

**North Korean nuclear weapons:
Don't let it get worse**

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**DPRK – Nuclear
Full speed ahead.**

**Yongbyon Nuclear
Complex**



The new Experimental Light Water Reactor (ELWR) sits on the site of the original 5 MWe reactor's cooling tower. The ELWR's pump house will now serve a secondary cooling system for each reactor.

26 SEP 2010

Overhead imagery



Source: DigitalGlobe

4 NOV 2010



Source: DigitalGlobe

28 MAY 2011



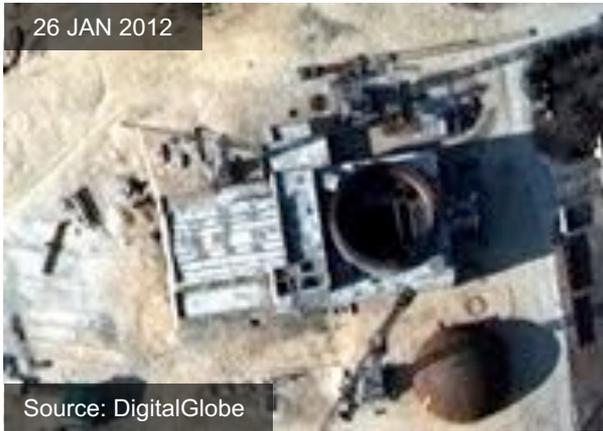
Source: GeoEye

4 NOV 2011



Source: DigitalGlobe, 38 North

26 JAN 2012



Source: DigitalGlobe

20 MAR 2012



Source: DigitalGlobe

24 JUN 2012



Source: GeoEye

6 AUG 2012



Source: GeoEye

12 DEC 2013



Source: DigitalGlobe/ Google Earth



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.



The Plutonium separation facility was the last of the major facilities completed in the southern area. Here spent fuel is processed to extract its plutonium. Although no plutonium has been processed here since late 2009, the facility has been kept in a standby condition and should be ready to process the fuel rods currently in the 5 MWe reactor, expected in about a year.



A close-up of Yongbyon's IRT-2000 research reactor complex. The Soviet supplied research reactor became critical in 1965 and the complex is one of the oldest parts of the Centre.

