

CRS Report for Congress

North Korea's Nuclear Weapons Development and Diplomacy

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Summary

The six parties to the North Korean nuclear negotiations concluded an agreement on February 13, 2007, that specifies two Phases of implementation. The phases provided for a freeze of North Korean nuclear installations at the Yongbyon site, a subsequent disablement of all North Korean nuclear facilities, and a North Korean declaration of “all nuclear programs.” The Agreement also establishes working groups of the six parties on subjects such as U.S.-North Korean normalization of relations, denuclearization of the Korean peninsula, energy and economic cooperation, Japan-North Korea normalization of relations, and a North Korean peace and security mechanism. The Six Party Agreement was negotiated following a North Korean nuclear test in October 2006, the imposition of sanctions against North Korea by the United Nations Security Council, and mounting congressional criticism of Administration policy. The nuclear test signaled progress by North Korea in reprocessing plutonium since 2002 for six to eight atomic bombs.

The Agreement also came about because of changes in Bush Administration policy. Tactically, the Administration ended its unwillingness to negotiate bilaterally with North Korea and actively sought bilateral meetings; the details of the Agreement were negotiated at these meetings.

The implementation of the Initial Phase of the Agreement, which had a 60-day deadline, has been delayed because of North Korean demands for access to foreign banks to deposit \$25 million from frozen accounts at the Banco Delta in Macau — the object of U.S. financial sanctions since September 2005 because of Banco Delta's involvement in North Korean criminal counterfeiting. Implementation of Phase Two, which has no timetable, likely will involve new rounds of negotiations, especially between the Bush Administration and North Korea over issues in contention like the definition of disablement, the U.S. claim that North Korea has a secret highly enriched uranium program, verification of any disablement or declaration of nuclear programs, and issues unresolved in the working groups.

This report will be updated periodically.

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North Korea's Nuclear Weapons Development and Diplomacy

The February 2007 Six Party Agreement: Provisions and Implementation

Main Features of the Agreement

1. An Initial phase with a 60-day timetable.

- North Korea is to freeze (“shut down and seal”) its nuclear installations at Yongbyon, including the operating five megawatt nuclear reactor and plutonium reprocessing plant.
- North Korea will “invite back” the IAEA to monitor the freeze at Yongbyon. This is the same role that the IAEA had from 1994 until December 2002 under the 1994 U.S.-North Korean Agreed Framework.
- As these arrangements are made, North Korea is to receive 50,000 tons of heavy oil. South Korea reportedly will finance this shipment.
- North Korea “will discuss” with the other six parties “a list of all its nuclear programs, including plutonium extracted from used fuel rods” from the five megawatt reactor (which North Korea claims to have reprocessed into nuclear weapons-grade plutonium).
- North Korea and the United States will “start bilateral talks aimed at resolving bilateral issues and moving toward full diplomatic relations.” The United States “will begin the process of removing” North Korea from the U.S. list of state sponsors of terrorism and “advance the process of terminating” economic sanctions against North Korea under the U.S. Trading with the Enemy Act.
- North Korea and Japan will “start bilateral talks” toward normalization of relations on the basis of settlement of “outstanding issues of concern” (which Japan interprets to include the issue of North Korea’s kidnapping of Japanese citizens).
- Although unstated in the agreement, a defacto component of the Initial Phase was Christopher Hill’s pledge to resolve the issue of U.S. sanctions against Banco Delta and the freezing of North Korean accounts within 30 days of February 13, 2007.

