

**10<sup>th</sup> Berlin Conference on Asian Security (BCAS)**

***Nuclear Stability in Asia  
Strengthening Order in Times of Crises***

Berlin, June 19-21, 2016

A conference jointly organized by Stiftung Wissenschaft und Politik (SWP), Berlin  
and Konrad-Adenauer-Stiftung (KAS), Berlin

Discussion Paper  
Do Not Cite or Quote without Author's Permission

***Session III:  
North Korea's nuclear program***

Melissa Hanham  
James Martin Center for Nonproliferation Studies  
Monterey

## North Korea's Nuclear Program: The View from the United States

*Melissa Hanham*

The United States views North Korea's nuclear and missile program as more advanced than is commonly appreciated in by the nongovernmental community or governments more far afield. While the US government appreciates the technical capability of the DPRK's nuclear and missile program, it has been paralyzed on how to respond. This is further compounded by the fact that North Korea has been accelerating its development of new capabilities, with frequent demonstrations and tests in 2016.

The current US administration under Barack Obama, has placed its bets on the success of the brokered Iran Deal, and with little time left in the administration, will not seek to re-open serious negotiations with North Korea. Further, North Korea touts the nuclear history of Libya as proof-positive of the adverse effect to regime when nuclear weapons are negotiated away. In the near term, Washington, DC will focus its energy on multilateral cooperation to enforce sanctions to slow and disrupt procurement and finance efforts as Pyongyang seeks to develop new weapons systems and bolster old ones.

### Dangerous New Capabilities

As former US Secretary of Defense Robert Gates left office in mid-2011, he cautioned:

North Korea now constitutes a direct threat to the United States. The president told [China's] President Hu that last year. They are developing a road-mobile ICBM. I never would have dreamed they would go to a road-mobile before testing a static ICBM. It's a huge problem. As we've found out in a lot of places, finding mobile missiles is very tough.<sup>1</sup>

Baffling to states with established nuclear programs, North Korea's nuclear and missile programs follow non-linear, almost fragmented paths to development. Pyongyang tests new technologies before perfecting old ones, developing ballistic and cruise missiles; solid and liquid fuel technologies; working on intercontinental ballistic missiles (ICBMs) before it successfully tests and deploys intermediate-range

---

<sup>1</sup> John Barry, "The Defense Secretary's Exit Interview," Newsweek, 21 June 2011, [www.thedailybeast.com](http://www.thedailybeast.com); See also: Robert Gates, "The 10th IISS Asia Security Summit, The Shangri-La Dialogue, First Plenary Session Q&A," The International Institute for Strategic Studies, 4 June 2011, [www.iiss.org](http://www.iiss.org).

systems; and attempting to make road-mobile ICBMs before perfecting a static design.<sup>2</sup>

In 2016, the myriad of programs went on display in a way never seen before. In January, North Korea conducted its fourth nuclear test at the Punggye-ri nuclear test site. Though state-run media claimed a “thermonuclear test,” the yield was too low to be considered a two-stage thermonuclear weapon. Seismic data from the event was very similar to the 2013 test, however it is not yet possible to rule out the possibility of a boosted-fission device using deuterium-tritium gas. North Korea may test again at any time. The mountainous test site has a capacity for additional consecutive or parallel tests.

Still more worrisome, North Korea released photos via web and television showing Kim Jong Un at the Taesong Machine Factory handling a mock-up of a purported compact warhead capable of fitting the KN-08 missile. It is likely a simple fission device of approximately 60cm. The poster does not show a secondary as would be



Figure 1: Still images of KJU & alleged warhead (via KCTV)

expected from a hydrogen weapon. Kim also views a cylindrical object staged between the physics package and KN-08 nosecone, which is possibly a weighted firing device. While there are several attributes of the mock-up that seem like poor, perhaps even damaging choices, the design has roots in the truth. It is not a fantasy or a hoax.

These warhead images were followed up with more images of Kim Jong Un viewing a simulation of the thermodynamic effect on a reentry vehicle at the Chamjin Missile Factory. This rudimentary test is the first along a path toward flight testing the

---

<sup>2</sup> Melissa Hanham, “North Korea’s Procurement Network Strikes Again: Examining How Chinese Missile Hardware Ended Up in Pyongyang,” Nuclear Threat Initiative, July 31, 2012, NTI.org.

KN-08 with a dummy warhead, and not unlike how the US conducted similar tests in the 1970s.<sup>3</sup>