**We learned a lot through seven visits,
but no access since 2010**



November 2010 visit to Yongbyon presented us with a new reality

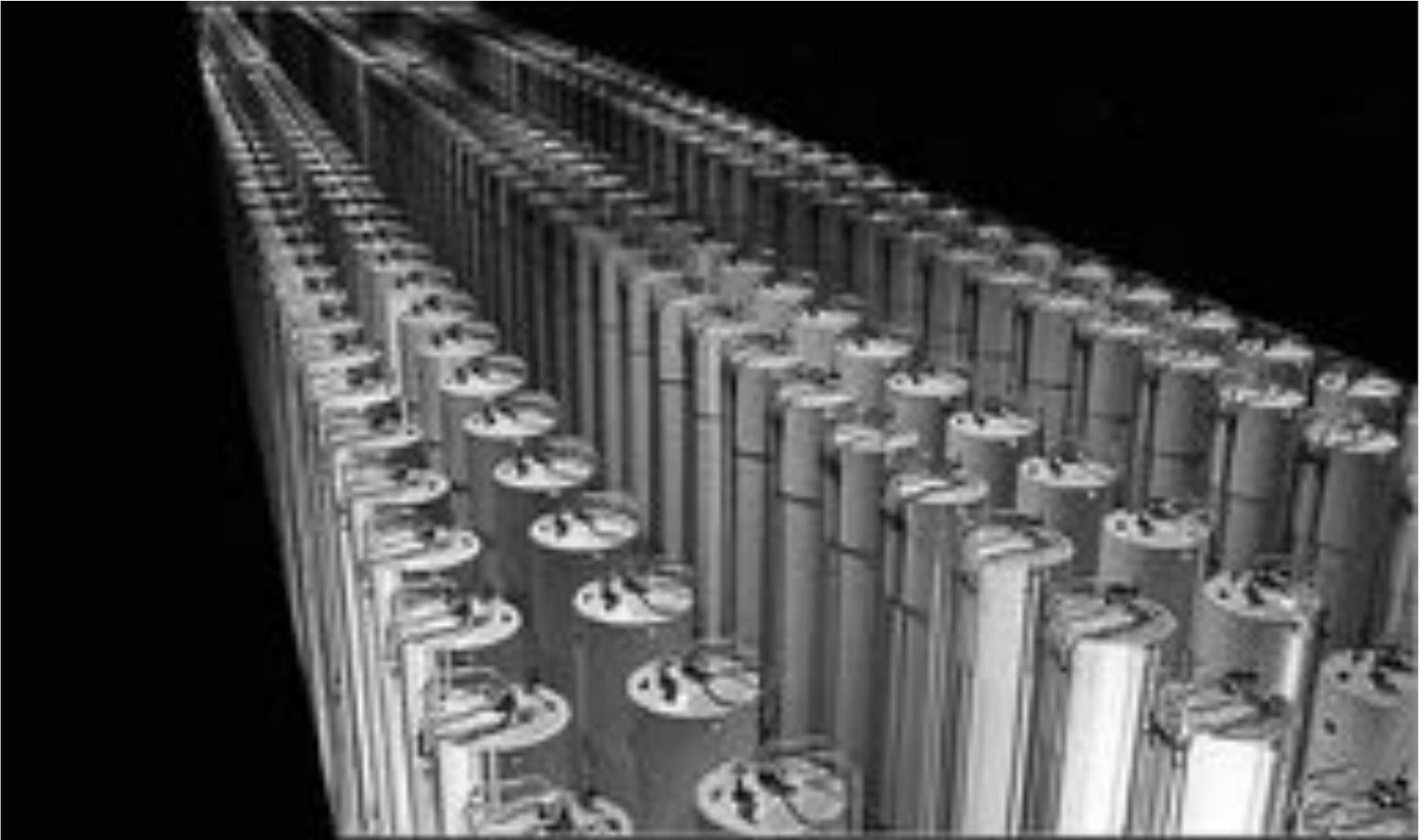
“We will convert our center to an LWR and pilot enrichment facility.”

DPRK Official, Nov. 2010



Activities at Yongbyon have been extensive since Nov. 2010

Purely illustrative - this is not Yongbyon, but close to what we saw (Nov. 12, 2010).



Piketon, Ohio Centrifuge plant, 1984 (Department of Energy)

Several additional centrifuge lines were removed graphically to try to get this as close as possible to the centrifuge cascades we saw in Bldg. 4 at Yongbyon



