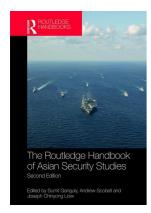
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3

NORTH KOREA'S NUCLEAR WEAPONIZATION PROGRAM

Background, context, and trends for the future

Bruce E. Bechtol Jr

North Korea's nuclear weaponziation program has been an irritant both for the region it sits in and for the international community since the very first nuclear crisis of 1994. Unfortunately, since that time, the threat from North Korea's nuclear program – both from proliferation and from the threat of Pyongyang initiating a nuclear attack – has not abated since the "solving" of the nuclear crisis in 1994 with the implementation of the Agreed Framework. Rather, this threat has continued to grow. In fact, since 1994, North Korea has implemented an increase in this threat by diversifying the types of weapons (now both Plutonium and Highly Enriched Uranium), and the types of platforms that would carry these weapons (warheads) – with short-range, medium-range, intermediate-range, and potentially intercontinental range ballistic missiles that could bring death and destruction to nation-states far beyond North Korea's borders.

The development and testing of North Korea's nuclear weapons program

North Korea's plutonium program is widely thought to have begun sometime back in the 1980s, following the construction of an experimental five Kilowatt graphite reactor at Yongbyon. The Soviet Union built the nuclear facility for the North Koreans. By the very early 1990s, the American intelligence community had assessed that the North Koreans had converted the facility to one that produced nuclear weapons and were on the road to doing so.²

North Korea signed an IAEA safeguards agreement in 1992. But IAEA inspections in 1993 revealed that North Korea had already reprocessed plutonium at least three times. When inspectors asked to look at two sites suspected of holding nuclear waste, Pyongyang declared these sites off limits and kicked out the inspectors – thus kicking off the first "nuclear crisis." Following a resumption of talks and the negotiations (at times led by former President Jimmy Carter), this nuclear crisis ended in 1994 with what was called the "Agreed Framework." Even at the time, there were many who urged caution about the "Agreed Framework." To quote Korean scholar Scott Snyder, "First, although U.S. officials did convince the North Koreans to can and store their spent fuel, they were unable to persuade them to give up their nuclear components entirely, as they did with Kazakhstan and Ukraine." These issues would be problematic later as we shall see.

North Korea's highly enriched uranium program (HEU) came into existence as a result of an agreement with Pakistan that eventually led to an exchange of ballistic missiles for centrifuges, plans, blueprints, scientific assistance, and other elements of an HEU weaponization program.

The agreement began in the mid-1990s as a result of a North Korean desire to continue its nuclear weaponization despite the restrictions of the "Agreed Framework." To quote high ranking North Korean defector Hwang Jang-yop, who recalled a conversation he had in 1996 with another North Korean high ranking official, "before the fall of 1996, he said we've solved a big problem. We don't need plutonium this time. Due to an agreement with Pakistan, we will use uranium."

In the 2001–2002 time frame a great deal of information became available to the Bush administration that definitively proved North Korea was actively pursuing and building an HEU weaponization program. It was because of this information that American Ambassador James Kelly confronted the North Koreans in October of 2002, asserting that they had an active HEU weaponization program. The North Korean delegation – in a startling reply – admitted to the program and then attempted to use it as leverage to gain concessions (which failed). The Bush administration soon released much of the information regarding North Korea's program (minus sources and methods). Soon thereafter, numerous facts became available to the public showing that Pakistan, led by the efforts of A.Q. Khan, had been supplying North Korea with things such as blueprints and centrifuges and assisting them with their HEU program, as North Korea was assisting Pakistan with its ballistic missile program.⁷

Many of the details revealed about North Korea's HEU acquisition program with Pakistan (it can hardly be called anything else) are quite interesting. While some cash was being used (to bribe Pakistani generals as often as not), the focus of the deal was essentially nukes-for-missiles. North Korea supplied Pakistan with Scud and No Dong missiles, technology, and personnel for assistance, and Pakistan did the same for North Korea with its HEU program. Ironically, the platforms often used to shuttle the centrifuges and missiles back and forth between Pakistan and North Korea were American made C-130s, typically flying through Chinese airspace. Ironic because China claimed no knowledge of the deal between North Korea and Pakistan at the time.

