Korea’s uranium weapons program is also significant because it was operating even as President Bill Clinton and South Korean President Kim Dae-jung were actively engaging North Korea and providing diplomatic and economic benefits. The time line rebuts Pyongyang’s assertions that the program was born of a fear of attack in response to President George W. Bush’s foreign policy.

Pyongyang’s decision to violate its international denuclearization commitments while receiving large-scale aid, engaging in missile negotiations with the U.S., and meeting with the South Korean president and U.S. Secretary of State Madeleine Albright in 2000 bodes ill for the veracity of any future denuclearization commitments.

**Missiles.** North Korea has an extensive ballistic missile force that can strike South Korea, Japan, and

U.S. military bases in Asia. Pyongyang has deployed 800 Scud short-range tactical ballistic missiles, 300 No-Dong medium-range missiles, and 100 to 200 Musudan intermediate-range ballistic missiles. The Scud missiles threaten South Korea, the No-Dong can target all of Japan, and the Musudan can hit U.S. bases on Okinawa and Guam.

Pyongyang continues development of the Taepo-Dong (TD) series of long-range missiles, which have not yet reached initial operating capacity. In August 1998, North Korea launched a TD-1 missile, which flew over Japan. In July 2006, Pyongyang launched a TD-2 missile, which failed after 42 seconds of flight and crashed into the East Sea. In April 2009, a TD-2 flew 3,700 kilometers (km), and after a failed launch in April 2012, Pyongyang successfully put a satellite into orbit in December 2012.

## North Korea Claims Nuclear-Capable Missiles

Pyongyang now asserts that it has full nuclear strike capability. In October 2012, the National Defense Commission warned its strategic rocket forces can hit U.S. bases in South Korea, Japan, and Guam as well as on the U.S. mainland.<sup>19</sup> In February 2013, North Korea announced that its nuclear test was a “miniaturized and lighter” nuclear weapon that could fit atop a missile.<sup>20</sup> In March 2013, the Korea People’s Army Supreme Command warned, “The U.S. should not forget that Anderson AFB in Guam [and] naval bases in Japan and Okinawa are within striking range of the DPRK’s precision strike means.”<sup>21</sup> In March 2013, Kim Jong-un and several generals were photographed in front of a map depict-

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15. Capacity to produce highly enriched uranium for nuclear weapons is directly proportional to the number of centrifuges available. Large numbers of centrifuges would indicate that North Korea’s uranium program could be closer to producing nuclear weapons than previously assessed.
  16. Olli Heinonen, “The North Korean Nuclear Program in Transition,” 38 North, April 26, 2012, <http://38north.org/2012/04/oheinonen042612/> (accessed May 1, 2014).
  17. David Albright and Christina Walrond, “North Korea’s Estimated Stocks of Plutonium and Weapon-Grade Uranium,” Institute for Science and International Security, August 16, 2012, [http://isis-online.org/uploads/isis-reports/documents/dprk\\_fissile\\_material\\_production\\_16Aug2012.pdf](http://isis-online.org/uploads/isis-reports/documents/dprk_fissile_material_production_16Aug2012.pdf) (accessed May 1, 2014).
  18. Kim Eun-jung, “N. Korea Can Produce Uranium-Based Nuclear Bomb: Seoul’s Defense Chief,” Yonhap, November 20, 2013, <http://english.yonhapnews.co.kr/national/2013/11/20/66/0301000000AEN20131120008200315F.html> (accessed May 1, 2014).
  19. “N. Korea Says Its Rockets Could Hit Continental US,” *Chosun Ilbo*, October 12, 2012, [http://english.chosun.com/site/data/html\\_dir/2012/10/10/2012101000437.html](http://english.chosun.com/site/data/html_dir/2012/10/10/2012101000437.html) (accessed May 1, 2014).
  20. Permanent Mission of the Democratic People’s Republic of Korea, “Note Verbale Dated 13 February 2013 from the Permanent Mission of the Democratic People’s Republic of Korea to the United Nations Addressed to the President of the Security Council,” S/2013/91, February 14, 2013, <http://www.undocs.org/S/2013/91> (accessed May 1, 2014).
  21. “North Korea Says U.S. Bases in Japan, Guam Could Be Targeted by Nukes,” *Mainichi Shimbun*, March 21, 2013.