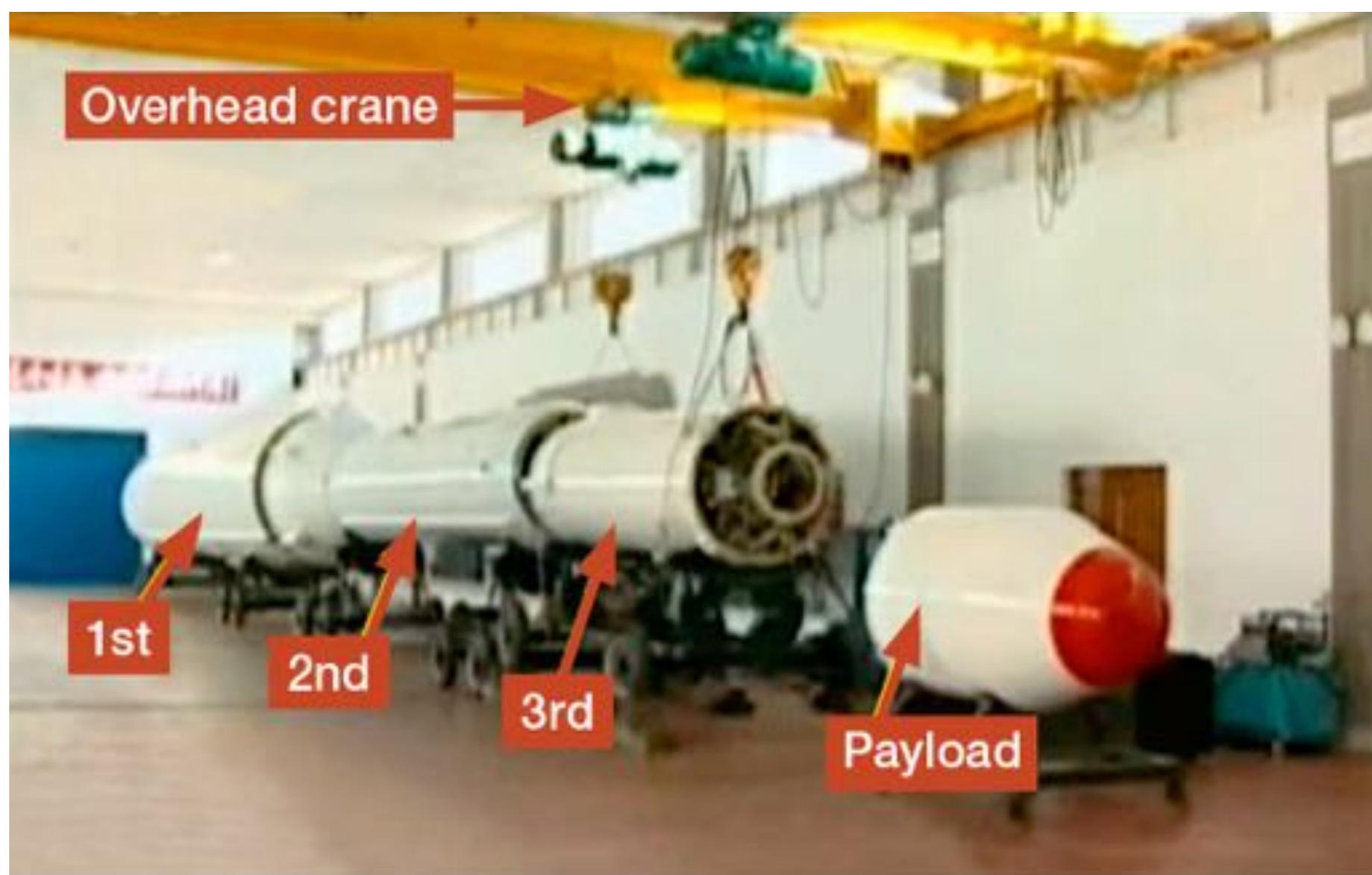


Construction at Sohae Satellite Launch Site

- Recent imagery reported by 38 North (Oct. 9) shows significant construction at Sohae
- Work ongoing to upgrade Unha launch pad and possibly build a second mobile missile launch pad
- Activities in line with North Korean desire to field mobile missile capability and launch larger rockets than the Unha-3 launched last December 2012



North Korea continues to prepare for future space launches, increasing the likelihood of rocket tests that improve its missile program



View of the inside of the main assembly building, from a KCTV video taken during Kim Jung Eun's visit on 22 November 2012.

Unha-3 Rocket Launch Preparation



IHS Jane's Satellite Imagery Analysis

3 April 2014



11 August 2014



Airbus Defence and Space imagery shows infrastructure changes around the Sohae horizontal assembly building. During 2014 the rail spur, previously terminating at the rail siding, was extended to provide direct access to the launch pad.

December 2012



8 April 2012



On the left, the Unha 3(2)'s first stage being stacked, December 2012. On the right, on the 8 April 2012, the Unha 3(1) displayed using the overhead crane for media visit.

© KCTV / Associated Press / IHS: 1463204



Kim Jong Un being shown an historical satellite image from ~2005 (GoogleEarth?) on large flat screen monitor!