Also of interest regarding North Korea's HEU program, in 2004, the Libyans gave up their HEU program, in an effort where the West agreed to open up diplomatic relations again with the troubled regime. At the time, Ghadafi revealed a great number of things about his nuclear deals with Pakistan that also impacted North Korea. Vice President Cheney spoke of this at the time when he stated, "the Libyans acquired their technical expertise, weapons design and so forth from Mr A.Q. Khan, Pakistan . . . Mr Khan also provided similar capabilities to the North Koreans. So we're confident that the North Koreans do, in fact, have a program to enrich uranium to produce nuclear weapons." But the most compelling aspect of evidence uncovered in Libya in 2004, was the assertion that Pakistan supplied Chinese originated information (the Chinese assisted Pakistan with their nuclear program) to not only Libya, but also North Korea, that showed how to make an HEU warhead for a ballistic missile. The Libyans turned over detailed technical documents that gave instructions on how to manufacture components for a nuclear warhead and how to place it on a ballistic missile. The documents turned over showed details for blueprints of a 500-kilogram warhead. A 500-kilogram warhead is exactly the size that would fit on a North Korean No Dong missile — or the equivalent in Pakistan and Iran.

The "replacement" for the "Agreed Framework" as some would call it, became known as the "Six-party talks." These were initiated by the Bush administration, and of course involved North Korea, as well as China, Russia, South Korea, Japan, and the United States. The talks were aimed at getting North Korea to dismantle – not just freeze – its nuclear weapons program. ¹² The talks showed complete failure on October 9, 2006, when the North Koreans tested a plutonium nuclear device. The device appeared to be one to two kilotons in strength – in other words, a small yet at least partially successful test of a nuclear device (likely a weapon). ¹³

Following North Korea's first nuclear test, Stanford University scholar Siegfried Hecker visited East Asia and met with both North Korean and Chinese specialists. His report on the trip included a statement from Chinese specialists, "The DPRK aimed for 4 kilotons and got 1 kiloton. That is not bad for the first test. We call it successful, but not perfect." The same approximation of the strength of the test was reportedly estimated by the U.S. Office of Nuclear Intelligence.¹⁴

North Korea's first nuclear test was important. Oddly, when one looks back, the test seemed to move the United States in the direction of resuming Six-party talks. The United States had been implementing strong sanctions that were putting pressure on North Korea's finances and this seemed to be working. ¹⁵ To the surprise of many, in 2007, as a result of the Six-party talks, the North Koreans and the other five parties came to the following agreement (in the initial phase):

- "The DPRK will shut down and seal for the purpose of eventual abandonment the Yongbyon nuclear facility, including the reprocessing facility and invite back IAEA personnel to conduct all necessary monitoring and verifications as agreed between IAEA and the DPRK.
- The DPRK will discuss with other parties a list of all its nuclear programs as described in the Joint Statement, including plutonium extracted from used fuel rods that would be abandoned pursuant to the Joint Statement.
- The DPRK and the US will start bilateral talks aimed at resolving pending bilateral issues
 and moving toward full diplomatic relations. The US will begin the process of removing
 the designation of the DPRK as a state-sponsor of terrorism and advance the process of
 terminating the application of the Trading with the Enemy Act with respect to the DPRK.
- The DPRK and Japan will start bilateral talks aimed at taking steps to normalize their relations in accordance with the Pyongyang Declaration, on the basis of the settlement of unfortunate past and the outstanding issues of concern.
- Recalling Section 1 and 3 of the Joint Statement of 19 September 2005, the Parties agreed
 to cooperate in economic, energy and humanitarian assistance to the DPRK. In this regard,
 the Parties agreed to the provision of emergency energy assistance to the DPRK in the initial phase. The initial shipment of emergency energy assistance equivalent to 50,000 tons of
 heavy fuel oil (HFO) will commence within next 60 days."16

The parties also agreed that the following working groups would be formed:

- 1 "Denuclearization of the Korean Peninsula
- 2 Normalization of DPRK-US relations
- 3 Normalization of DPRK-Japan relations
- 4 Economy and Energy Cooperation
- 5 Northeast Asia Peace and Security Mechanism"17

