

CRS Report for Congress

North Korea's Nuclear Weapons Development and Diplomacy

Updated January 21, 2008

Larry A. Nicksch
Specialist in Asian Affairs
Foreign Affairs, Defense, and Trade Division



Prepared for Members and
Committees of Congress

North Korea's Nuclear Weapons Development and Diplomacy

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 Korean 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, was delayed until the Bush Administration acceded to 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. Following the release of the funds, North Korea shut down its operational nuclear reactor and plutonium reprocessing plant. Negotiations between North Korean and U.S. diplomats produced a deal for implementation of Phase Two of the February 2007 agreement that was alluded to in a six party statement of October 3, 2007. Phase Two was to be completed by December 31, 2007. North Korea would allow disablement of the plutonium facilities at Yongbyon and would provide a declaration of its nuclear programs. The Bush Administration would reciprocate by removing North Korea from the U.S. list of state sponsors of terrorism and from the sanctions under the U.S. Trading with the Enemy Act. The December 31 deadline, however, was not met. Substantial progress was made on disablement, but North Korea's declaration of its nuclear programs fell short of the Bush Administration's expectations of the information that needed to be disclosed.

This report will be updated periodically.

Contents

Most Recent Developments	1
The February 2007 Agreement on North Korea's Nuclear Disarmament:	
Provisions and Implementation	1
Main Features of the Agreement	1
Issues and Prospects for the Agreement	6
North Korea's Nuclear Programs	8
Plutonium Program	8
Highly Enriched Uranium (HEU) Program	10
International Assistance	10
North Korea's Delivery Systems	11
State of Nuclear Weapons Development	12
For Additional Reading	14

North Korea's Nuclear Weapons Development and Diplomacy

Most Recent Developments

The series of measures negotiated between the Bush Administration and North Korea to implement Phase Two of the February 2007 six party nuclear agreement were not fully implemented by the target deadline of December 31, 2007. Significant progress was reported on the disablement of North Korea's nuclear installations at Yongbyon, but an apparent wide gap existed between the Administration and North Korea over the content of an agreed-upon declaration of North Korea's nuclear program. As a result, the Bush Administration did not proceed with reciprocal measures it promised: removal of North Korea from the U.S. list of state sponsors of terrorism and removal of North Korea from the sanctions provisions of the U.S. Trading with the Enemy Act.

The February 2007 Agreement on North Korea's Nuclear Disarmament: Provisions and Implementation¹

Main Features of the Agreement

1. An Initial phase, or Phase One, 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

¹ The six parties to the negotiations on North Korea's nuclear programs are the United States, North Korea, China, South Korea, Japan, and Russia.

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 Phase One. There was little implementation of the Initial Phase by the 60-day deadline of April 13, 2007. North Korea demanded the release of all of the \$25 million in its accounts in Banco Delta before it would implement its obligations in Phase One. Amidst reported disagreement between the State and Treasury Departments, the Bush Administration decided on April 10, 2007, to accept North Korea and allow the release of the entire \$25 million.² 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.³ A key result of this appears to be a collapse of the Bush Administration’s anti-counterfeiting policy toward North Korea. Since September 2005, the Treasury Department had imposed sanctions on Banco Delta and had warned banks in numerous countries to stop doing business with North Korea because of North Korea’s counterfeiting of U.S. currency, cigarettes, and pharmaceuticals.

Assistant Secretary Hill then visited Pyongyang, the first time an American officials 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. IAEA monitors moved into Yongbyon in July 2007 and certified that the Yongbyon

² Lee Dong-min, Interview with former White House official Victor Cha, Vantage Point, June 2007, p. 22-24.

³ Jay Solomon, Money transfer advanced North Korea pact, *The Wall Street Journal Asia*, June 15, 2007, p. 8.

nuclear installations were shut down. South Korea delivered the 50,000 tons of heavy oil promised to North Korea.

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.”