Strategic Rocket Forces





Mosaic composite of two images compared with Google Earth imagery



Cluster of building along river listed on Wikimapia and Google Earth Community Blog as Second Economic Committee Executive Offices

Underground Entrance



Second Economic Committee Executive Offices now reportedly include Strategic Rocket Forces headquarters

© 2012 Google
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Image © 2012 DigitalGlobe

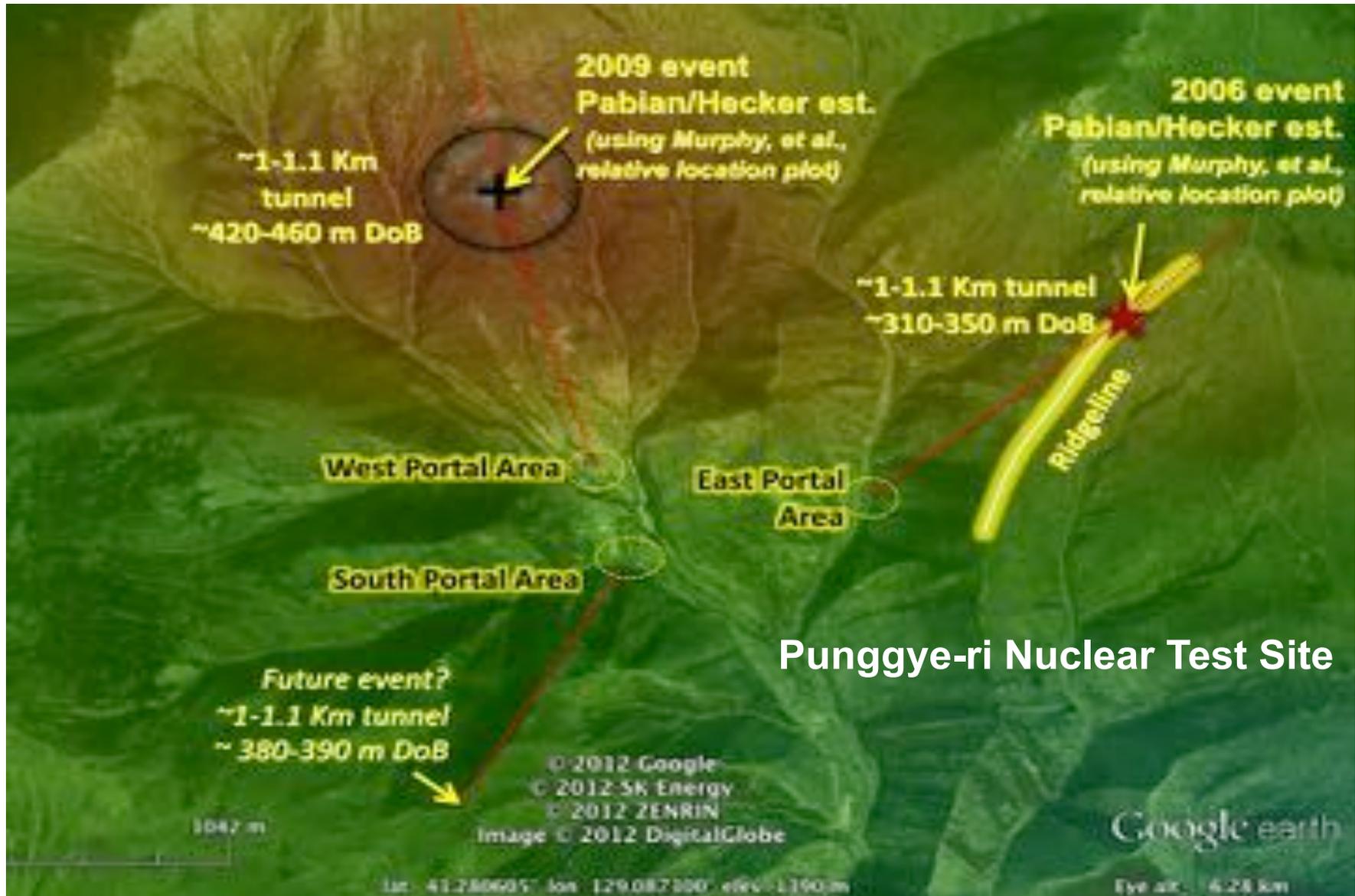
Google Earth

11 NOV 2005

19 44' 32.52" N 126° 04' 21.28" E Elev. 74 m

176 3m 993 m

Better bombs? North Korea would require another test



Testing is only area of restraint at this time

12-year comparison of DPRK nuclear program

Nuclear Capability	January 2003	January 2015
Plutonium	0 to 10 kg	24 to 42 kg
HEU (Highly enriched U)	Likely zero	Possibly 150 kg
Nuclear tests	Zero	3
Nuclear weapons	Likely zero Pu Zero HEU	4 to 8 Pu Possibly 6
Long-range rockets	One failed Taepodong-1 launch (1998)	Successful Unha-3 launch (Dec. 2012)

Potential DPRK nuclear program by 2016

Nuclear Capability	January 2003	December 2016 (Estimates)
Plutonium	0 to 10 kg	34 to 52 kg
HEU (Highly enriched U)	Likely zero	Possibly 500 kg
Nuclear tests	Zero	Possibly 4
Nuclear weapons	Likely zero Pu Zero HEU	6 to 10 Pu Possibly 12 HEU
Long-range rockets	One failed Taepodong-1 launch (1998)	Musudan or KN-08 tests

Recent activities

Nuclear Capability	January 2014	Current activities
Nuclear reactors	5 MWe restarted ELWR under construction	Stopped operations again Exterior appears ready
Fuel fabrication plant (FFP)	Reactivated Fuel for ELWR	Lots of activity at FFP Other potential site
Uranium enrichment	Centrifuge facility Covert facilities ?	Doubled centrifuge roof Little information on covert