Among the key demands that North Korea called for in coming to the agreement was that funds frozen in a bank in Macao known as "Banco Delta Asia" be released – which would effectively ease the pressure (because of the snowball effect) on North Korea's illicit financial networks. The Bush administration did this. ¹⁸ On June 26, 2008, the Bush administration met the other key demand the North Koreans had called when they "announced the lifting of the Trading with the Enemy Act (TWEA) with respect to the Democratic People's Republic of Korea (DPRK, or North Korea), and notified Congress of his intent to rescind North Korea's designation as a State Sponsor of Terrorism (SST)." Nevertheless, after many exchanges of papers and samples and stonewalling on the part of North Korea, near the end of the Bush administration, in December

of 2008, after four days of talks, it came to light that North Korea had simply refused to key verification initiatives that would prove it was dismantling its program. The North Koreans threw up road blocks that essentially made it impossible to verify their claims of dismantlement, not the least among them the refusal to allow soil samples to be taken out of the DPRK. Thus, in the end, Washington and the other parties walked away from the talks – entirely because of North Korea's refusal to follow verification protocols.²⁰

The year 2009 was special for a couple of reasons. The first reason was because more definitive evidence came to light proving North Korea had an HEU weaponization program – and had for some time. Pakistani scientific leader A.Q. Kahn confessed in that year that he had toured a facility in North Korea that had more than 3,000 centrifuges. Kahn also stated that Pakistan had assisted North Korea with blueprints, key machinery, and technical advice for at least six years. Kahn disclosed that high ranking political and military officials were involved in the nuclear deal between the two nations – thus (at the time) providing yet more evidence that the North Koreans had developed an HEU weaponization program.²¹

The second reason that 2009 was a special year was because the DPRK conducted its second nuclear test. On May 25, 2009, only a few months into the Obama administration (and thus ending any hopes for early talks), North Korea conducted its second nuclear test. ²² According to most analysts at the time, this test was around four times larger than the first test (around four kilotons) – a weapon capable of killing tens of thousands of people. ²³ According to the Office of the Director of National Intelligence, "The U.S. Intelligence Community assesses that North Korea probably conducted an underground nuclear explosion in the vicinity of P'unggye on May 25, 2009. The explosion yield was approximately a few kilotons. Analysis of the event continues." ²⁴

In 2010, the North Koreans definitively proved to the whole world what smart analysts had assessed (and claimed) since 2003 – they had a nuclear HEU program. It was then that Dr. Siegfried S. Hecker of Stanford University and Mr. Jack Pritchard, at the time the President of the Korea Economic Institute, who were in North Korea on a visit, were (much to their surprise) given a tour of a North Korean HEU facility containing more than 2,000 centrifuges. Hecker said in part in a report he published later, that "At the fuel fabrication site, we were taken to a new facility that contained a modern, small industrial-scale uranium enrichment facility with 2,000 centrifuges that was recently completed and said to be producing low enriched uranium (LEU) destined for fuel for the new reactor." Dr. Hecker went on to provide even more definitive evidence when he further stated, "Nevertheless, the uranium enrichment facilities could be readily converted to produce highly-enriched uranium (HEU) bomb fuel (or parallel facilities could exist elsewhere) and the LWR could be run in a mode to produce plutonium potentially suitable for bombs, but much less suitable than that from their current reactor." American Envoy to the IAEA Glynn Davies confirmed soon thereafter that the North Koreans likely had other HEU facilities as well as the one that they showed to Hecker and Pritchard.

During February of 2013, the North Koreans conducted their third nuclear test. This was once again the largest ever, with the ROK Ministry of National Defense assessing the test to be around six kilotons. This test was more of an enigma than the previous two because of suspicions that it was an HEU device – but no particles were captured as with the previous two tests and thus there was no definitive proof.²⁷ There was some evidence that suggests the third test was of an HEU device. High ranking Iranian officials were reportedly present for the test – and were charged millions of dollars to be there by the North Koreans.²⁸ Another key to the puzzle was that the North Koreans claimed the test was of a "miniaturized and lighter nuclear device with greater explosive force than previously."²⁹ This would, most likely be an HEU device if the North Korean claim is to be believed. Thus, based on the reports that Iranians were present (Iran has an

HEU weaponization program closely matching that of North Korea), the fact that the North Koreans went to so much trouble to keep particles from escaping that could be analyzed by the international community, and the claim by the North Koreans that it was of a "miniaturized and lighter nuclear device," it seems very possible that the third North Korean nuclear test could have been of an HEU device – though no definitive evidence has yet been uncovered.

