



North Korea's Nuclear Weapons Development and Diplomacy

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Summary

Since August 2003, negotiations over North Korea's nuclear weapons programs have involved six governments: the United States, North Korea, China, South Korea, Japan, and Russia. Since the talks began, North Korea has operated nuclear facilities at Yongbyon and apparently has produced weapons-grade plutonium estimated as sufficient for five to eight atomic weapons. North Korea tested a plutonium nuclear device in October 2006. U.S. officials have cited evidence that North Korea also operates a secret highly enriched uranium program, which also could produce atomic weapons. There also is substantial information that North Korea has engaged in collaborative programs with Iran and Syria aimed at producing nuclear weapons.

On May 25, 2009, North Korea announced that it had conducted a second nuclear test. On April 14, 2009, North Korea terminated its participation in six party talks and said it would not be bound by agreements between it and the Bush Administration, ratified by the six parties, which would have disabled the Yongbyon facilities. North Korea also announced that it would reverse the ongoing disablement process under these agreements and restart the Yongbyon nuclear facilities. Three developments since August 2008 appear to have influenced the situation leading to North Korea's announcement: the failure to complete implementation of the Bush Administration-North Korean agreement, including the Yongbyon disablement, because of a dispute over whether inspectors could take samples of nuclear materials at Yongbyon; the stroke suffered by North Korean leader, Kim Jong-il, in August 2008, which reportedly brought forth a collective leadership including a more pronounced role for the North Korean military; and the issuance by North Korea after January 1, 2009, of a tough set of negotiating positions, including an assertion that the United States must extend normal diplomatic relations prior to any final denuclearization agreement rather than in such an agreement; and that U.S. reciprocity for North Korean denuclearization must be an end of the "U.S. nuclear threat," meaning major reductions of and restrictions on U.S. military forces in and around the Korean peninsula.

North Korea's announcement presents the Obama Administration with two apparent challenges. One is how to restore a negotiating track with North Korea. The Administration appears to face a choice between seeking to bring North Korea back into the six party framework or offering North Korea strictly bilateral U.S.-North Korean negotiations. Responding to North Korea's tough negotiating positions would be a second challenge. Would the Administration's goal in the next stage of negotiations be the complete dismantlement of Yongbyon, or would it focus on the elimination of North Korea's nuclear weapons and plutonium? North Korea's assertion of diplomatic normalization prior to denuclearization contradicts the longstanding U.S. position that the two would be reciprocal. North Korea's likely demand for light water nuclear reactors (LWRs) as part of a future nuclear agreement would confront the Obama Administration with a decision whether to enter into a second LWR project that could consume ten years or more (the first project began in 1994 under the U.S.-North Korean Agreed Framework and collapsed in 2002). Pyongyang's demand that a denuclearization agreement include an end to the "U.S. nuclear threat" directly challenges the position of several U.S. administrations that the United States would not negotiate with North Korea over the status of U.S. military forces in South Korea. Finally, any attempt by the Obama Administration to bring North Korea's highly enriched uranium and proliferation activities with Iran and Syria into negotiations would reverse the decision of the Bush Administration that North Korea did not have to admit to these activities in the Bush Administration-North Korean agreements.

This report will be updated periodically.

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North Korea's Nuclear Test and Withdrawal from the Six Party Talks

On May 25, 2009, North Korea announced that it had conducted a second test of a nuclear bomb. U.S. and foreign officials said afterwards that initial detected soundings indicated that a nuclear test had taken place. U.S. and foreign nuclear experts estimated the explosive power of the bomb at between 1.5 kilotons and 8 kilotons; most estimates were in range of 4 to 5 kilotons. An initial Russian statement gave a much higher estimate of 20 kilotons. By comparison, the first North Korean test of October 2006 had an explosive yield of less than one kiloton.¹ North Korean statements indicated that this second test had achieved technical advances over the first test. A North Korean diplomat in Moscow predicted that there would be further tests.

The nuclear test followed North Korea's announcement on April 14, 2009, that it was withdrawing from the six party talks on North Korea's nuclear programs. It cited as the reason for its decision a statement approved by the United Nations Security Council criticizing North Korea's test launch of a long-range Taepodong II missile on April 5, 2009. The Security Council statement, issued by the President of the Security Council, said that the missile test violated Security Resolution 1718 of October 2006, which banned tests of long-range North Korean missiles. The statement called on members of the United Nations to enforce sanctions against North Korea adopted in Resolution 1718.² North Korea claimed that the missile test was a legitimate launching of a satellite into space. North Korea warned prior to the April 5 test that it would withdraw from the six party talks if the Security Council took any action against it over the missile test.

