## Analysis of North Korea Nuclear Tests

### Yield

Analysts have generally agreed that the nuclear test was successful, despite uncertainty of the exact yield.

The U.S. intelligence community assessed that North Korea "probably" had conducted a nuclear test with a yield of "a few kilotons." The Preparatory Commission for the Comprehensive Test Ban Treaty Organization assessed the yield at only slightly larger than the 2006 test, which was one kiloton.

Russia placed the yield of the test significantly higher at 10 to 20 kilotons. This was approximately the yield of the Fat Man and Trinity bombs developed by the United States during World War II. After the 2006 test the Russians estimated a far higher yield of 5 to 10 kilotons when other sources estimated a yield of 0.5 to 0.9 kilotons. Defense Minister Lee Sang-Hee of South Korea said that more data were needed but that the yield might be between 1 to 20 kilotons.

Based on readings from 23 seismic stations, the Preparatory Commission for a Comprehensive Test Ban estimated the blast wave as 4.52. This corresponds to an explosive force of 2.4 kilotons and compares to a wave of 4.1, or 0.8 kilotons, for the 2006 blast.

Analyst Martin Kalinowski at the University of Hamburg estimated the yield at being from 3 to 8 kilotons, still a very successful test when compared with the 2006 test. Hans M. Kristensen of the Federation of American Scientists cautioned that "early news media reports about a 'Hiroshima-size' nuclear explosion seem to be overblown." The *Bulletin of the Atomic Scientists* asserted that the blast was more powerful than the 2006 test, but put the yield between 2 to 6 kilotons, far short of a Hiroshima-type device. The group concluded that the bomb failed to detonate correctly, but that still in that case the potential of this weapon should not be dismissed.

### Lack of radionuclide confirmation

In June 2009, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) announced that no radionuclides had been detected that could be associated with the 25 May event. At the time of the test, the CTBTO global network included 40 radionuclide sampling stations. In addition, the United States reported that no radionuclides were detected by aircraft over the Sea of Japan (East Sea of Korea), and South Korea also reported that no radionuclides were detected. By contrast, radionuclides were detected in at least two locations after the 2006 event. Lack of detection does not mean that the event was non-nuclear: it is reasonable for a nuclear test with this yield, buried deep enough in the appropriate rock, to not yield remotely detectable radionuclides. It does, however, make it more difficult to prove whether the test was in fact nuclear.

## Missile tests

On the same day, North Korea also conducted short-range surface-to-air missile tests. The number of fired missiles was first reported as three, but corrected to two by the South Korean defense ministry on 27 May 2009. The first missile had a range of 130 km (81 mi). The South Korean news agency Yonhap cited military officials as saying that the launches seemed to be aimed at keeping U.S. and Japanese surveillance planes away from the site.

On 26 May 2009, South Korea's Yonhap news agency reported, citing officials, that North Korea fired three more short-range missiles off an east-coast base, one ground-to-ship missile and one surface-to-air missile. The move came as UN diplomats began work on a resolution to punish North Korea for its underground nuclear test.

By 27 May 2009, at least five short range missiles were launched by North Korea. A military spokesman quoted by official media said that North Korea could no longer guarantee the safety of shipping off its west coast, suggesting a missile could also be fired in that direction.

Another short-range missile was fired off North Korea's east coast on 28 May 2009.

On 29 May 2009, U.S. officials said that satellite photos revealed vehicle activity at two sites in North Korea suggesting that North Korean military might be preparing to launch a long-range ballistic missile. This was reaffirmed on 1 June 2009 by Defense Secretary Robert M. Gates who said at a news conference with his Philippine counterpart during a brief visit to Manila "We have seen some signs that they may be doing something with another Taepodong-2 missile, but at this point it's not clear what they're doing".

Yonhap news agency reported on 2 June 2009 that North Korea was readying as many as three medium-range missiles (according to some analysts, Rodong missiles) at a missile base in Anbyon region, Gangwon Province, northeast of the capital of Pyongyang. In addition, a South Korean defence ministry spokesman said that signs that North Korea was preparing to fire an intercontinental ballistic missile (ICBM) had been detected. verifying US defense officials' reports and Defense Secretary Robert M. Gates's statement made on 1 June. North Korea apparently has moved the ICBM to a new base in Dongchang-ri along its west coast and a launch could take place in one or two weeks, according to Yonhap.