North Korea conducted its fourth nuclear test during January of 2016. This test was unique because the DPRK claimed it was of a hydrogen weapon. While most believe this is unlikely, there may have been new technology involved in the test (which was of comparable size to the test conducted in 2013). To quote a report written after the test by the Korea Institute for Defense Analysis, "Judging by the seismic data, the yield of the nuclear explosion was similar to that of the third test carried out in 2013, a far cry from the power of a hydrogen bomb, which ranges from hundreds of kilotons to tens of megatons. Therefore, it is highly likely that this test was not a hydrogen bomb test or even a failed one, contrary to what the North says. Another possibility is that North Korea tested a boosted fission weapon, using deuterium and tritium, which is a technology essential for increasing its yield and reducing the size of a nuclear warhead in order to allow such a warhead to be mounted on a missile, in addition to being an intermediate process in the development of a hydrogen bomb." ³⁰

The previous nuclear tests North Korea conducted were in 2006, 2009, 2013, and 2016. Thus, there were several years between each test. This trend ended in 2016. On September 9, 2016, North Korea conducted its fifth nuclear test. There were several notable things about this test. First of all, it was the largest nuclear test yet, measuring at least 10 kilotons in size, but perhaps as large as 12 to 15 kilotons (or larger). Such a weapon could kill 200,000 people or more if detonated in a large city. Also important about this test, the North Koreans asserted that they tested a weapon designed to be put on a ballistic missile (compelling if true). Finally, this test was conducted months – not years – after the previous test (and appeared to be successful), thus showing that North Korea has been accelerating the testing and capabilities of its nuclear program to match the rapid acceleration noted since 2013 in North Korea's ballistic missile programs – several of which are assessed to be capable of carrying nuclear warheads.³¹

Platforms for North Korea's nuclear weapons

One very likely candidate for carrying a nuclear warhead is the No Dong. North Korea sold No Dong missiles to Pakistan as Pakistan was selling them HEU technology. The technology included blueprints for mounting a 500 kilogram warhead on a missile - likely the No Dong (this technology was revealed when Libya turned over all of its nuclear weaponization technology to the U.K. and the U.S. in 2004). North Koreans were present at Pakistani No Dong testlaunches, and it is likely the two nations exchanged technology on how to equip a No Dong with an HEU warhead.³² The No Dong has the range to hit Tokyo and other key nodes in Japan.³³ Another very intriguing and very possible platform for a nuclear warhead is the missile known as the Musudan. The Musudan is a missile made in North Korea based on the Soviet SS-N-6 design, but land-based and with a longer range. The Soviet SS-N-6 carried a nuclear warhead, so it is likely the North Korean land-based version can also carry a nuclear warhead (albeit smaller because of increased range). The Musudan comes on a transporter-erector-launcher and would be difficult to attack using a pre-emptive strike. It has the range (now proven) to hit Guam (where there are 165,000 U.S. citizens). 34 The Taepo Dong missile also likely has the capability to carry a nuclear warhead. It potentially has the range to target Alaska, Hawaii, and even the west coast of the U.S.³⁵ But the Taepo Dong takes weeks to set up and could likely be destroyed on the launch pad if the United States felt an imminent threat.³⁶