Implementation of the Initial Phase. There was little implementation of the Initial Phase by the 60-day deadline of April 13, 2007. Although the Bush Administration agreed to an unfreezing of North Korea's accounts at Banco Delta within the 30 days pledged by Hill, delays resulted in the Macau Banking Authority not releasing the \$25 million to North Korea until mid-April 2007. However, instead of withdrawing the money in cash, North Korea demanded assurances from the Bush Administration that the U.S. Treasury Department would not penalize any foreign banks that received transferred money from North Korea's Banco Delta accounts. It also proposed that a U.S. bank facilitate the transfer the money to a North Korean account in a foreign bank. In June 2007, the Bush Administration and the Russian government arranged for the money to be transferred through the New York Federal Reserve Bank to Russia's central bank, which then forwarded the money to a private bank that maintained a North Korean account.¹

Assistant Secretary Hill then visited Pyongyang, the first time an American official had been there since October 2002. North Korea also invited a team from the IAEA to Pyongyang to negotiate the return of IAEA monitors to Yongbyon. Hill predicted that North Korea would shut down the Yongbyon facilities within a few weeks.²

2. "Next Phase" or Phase Two.

Following the initial phase is a "Next Phase" without a timetable or deadline specified for implementation. (This will be referred to as Phase Two.)

- North Korea is to make "a complete declaration of all nuclear programs."
- A "disablement of all existing nuclear facilities."
- North Korea is to receive "economic, energy and humanitarian assistance up to the equivalent of 1 million tons of heavy fuel oil, including the initial shipment of 50,000 tons of heavy oil."

3. Five Working Groups.

Ongoing with the Initial Phase and Phase Two is the establishment and functioning of five working groups to negotiate key issues. Agreements reached by the working groups "will be implemented as a whole in a coordinated manner." The working groups will deal with the following subjects:

- Denuclearization of the Korean Peninsula;
- Normalization of North Korea-U.S. relations;

¹ Jay Solomon, Money transfer advanced North Korea pact, *The Wall Street Journal Asia*, June 15, 2007, p. 8.

² David Lague, U.S. says North Korea may begin shutting reactor in weeks, *New York Times*, June 19, 2007, p. A11.

- Normalization of North Korea-Japan relations;
- Economy and energy cooperation; and
- Northeast Asia peace and security mechanisms.

4. Separate Permanent Peace Forum.

Negotiation in a separate forum of a “permanent peace regime on the Korean Peninsula” by the “directly related parties.” In the late 1990s, the United States, North Korea, South Korea, and China negotiated unsuccessfully over a Korean peace agreement.

North Korea’s Nuclear Programs

Plutonium Program

Most of North Korea’s plutonium-based nuclear installations are located at Yongbyon, 60 miles from the North Korean capital of Pyongyang. They are the facilities covered by the 1994 U.S.-North Korean Agreed Framework. (For more information see CRS Report RS21391, *North Korea’s Nuclear Weapons: Latest Developments*, by Sharon Squassoni) The key installations are as follows:³

- *An atomic reactor, with a capacity of about 5 electrical megawatts that began operating by 1987.* It is capable of expending enough reactor fuel to produce about 6 kilograms of plutonium annually — enough for the manufacture of a single atomic bomb annually. North Korea in 1989 shut down the reactor for about 70 days; U.S. intelligence agencies believe that North Korea removed fuel rods from the reactor at that time for reprocessing into plutonium suitable for nuclear weapons. In May 1994, North Korea shut down the reactor and removed about 8,000 fuel rods, which could be reprocessed into enough plutonium (25-30 kilograms) for 4-6 nuclear weapons. North Korea started operating the reactor again in February 2003, shut it down in April 2005, and said it had removed another 8,000 fuel rods.
- *Two larger (estimated 50 megawatts and 200 electrical megawatts) reactors under construction at Yongbyon and Taechon since 1984.* According to U.S. Ambassador Robert Gallucci, these plants, if completed, would be capable of producing enough spent fuel annually for 200 kilograms of plutonium, sufficient to manufacture nearly 30 atomic bombs per year. However, when North Korea reopened the plutonium program in early 2003, reports indicate that construction on the larger reactors was not resumed, but construction reportedly was resumed in June 2005.

³ Albright, David and O’Neill, Kevin. Solving the North Korean nuclear puzzle. Washington, D.C., Institute for Science and International Security Press, 2000. pp. 57-82.

