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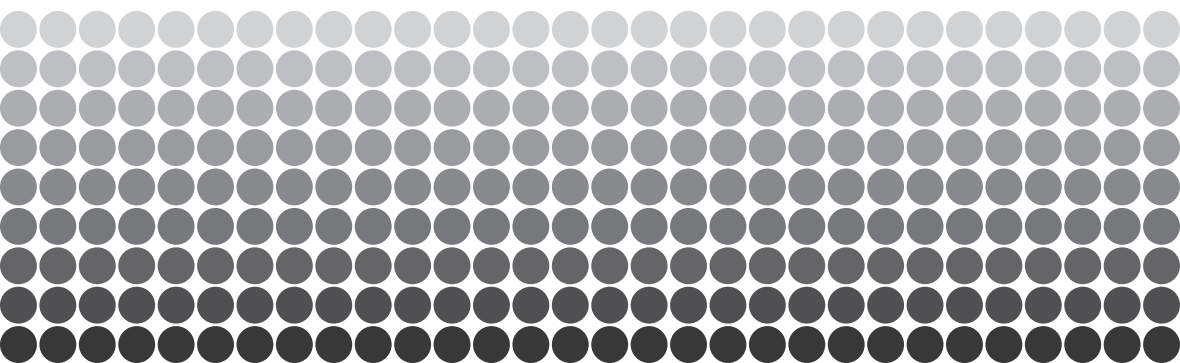

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IX. North Korea's military nuclear capabilities

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The Democratic People's Republic of Korea (DPRK, North Korea) maintains a secretive and highly opaque military nuclear programme. There is no public information to verify that it possesses operational nuclear weapons. However, in January 2012, James R. Clapper, the US Director of National Intelligence, assessed that North Korea had produced nuclear weapons, although he gave no estimate of the size of the country's weapon inventory.[6] In 2011 he had stated that North Korea possessed the capability to build nuclear weapons but that the US intelligence community did not know whether it had done so.[7]

As of January 2013, North Korea had carried out two underground tests of nuclear explosive devices: the first in October 2006, which had an estimated yield of less than 1 kiloton and was widely considered to be a failure; and the second in May 2009, which had an estimated yield of 2–6 kt.[8] During 2012 several non-governmental reports concluded, based on the analysis of satellite imagery and other evidence, that North Korea was making technical preparations for carrying out a third underground nuclear test in tunnels at its nuclear test site, Punggye-ri, in the north-east of the country.[9]

There has been considerable speculation that North Korea is seeking to build nuclear weapons using highly enriched uranium (HEU), rather than plutonium as the fissile material, as the tests in 2006 and 2009 are believed to have used.[10] While it is not known whether North Korea has produced

[6] Clapper, J. R., US Director of National Intelligence, 'Worldwide threat assessment of the US intelligence community for the Senate Select Committee on Intelligence', Unclassified statement for the record, 31 Jan. 2012, <http://www.dni.gov/index.php/newsroom/testimonies/>, p. 6.

[7] Clapper, J. R., US Director of National Intelligence, 'Worldwide threat assessment of the U.S. Intelligence Community for the House Permanent Select Committee on Intelligence', Statement for the record, 10 Feb. 2011, <http://www.dni.gov/index.php/newsroom/testimonies/>, p. 6.

[8] Fedchenko, V. and Ferm Hellgren, R., 'Nuclear explosions, 1945–2006', *SIPRI Yearbook 2007*; and Fedchenko, V., 'Nuclear explosions, 1945–2009', *SIPRI Yearbook 2010*. For a description of the methods used to estimate the explosive yields of the tests and attendant uncertainties see Pabian, F. V. and Hecker, S. S., 'Contemplating a third nuclear test in North Korea', *Bulletin of the Atomic Scientists*, 6 Aug. 2012, <http://www.thebulletin.org/web-edition/features/contemplating-third-nuclear-test-north-korea>.

[9] 'North Korean nuclear test preparations: an update', 38North, 27 Apr. 2012, <http://38north.org/2012/04/punggyeri042712/>; and Pabian and Hecker (note 8). North Korea carried out a 3rd nuclear test explosion at Punggye-ri on 12 Feb. 2013, which will be discussed in *SIPRI Yearbook 2014*.