ing missile launch azimuths from Korea to Hawaii and three targets in the continental United States.<sup>22</sup>

Pyongyang threatened to turn Seoul and Washington into “seas of fire” through a “diversified precise nuclear strike,”<sup>23</sup> using “lighter and smaller nukes unlike what they had in the past.”<sup>24</sup> The word “diversified” was interpreted as Pyongyang having developing both plutonium and uranium weapons.<sup>25</sup>

### **Allied Reassessment of North Korean Capabilities**

During the past year, the United States and South Korea have revised their estimates and now see a more dire North Korean threat. After recovering components of the North Korean long-range missile launched in December 2012, South Korea assessed that it had “a range of more than 10,000 kilometers.”<sup>26</sup> In March 2013, Minister of Defense Kim Kwan-jin told the National Assembly that the missile could have reached the U.S. West Coast.<sup>27</sup> New York and Washington, D.C., are approximately 11,000 km from North Korea.

U.S. Vice Chairman of the Joint Chiefs of Staff Admiral James Winnefeld stated in March 2013, “We believe the KN-08 probably does have the range to reach the United States. The North Korean threat went just a little bit faster than we might have expected.”<sup>28</sup> In April 2013, the Obama Administration reversed its decision to cut construction of 14 additional missile defense interceptors in Alaska,

claiming an unexpected acceleration of the North Korean missile threat.

Following an August 2013 meeting between South Korean Minister of Defense Kim Kwan-jin and U.S. Secretary of Defense Chuck Hagel, a Ministry of Defense official commented that both countries agreed that North Korea could “miniaturize nuclear warheads small enough to mount on ballistic missiles in the near future.”<sup>29</sup>

### **North Korea has an extensive ballistic missile force that can strike South Korea, Japan, and U.S. military bases in Asia.**

U.S. experts concluded that the recovered North Korean missile provided “tangible proof that North Korea was building the missile’s cone at dimensions for a nuclear warhead, durable enough to be placed on a long-range missile that could re-enter the earth’s atmosphere from space.” A U.S. official added that South Korea provided other intelligence suggesting that North Korea had “mastered the miniaturization and warhead design as well.”<sup>30</sup>

In April 2013, U.S. officials told reporters that North Korea “can put a nuclear weapon on a missile, that they have missile-deliverable nuclear weap-

22. Jeffrey Lewis, “North Korean Targeting,” Arms Control Wonk, April 8, 2013, <http://lewis.armscontrolwonk.com/archive/6515/north-korean-targeting> (accessed May 1, 2014).

23. Choe Sang-hun, “North Korea Threatens to Attack U.S. with ‘Lighter and Smaller Nukes,’” *The New York Times*, March 5, 2013, <http://www.nytimes.com/2013/03/06/world/asia/north-korea-threatens-to-attack-us-with-lighter-and-smaller-nukes.html> (accessed May 1, 2014).

24. Ibid.

25. North Korea has a finite amount of plutonium for nuclear weapons, and any additional tests will deplete the existing stock. However, if Pyongyang conducts a nuclear test using a uranium-based weapon, it would demonstrate that it has a second program to augment its existing nuclear weapons arsenal.

26. “S. Korea Says Debris Reveals North’s ICBM Technology,” Voice of America, December 23, 2012, <http://www.voanews.com/content/north-korea-missile/1570703.html> (accessed May 1, 2014).

27. “N. Korea Rocket ‘Could Fly 10,000 km,’” *Chosun Ilbo*, April 16, 2012, [http://english.chosun.com/site/data/html\\_dir/2012/04/16/2012041601302.html](http://english.chosun.com/site/data/html_dir/2012/04/16/2012041601302.html) (accessed May 1, 2014).

28. Park Hyun, “US to Boost Missile Defense in Response to North Korean Threats,” *The Hankyoreh*, March 18, 2013, <http://english.hani.co.kr/arti/ENGISSUE/102/578507.html> (accessed May 1, 2014).

29. Jeong Yong-soo and Kang Jin-kyu, “U.S., Korea See Larger Nuclear Threat,” *JoongAng Ilbo*, August 29, 2013, <http://koreajoongangdaily.joins.com/news/article/article.aspx?aid=2976819> (accessed May 1, 2014).

