North Korea's Nuclear Capability

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1. What we know about North Korea's nuclear program

To be a real threat, North Korea should have three critical components of nuclear weapons - fissile materials, detonation devices, and a delivery system. As to the fissile material, it is known that North Korea has natural uranium ore that can be distilled to HEUs using their own uranium enrichment facilities. They have fuel fabrication facility which is for the Uranium enrichment in Yongbyun, and it is speculated that they have another hidden U enrichment facility outside Yongbyun.

It is also known that they have capability of producing weapon-grade plutonium. North Korea has 5MW reactor and reprocessing plant, which combination allows them to produce WGP. Satellite images of nuclear complex in Yongbyun show several indications that North Korea's 5 MW nuclear reactor is in operation. The irradiated fuels are usually discharged after 2-3 years of operation, but it is possible to unload a part of the irradiated fuels after several months of operation. Therefore, it is estimated that they can add 5-10 kg of WGP annually after 2-3 years of continuous operation of the reactor.

There are two types of explosion device for nuclear weapons, which are gun-type and implosive. Among the two, implosive device needs higher level of technology skill and suitable for miniaturization of nuclear warhead. With this technology, high explosion yield is possible with lesser amount of fissile materials. North Korea employed implosion technology for the first two tests which technology may be more difficult to produce. But North Korea has been at this for a while, and it would not be over concerning to worry about their interest in thermonuclear technology under the condition that they are capable of possessing HEUs and WGP at the same time.

Currently, it seems that NK still remains dependent on foreign supply for its weapons program and its procurements for this program are ongoing. However, nuclear technology is no longer state of the art. Manhattan project only took 3 years and North Korea has been at its nuclear program for a long period of time.

2. How far North Korea's nuclear technology has come?

There is very limited information available about the technical features of North Korea's nuclear device. While it is believed that the previous two tests used plutonium as the fissile material, it is speculated that the third test involves uranium device. It is still unclear because monitoring efforts to detect radioactive isotopes have failed. Miniaturization of a nuclear warhead to mount on a missile is one of the deep concerns regarding North Korea's nuclear capability. Success of the miniaturization of nuclear bomb will allow them to load the ballistic missiles they have, and it may cause serious regional and global security problems. In particular, this is the most significant criteria to measure the progress of the development.

The estimated explosion yields for the last nuclear test are varied from several kilotons to 40 kilotons. Because of a series of assumptions on the North Korea's nuclear test, the estimation cannot be guaranteed.

Optimistic analysis of the three nuclear tests is introduced when low estimate of seismic scale and correlation are applied. The third nuclear test has only 6-7 kt of explosion yield and that means North Korea's implosion technology is in its primitive stage so far. In this case, miniaturization can be out of concern for a while. Pessimistic analysis is introduced with high estimate of seismic scale and correlation, and the third nuclear test almost reaches up to 30 kt of explosion yield. This implies that North Korea has completed its implosion technology. Since they have both HEU and WGP capabilities, they are almost at the point of miniaturization and diversification.

However, the most important fact is that the explosion yields have been continuously increased in any case.

	Best Case Scenario	Worst Case Scenario
Implosion Technology	**Primitive**	**Highly Advanced**
Yield of Explosion	**6~7 kt**	**~ 40 kt**
Miniaturization	×	○
Diversification	○	○

3. Will it continue?

North Korea publicly announced that it would continue to improve and expand its nuclear capabilities. Its nuclear program is not only for political propaganda. Instead, it is in the process of transforming into a weapon with threatening military implications.

It is for sure that North Korea will try to go beyond its current capability despite all the sanctions and restrictions on technology transfers from the international society. If they need time, money and several more tests to upgrade their nuclear weapon to a small and sufficiently accurate weapon, there is little to block them from developing nuclear capabilities. Cost for technology development should be much lower than those of capitalist nations. Underground tests can be replaced by simulations, if not all. They already conducted over 140 high-explosive detonation experiments.

From other country's nuclear weapons program trajectory, it is assumed that a country can succeed in miniaturization within 10-20 years and North Korea is believed to have made progress in its miniaturization technology. And it will continue.

	Detonation Test	1st Nuclear Test	2nd Nuclear Test	3rd Nuclear Test	Miniaturization
India		1974	1998	-	1998~
Pakistan	1980~ (20)	1998	-	-	1998~
North Korea	1980~ (140)	2006	2009	2013	?