- *A plutonium reprocessing plant about 600 feet long and several stories high.* The plant would separate weapons grade plutonium-239 from spent nuclear fuel rods for insertion into the structure of atomic bombs or warheads. U.S. intelligence agencies reportedly detected North Korean preparations to restart the plutonium reprocessing plant in February and March 2003. According to press reports, the CIA estimated in late 2003 that North Korea had reprocessed some of the 8,000 fuel rods. In January 2004, North Korean officials showed a U.S. nuclear expert, Dr. Sigfried Hecker, samples of what they claimed were plutonium oxalate powder and plutonium metal. Dr. Hecker later said in testimony before the Senate Foreign Relations Committee (January 21, 2004) that, without testing, he could not confirm whether the sample was metallic plutonium “but all observations I was able to make are consistent with the sample being plutonium metal.”

Satellite photographs reportedly also show that the atomic reactors have no attached power lines, which they would have if used for electric power generation.

Persons interviewed for this study believe that North Korea developed the two reactors and the apparent reprocessing plant with its own resources and technology. It is believed that Kim Jong-il, the son and successor of President Kim Il-sung who died in July 1994, directs the program, and that the military and the Ministry of Public Security implement it. North Korea reportedly has about 3,000 scientists and research personnel devoted to the Yongbyon program. Many have studied nuclear technology (though not necessarily nuclear weapons production) in the Soviet Union and China and reportedly Pakistan.

Highly Enriched Uranium (HEU) Program

North Korea’s secret highly enriched uranium (HEU) program appears to date from at least 1996. Hwang Jang-yop, a Communist Party secretary who defected in 1997, has stated that North Korea and Pakistan agreed in the summer of 1996 to trade North Korean long-range missile technology for Pakistani HEU technology.⁴ Other information dates North Korea-Pakistan cooperation to 1993. The Clinton Administration reportedly learned of it in 1998 or 1999, and a Department of Energy report of 1999 cited evidence of the program. In March 2000, President Clinton notified Congress that he was waiving certification that “North Korea is not seeking to develop or acquire the capability to enrich uranium.” The Japanese newspaper *Sankei Shimbun* reported on June 9, 2000, the contents of a “detailed report” from Chinese government sources on a secret North Korean uranium enrichment facility inside North Korea’s Mount Chonma. Reportedly, according to a CIA report to Congress, North Korea attempted in late 2001 to acquire “centrifuge-related materials in large quantities to support a uranium enrichment program.”⁵

⁴ Kim Min-cheol. Hwang tells of secret nuke program. *Choson Ilbo* (Seoul, internet version), July 5, 2003.

⁵ Pincus, Walter. N. Korea’s nuclear plans were no secret. *Washington Post*, February 1, (continued...)

The CIA estimated publicly in November 2002 that North Korea could produce two atomic bombs annually through HEU beginning in 2005;⁶ other intelligence estimates reportedly project a bomb producing capability between 2005 and 2007. Ambassador Robert Gallucci, who negotiated the 1994 U.S.-North Korean Agreed Framework, and Mitchell Reiss, head of the State Department's Policy Planning Bureau until 2004, have stated that a functioning North Korean HEU infrastructure could produce enough HEU for "two or more nuclear weapons per year." The *Washington Post* of April 28, 2004, quoted an U.S. intelligence official saying that a North Korean HEU infrastructure could produce as many as six atomic bombs annually. Administration officials have stated that they do not know the locations of North Korea's uranium enrichment program or whether North Korea has assembled the infrastructure to produce uranium-based atomic bombs.⁷

International Assistance

Knowledgeable individuals believe that the Soviet Union did not assist directly in the development of Yongbyon in the 1980s. The U.S.S.R. provided North Korea with a small research reactor in the 1960s, which also is at Yongbyon. However, North Korean nuclear scientists continued to receive training in the U.S.S.R. up to the demise of the Soviet Union in December 1991. East German and Russian nuclear and missile scientists reportedly were in North Korea throughout the 1990s. Since 1999, reports have appeared that U.S. intelligence agencies had information that Chinese enterprises were supplying important components and raw materials for North Korea's missile program.⁸