North Korea staged boycotts of the six party talks on two previous occasions, in 2004-2005 and 2005-2006, each for nearly one year. North Korea's announcement of April 13, 2009, however, contained a more absolute rejection of the six party talks than was the case in the prior boycotts. The announcement said that North Korea "will never again take part in such talks." It also said that North Korea "will take steps to restore disabled nuclear facilities" and "revive nuclear facilities and reprocess used nuclear fuel rods." North Korea thus threatened to restore operation of its plutonium nuclear installations at Yongbyon that have been shut down since mid-2007 under agreements between North Korea and the Bush Administration for the disablement of the Yongbyon facilities.³ By early 2009, the disablement process was about 80% completed. Following the announcement, North Korea expelled from Yongbyon technicians and monitors from the United States and the International Atomic Energy Agency who had been there since 2007. After the April 14 announcement, North Korea threatened to conduct a second test of a nuclear device (the first test was in October 2006).

The earliest revival of the Yongbyon facilities that North Korea could implement would be a restarting of the plutonium reprocessing plant, which takes nuclear fuel rods from North Korea's nuclear reactor at Yongbyon and converts them into nuclear weapons-grade plutonium. Experts

¹ Sigfried Hecker, From Pyongyang to Tehran, with nukes, *The New ForeignPolicy.com*, May 26, 2009.

² "UN council demands enforcement of N.Korea sanctions," *Reuters News*, April 13, 2009.

³ Evan Ramstad and David Crawford, "North Korea leaves six-party talks," *Wall Street Journal Asia*, April 15, 2009, p. 1. "North Korea quits nuclear talks, to restart plant," *Reuters News*, April 14, 2009.

believe that North Korea could restart the reprocessing plant within two months and then reprocess 8,000 fuel rods available from the reactor within four to six months—enough plutonium for one atomic bomb.⁴ (See CRS Report RL34256, *North Korea's Nuclear Weapons*, for more information on North Korea's ability to restart the plutonium reprocessing plant.) U.S. officials and non-government nuclear experts have said that North Korea previously had reprocessed enough plutonium for five to eight atomic bombs. Reassembling the nuclear reactor and a nuclear fuel fabrication plant and restarting them would be a more difficult, time-consuming process, taking possibly up to a year, according to U.S. officials and nuclear experts. Once these facilities were operating, North Korea would be able to produce about six kilograms of plutonium per year, enough for one atomic bomb.⁵

Besides the April 5, 2009, missile test, three developments since August 2008 appear to have influenced the situation leading up to North Korea's announcement. One is the failure of the Bush Administration, North Korea, and the other six party governments to complete implementation of the agreements reached between the Bush Administration and North Korea in 2007 and early 2008, particularly the failure to complete the agreed upon disablement of the Yongbyon facilities. A second was the stroke suffered by North Korean leader, Kim Jong-il, in August 2008, and the apparent subsequent emergence of a collective group of leaders including an influential element of the North Korean military. A third development was the issuance by North Korea after January 1, 2009, of a set of tough negotiating demands for future round of nuclear negotiations with the United States.

Bush Administration-North Korean Agreements and Failure of Implementation

The Bush Administration negotiated three agreements with North Korea between February 2007 and October 2008; two were issued in February and October 2007 as agreements of the parties to the six party talks over North Korea's nuclear programs (United States, North Korea, China, South Korea, Japan, and Russia). The third was negotiated in Singapore in April 2008. The Bush Administration and North Korea began a process of implementation on June 26, 2008. A six party meeting of July 10-12, 2008, set out a timetable to complete implementation by October 31, 2008. The main aim of the Bush Administration in these agreements was to secure the disablement of North Korea's plutonium installations at Yongbyon. The agreements, however, were not implemented fully when the Bush Administration left office. This was due partly to the failure of the Bush Administration and North Korea to resolve a dispute over a verification system, especially the right of inspectors to take samples.⁶

On June 26, 2008, the North Korean government and the Bush Administration took measures to implement the nuclear agreements that they had negotiated in 2007 into 2008. The agreements created two obligations each for North Korea and the Bush Administration to fulfill. North Korea was to allow a process of disablement of its plutonium nuclear facilities at Yongbyon, a site 60 miles from the capital of Pyongyang. The shutting down of Yongbyon was a key provision of the 1994 Agreed Framework negotiated by the Clinton Administration and North Korea. Yongbyon ceased to operate between 1994 and the end of 2002. In late 2002, the Bush Administration

⁴ Sigfried Hecker, From Pyongyang to Tehran, with nukes, *The New ForeignPolicy.com*, May 26, 2009.