30. Eli Lake, “US Recovery of North Korean Satellite Exposed Nuclear Progress,” *The Telegraph*, April 15, 2013, <http://www.telegraph.co.uk/journalists/the-daily-beast/9995514/US-recovery-of-North-Korean-satellite-exposed-nuclear-progress.html> (accessed May 1, 2014).

ons, but not ones that can go more than 1,000 miles [1,609 km].”<sup>31</sup> Yet in March 2014, General Charles Jacoby, chief of the North American Aerospace Defense Command, testified that “tangible evidence of North Korean and Iranian ambitions reinforces our understanding of how the ballistic missile threat to the homeland has matured from a theoretical to a practical consideration.”<sup>32</sup>

### **North Korea Expands Nuclear and Missile Facilities**

Since Kim Jong-un assumed power, North Korea has initiated, expanded, and accelerated construction efforts for fissile material production (both plutonium and uranium), nuclear test preparations, and missile launch facilities. This construction activity will enhance Pyongyang’s ability to expand its nuclear arsenal and to deliver them via missiles.

North Korea restarted its 5 MWe (megawatts electrical) nuclear reactor to expand its supply of weapons-grade plutonium. Construction activity was observed in mid-2013 at several locations in the Yongbyon nuclear complex, and activity indicating resumption of the reactor was observed by October 2013.

In December 2013, commercial satellite imagery identified a probable fuel fabrication plant for a plutonium production reactor. This indicates a more extensive North Korean effort to modernize and restart the Yongbyon complex than previously assessed, dating back to 2009. When operational, the reactor could produce approximately 6 kilograms of plutonium (enough for one nuclear weapon) per year.<sup>33</sup>

Pyongyang also continued to augment the parallel path of uranium-based nuclear weapons. By

August 2013, North Korea had doubled the size of the building housing the gas centrifuge plant for uranium enrichment at Yongbyon. Pyongyang has declared the plant produces low enriched uranium to fuel the experimental light water reactor under construction at Yongbyon. However, fuel-grade uranium can be enriched, either at Yongbyon or at additional covert facilities, to weapons-grade uranium.

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**“Tangible evidence of North Korean and Iranian ambitions reinforces our understanding of how the ballistic missile threat to the U.S. has matured from a theoretical to a practical consideration.”**

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Doubling available floor space could allow doubling the number of uranium centrifuges. In 2010, North Korea stated that 2,000 centrifuges were present in the original building; thus it could hold 4,000 centrifuges. The Institute for Science and International Security estimates that the expanded facility could produce enough weapons-grade uranium for up to two nuclear weapons per year.<sup>34</sup>

There was also significant excavation activity at the Punggye-ri Nuclear Test Site in early 2014. North Korea has two completed tunnels ready for additional nuclear tests and is excavating a third tunnel.<sup>35</sup> In late April 2014, increased activity at the test site indicates continued North Korean intent to test additional nuclear weapons.

North Korea is modifying the launch gantry at the Sohae missile launch site to enable launching

