

Denuclearization and Peace Making – Parallel or Sequential?

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Denuclearization and peacemaking must be in parallel

- DPRK has not, and will not, give up its nuclear program first without commensurate normalization and peace - making steps.
- U.S. will not normalize first without commensurate denuclearization steps.

But, what's involved in "denuclearization?"

Challenge has changed dramatically over the years

- Term goes back to January 1992 "Joint Declaration of the Denuclearization of the Korean Peninsula"
- End of 2000 – no nuclear weapons, plutonium production frozen, nascent uranium enrichment program.
- End of 2008 – handful of nuclear weapons, one nuclear test, renewed plutonium production, progress on uranium enrichment, limited missile progress.
- End of 2016 – more than 20 nuclear weapons, five nuclear tests, plutonium and highly enriched uranium, tritium, lots of missile tests.
- End of 2020 – more than 40 nuclear weapons, hydrogen bomb test, more highly enriched uranium, ICBM tests and other missile advances,

What is North Korea's nuclear program?

Governs size of arsenal

Governs sophistication of arsenal

Governs threat arsenal poses

Bomb-grade Pu or HEU

Weaponization

Delivery system

- Most difficult part
- Reactors (**Pu**) or enrichment (**HEU**)

Hydrogen bombs

- **Tritium**
- **Deuterium**
- **Li-6D**

- Physics, computers
- High explosives
- Detonators
- Initiators
- Machining
- Assembly
- Explosives tests
- Arming, fuzing, firing
- Nuclear testing

- Plane
- Boat
- Van
- **Missile**

Estimated current nuclear capabilities (S.S. Hecker)

Nuclear Capability	December 2020 (Rough estimates)
Plutonium	25 – 48 kg
HEU (highly uncertain)	~650 - 900 kg
Tritium	Very limited
Nuclear devices (sufficient material)	~45 (20 to 60)* (Very few hydrogen bombs)
Nuclear device deliverable by SCUD & Nodong missiles	Yes
Nuclear device deliverable by IRBMs & ICBMs	Hwasong-12, 14, 15, 16? Not yet militarily useful.

* Numbers based on amount of bomb fuel available – may not all be weaponized

Technical denuclearization challenges

- Fissile materials production
 - Uranium mining – Pyongsan +?
 - Plutonium - Yongbyon
 - Uranium enrichment – Yongbyon +??
 - Tritium for hydrogen bombs - Yongbyon
- Nuclear weapon design, manufacture and testing
 - Nuclear Weapons Institute
 - Weapons production facilities
 - Punggye-ri nuclear test site
- Delivery vehicles and military command & control
 - Missile factories, launch sites, mobile sites
 - Submarines and SLBMs ?
 - Strategic Rocket Forces

Yongbyon Nuclear Research Center



Plutonium (reactors and reprocessing)
Highly enriched uranium (centrifuge halls)
Tritium (hydrogen bomb fuel – from reactors)

5 MWe Reactor

January 2020

No signs of operational status. Standard vehicle activity at east entrance. Possible warm water discharge from spent fuel rod cooling pond.

February 2020

No signs of operational status. Standard vehicle activity at east entrance. Possible warm water discharge from spent fuel rod cooling pond.

March 2020

No signs of operational status. Standard vehicle activity at east entrance. Possible warm water discharge from spent fuel rod cooling pond.

March 23, 2020

No steam effluent from turbine generator building January-March 2020.

No ice melt or other visual signature of activity, suggesting *no outflow* of warm liquid effluent from reactor's tertiary cooling loop between January-March 2020.

Likely personnel presence near main entrance.

Standard vehicle activity at east entrance. No presence of blue CO2 coolant truck.

Dredger moved from north of pump house south of pump house in October 2019; dredging continues.



Radiochemical Laboratory

January 2020

No signs of reprocessing campaign or operational status.

February 2020

No signs of reprocessing campaign or operational status.

March 2020

No signs of reprocessing campaign or operational status.

