



## Part II: Technical Note on Reaching a Denuclearization Agreement with North Korea

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In the aftermath of the Hanoi summit with North Korea, it is worth assessing what North Korea's full nuclear complex looks like and why offers to only dismantle Yongbyon fell short. Ignoring the nuclear weapons already made, if only Yongbyon is dismantled, North Korea would still maintain a complete, independent nuclear weapons complex able to make a few to several nuclear weapons a year. In that sense, Yongbyon is expendable without sacrificing North Korea's ability to maintain its existing nuclear arsenal and produce more nuclear weapons, including thermonuclear weapons. It could even expand its rate of nuclear weapons production by increasing its pace of production of weapon-grade uranium at enrichment sites outside Yongbyon. Moreover, efforts to use less fissile material per weapon, miniaturize warheads, and make them more reliable and secure could proceed unaffected by a shutdown at Yongbyon.

### Capabilities Outside Yongbyon

If the facilities at Yongbyon were shuttered, North Korea would still be able to make:

- 1) **Weapon-grade uranium.** It would also retain the ability to expand the amount of weapon-grade uranium produced each year.
- 2) **Enriched lithium,** a critical material for building thermonuclear weapons.
- 3) **New nuclear weapons** at a set of unknown or never inspected facilities, at the rate of a few to several per year.
- 4) **New developments and advances in nuclear weapons** at a series of largely unknown facilities, albeit without the benefit of full-scale testing underground. However, further warhead miniaturization could proceed.
- 5) **Re-entry vehicles** able to hold nuclear warheads.
- 6) **Advances in re-entry vehicles,** even absent flight testing.
- 7) **Ballistic missiles** of all ranges.

Some have tried to measure the importance of Yongbyon by counting the number of buildings there and asserting that they represent a large fraction of the total buildings in the nuclear weapons complex. But this makes no sense, since it is not known how many buildings are in

the entire nuclear weapons complex. It also assumes that somehow each building is equal, and by eliminating these buildings, North Korea's nuclear weapons program has somehow been reduced by a similar fraction. But all buildings are not equal.

### **System-Wide Approaches**

To achieve denuclearization, the U.S. administration rightly emphasized system-wide approaches including facilities both known or unknown to intelligence outside Yongbyon, and not just declared or admitted nuclear sites. Many of the proponents of the Yongbyon only approach should recall the Iran nuclear deal negotiations, which could only proceed in 2014 after the United States was able to determine, at least tentatively, that Iran was not building or operating secret enrichment sites, e.g. it was able to assess with reasonable confidence that the declared, known enrichment facilities at Natanz and Fordow were the only ones in operation. That determination cannot today be made with regard to North Korea and critical facilities outside Yongbyon.

This is also why an initial North Korean declaration is so important to provide a lay of the land of North Korea's nuclear weapons program, which would allow negotiations to proceed toward denuclearization. Such a declaration would allow the determination of a first step, if a step-by-step approach is taken. One example of such a step would be the shutdown of an adequate combination of nuclear facilities, including those at and outside Yongbyon, that are able to make or recycle plutonium and weapon-grade uranium. This would ensure that North Korea cannot significantly increase the quantity and quality of its nuclear weapons arsenal while the parties negotiate further significant denuclearization steps.

While North Korea should be offered incentives, some of which could be substantial, the principal sanctions, particularly those imposed in the last several years, should not be removed in return for a first step that would amount to a monitored freeze. The parties would need to agree to dismantlement steps and create a plan. Until a complete nuclear and long-range ballistic missile facility accounting, inspection verification arrangement, and initial deconstruction effort is first underway, the United Nations, U.S., and allied sanctions should remain firmly in place.