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31. Richard Engel, “Will North Korea Follow Through on Nuclear Threats?” NBC News, April 3, 2013, <http://www.nbcnews.com/video/nightly-news/51421978> (accessed May 1, 2014).
  32. General Charles H. Jacoby Jr., statement before the Committee on Armed Services, U.S. Senate, March 13, 2014, [http://www.armed-services.senate.gov/imo/media/doc/Jacoby\\_03-13-14.pdf](http://www.armed-services.senate.gov/imo/media/doc/Jacoby_03-13-14.pdf) (accessed May 3, 2014).
  33. 38 North, “Update on Yongbyon: Restart of Plutonium Production Reactor Nears Completion; Work Continues on the Experimental Light Water Reactor,” June 3, 2013, <http://38north.org/2013/06/yongbyon060313/> (accessed May 1, 2014); 38 North, “More Evidence That North Korea Has Restarted Its 5 MWe Reactor,” October 2, 2013, <http://38north.org/2013/10/yongbyon100213/> (accessed May 1, 2014); and 38 North, “Major Development: Reactor Fuel Fabrication Facilities Identified at Yongbyon Nuclear Complex,” December 23, 2013, <http://38north.org/2013/12/yongbyon122313/> (accessed May 1, 2014).
  34. David Albright and Robert Avagyan, “Recent Doubling of Floor Space at North Korean Gas Centrifuge Plant,” Institute for Science and International Security, August 7, 2013, [http://isis-online.org/uploads/isis-reports/documents/Yongbyon\\_fuel\\_facility\\_7Aug2013.pdf](http://isis-online.org/uploads/isis-reports/documents/Yongbyon_fuel_facility_7Aug2013.pdf) (accessed May 1, 2014).
  35. 38 North, “North Korea’s Punggye-ri Nuclear Test Site: Significant Acceleration in Excavation Activity; No Test Indicators,” February 13, 2014, <http://38north.org/2014/02/punggye021314/> (accessed May 1, 2014).
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rockets of up to 50 meters in length, almost 70 percent longer than the Unha-3 space launch vehicle that was tested twice in 2012. The gantry modifications, part of a major construction project at Sohae, was projected to be complete by April 2014 and will allow a more robust test program for theater-range and intercontinental ballistic missiles.<sup>36</sup> Pyongyang is also constructing two flat launch pads, most likely for testing road-mobile missiles, such as the Musudan intermediate-range ballistic missile and the KN-08 intercontinental ballistic missile (ICBM).<sup>37</sup>

In late 2013, after a year-long hiatus, North Korea began constructing new facilities at the Tonghae Satellite Launching Ground, including a launch pad, a missile assembly building, and a launch control center. These facilities appear to be designed to test future generations of larger, more capable rockets. North Korea had previously used the Tonghae site for test launching missiles, but appears to have shifted operations to the newer, more capable Sohae complex. However, restarted construction at Tonghae indicates North Korea will maintain two launch sites for larger missiles under development.<sup>38</sup>

### North Korea as Proliferation Risk

The uranium enrichment facility revealed in 2010 will not only augment North Korea's nuclear arsenal but also increase the risk of nuclear proliferation. The HEU facility was not present a year earlier when foreign observers visited Yongbyon, indicating it was created elsewhere and transferred undetected. U.S. intelligence officials concluded that North Korea has a sophisticated network of additional covert sites, including other fully operational enrichment sites.<sup>39</sup> Uranium enrichment facilities are smaller and easier to conceal than plutonium-processing activities.

The revelation of this uranium facility is worrisome because it precludes an accurate assessment of North Korea's nuclear bomb-making capacities

and thus the scope of the military threat to the United States and its allies. This leads to increased risk when U.S. officials routinely underestimate North Korean capabilities and progress. In other words, given North Korea's past successes in maintaining secrecy, U.S. officials need to be more aggressive in rooting out the truth of North Korea's nuclear program. It also increases the need for an even more intrusive verification regime in any follow-on negotiations—more intrusive than what Pyongyang rejected during the Six-Party Talks.

Pyongyang has a long history of exporting missiles, conventional weapons, and nuclear reactor assistance. In March 2003, Li Gun, head of North Korea's delegation to nuclear negotiations, told U.S. officials that the North would expand, demonstrate, and transfer technology from its nuclear program if the United States did not end its hostile policy.<sup>40</sup>

North Korea may be emboldened to proliferate because it avoided any penalty for building a nuclear reactor in Syria. In November 2006, President Bush vowed that “the transfer of nuclear weapons or material by North Korea to states or nonstate entities—especially to the Middle East—would be considered *a grave threat* to the United States, and *we would hold North Korea fully accountable* for the consequences of such action.”<sup>41</sup> Yet neither the United States nor the United Nations imposed any punitive measures.

North Korea's willingness to engage in high-risk behavior by constructing a reactor in Syria suggests a number of disturbing conclusions about dealing with North Korea:

1. **Treaties do not work.** Pyongyang's involvement occurred when it was a member of the Non-Proliferation Treaty, suggesting that treaties are ineffective in curtailing North Korean behavior. The international unwillingness to impose a penalty on North Korea has undermined the treaty's viability.

36. 38 North, “North Korea Nears Completion of Larger Rocket Launch Pad,” February 6, 2014, <http://38north.org/2014/02/sohae020614/> (accessed May 1, 2014).