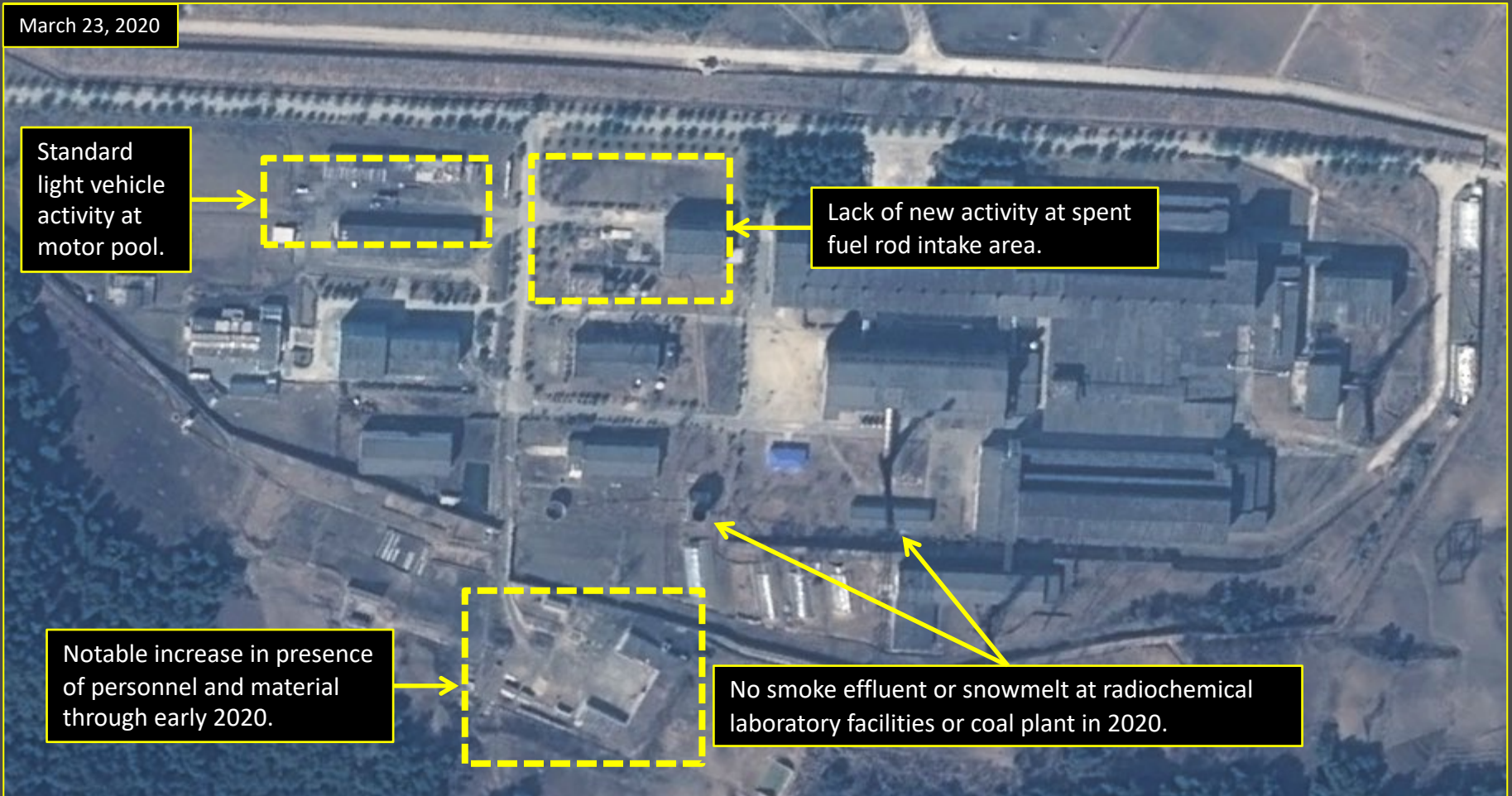
March 23, 2020

Standard light vehicle activity at motor pool.

Lack of new activity at spent fuel rod intake area.

Notable increase in presence of personnel and material through early 2020.

No smoke effluent or snowmelt at radiochemical laboratory facilities or coal plant in 2020.



Experimental Light Water Reactor

January 2020

No signs of operational status, including no new liquid discharge from secondary discharge line. Standard vehicle/equipment activity around reactor.