⁵ Ibid.

⁶ Glenn Kessler, "N. Korea doesn't agree to written nuclear pact," *Washington Post*, December 12, 2008.

suspended U.S. obligations under the Agreed Framework because of U.S. intelligence estimates that North Korea was operating a secret nuclear weapons program based on highly enriched uranium. North Korea responded by re-starting the Yongbyon facilities. Between early 2003 and the summer of 2007, the Yongbyon reactor and the plutonium reprocessing plant produced enough weapons grade plutonium for the production of several atomic bombs. North Korea tested an atomic device in October 2006.

The disablement process began in October 2007. The Bush Administration said in June 2008 that eight of eleven components of the disablement process had been completed.⁷ A major uncompleted task was the removal of spent plutonium fuel rods from the five megawatt reactor. According to informed U.S. sources, as of February 2009, about 6,100 of 8,000 spent fuel rods reportedly had been removed.⁸

North Korea's second obligation was to provide the United States and other members of the six party talks with a "complete and correct" declaration of nuclear programs. The declaration negotiated and reportedly finalized in Singapore and delivered to China on June 26, 2008, contains a declaration of the amount of plutonium that North Korea claims to possess. Reports asserted that North Korea declared 30.8 kilograms of plutonium.⁹ U.S. intelligence estimates reportedly conclude that North Korea has accumulated 50 to 60 kilograms of plutonium.¹⁰ However, other components of North Korea's nuclear programs reportedly are omitted from the declaration, apparently based on concessions the Bush Administration made to North Korea in the Singapore agreement. These include the number of atomic bombs North Korea possesses, information about the facilities where North Korea produces and tests atomic bombs, and the locations where North Korea stores plutonium and atomic bombs. The declaration also reportedly contains no information about North Korea's reported highly enriched uranium program or North Korea's reported nuclear collaboration activities with Iran and Syria. According to Bush Administration officials, the uranium enrichment and Syria issues are addressed in a "confidential minute."¹¹ (They said nothing about Iran.) However, in the confidential minute, North Korea reportedly does not admit to uranium enrichment or proliferation activities with Syria. It merely "acknowledges" U.S. concerns that North Korea has engaged in these activities in the past.¹²

The United States' two obligations under the agreements were to remove North Korea from the U.S. Trading with the Enemy Act and from the U.S. list of state sponsors of terrorism. Removal from the Trading with the Enemy Act allows U.S. companies to import North Korean goods and

⁷ White House Press Spokesman, "Press Fact Sheet: Presidential Action on State Sponsor of Terrorism (SST) and the Trading with the Enemy Act (TWEA)," June 26, 2008.

⁸ Cited in CRS Report RL34256, *North Korea's Nuclear Weapons*, by Mary Beth Nikitin. In September 2008, about 4,800 fuel rods reportedly had been removed from the reactor. The disablement processes resumed after Christopher Hill negotiated an agreement with North Korea on verification, and additional fuel rods were removed before North Korea again slowed removal of fuel rods in early 2009. See Jin Dae-woong, "North Korea may play cards to press U.S.," *Korea Herald* (internet), September 24, 2008; and Yi Chong-chin, "DPRK official at energy aid talks comments on nuclear verification issue," Yonhap News Agency, September 19, 2008.

⁹ "North Korea tells China 30.8 kg of plutonium extracted," Agence France Presse, October 24, 2008.

¹⁰ Glenn Kessler, "U.S. increases estimate of N.Korean plutonium," *Washington Post*, May 14, 2008.

¹¹ Anne Gearan, "U.S. official: North Korea has agreed to intensive US verification of its plutonium production," Associated Press, June 26, 2008. Helene Cooper, "Past deals by N.Korea may face less study," *New York Times*, April 18, 2008. p. A5.