Nuclear export	Cooperation with Iran?	Likely no current cooperation with Iran
Political	Kim Jong-un New constitution declares DPRK nuclear state	Threats off and on. Recent outreach.

Recent activities

Nuclear Capability	January 2014	Current activities
Plutonium	24 to 42 kg	No additional Pu now Perhaps 3-4 kg in reactor Not sure when reprocess
HEU (Highly enriched U)	Possibly 100 kg	No information New Iranian information on composite rotors
Nuclear tests	3	Not much activity now Some suspicion of May 11, 2010 test.
Nuclear weapons	4 to 8 Pu Possibly 4 HEU	No information
Long-range rockets	Successful Unha-3 launch (Dec. 2012)	Lots of activity at launch site.

So, what to do now?

- Deal with DPRK as it is, not the way we'd like it to be
 - Time is not on their side
- Stay the course on denuclearization, but limit threat
 - Long term defined by Sept. 19, 2005 Joint Statement
- For now - three no's and three yes's
 - No more bombs (no Pu or HEU)
 - No better bombs (no nuclear or missile tests)
 - No export
- Yes - address fundamentals of North Korea's insecurity to create conditions favorable to disarmament and provide energy and economic assistance

Possible steps to 3 No's – halt and roll back

Nuclear activity	Informal agreement	Potential next steps	Intermediate steps
Plutonium	Stop 5 MWe	Unload fuel, reprocess, safeguard	Terminate all plutonium operations. Dismantle.
HEU	Open YB Centrifuge Facility - inspect	Open all other YB facilities. Declare all UE ops	Close covert facilities. Negotiate on YB.
Nuclear tests	Moratorium	Destroy test tunnels	Cease all testing
Missiles	Moratorium	Declaration. Offer satellite launch services.	No long-range tests. Provide launch services.
LWR	Declaration	Safety inspection.	Decide on future of LWR.