February 2020

No signs of operational status, including no new liquid discharge from secondary discharge line. Standard vehicle/equipment activity around reactor.

March 2020

No signs of operational status, including no new liquid discharge from secondary discharge line. Standard vehicle/equipment activity around reactor. New personnel activity.

March 23, 2020

New building constructed in late November/early December 2019.

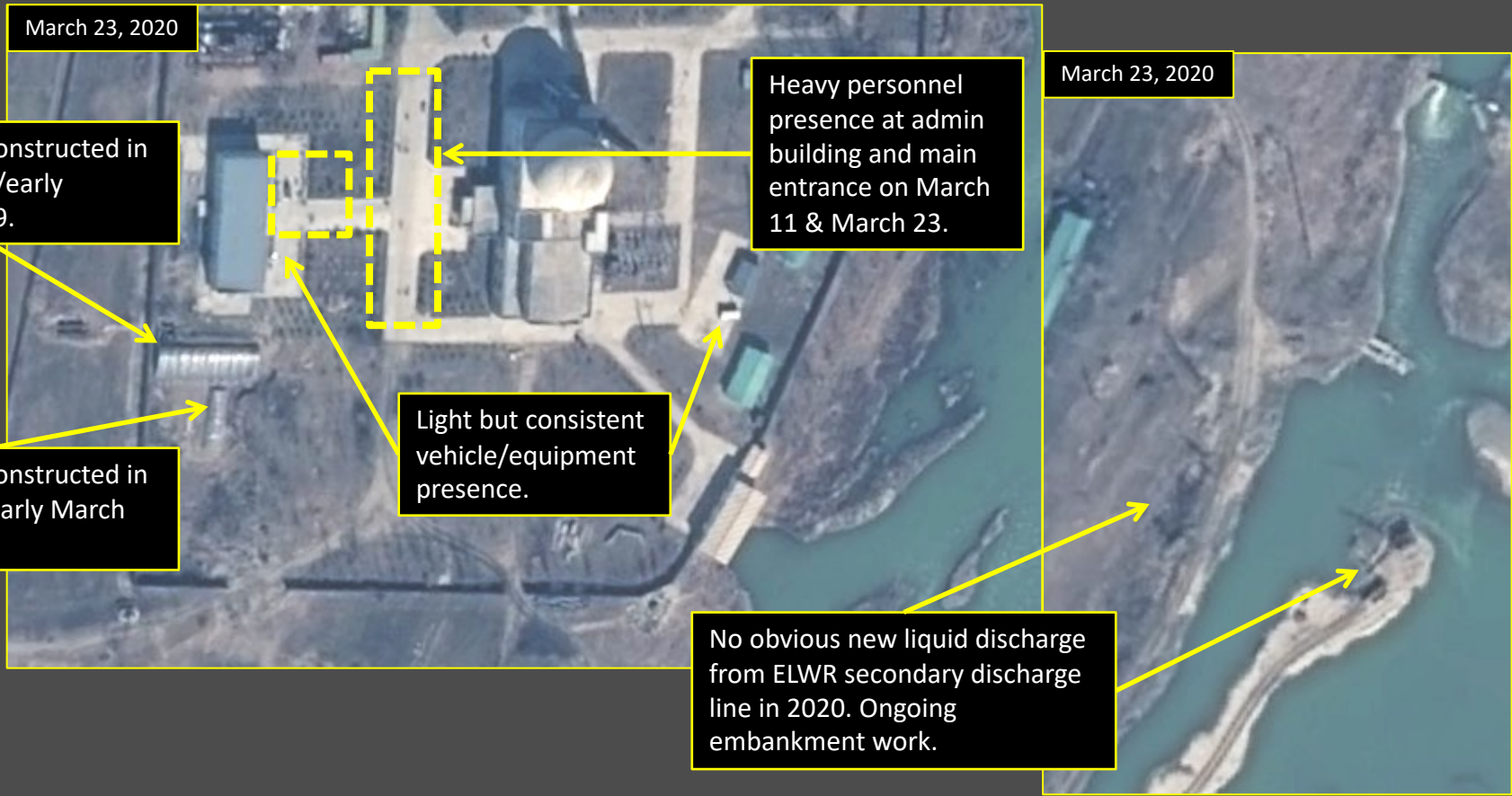
New building constructed in late February/early March 2020.