North Korea's Delivery Systems

North Korea's missile launchings of July 4, 2006, re-focused U.S. attention on North Korea's missile program and Pyongyang's apparent attempts to develop long-range missiles that could strike U.S. territories. North Korea succeeded by 1998 in developing a "Nodong" missile with a range estimated at up to 900 miles, capable of covering South Korea and most of Japan. North Korea reportedly deployed nearly 100 Nodong missiles by 2003. On August 31, 1998, North Korea test fired a three-stage rocket, apparently the prototype of the Taepodong I missile; the third stage apparently was an attempt to launch a satellite. U.S. intelligence estimates reportedly concluded that such a missile would have the range to reach Alaska, Guam, and the Northern Marianas Commonwealth. Media reports in early 2000 cited U.S. intelligence findings that without further flight tests, North Korea could deploy an intercontinental ballistic missile that would be capable of striking Alaska, Hawaii,

⁵ (...continued)
2003. P. A1.

⁶ CIA unclassified point paper distributed to Congress, November 19, 2002.

⁷ Kessler, Glenn. New doubts on nuclear efforts by North Korea. *Washington Post*, March 1, 2007. P. A1.

⁸ ROK source views CIA report on DPRK production of plutonium. *Chungang Ilbo* (internet version), February 25, 2001. Gertz, Bill. Pyongyang's launch met by indifference. *Washington Times*, May 16, 1999. p. C1.

and the U.S. west coast. Japan's *Sankei Shimbun* newspaper reported on August 6, 2003, that North Korea and Iran were negotiating a deal for the export of the long-range Taepo Dong-2 missile to Iran and the joint development of nuclear warheads. U.S. officials claimed in September 2003 that North Korea had developed a more accurate, longer-range intermediate ballistic missile that could reach Okinawa and Guam (site of major U.S. military bases) and that there was evidence that North Korea had produced the Taepodong II, which could reach Alaska, Hawaii, and the U.S. west coast.

However, the apparent failure of the Taepodong missile launched July 4, 2006, indicated that North Korea had not succeeded in developing such a long-range missile. However, evaluations of all seven of the missiles launched on July 4, 2006, by intelligence agencies of the United States and other governments reportedly have concluded that North Korea has increased the accuracy of its Scud and Nodong missiles and that the launches displayed the ability of North Korea's command and control apparatus to coordinate multiple launchings of missiles at diverse targets.⁹ (For additional information, see CRS Report RS21473, *North Korean Ballistic Missile Threat to the United States*, by Steve Hildreth.)

The Clinton Administration to press North Korea for new talks over North Korea's missile program. In talks held in 1999 and 2000, North Korea demanded \$1 billion annually in exchange for a promise not to export missiles. U.S. negotiators rejected North Korea's demand for \$1 billion but offered a lifting of U.S. economic sanctions. This laid the ground for the Berlin agreement of September 1999, in which North Korea agreed to defer further missile tests in return for the lifting of major U.S. economic sanctions. President Clinton formalized the lifting of key economic sanctions against North Korea in June 2000. North Korea continued the moratorium, but it appears to have used Pakistan and Iran as surrogates in testing intermediate-range missiles based on North Korean technology.¹⁰

State of Nuclear Weapons Development

A CIA statement of August 18, 2003, reportedly estimated that North Korea had produced one or two simple fission-type nuclear weapons and had validated the designs without conducting yield-producing nuclear tests.¹¹ The initial estimate of one or two nuclear weapons is derived primarily from North Korea's approximately 70-day shutdown of the five megawatt reactor in 1989, which would have given it the opportunity to remove nuclear fuel rods, from which plutonium is reprocessed. The U.S. Central Intelligence Agency (CIA) and the Defense Intelligence Agency (DIA)

⁹ An expert is amazed by the targeting accuracy: an exclusive report based on complete data on the landing points of North Korean missiles. *Yomiuri Weekly* (Tokyo) in Japanese, August 6, 2006. p. 22-23.