Implementation of Phase Two. Negotiations between Assistant Secretary Hill and North Korean negotiator, Kim Gye-gwan in September 2007 produced a statement of the six parties on October 3, 2007. The statement set a deadline of December 31, 2007, for implementation of agreed-upon measures to complete Phase Two. North Korea was to allow the disablement of three facilities at Yongbyon: the five megawatt nuclear reactor, the plutonium reprocessing plant, and the nuclear fuel fabrication plant. North Korea also was “to provide a complete and correct declaration of all its nuclear programs.” North Korea also “reaffirmed its commitment not to transfer nuclear materials, technology, or know-how.” “In parallel with the DPRK’s actions,” the United States was to “fulfill its commitments to the DPRK.” The October 3 statement specified U.S. commitments as the removal of North Korea from the U.S. list of state sponsors of terrorism and removal of North Korea from the sanctions provisions of the U.S. Trading with the Enemy Act. The October 3 statement reaffirmed the February 2007 agreement’s promise of “economic, energy and humanitarian assistance up the equivalent of one million of HFO [heavy fuel oil].”

A “North Korea Deal Fact Sheet” issued by the State Department on October 3, 2007, added detail to North Korea’s obligation to provide a declaration of nuclear programs. According to the Department, “the declaration will include all nuclear facilities, materials, and programs.” That description, however, omitted reference to the number of atomic bombs North possesses. The Department’s Fact Sheet also contained a separate statement related to the U.S. belief that North Korea has operated a secret highly enriched program since the late 1990s. The Fact Sheet stated that “the DPRK also agreed to address concerns related to any uranium enrichment programs and activities.” The statement thus did not claim that North Korea would declare a uranium enrichment program.

However, the December 31, 2007 deadline was not met. The disablement of the Yongbyon facilities got underway later in October. The Bush Administration reported substantial progress by December 31. U.S. officials said that five of eleven tasks were completed, and the remainder were in progress. Machinery was removed from the three facilities, and connections between other machinery were broken.

U.S. technicians had slowed the removal of nuclear fuel rods from the reactor for safety reasons.⁴ The U.S. envoy to the IAEA said in late November 2007 that the scope of disablement would fulfill the goal previously stated by Christopher Hill that disablement should be extensive enough so that it would take North Korea about a year to restart the Yongbyon facilities.⁵ U.S. diplomats and technicians were involved heavily in the process of disablement, and the State Department reportedly posted a diplomat permanently in Pyongyang to oversee U.S. participation in the disablement process.⁶ This progress, too, contributed to a U.S.-North Korean agreement for a first time visit by a major U.S. cultural group to North Korea — the New York Philharmonic Orchestra, which is scheduled for February 26, 2008.

Little progress, however, was reported regarding the declaration of North Korea's nuclear programs. North Korea apparently supplied information to the Bush Administration in November 2007. The North Korean Foreign Ministry, in a statement of January 4, 2008, described this as a "nuclear report" and said that North Korea had "done what it should do." Bush Administration officials replied that North Korea's declaration of November 2007 was incomplete and thus inadequate.⁷ In early December 2007, Assistant Secretary of Hill visited North Korea in an attempt to break the impasse; he delivered a letter from President Bush to North Korean leader Kim Jong-il calling on North Korea to make a full declaration.⁸

From the White House's description of the Bush letter and other reports, there appears to be three and possibly four areas of contention.⁹ One is the number of atomic bombs that North Korea possesses. Administration officials stated that a declaration should include that information. North Korea's Kim Gye-gwan stated that North Korea would not supply that information as part of implementing Phase Two.¹⁰

A second area of contention is the quantity of plutonium that North Korea has acquired from the Yongbyon nuclear reactor before 1994 (when it was shut down under the U.S.-North Korea Agreed Framework) and after 2002 when North Korea

⁴ Glenn Kessler, Progress is reported on nuclear pact, *Washington Post*, December 15, 2007, p. A16.

⁵ Restoring disabled N. Korea nukes would need year — US, *Reuters News*, November 22, 2007.

⁶ The Nelson Report, November 26, 2007. The Nelson Report stated "we can confirm Korean press stories that a liaison person has been posted by the State Department to Pyongyang."