Light but consistent vehicle/equipment presence.

Heavy personnel presence at admin building and main entrance on March 11 & March 23.

March 23, 2020

No obvious new liquid discharge from ELWR secondary discharge line in 2020. Ongoing embankment work.





Feb. 3, 2014ç

Fuel fabrication facility

Settling ponds

New centrifuge buildings

Former fuel rod final assembly

Rail spur

Uranium trioxide to uranium dioxide conversion

New steam plant

Uranium dioxide to uranium tetrafluoride to uranium metal conversion

Uranium metallurgy

Hydrogen fluoride production

The fuel fabrication facility is the largest of the functional areas in the southern half of the Centre. Visible is a new centrifuge building with an expected capacity of 2,000 centrifuges.

Northern Radioisotope Laboratories

January 2020

Consistent vehicle activity. No visible sign of facility operation.

February 2020

Rooftop snowmelt suggests operation of radioisotope laboratories.
Consistent vehicle activity.

March 2020

Consistent vehicle activity. New construction activity at frozen construction site of L-shaped building.

February 19, 2020

Consistent vehicle presence at old radioisotope laboratory.

Rooftop snowmelt consistent with warm (operational) facility/heat venting from within building.

New construction activity at site of "L-shaped building #2." Site has been inactive since late 2017/early 2018.