¹² Anne Gearan, "U.S. official: North Korea has agreed to intensive US verification of its plutonium production," Associated Press, June 26, 2008.

sell non-strategic goods to North Korea. It opens up possibilities for U.S. companies to invest in North Korea. However, given North Korea's communist economic system and its suspicions of foreign intrusions, there appears to be little likelihood of any meaningful trade or investment relations developing between the United States and North Korea.¹³ Removal from the Trading with the Enemy Act could give North Korea in the future access to \$31.7 million in North Korean assets in the United States that have been frozen since the Korean War.¹⁴

Removal from the U.S. list of state sponsors of terrorism will end the requirement that U.S. presidents oppose financial aid to North Korea from international financial agencies like the World Bank and the International Monetary Fund. An opportunity to secure such financial aid might have been a North Korean objective in seeking removal from the terrorism support list.

North Korea may have had three additional motives for its pressure on the Bush Administration to remove it from the list of state sponsors of terrorism. One was to reduce U.S. support for Japan on the issue of Japanese citizens kidnapped by North Korea. The Clinton and Bush administrations previously had cited a resolution of the Japanese kidnapping issue as linked to removal of North Korea from the terrorism support list. A second motive apparently was to improve the prospects for normalization of diplomatic relations with the United States, which North Korea says it wants.¹⁵ A possible third motive may be to remove any U.S. incentive to examine the issue of North Korea's activities in the Middle East and deny to the United States a potential negotiating lever over North Korea's activities in the Middle East. Numerous reports indicate that North Korea's activities include providing training and weapons to Hezbollah and cooperation with the Iranian Revolutionary Guards in the development of both missiles and nuclear weapons. (See subsequent section on "Nuclear Collaboration with Iran and Syria." See also CRS Report RL30613, *North Korea: Terrorism List Removal*)

The first U.S.-North Korean agreement, issued as a six party statement in February 2007, also set an important obligation to North Korea by the five other parties. The five parties were to provide North Korea with one million tons of heavy fuel oil or the energy equivalent thereof, corresponding with the disablement of Yongbyon.

Implementation Process

On June 26, 2008, North Korea submitted its declaration on nuclear programs to China, the chairman of the six party talks. Simultaneously, President Bush announced that he had removed North Korea from the Trading with the Enemy Act. The President has authority to renew annually Trading with the Enemy sanctions on North Korea or to lift those sanctions from North Korea. President Bush also announced that he had sent to Congress notification of his intent to remove North Korea from the list of state sponsors of terrorism after 45 days, on August 11, 2008. Under U.S. law, the President is required to notify Congress 45 days before removing a country from the list. The White House said that North Korea would be removed on August 11, 2008, unless Congress acted legislatively to block removal. However, the White House also said on June 26, 2008, that removal of North Korea was conditioned on North Korean acceptance of provisions for U.S. verification of the North Korean declaration of nuclear programs.

¹³ Missy Ryan, "Slim trade impact seen in US move on N.Korea sanctions," Reuters, June 26, 2008.

¹⁴ U.S. Treasury Department, *Calendar Year 2006 Fifteenth Annual Report to the Congress on Assets in the United States of Terrorist Countries and International Terrorism Program Designees*, September 2007.

¹⁵ "N Korea wants normalized relations with the US," *Dong-A Ilbo* (Seoul, internet), June 6, 2008.

On July 12, 2008, the six parties issued a press communique setting a target date of October 31, 2008, for completion of the disablement of Yongbyon and the completion of the delivery of heavy fuel oil and alternative energy assistance.

Verification Issue

The Bush Administration did not remove North Korea from the list of state sponsors of terrorism on August 11, 2008. In July, the Bush Administration presented North Korea with a draft protocol on verification of North Korea's nuclear programs. The draft protocol would have given U.S. and other six party inspectors the right to conduct inspections at sites throughout North Korea.¹⁶ North Korea rejected the U.S. proposal, arguing that inspections should cover only those facilities at Yongbyon that it had listed in its declaration of June 26, 2008. North Korea retaliated by halting the disablement process at Yongbyon and announcing that it would restart the plutonium reprocessing plant at Yongbyon.¹⁷