⁷ Blaine Harden, All nuclear efforts disclosed, N. Korea says, *Washington Post*, January 5, 2008, p. A13.

⁸ Deb Riechmann, Bush sends letter to N. Korean leader, *Associated Press*, December 6, 2007.

⁹ For a good overall description of the areas of contention, see Brian Lee, North to miss today's declaration deadline, *JoongAng Ilbo* (internet version), December 31, 2007.

¹⁰ Nicholas Krlev, U.S. to hold N. Korea to vows, *Washington Times*, November 29, 2007, p. A1.

restarted the reactor. The Bush Administration and U.S. intelligence agencies have estimated 50 kilograms.¹¹ However, in the November 2007 declaration, North Korea reportedly asserted that it has 30 kilograms of plutonium.¹² This difference of 20 kilograms could be enough for four atomic bombs.

A third area of contention is over uranium enrichment. North Korea reportedly declared that it had imported aluminum tubes from Russia suitable for a uranium enrichment centrifuge infrastructure, but it asserted that it did not use the aluminum tubes for any such program.¹³ However, samples of these aluminum tubes shown to U.S. experts reportedly contained traces of enriched uranium.¹⁴ North Korea reportedly did not disclose receiving a “starter kit” for a highly enriched uranium program from Pakistan’s nuclear czar, A.Q. Khan, despite Pakistani President Musharraf’s assertion that Khan did provide such a starter kit, with over 20 centrifuges, to North Korea.¹⁵ In short, North Korea continued its long-standing denial of having a highly enriched uranium program. Its denials in late 2007 also constitute a denial that it engaged in even a low uranium enrichment program.

A fourth possible area of contention is over nuclear proliferation activities. In September 2007, Israeli warplanes bombed a facility in Syria that Israeli officials asserted was a nuclear-related facility. Numerous reports cited North Korean involvement with the facility; some reports alleged that North Korean technicians were in the facility when the Israelis bombed it. After the Israeli bombing, Bush Administration and State Department officials began to say that North Korea needed to declare proliferation activities. Reportedly, however, North Korea has stood by its statement in the October 3, 2007 six party statement that it has not proliferated nuclear materials or technology.

A North Korean Foreign Ministry statement of December 26, 2007, asserted that the United States and the other six parties were not supplying energy-related aid fast enough, and it warned that North Korea might slow down the remaining tasks of disablement of Yongbyon. At the end of 2007, North Korea had received 150,000 tons of heavy fuel oil and 5,010 steel products to renovate aging power plants. Of this, the United States had contributed 50,000 tons of oil. The Bush Administration requested from Congress \$106 million for future energy aid to North Korea. This

¹¹ The White House, Report to Congress on Nuclear and Missile Programs of North Korea, November 2007.

¹² Brian Lee, North to miss today’s declaration deadline, *JoongAng Ilbo* (internet version), December 31, 2007.

¹³ Glenn Kessler, N. Korea offers evidence to rebut uranium claims, *Washington Post*, November 10, 2007, p. A1.

¹⁴ Glenn Kessler, Uranium traces found on N. Korean tubes, *Washington Post*, December 2007, p. A25. Several nuclear experts pointed out that besides constituting evidence of a secret North Korean highly enriched uranium program, the traces of uranium could have been deposited on the aluminum tubes before North Korea acquired them either from Russia or Pakistan.

¹⁵ Nicholas Kralev, Bush letter to Kim urges full nuke disclosure, *Washington Times*, December 7, 2007, p. A15.

appropriation was included in the omnibus appropriations bill passed by Congress in December 2007 for FY2008.

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;
- 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. In late 2007, South Korean President Roh Moo-hyun proposed the issuance of a peace declaration by the two Koreas, the United States, and China prior to the initiation of negotiations over a Korean peace agreement. The Bush Administration expressed a willingness to begin peace agreement talks upon the completion of Phase Two of the February 2007 nuclear agreement. However, it said the United States would not enter into a peace declaration or a peace agreement before the nuclear issue was settled.