37. 38 North, “Significant Developments at North Korea's Sohae Test Facility,” January 29, 2014, <http://38north.org/2014/01/sohae012914/> (accessed May 1, 2014).

38. 38 North, “Construction at Tonghae Resumes: No Tests Likely in 2013,” November 29, 2013, <http://38north.org/2013/11/tonghae112913/> (accessed May 1, 2014).

39. David E. Sanger and William J. Broad, “North Korean Nuclear Ability Seen to Far Outpace Iran's,” *The New York Times*, December 14, 2010.

40. Author's interview with former U.S. official December 2007.

41. Associated Press, “World Aligns Against N. Korea for Nuclear Test,” NBC News, October 9, 2006 (emphasis added).



2. **Negotiations do not work.** North Korea continued its involvement while engaged in Six-Party Talks, indicating there is no direct link between negotiating with Pyongyang and preventing violations or provocations.
3. **The IAEA does not work.** The IAEA failed to detect or respond effectively to nuclear proliferation. Israel's attack on Syria's al-Kibar reactor was due to a lack of confidence that the IAEA could deter a security threat. Even after the attack, when it was clear that the reactor was a blatant violation, the IAEA imposed no penalties.
4. **Weak sanctions do not work.** Pyongyang has acquired the necessary resources for its nuclear program and proliferated the resulting nuclear technology, suggesting the threat of insufficient and timidly implemented sanctions has not been a deterrent.
5. **Detection is extremely difficult.** The near completion of the Syrian reactor and the unveiling of the uranium facility at Yongbyon show the difficulty of identifying a covert program and playing proliferation whack-a-mole.
3. **Potential increases to South Korean and Japanese defense expenditure on missile defense.** This occurred in Japan after the 1998 and 2006 North Korean missile launches.
4. **More willingness in Seoul to integrate its independent missile defense system** into the comprehensive allied program.
5. **North Korean use of its demonstrated nuclear and missile capabilities in greater coercive diplomacy,** with the implied threat of tactical attacks on South Korea and Japan.
6. **Stronger domestic Japanese debate over the risks of providing assistance to South Korea** during a Korean crisis, particularly given strained bilateral relations for fear of inviting a North Korean nuclear attack on Japan.
7. **Greater sense that North Korean nuclear weapons more directly threaten U.S. bases on Okinawa and Guam as well as the U.S. mainland.**
8. **U.S. public and congressional calls for additional U.S. missile defense systems.**
9. **Increased fear that Iran will acquire the same capability** given the extensive North Korean-Iranian collaboration.

### **Implications of Unambiguous North Korean Nuclear Capabilities**

Although the U.S. and its allies have long suspected that North Korea had nuclear weapons, irrefutable evidence of these capabilities would have extensive ramifications:

1. **Mock government shock of the “unexpected breakthrough.”** This occurred in 2013 when the Obama Administration cited sudden and unexpected advancements of the North Korean missile program to justify reinstating the 14 ground-based missile interceptors that it had previously cut from the defense budget.
2. **Heightened South Korean and Japanese concerns over their safety and U.S. ability to defend them from the “new threat.”** Seoul and Tokyo would call for new reassurances of the U.S. nuclear umbrella as well as additional U.S. missile defense deployments.

### **South Korea Resists Allied Missile Defense System**

Despite the clear and present danger from North Korean missiles, Seoul insists on implementing an independent and *less capable* missile defense system to protect its citizens and U.S. forces in Korea against North Korean weapons, which can be equipped with nuclear, biological, chemical, and high-explosive warheads. South Korea continues to resist both purchasing more capable interceptors and integrating its system into the comprehensive allied system with linked sensors that improve allied defense capabilities against North Korean ballistic missiles.

The Korea Air and Missile Defense system consists of only a low-tier capability comprised of land-based PAC-2 missiles. South Korea plans to upgrade this capability to PAC-3 and SM-2 Block IIIA/B mis-

siles deployed on Aegis destroyers, even though these ships will lack a theater ballistic missile capability.