March 5, 2020

March 11, 2020

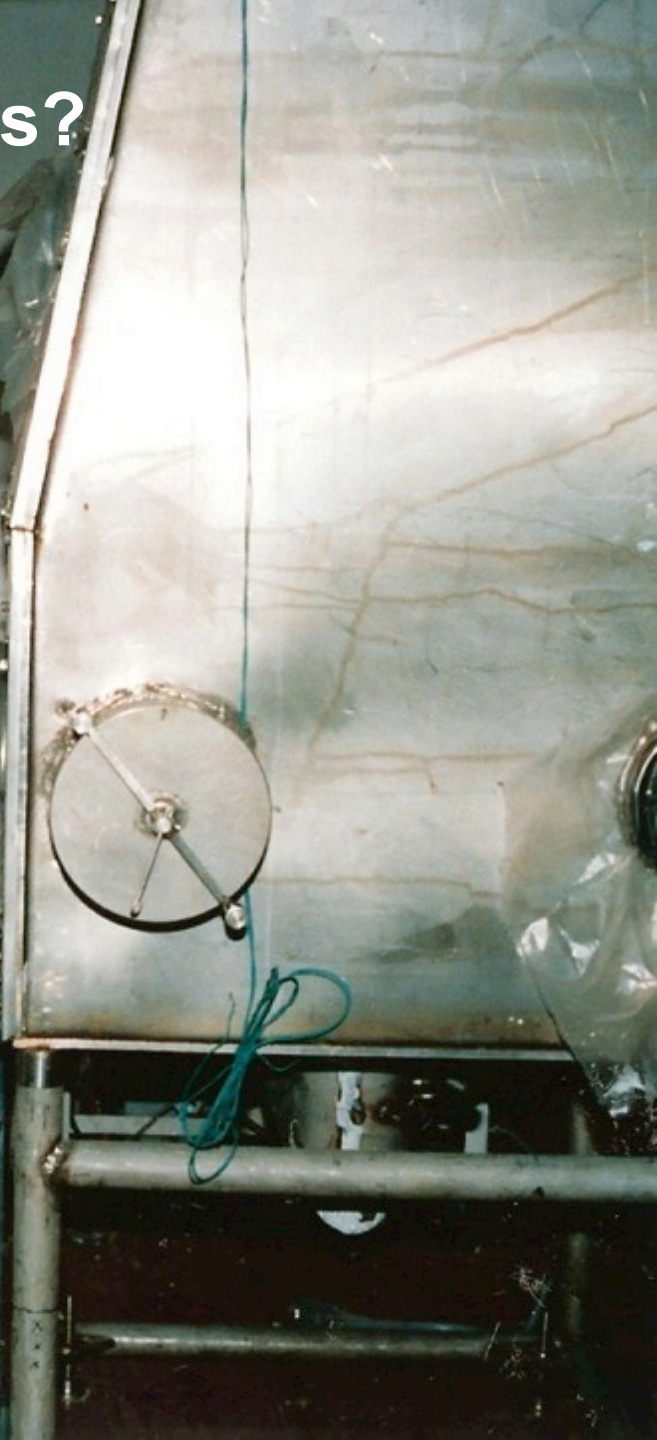
March 23, 2020



How can we judge what the North has?
Old-fashioned way:
Looking from the inside



Hecker



Kim Jong-un site visit on KCNA in March 2016





September 3, 2017 nuclear test

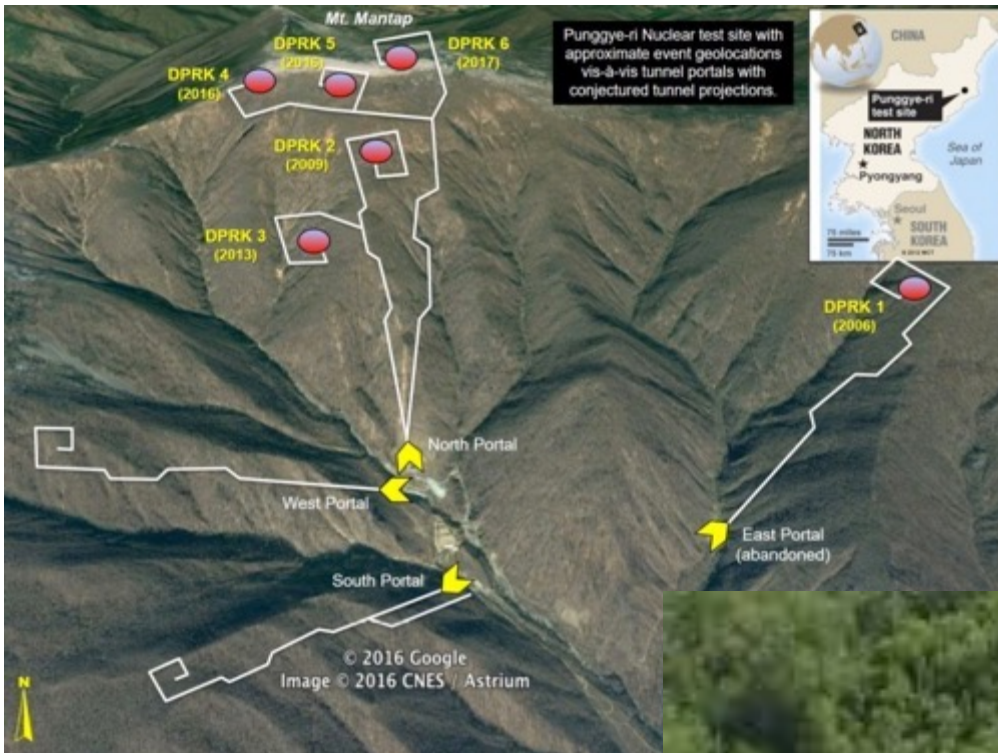
Nuclear tests are critical to weaponization

- Oct. 9, 2006: Close to 1 kiloton
- May 25, 2009: ~ 2 to 7 kilotons
- Feb. 12, 2013: ~ 7 to 14 kilotons
- Jan. 6, 2016: ~ 7 to 14 kilotons
 - Claim of H bomb not likely not true (proof of principle?)
- Sept. 9, 2016: ~ 15 to 25 kilotons
 - Likely made progress in miniaturization
- Sept. 3, 2017: 200 to 250 kilotons
 - Hydrogen bomb possible