[10] North Korea reportedly obtained clandestine design assistance for an HEU-based weapon from Pakistani nuclear engineer Abdul Qadeer Khan. United Nations, Security Council, Report of the Panel of Experts established pursuant to Resolution 1874 (2009), 11 May 2012, annex to S/2012/422, 14 June 2012, p. 15.

HEU for use in nuclear weapons, it is believed to have an active uranium-enrichment programme. In 2010 a delegation of US scientists visiting the nuclear complex at Yongbyon, North Pyongan, was shown a previously undisclosed centrifuge enrichment facility, located in a former metal fuel rod fabrication building.[11] A leaked 2011 report by the United Nations Security Council's Panel of Experts on North Korea assessed that it was 'highly likely that one or more parallel covert facilities capable of [low-enriched uranium] or HEU production exist elsewhere [in the country]'.[12] In addition, the IAEA has reported circumstantial evidence that North Korea acquired the capability to produce uranium hexafluoride (UF_6) feed gas for enrichment centrifuges prior to 2001.[13]

By using HEU for nuclear weapons, North Korea could potentially overcome the constraints posed by its limited stock of weapon-grade plutonium. In 2008 North Korea declared that it had separated 31 kilograms of plutonium from the spent fuel produced by its 5-megawatt-electric graphite-moderated research reactor at Yongbyon prior to the reactor being shut down; it subsequently produced an estimated 8–10 kg of separated plutonium (see section X). Following the 2006 and 2009 tests, and depending on the amount of plutonium used in those tests, North Korea had sufficient plutonium to construct six to eight rudimentary nuclear weapons, assuming that each weapon used 5 kg of plutonium. North Korea is currently building a new indigenously designed pressurized light water reactor at the Yongbyong site; while this is ostensibly a step toward a nuclear power generation capacity, it could be used to produce plutonium for its nuclear weapon programme.[14]

There is circumstantial evidence that North Korea may be interested in testing both plutonium and HEU explosive devices, either simultaneously or in quick succession.[15] The plutonium test could provide information on the yield-to-weight ratio needed for building a warhead that is compact and light enough to fit on a long-range ballistic missile, while a test using HEU could pave the way for an expanded future arsenal.[16] However, if an

[11] Hecker, S. S., 'A return trip to North Korea's Yongbyon nuclear complex', Stanford University, Center for International Security and Cooperation, 20 Nov. 2010, <http://cisac.stanford.edu/publications/north_koreas_yongbyon_nuclear_complex_a_report_by_siegfried_s_hecker/>.

[12] Panel of experts established pursuant to Resolution 1874 (2009), Report, para. 53. The leaked report is available at <http://www.scribd.com/doc/55808872/UN-Panel-of-Experts-NORK-Report-May-2011>.

[13] North Korea is suspected of having transferred UF_6 to Libya's clandestine uranium-enrichment programme in 2000 and 2001. International Atomic Energy Agency, Board of Governors and General Conference, 'Application of Safeguards in the Democratic People's Republic of Korea', Report by the Director General, GOV/2011/53–GC(55)24, 2 Sep. 2011, para. 50.

[14] Puccioni, A., 'Pyongyang takes a major step in new reactor project', *Jane's Defence Weekly*, 22 Aug. 2012, p. 8.

[15] Pabian and Hecker (note 8).

[16] Hecker, S. S., 'What to expect from a North Korean nuclear test?', *Foreign Policy*, 4 Feb. 2013.

underground test were well contained, it would be difficult for airborne sampling techniques outside the country to determine whether HEU or plutonium had been used.[17] There has also been speculation that North Korea may attempt to test a fusion-boosted fission device or possibly even a thermonuclear weapon.[18]

[17] Choe, S., 'North Korea: a third nuclear test may not answer basic questions', *New York Times*, 6 Feb. 2013.

[18] Lewis, J., 'Setting expectations for a DPRK test', Arms Control Wonk, 29 Jan. 2013, <http://lewis.armscontrolwonk.com/archive/6200/setting-expectations-for-a-dprk-test>; and Makino, Y., 'N. Korea likely to test fusion-boosted fission bomb able to reach U.S.', Asahi Shimbun Asia and Japan Watch, 25 Jan. 2013, <http://ajw.asahi.com/article/asia/korean_peninsula/AJ201301250058>.