Issues and Prospects for the Agreement

The completion of Phase Two of the February 2007 nuclear agreement is stalemated by the apparent wide gap between the Bush Administration and North Korea over the information that North Korea should include in the declaration of nuclear programs. One possible reason for this is that President Bush stiffened U.S. requirements for the declaration. In the autumn of 2007, he added proliferation and the number of atomic bombs to the types of information that North Korea should disclose.¹⁶ He did this following the Israeli bombing of the alleged North Korean-assisted nuclear facility in Syria and after Japan began to criticize the Administration’s plan to remove North Korea from the list of state sponsors of terrorism. North Korea has resisted complying with these additions. A second reason is North Korea’s refusal to rescind its long-standing (since November 2002) denial that has a uranium enrichment program despite U.S. evidence of North Korean imports of components for such a program and Pakistan government assertions that

¹⁶ US sets additional tasks for North Korea, Dong-A Ilbo (internet version), December 3, 2007. Helene Cooper, A new Bush tack on North Korea, *New York Times*, December 7, 2007, p. A1. Nicholas Kravev, U.S. to hold N. Korea to vows, *Washington Times*, November 29, 2007, p. A1.

Pakistan's A.Q. Khan provided North Korea with a starter kit for a highly enriched uranium infrastructure, including centrifuges.

There could be several reasons why North Korea has not been more forthcoming with information. One could be that Kim Jong-il never has intended to give up his nuclear programs and is prepared to create a long-term stalemate over the declaration issue similar to two long term stalemates that North Korea created in the six party talks (August 2004-July 2005, and November 2005-November 2006). Another is that North Korea is prepared to give up its aging nuclear complex at Yongbyon but already has shifted its nuclear program to a secret highly enriched uranium infrastructure, which it created in 2000. A reason related to these two could be that North Korea's politically-powerful military has asserted itself against disclosing vital nuclear information to the United States, perhaps overruling a more accommodating position of North Korea's Foreign Ministry.¹⁷ On the nuclear issue, Kim Jong-il undoubtedly has to listen to his military.

Other possible reasons focus on North Korean negotiating tactics. North Korea could be holding back on the declaration because it wants the United States to provide one of the promised U.S. benefits in reciprocity for the progress and near completion of disablement of the Yongbyon installations — either removal from the terrorism support list or removal from the sanctions under the U.S. Trading with the Enemy Act. North Korea, too, could intend to demand new benefits from the United States for the completion of Phase Two. One such new demand could be for light water nuclear reactors, which North Korea currently demands as a condition for full dismantlement of nuclear programs.

If the stalemate over the declaration runs into the spring of 2008, then it becomes unlikely that the Bush Administration could negotiate a full dismantlement of North Korea's nuclear programs by the time it leaves office in January 2009. Assistant Secretary Hill has spoken of such a timetable scenario for a complete settlement, but he has predicated it upon completion of Phase Two by December 31, 2007.

A dismantlement phase of negotiations undoubtedly will have to deal with difficult issues. One issue is verification of North Korea's disclosed nuclear facilities. Phase Two of the 2007 Agreement on North Korea's Nuclear Disarmament does not mention verification of disclosed facilities, but U.S. officials have stressed its importance.¹⁸ The role of the IAEA is limited to monitoring the freeze of the known nuclear installations at Yongbyon under Phase One. For any facilities or materials disclosed by North Korea beyond Yongbyon, a verification system would have to be negotiated to insure some verification of the North Korean declaration. More U.S. and South Korean intelligence analysts reportedly believe that North Korea has large numbers of nuclear facilities underground and in

¹⁷ Jay Solomon, U.S. courts North Korea's army — new strategy recognizes military's pivotal role in nuclear disarmament, *The Wall Street Journal*, December 29, 2007, p. A3.

¹⁸ Lee Joo-hee, U.S. to address N.K. missiles after nuclear talks, *Korea Herald* (internet), August 27, 2007.

mountains.¹⁹ North Korea has a history of rejecting intrusive inspections by the IAEA. Its September 2007 invitation to U.S., Chinese, and Russian experts to visit Yongbyon raises the possibility that an alternative verification mechanism could be established.