Of the missiles described thus far, only one has the range (potentially) to hit any of the 50 states within the U.S., and it takes so long to set up that it could likely be destroyed before launch. But the North Koreans are in the process of testing and deploying a ballistic missile that can both hit the west coast of the United States and be deployed on a transporter-erector-launcher. While this missile has not yet been deployed, it would be a clear threat to the U.S. once it is - including the west coast. The United States has designated this missile the "KN-08." Senior American officials have publicly assessed that this missile is equipped with a nuclear warhead.³⁷ During July of 2017 North Korea twice successfully tested an ICBM that they called the "Hwasong-14." This missile is assessed to have the capability to hit at least Alaska and Hawaii and perhaps cities on the west coast of the United States depending on the size and weight of the nuclear payload.³⁸ Thus, the North Koreans have a static missile with the range to target the continental United States, and a road mobile missile with the same capabilities. But in a key effort to diversify its nuclear strike capability, North Korea is in the process of fielding a submarine launched ballistic missile (SLBM). The missile has undergone testing since at least 2014, and in 2016 was launched to a range of 500 kilometers.³⁹ Combined with the capability of the submarine the missile comes with, it is my assessment that once operational it has the potential to hit either Hawaii or Guam (depending on the range of the submarine).⁴⁰ There are other possibilities. The North Koreans could possibly use their H-5 light bombers to drop a nuclear bomb.⁴¹ They could also use a cargo vessel or container ship, sailing it into any harbor (in Japan, South Korea, or the United States to use a few examples), and detonating a nuclear device. North Korean ships often get past sanctions by sailing under the flags of other nations. They could use this same method to get past allied defenses.⁴²

Nuclear proliferation to other rogue states: a red line?

In 2007, Israeli Air Force jets destroyed what rumors released to the press described as a plutonium nuclear reactor, built by the North Koreans, to produce fissile material (and bombs) for the Syrian military. But there were no definitive information sources released to the public until the Office of National Intelligence gave a formal briefing to the press in 2008 (interested readers can read the entire briefing as seen in the endnotes for this chapter). According to the very detailed briefing, the facility was identified at an isolated area in Syria in 2006, and closely resembled the North Korean facility at Yongbyon. In 2007, intelligence collected revealed key aspects of the facility. A thin roof and curtain walls were added to the facility after completion to mask the outline closely resembling the North Korean facility (probably fooling no one). Of interest, North Korean officials began visiting Syria as early as 2001 (though evidence suggest 1997 or before was when this whole project began). Among key officials was Chon Chi-bu, one of North Korea's most important nuclear scientists. To quote one of the briefers, "our information shows that Syria was building a gas-cooled, graphite-moderated reactor that was nearing operational capability in August 2007. The reactor would have been capable of producing plutonium for nuclear weapons. It was not configured to produce electricity and was ill-suited for research." The official finalized this statement by saying, "Only North Korea has built this type of reactor in the past 35 years." 43

According to Ali Reza Asghari, a former General in the Iranian Republican Guard Corps, and former deputy defense minister, "Iran spent up to \$2 billion dollars to finance Syria's North Korea built facility. He made the allegations after defecting from Iran."⁴⁴ Thus, it appears possible, perhaps even likely, that Iran was looking to go "offshore" by developing a plutonium program in Syria to augment their existing HEU weaponization program.

Reportedly, North Korea and Iran likely intensified or began their nuclear weaponization cooperation during 2003. It was then that long time reporter Douglass Frantz wrote an article for the Los Angeles Times that stated, "a three-month investigation by The Times – drawing on

previously secret reports, international officials, independent experts, Iranian exiles and intelligence sources in Europe and the Middle East – uncovered strong evidence that Iran's commercial program masks a plan to become the world's next nuclear power." He further commented, "Technology and scientists from Russia, China, North Korea and Pakistan have propelled Iran's nuclear program much closer to producing a bomb than Iraq ever was." Frantz concluded that, "North Korean military scientists recently were monitored entering Iranian nuclear facilities. They are assisting in the design of a nuclear warhead, according to people inside Iran and foreign intelligence officials. So many North Koreans are working on nuclear and missile projects in Iran that a resort on the Caspian coast is set aside for their exclusive use."

According to Jane's Defence Weekly, North Korea built around 10,000 meters of underground infrastructure for Iran's nuclear facilities. These facilities included "bunker buster" resistant construction. One of North Korea's leading underground facilities experts (Myong Lyu-do) came to Iran to lead North Korea's assistance to that country. This activity appears to have occurred around the 2006 time frame. 46 According to the European press, in 2011, the North Koreans supplied the Iranians with a computer program (which reportedly was originally manufactured in the U.S.) that simulated neutron flows. The program is said to be crucial in developing nuclear weapons technology.⁴⁷ According to Joby Warrrick, of the Washington Post, "Crucial technology linked to experts in Pakistan and North Korea also helped propel Iran to the threshold of nuclear capability." He further commented, "Iran relied on foreign experts to supply mathematical formulas and codes for theoretical design work - some of which appear to have originated in North Korea, diplomats and weapons experts say."48 As stated earlier in this chapter, Iranians (high ranking officials) have reportedly been present at North Korean nuclear tests. And even since 2015, nuclear experts in the region and dissident groups continue to make assertions that North Korea is assisting Iran's nuclear program. These assertions include evidence that Iran is actually housing nuclear materials in North Korea, and reports of continuous exchanges of experts, engineers, and scientists.⁴⁹