Hiroshima. Universal History Archive / Getty

Punggye-ri nuclear test site

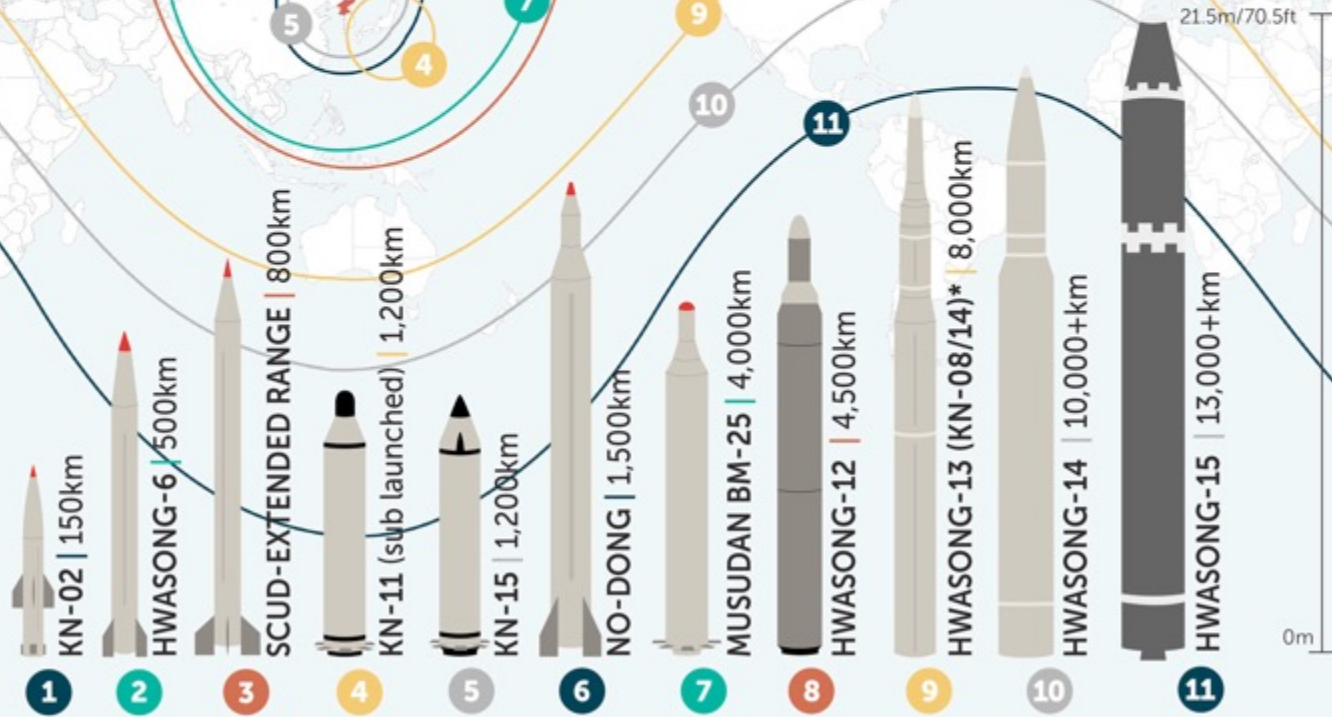




NORTH KOREA'S BALLISTIC MISSILES



North Korea's ballistic missile program is one of the most rapidly developing threats to global security. In recent years, an unprecedented pace of missile testing has included new and longer range missiles, sea-launches, and the orbiting of satellites. The most notable of these advances has been North Korea's development of two new intercontinental ballistic missiles, the Hwasong-14 and -15, which can likely reach the continental United States.



*Not yet flight tested.

Missiles and infrastructure pose major challenge

Hwasong-15 & Hwasong-16 ICBM-capable



Hs-15—Launched Nov 29, 2017
Range and altitude---950km and nearly
4,500km on a 'lofted' trajectory

Hs-16?—October 10, 2020 Parade
Greater expected range than Hs-15
11-axle TEL



Summer 2019 and 2020: Solid-fuel rockets and submarines



Creator: Kim Hong-Ji
Credit: REUTERS

Solid-fueled
Short Range Missiles



New MRLs –
Multiple Rocket
Launchers



New submarine
construction

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Political and military challenges will be just as great

Denuclearization and peacemaking must be in parallel

- Cooperative military to peaceful conversion of nuclear program offers the best path forward – the only one that may make verification possible.
- Peacemaking – should be accomplished between North and South. U.S. role should be to normalize relations with the North and create the security environment that allows the two Koreas to proceed.