¹⁰ Gertz, Bill. Pakistan's missile program aided by North Korea. *Washington Times*, September 14, 1998. p. A1. Alon, Ben-David. Iran successfully tests Shahab 3. *Janes Defence Weekly* (internet version), July 9, 2003. Coughlin, Con. China, N. Korea send experts to hone Iran's long-range missiles. *New York Times*, November 23, 1997. p. A5.

¹¹ Sanger, David E. North Korea's bomb: untested but ready, C.I.A. concludes. *New York Times*, November 9, 2003. P. 4.

reportedly estimated in late 1993 that North Korea extracted enough fuel rods for about 12 kilograms of plutonium — sufficient for one or two atomic bombs. The CIA and DIA apparently based their estimate on the 1989 shutdown of the five megawatt reactor.¹²

South Korean and Japanese intelligence estimates reportedly were higher: 16-24 kilograms (Japan) and 7-22 kilograms (South Korea). These estimates reportedly are based on the view that North Korea could have acquired a higher volume of plutonium from the 1989 reactor shutdown and the view of a higher possibility that North Korea removed fuel rods during the 1990 and 1991 reactor slowdowns. Russian Defense Ministry analyses of late 1993 reportedly came to a similar estimate of about 20 kilograms of plutonium, enough for two or three atomic bombs. General Leon LaPorte, former U.S. Commander in Korea, stated in an interview in April 2006 that North Korea possessed three to six nuclear weapons before the 1994 U.S.-North Korean Agreed Framework.¹³

Russian intelligence agencies also reportedly have learned of significant technological advances by North Korea toward nuclear weapons production. On March 10, 1992, the Russian newspaper *Argumenty I Fakty* (Arguments and Facts) published the text of a 1990 Soviet KGB report to the Soviet Central Committee on North Korea's nuclear program. It was published again by *Izvestiya* on June 24, 1994. The KGB report asserted that "According to available data, development of the first nuclear device has been completed at the DPRK nuclear research center in Yongbyon." The North Korean government, the report stated, had decided not to test the device in order to avoid international detection.

Additionally, a number of reports and evidence point to at least a middle-range likelihood that North Korea may have smuggled plutonium from Russia. In June 1994, the head of Russia's Counterintelligence Service (successor to the KGB) said at a press conference that North Korea's attempts to smuggle "components of nuclear arms production" from Russia caused his agency "special anxiety." U.S. executive branch officials have expressed concern in background briefings over the possibility that North Korea has smuggled plutonium from Russia. One U.S. official, quoted in the *Washington Times*, July 5, 1994, asserted that "There is the possibility that things having gotten over the [Russia-North Korea] border without anybody being aware of it." The most specific claim came in the German news magazine *Stern* in March 1993, which cited Russian Counterintelligence Service reports that North Korea had smuggled 56 kilograms of plutonium (enough for 7-9 atomic bombs) from Russia.

If, as it claims, North Korea reprocessed the 8,000 nuclear fuel rods in 2003 that it had moved from storage at the beginning of that year, North Korea gained an additional 25-30 kilograms of plutonium, according to Dr. Sigfried Hecker in his testimony before the Senate Foreign Relations Committee on January 21, 2004. Dr. Hecker, former director of the Los Alamos Laboratories, had visited North Korea's

¹² Ibid., p. 111-166. Kim Kyoung-soo. North Korea's weapons of mass destruction: problems and prospects. Elizabeth, New Jersey, and Seoul, Hollym, 2004. pp. 27-50.

¹³ Kang Chan-ho. Former USFK commander: transfer of wartime control should not be carried out overnight. *Joong Ang Ilbo* (Seoul), April 3, 2006. p. 13.