Neither the February 2007 nor the October 2007 six party nuclear agreements mentioned a system of country-wide inspections. There is no evidence that the Singapore agreement of April 2008 detailed any system of verification. However, following the U.S.-North Korean meeting at Singapore, the Bush Administration began to seek supplemental agreements with North Korea regarding the establishment of verification mechanisms to examine North Korea's declaration of its plutonium stockpile. In early May 2008, the Bush Administration and North Korea negotiated an accord for North Korea to turn over to the United States over 18,000 documents related to its plutonium program, dating back to 1986. U.S. experts are examining these documents and have disclosed no revealing information from them. The White House announcement of June 26, 2008, stated that removal of North Korea from the terrorism support list after 45 days would be carried out "only after the six parties reach agreement on acceptable verification principles and an acceptable verification protocol; the six parties have established an acceptable monitoring mechanism; and verification activities have begun."

A six party meeting of July 10-12, 2008, reached agreement on verification principles, including "visits to facilities, review of documents, interviews with technical personnel." "Other measures" would have to be "unanimously agreed upon among the six parties." Verification would be carried out by experts of the six parties. The International Atomic Energy Agency would have only an advisory role.

The Bush Administration reacted to North Korea's announcement of a restarting of the plutonium reprocessing by scaling back the scope of its verification proposals. Assistant Secretary of State Christopher Hill went to Pyongyang in early October 2008 and negotiated a verification deal, which would concentrate inspections only on Yongbyon.¹⁸ North Korea agreed and announced a resumption of disablement. The Bush Administration followed on October 11, 2008, with the announcement of Secretary of State Condoleezza Rice that North Korea was removed from the U.S. list of state sponsors of terrorism.

¹⁶ Glenn Kessler, "Far reaching U.S. plan impaired N. Korea deal; demands began to undo nuclear accord," *Washington Post*, September 26, 2008, p. A20.

¹⁷ Glenn Kessler, "Far-reaching U.S. plan impaired N.Korea deal; demands began to undo nuclear accord," *Washington Post*, September 26, 2008, p. A20.

¹⁸ Special briefing by State Department spokesman, Sean McCormack, M2 Presswire, October 11, 2008.

The State Department's description of the verification agreement included the following points. Inspectors would have access only to the sites at Yongbyon described in North Korea's June 26, 2008 declaration. Access to non-declared sites would be by "mutual consent." The inspection organization would be composed of the five non-North Korean members of the six party talks—the United States, China, South Korea, Japan, and Russia. The organization would make decisions on the basis of unanimous consent. The terms of the verification agreement were contained in a U.S.-North Korean document and in "certain other understandings."¹⁹

The Bush Administration and the State Department gave few details on two other aspects of Hill's talks in Pyongyang and the verification agreement. One was the issue of inspectors being able to take samples of nuclear materials at the Yongbyon installations for laboratory analysis. A North Korean Foreign Ministry statement of November 11, 2008, and subsequent statements asserted that the written verification agreement said nothing about sampling and that North Korea only had to abide by the written agreement and nothing else. The State Department then acknowledged that Hill's discussion with North Koreans about sampling was only a verbal understanding.²⁰ This issue was not resolved in the December 2008 six party meeting.

The second aspect of Hill's talks was his meeting with North Korean Lt. General Lee Chan-bok. This was the first time that a North Korean military leader had participated in the nuclear talks. General Lee reportedly called for bilateral U.S.-North Korean military talks and may have linked U.S. acceptance of bilateral military talks to further progress on the nuclear issue.²¹ Hill and the State Department have been silent on the content of this meeting.

At the six party meeting in December 2008, an attempt was made to draw up a compromise agreement on the sampling issue, but North Korea reportedly rejected a Chinese draft proposal. The sampling issue, too, resulted in a slowing of the disablement process and the delivery of heavy fuel oil to North Korea.²² Thus, by the time the Bush Administration left office in January 2009, the disablement process remained stalled at about 80% completion, and only about 80% of the heavy fuel oil and alternative energy aid had been delivered.

Kim Jong-il's Stroke and Political Changes Inside North Korea

In August 2008, North Korean leader, Kim Jong-il suffered a stroke that apparently was severe and incapacitated him. Kim reportedly has been suffering from several major ailments since 2000, including heart, liver, and kidney problems, and possibly diabetes.²³ In the remainder of 2008, there were reports that a small collective leadership group of Communist Party leaders and

¹⁹ Ibid.