Professor Choi Bong-wan of the graduate school of national defense at South Korea's Hannam University conducted a computer simulation that showed a PAC-2/3 low-altitude missile defense system would have only 1 second to intercept a North Korean missile at a range of 12–15 km, while a Terminal High Altitude Area Defense (THAAD) medium-range system would have 45 seconds to intercept a missile at 40–150 km and a SM-3 high-altitude system would have 288 seconds at an altitude of 70–500 km.<sup>42</sup>

Seoul's resistance to joining an integrated allied missile defense system may be due to concerns about aggravating China, which has warned South Korea against implementing a more strategic defense system. Seoul may also be hesitant to join an allied system that includes Japan, with which South Korea has strained relations due to lingering emotions from Japan's occupation of the Korean Peninsula. In June 2012, Seoul canceled at the last minute a scheduled signing of a joint military intelligence-sharing agreement due to an upsurge in South Korean nationalism. Regardless of the reason, South Korea's resistance increases the risk to its populace and the United States and Japan from North Korea's missiles.

### What the U.S. Should Do

Because international diplomacy and U.N. resolutions have not prevented North Korea from continuing to develop nuclear weapons and ICBM capabilities, the U.S. should:

- **Fund its defense commitment to Asia.** While the Obama Administration has been stalwart in its rhetoric pledging an "Asia Pivot," it has not provided the military budget necessary to honor fully American commitments to security in the Pacific. Massive defense budget cuts are already affecting U.S. capabilities in the region, increasing risk to allies, U.S. security and economic interests, and the safety of U.S. service personnel and American citizens living and working in the region.
- **Improve U.S. homeland ballistic missile defense.** The U.S. should accelerate deployment

of additional ground-based midcourse defense interceptors in Alaska and California to prevent an emerging gap between North Korean ballistic missile capabilities and U.S. defenses.

- **Accelerate development of advanced versions of the SM-3 interceptor** for Aegis-capable ships, including restarting the SM-3 Block IIB program, which would give the Aegis system the ability to intercept long-range ballistic missiles.
- **Restart the boost-phase ballistic missile defense programs.** During the boost phase, a missile is at its slowest, has not yet deployed decoys, and is therefore most vulnerable and easily intercepted. The Obama Administration cancelled all such programs in its first term, including the Airborne Laser and the Kinetic Energy Interceptor.
- **Restart the multiple kill vehicle program for ground-based interceptors** to increase the probability of interception by only one interceptor, rather than requiring the launch of multiple interceptors.
- **Improve and modernize U.S. space-based sensors,** including the Space Tracking and Surveillance System. This is a critical capability for detecting missile launches and tracking their trajectory.

### What South Korea Should Do

South Korea should:

- **Publicly articulate the scope of the North Korean missile threat** and the extent of potential casualties from a ballistic missile attack, including from nuclear, chemical, and biological warheads;
- **Deploy a multilayered missile defense system that is interoperable with a U.S. regional missile network** to provide for a more coherent and effective defense of allied military facilities and the South Korean populace;

42. "Call to Revise Plans for Defense Against Nuclear Rockets," *Chosun Ilbo*, January 16, 2014, [http://english.chosun.com/site/data/html\\_dir/2014/01/16/2014011601265.html](http://english.chosun.com/site/data/html_dir/2014/01/16/2014011601265.html) (accessed May 1, 2014).

- **Purchase a medium-tier ground-based system**, such as the THAAD, as well as SM-6 or SM-3 ship-borne missiles;
- **Augment missile defense planning and exercises with U.S. forces** and initiate trilateral missile defense cooperation and exercises with the United States and Japan;
- **Reestablish military cooperation and training with Japan** to improve defense of the Korean Peninsula and overcome historic animosities and unresolved political issues between South Korea and Japan; and
- **Sign a general security of military information agreement with Japan** to enable exchange of military information.

## Conclusion

Continuing to discount the North Korean nuclear and missile threat and pursuing the timid incrementalism of punitive measures is dangerous. This will give Pyongyang more time to expand and refine its nuclear and missile delivery capabilities, further undermining the security of the U.S. and its allies. North Korea's history as a nuclear and missile proliferator makes clear that the danger is not limited to the Korean Peninsula or Asia.

To protect their citizens more fully from ballistic missile attacks, the United States and its allies should continue to develop and deploy viable missile defense systems. An effective system would include ground-based, sea-based, and air-based components.

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