Policy options for the North Korean nuclear threat

Clearly, North Korea has presented huge foreign policy challenges for the international community and especially for those nation-states that have significant interests in Northeast Asia. The questions that are often raised address whether the United States and its allies should use the "carrot" or the "stick." An analysis of events since the very first "solution" was reached in 1994 (the Agreed Framework), until now, makes it clear that diplomacy and coercion have both failed. Thus, we are faced with the problem of a rogue state, with growing capabilities, showing no signs of giving up its nuclear weapons, and no clear path to containment.

While most have called sanctions failures, is this really true? As of 2016 North Korea sits under some of the most severe economic sanctions in the world. ⁵⁰ Since these sanctions are among the toughest in the world, one wonders why they are not working as many hoped when they were initiated. The answer is simple: enforcement. North Korean sanctions and even American unilateral actions such as those that come under the Patriot Act can truly coerce the North Korean government and create containment scenarios that will slow down its nuclear programs. ⁵¹ In fact, as analysis has revealed, the sanctions already in place by 2016 were and are enough to put extreme pressure on North Korea – if truly enforced. Has this ever happened and what made it work? The answer is yes, with the now famous "Banco Delta Asia" sanctions and accompanying enforcement actions that occurred between 2005 and 2007.

Banco Delta Asia was a small bank in Macao that did business with North Korean entities. Essentially, North Korea was (and this has been proven) using the bank as a money laundering concern. In 2005, North Korea was officially sanctioned by the Treasury Department. But this

time, funds were frozen and it was made clear that anyone doing business with North Korea was not going to be allowed to do business with the United States. Between 2005 and 2007, these actions created a snowball effect with North Korean concerns being kicked out of banks all over Asia because of fears that American interests would pull their money out. In fact, other nations followed suit, and by 2007, North Korea had almost no place to put its money (or to be more exact, to launder it). This may have brought the regime down or at least to its knees. But offers of new talks caused the United States to cancel the important "Banco Delta Sanctions." Since that time, no action that is even closely similar has been enforced. In addition, North Korea has diversified its money laundering of illicit funds (a key part of its economy), so efforts would likely be very resource intensive. Nevertheless, this methodology has been proven to work, and thus, when one is looking for a solution other than watching North Korea constantly testing nuclear weapons (and the missiles that would carry them), or ineffective talks, it is my assessment that renewed "Banco Delta Asia style" (broadly diversified) enforcement could be very effective – though this time the challenges would be even greater than 2005–2007 because of Pyongyang's diversification.

Conclusion

North Korea's nuclear weaponization program that Kim Il-sung dreamed of has come to fruition. It has grown from a small, experimental reactor in the 1980s, to a highly diversified, two-track program, capable of being launched using a variety of methods should North Korea choose to initiate hostilities. North Korea's nuclear weapons development truly picked up steam under Kim Jong-il, but it became intensified and development appeared to speed up, under Kim Jong-un. It should be noted that because this nuclear program has passed from father to son to grandson, it is now a legacy of the regime and considered one of the key factors in maintaining the power of the Kim family in North Korea.⁵⁴

Because of the various factors that exist in North Korea, it is my assessment that North Korea will never willingly give up its nuclear weapons. These weapons are considered a bulwark of the state, and to give them up would be a sign of weakness. Thus, a realistic option for the international community is to enforce containment options (such as strong action through financial sanctions). While on the surface diplomacy may seem very attractive, past precedent shows us that North Korea simply uses this to gain concessions, and then the paper any agreement is written on proves to be worthless. This has happened over and over again. By using strong measures and sticking to them, the international community can contain North Korea's rogue nuclear weapons activities, and force the regime to look for other ways to create instability and tensions within the region.

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