²⁰ "N. Korea rejects contentions it is delaying denuclearization," *Kyodo News*, November 12, 2008. "NKorea will not let nuclear samples out of country," Reuters, November 12, 2008.

²¹ "N. Korea proposes military talks with U.S.," *Kyodo News*, October 5, 2008. "Jin Dae-woong: N.K. delivered U.S. Ultimatum on Nuke Dispute," *Korea Herald* (internet), October 7, 2008.

²² Naoko Aoki and Kakumi Kobayashi, "6-way delegates fall short of North Korea nuke verification protocol," *Kyodo News*, December 11, 2008. Jin Dae-woong, "Nuke talks zero in on China's draft protocol," *Korea Herald Online*, December 10, 2008.

²³ "Kim Jong Il suffering convulsions," *Chosun Ilbo* (internet), September 12, 2008. Yi Song-chu, "The truth behind rumors about Kim Jong-il's illnesses—health rapidly deteriorated due to bad heart and lungs," *Tong-A Ilbo* (internet), January 19, 2004. Katsuhiko Kuroda, "General Secretary Kim Jong-il speculated to have received health checkups in Beijing," *Sankei Shimbun* (internet), January 2006.

military commanders had taken over day-to-day decision making. Kim's brother-in-law, Chang Song-taek, reportedly was a key figure in this group, possibly in a leadership role.²⁴ If Kim remains partially incapacitated or should die, a collective leadership could remain for some time; none of Kim's three sons seems to be in a position within the leadership to succeed him immediately. Reports surfaced that Kim Jong-il had named his youngest son, Kim Jong-un, age 26, as a successor and that Kim Jong-un had been given a low level position on the National Defense Commission.²⁵

In the aftermath of the stroke, the North Korean military took a more visible role in implementing policy and announcing policy positions and decisions. Assistant Secretary of State Christopher Hill negotiated with a North Korean General on the nuclear issue for the first time when he went to Pyongyang in October 2008. South Korean businessmen at the special economic zone of Kaesong inside North Korea found themselves dealing with North Korean military officials rather than civilian officials. A statement of April 18, 2009, by the North Korean military General Staff strongly suggested that the military leadership had played a lead role in the decision to withdraw from the six party talks and that, in the future, the military will control decisions on the nuclear program.²⁶

In the post-stroke period, the North Korean regime began to restrict further access to North Korea by outsiders and placed new limits on private and quasi-private economic activities. New limits were imposed on Chinese traders operating in North Korea, the quasi-private markets selling food and consumer goods that had emerged in the late 1990s, and transportation between South Korea and the Kaesong economic zone.²⁷ The regime shut down the U.S. food aid program in March 2009. After January 1, 2009, the North Korean Foreign Ministry and the military command issued a number of statements outlining a set of tough, negotiating positions for future nuclear talks with the United States (see section on Issues Facing the Obama Administration).

Issues Facing the Obama Administration

The Obama Administration faces two sets of issues in dealing with North Korea on the nuclear question. North Korea has created the first with its nuclear test and the withdrawal from the six party talks and announced restarting of the Yongbyon installations. The Obama Administration had professed a desire to begin nuclear negotiations with Pyongyang. It now faces the challenge of getting North Korea back into a negotiating framework. It would appear to have several options to move U.S. policy in this direction.

²⁴ "N.Korea 'to be led by Kim Jong-il's brother-in-law,'" Chosun.com, January 15, 2009. Selig Harrison, "Living with a nuclear North Korea," *Washington Post*, February 17, 2009, p. A13. While visiting Pyongyang in January 2009, Harrison cited "informed sources" who told him that Kim Jong-il still made key decisions but that he has turned over day-to-day authority in domestic affairs to Chang Song-taek and control over national security to the National Defense Commission."

²⁵ "NKorea leader's son to join top military body," Dow Jones International News, April 26, 2009.

²⁶ Korean Central Broadcasting Station, April 18, 2009. The General Staff declared that "our army from the beginning had no expectation for the six-party talks" and that the North Korean military now was "not being confined by the agreement of six-party talks." The military, in the future, "will advance on a road of reinforcing the country's defense power, including nuclear deterrent, in every way." The General Staff statement did not mention Kim Jong-il.