Yongbyon nuclear complex in January 2004. U.S. officials and nuclear experts have stated that this amount of plutonium would give North Korea the potential to produce between four to eight atomic bombs.¹⁴ These estimates appear to be based on projections that a country like North Korea would need 6-8 kilograms of plutonium to produce one atomic bomb. The IAEA has had a standard that a non-nuclear state would need about eight kilograms of plutonium to produce an atomic bomb.

The question of whether North Korea produced additional nuclear weapons with the plutonium that it apparently acquired after 2003 may depend on whether North Korea is able to develop a nuclear warhead that could be fitted onto its missiles. Experts believe that the one or two atomic bombs developed earlier likely are similar to the large-size plutonium bomb dropped by the United States on Nagasaki in August 1945. However, North Korea has few delivery systems that could deliver such a bomb to a U.S. or Japanese target. Thus, Pyongyang probably would not produce additional Nagasaki-type bombs but would retain its weapons-grade plutonium until it could use it to produce a nuclear warhead. Statements by U.S. officials reflect an apparent uncertainty over whether North Korea has achieved a warheading capability.¹⁵

According to press reports in late 2002, the CIA concluded that North Korea accelerated its uranium enrichment program in the 1999, 2000, and 2001. According to *U.S. News and World Report*, September 1, 2003, the CIA estimated that North Korea could produce a uranium-based atomic weapon by the second half of 2004. Another report, in the *Washington Post*, April 28, 2004, stated that U.S. intelligence officials had “broadly concluded” that a North Korean uranium enrichment program would be operational by 2007, producing enough material for as many as six atomic bombs.¹⁶ However, U.S. officials have stated that they know less about the secret uranium enrichment program (HEU) than they know about the plutonium program. North Korea received designs for uranium enrichment centrifuges from Pakistan nuclear “czar,” A.Q. Khan, and has attempted to purchase overseas key components for uranium enrichment centrifuges; but some of these purchases have been blocked.¹⁷ Assistant Secretary of State Christopher Hill stated on September 28, 2005, that “where there is not a consensus is how far they [North Korea] have gone with this [the HEU program].”¹⁸

¹⁴ Kessler, Glenn. N. Korea nuclear estimate to rise. *Washington Post*, April 28, 2004. p. A1. U.S. Expert says N. Korea has plutonium to make 8 bombs. *Yonhap News Agency*, January 2, 2006.

¹⁵ Cloud, David S. and Sanger, David E. U.S. aide sees arms advance by North Korea. *New York Times*, April 29, 2005. p. A1. Morgan, David. U.S. not certain North Korea has nuclear weapons. *Reuters News*, February 28, 2005.

¹⁶ Kessler, N. Korea nuclear estimate to rise, *Washington Post*, April 28, 2004. p. A1.

¹⁷ Albright and Hinderstein, Dismantling the DPRK’s nuclear weapons program, pp. 35-36.

¹⁸ Parties concur N.K. has HEU material, but disagree on program’s progress: Hill. *Yonhap News Agency*, September 29, 2005.

For Additional Reading

CRS Report RL31555, *China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issues*, by Shirley A. Kan.

CRS Report RL31785, *Foreign Assistance to North Korea*, by Mark E. Manyin.

CRS Report RL33567, *Korea: U.S.-South Korean Relations — Issues for Congress*, by Larry A. Niksch.

CRS Report RL31696, *North Korea: Economic Sanctions*, by Dianne E. Rennack.

CRS Report RS21473, *North Korean Ballistic Missile Threat to the United States*, by Steve Hildreth.

CRS Report RL33324, *North Korean Counterfeiting of U.S. Currency*, by Raphael F. Perl and Dick K. Nanto.

CRS Report RL33709, *North Korea's Nuclear Test: Motivations, Implications, and U.S. Options*, by Emma Chanlett-Avery and Sharon Squassoni.

CRS Report RS21391, *North Korea's Nuclear Weapons: Latest Developments*, by Sharon Squassoni.