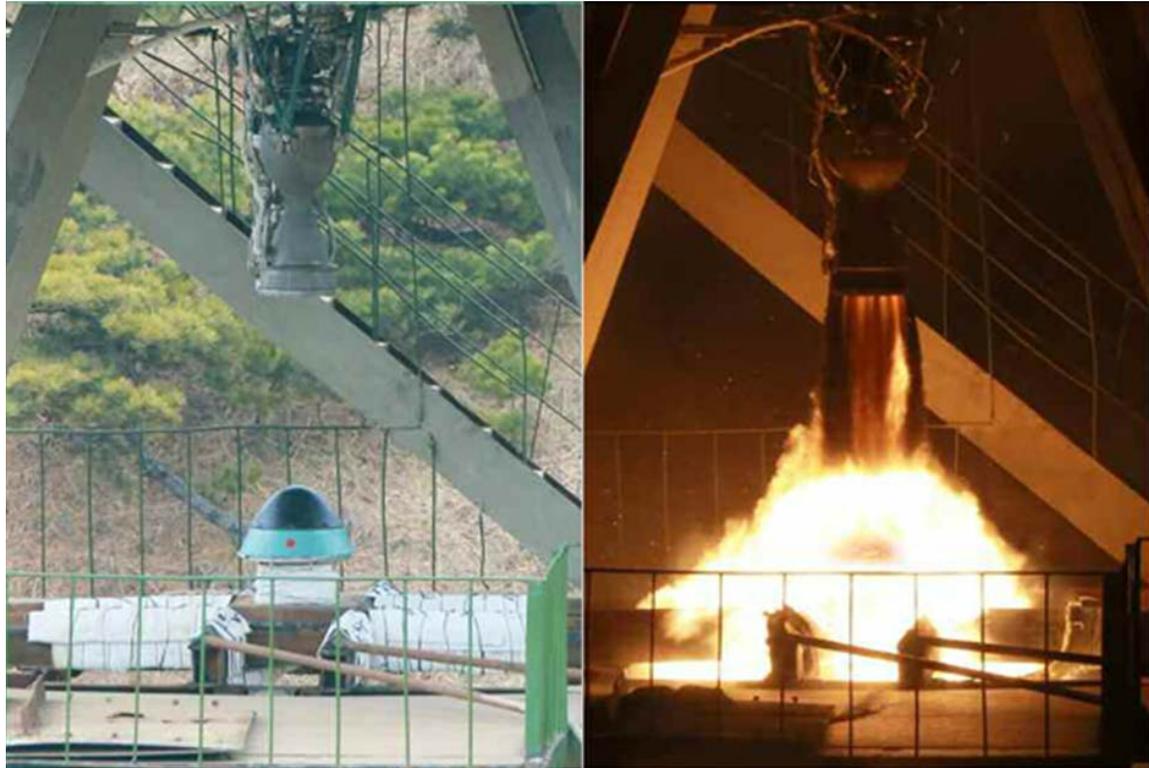


Figure 2: Thermodynamic structural test using scud engine (via Rodung Sinmun)

North Korea also restarted plutonium production at Yongbyon, as indicated by thermal infrared satellite imagery. Less is known about its enrichment program. Enrichment activities are notoriously difficult to detect, since there are few signatures for satellites to detect. One issue of note, however, is the expanding milling project at the Pyongsan uranium mine. The scale of this project is much larger than would be needed for the single enrichment facility at Yongbyon.

North Korea also conducted a series of liquid engine and solid motor tests which raise concerns for the US. The solid motor test conducted on 24 March 2016 near the Ryongsong Machine Complex in Hamhung showed a motor of approximately ~1.2m diameter, potentially for a nuclear-capable Nodong. A solid-fueled road-mobile missile such as the Nodong would put US forces and allies at risk, as they are easy to

---

<sup>3</sup> “Hardened Reentry Vehicle Development Program – Erosion-Resistant Nostip Technology,” Prototype Development Associates, Inc., January 1978.

hide and launch quickly. However, the photos purporting to demonstrate this test were heavily touched up, leaving some questions remaining.

The liquid-fueled dual-engine test soon after at the Sohae engine test stand. Close-ups of the stand show what is likely two 4D10 engines submerged in the fuel tank. The color of the flame is also interesting. The test shows a blue-clear flame at the origin making it possible that they are using a more energetic fuel such as NTO/UDMH.<sup>4</sup>



Figure 3: Liquid engine test at Sohae (via KCTV)

In addition, North Korea tested both liquid- and solid-fueled versions of a submarine launched ballistic missile (SLBM) to varying degrees of success. Their incremental testing has already achieved a successful ejection, though more testing will be required before perfecting either design. North Korean submarines are loud and easy to detect, but an SLBM increases the survivability of their strategic forces, and gives a somewhat longer range.

---

<sup>4</sup> Jeffrey Lewis, “New DPRK ICBM Engine,” 9 April 2016, *Arms Control Wonk*, [www.armscontrolwonk.com](http://www.armscontrolwonk.com).

## A Narrowing Window for Diplomacy

The United States remains steadfast in its approach of “strategic patience,” even as the evidence of its failure is mounting. Not only has North Korea had the opportunity to further grow and refine its nuclear and missile programs, but Kim Jong Un has since declared the state’s policy of the “Byungjin Line” (parallel development of both economy and nuclear weapons). This declaration makes it all the more difficult to diplomatically roll back North Korea’s programs. Nuclear weapons are now seen as central to both the security of the state and the legitimacy of the regime domestically and internationally.

In addition, the security balance in the region is rapidly changing. North Korea is not the only one building up missile capabilities. South Korea has heavily invested in ballistic and cruise missiles, as well as ballistic missile defense. The ROK Army Missile Command directs the Hyunmu-2 ballistic missile and Hyunmu-3 cruise missile programs along with its Multiple Launch Rocket Systems (MLRS). Their programs are neither small nor shrinking. These programs, serve to heighten North Korea’s fear of an act of “decapitation.” An exercise, that the US and South Korea already practice in joint exercises.

When the next US president takes office, he or she will be faced with a bolder and better armed North Korea than ever before. It is important that the new president set “strategic patience” aside, and take a more proactive approach. The US conditions for negotiation may no longer be achievable in the near term. Painful though it may be to the US’ ego, the new goal must be to pragmatically prevent the development of additional capabilities, such as thermonuclear weapons, solid-fuel ballistic missiles, SLBMs, and cruise missiles. Unfortunately, denuclearization may have to wait.