²⁷ "Turning back the clock: attempts to reclaim control in North Korea after 2004," presentation by Andrei Lankov, Korean historian, at the U.S.-Korea Institute At SAIS, February 11, 2009. "An Yong-hyon, DPRK markets that even Kim Jong Il cannot hold in check," Chosun.com, January 17, 2009.

One option would aim at quickly persuading North Korea to reverse its April 14 announcement and return to the six party talks. The Obama Administration would have to work with China and coordinate U.S. proposals with China in order to secure maximum Chinese support. One avenue would be to propose U.S. and Chinese steps that might appeal to North Korea to complete the Bush Administration-North Korean agreements and thus restore the six party framework. The Obama Administration could offer to defer the verification-sampling issue, which has blocked final implementation of the Bush Administration-North Korean agreements until a later stage of negotiations. The Obama Administration could work out arrangements with China to provide North Korea with the remaining 200,000 tons of heavy oil. If North Korea accepted these proposals, it would invite the expelled U.S. and IAEA technicians back to Yongbyon and renew the process of completing the disablement of Yongbyon. It would appear that this option would have to be undertaken quickly for it to have a chance to restore the Bush Administration-North Korean agreements.

A second option would be to wait out North Korea until North Korea was persuaded to return to the six party talks. North Korea instituted two nearly year long boycotts of the six party talks in 2004-2005 and 2005-2006. Each time, China reportedly provided substantial material incentives (economic aid, investments, financial payments, and trade credits) as inducements to North Korea to return to the talks. Such a scenario is possible again, although North Korea's announcement of withdrawal in April 2009 contained stronger rejectionist language than was the case during the prior two boycotts.

A third option would have the Obama Administration offer North Korea bilateral negotiations with the United States outside the six party framework. This likely would mean the end of the six party talks as an actual forum for negotiations, although it might continue as a nominal institution to ratify any final U.S.-North Korean denuclearization agreement. This would raise the question of the future roles of the other parties in dealing with the nuclear issue and U.S. consultations and coordination with them. On the other hand, securing bilateral talks with Washington may be a key objective of North Korea in its rejection of six party talks.²⁸ If so, it could be receptive to such a U.S. offer. There are indications that this may be the Obama Administration's preferred option. Statements from Administration officials suggest that the Obama Administration is not committed to the six party talks framework as strongly as the Bush Administration. In appointing Stephen Bosworth as the chief U.S. envoy dealing with North Korea, the Obama Administration specified that Bosworth would not attend formal six party meetings but would be the chief U.S. negotiator in direct bilateral talks with North Korea.²⁹

Even if implementation of the Bush Administration-North Korea agreements were completed, the Obama Administration undoubtedly would face significant difficulties in the next round of nuclear negotiations if Pyongyang put on the table the negotiating positions, which it has emphasized since January 1, 2009. These negotiating positions have been laid out in official statements by the North Korean Foreign Ministry and, in a new development, statements by the North Korean military. They also came in statements that North Korean officials, including military officials, made to Selig Harrison of the Center for International Policy, who visited

²⁸ North Korea's reservations about the six party talks may have increased in 2008 because Japan and South Korea became more assertive in demanding that North Korea agree to allow inspectors to take samples of nuclear materials at Yongbyon.

²⁹ Colum Lynch and Glenn Kessler, "U.S. looks to balance response to N. Korea," *Washington Post*, April 16, 2009, p. A3. Kim Hyun, "N. Korea forces U.S. to choose between dialogue or collapse of nuclear talks: analysts," Yonhap News Agency, April 14, 2009.

Pyongyang in mid-January 2009. Harrison had visited North Korea on numerous occasions since the early 1990s and had met with high-ranking North Korean officials.

The negotiating positions taken by North Korea can be summarized as follows:

—North Korea will not give up its nuclear weapons in return for normalization of diplomatic relations with the United States and economic aid from the United States. Normalization of relations must come before denuclearization as a step toward denuclearization.³⁰ North Korean officials rejected Selig Harrison's proposal that North Korea turn over its plutonium stockpile to the International Atomic Energy Agency in return for U.S. diplomatic recognition and U.S. economic aid and trade credits.