North Korea also could add conditions in a dismantlement phase of negotiations. Statements by Pyongyang indicate the possibility that North Korea may raise up to three added conditions. One would be a demand for heavy oil shipments for multiple years rather than the one year specified in the Agreement on North Korea's Nuclear Disarmament. A second demand would be for a clear commitment by the United States and the other Six Party governments to construct light water nuclear reactors (LWRs) inside North Korea. North Korea long has conditioned any complete dismantlement of its nuclear programs to the completion of construction of LWRs — thus setting a timetable for dismantlement many years into the future. The third demand would be for military concessions by the United States to reduce the size and limit the deployments and military exercises of U.S. forces in and around the Korean peninsula. North Korean officials have stated repeatedly since March 2005 that the United States would have to make military concessions as part of “denuclearization of the Korean peninsula.” The politically powerful North Korean military leadership appears to place priority on securing military concessions from the United States. In July 2007, the North Korean military command proposed bilateral military-to-military talks with the U.S. military. If the North Korea military is a factor influencing North Korea to hold back information in its November 2007 declaration of nuclear programs, the military likely would be able to insist that its military agenda be brought into dismantlement phase negotiations with the Bush Administration.

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 and by Phase One of the February 2007 Six Party Nuclear Agreement. (For more information see CRS Report RS21391, *North Korea's Nuclear Weapons: Latest Developments*, by Sharon Squassoni) The key installations are as follows:²⁰

- *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.*

¹⁹ Jon Herskovitz, Money may not pry nuclear secrets from North Korea, Reuters News, July 20, 2007.

²⁰ 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.

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. According to newly resumed IAEA monitors, North Korea shut down the reactor in July 2007.

- *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.
- *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.” IAEA monitors in July 2007 stated that the reprocessing plant was not in operation.

Satellite photographs reportedly also show that the five megawatt reactor has no attached power lines, which it would have if used for electric power generation.

Persons interviewed for this study believe that North Korea developed the five megawatt reactor and the 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.²¹ 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."²²

The CIA estimated publicly in November 2002 that North Korea could produce two atomic bombs annually through HEU beginning in 2005;²³ 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.²⁴

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

²¹ Kim Min-cheol. Hwang tells of secret nuke program. *Choson Ilbo* (Seoul, internet version), July 5, 2003.

²² Pincus, Walter. N. Korea's nuclear plans were no secret. *Washington Post*, February 1, 2003. P. A1.

²³ CIA unclassified point paper distributed to Congress, November 19, 2002.

²⁴ Kessler, Glenn. New doubts on nuclear efforts by North Korea. *Washington Post*, March 1, 2007. P. A1.

Chinese enterprises were supplying important components and raw materials for North Korea's missile program.²⁵

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, 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.²⁶ (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

²⁵ 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.

²⁶ 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.

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.²⁷

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.²⁸ 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) 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.²⁹

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.³⁰

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

²⁷ 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.

²⁸ Sanger, David E. North Korea's bomb: untested but ready, C.I.A. concludes. *New York Times*, November 9, 2003. p. 4.

²⁹ 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.

³⁰ 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.” 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 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.³¹ Nuclear expert David Albright estimated in February 2007 that North Korea had a stockpile of reprocessed plutonium of 28-50 kilograms, enough for between 5 and 12 nuclear weapons.³² 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.

³¹ 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.

³² David Albright and Paul Brannan. *The North Korean Plutonium Stock*, February 2007. Institute for Science and International Security, February 20, 2007.

officials reflect an apparent uncertainty over whether North Korea has achieved a warheading capability.³³

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.³⁴ 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.³⁵ 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].”³⁶

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.

³³ 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.

³⁴ Kessler, N. Korea nuclear estimate to rise, *Washington Post*, April 28, 2004. p. A1.

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

³⁶ Parties concur N.K. has HEU material, but disagree on program’s progress: Hill. *Yonhap News Agency*, September 29, 2005.

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