—North Korea wants to be recognized as a nuclear weapons state. North Korean officials asserted to Harrison that North Korea wants U.S. recognition of its status as a nuclear weapons state.³¹ North Korea has cited this goal repeatedly since 2007, which it appears to define as a situation in which the United States and other countries normalize relations with North Korea and provide economic-financial benefits while North Korea retains nuclear weapons. According to Harrison and U.S. nuclear expert, Sigfried Hecker, who visited North Korea in February 2009, North Korean officials, including military officials, indicated that a major objective of the nuclear program is to develop nuclear warheads that could be mounted on missiles.³² North Korea's view may be that developing nuclear warheads would force the United States, Japan, and other countries to "recognize" North Korea as a nuclear weapons state. Thus, a key purpose of the May 2009 nuclear test may have been to advance North Korean nuclear technology toward a capability to produce nuclear warheads.

—North Korea no longer has a plutonium stockpile of 31 kilograms that it declared in June 2008 because North Korea has "weaponized" all of its plutonium. This implies a North Korea position that future negotiations on final denuclearization must deal only with North Korea's plutonium atomic weapons.³³

—Denuclearization must include the entire Korean peninsula and must include the elimination of the "U.S. nuclear threat" to North Korea.³⁴ Pyongyang's apparent position that a final denuclearization negotiation must deal only with its atomic weapons appears to aim at giving North Korea more negotiating leverage to press its demand that the United States must agree to measures to eliminate the U.S. "nuclear threat." North Korea repeatedly has defined the "U.S. nuclear threat" to include the composition and major operations of U.S. military forces in South Korea and around the Korean peninsula and the U.S. "nuclear umbrella" over South Korea embodied in the U.S.-South Korean Mutual Defense Treaty. North Korean strategy seems aimed

³⁰ "DPRK Foreign Ministry's spokesman dismisses U.S. wrong assertion," Korean Central News Agency (KCNA), January 17, 2009. "DPRK Foreign Ministry spokesman's press statement on denuclearization of Korean peninsula," KCNA, February 5, 2009.

³¹ Woodrow Wilson International Center for Scholars, Selig S. Harrison reports on his trip to Pyongyang, February 4, 2009.

³² Selig S. Harrison, *Living with a nuclear North Korea*, Washington Post, February 17, 2009, p. A13. Siegfried S. Hecker, *From Pyongyang to Tehran, with nukes*, The New ForeignPolicy.com, May 26, 2009.

³³ Choe Sang-hun, "Tensions rise on Korean peninsula," *New York Times* (internet), January 19, 2009.

³⁴ "DPRK's principled stand on denuclearization of Korean peninsula," KCNA, February 2, 2009. Statement by the General Staff of the Korean People's Army, KCNA, February 2, 2009. "DPRK Foreign Ministry's spokesman dismisses U.S. wrong assertion," January 16, 2009.

at proposing that a final denuclearization agreement with the United States constitute the document that regulates the future U.S. military presence in and around the Korean peninsula, thus superseding the U.S.-South Korean Mutual Defense Treaty.

—Any system of verification and inspections must include inspections inside South Korea, including U.S. bases in South Korea. If North Korea holds to that position, negotiating an agreement on verification that would include sampling would pose additional difficulties and likely delays.

These negotiating positions, plus earlier positions laid out by Pyongyang, suggest that North Korea might assert that the next round of nuclear negotiations should focus on only an agreement for the complete dismantlement of the Yongbyon installations.³⁵ Pyongyang likely will assert that negotiations over its nuclear weapons should be postponed until a later phase of the six party talks or that the issue be negotiated in separate U.S.-North Korean bilateral negotiations. Pyongyang also may take the position that verification procedures, especially inspections and sampling, must be dealt with in this later, denuclearization phase of negotiations.

North Korea's negotiating positions also suggest the demands and conditions that Pyongyang likely would lay out for an agreement of dismantlement. North Korea appears ready to call on the United States to agree to diplomatic relations in a dismantlement agreement. North Korea also is certain to demand that the United States agree to begin a second project to construct light water nuclear reactors inside North Korea;³⁶ the 1994 Agreed Framework initiated the first light water reactor project, which was halted in 2002. North Korea also can be expected to insist that the actual physical dismantlement of Yongbyon would take place only when the construction of light water reactors is completed (a process that would take ten years or more, according to estimates by nuclear experts on the time required to construct a light water reactor). Another North Korean condition likely would be a continuation of heavy oil shipments until light water reactors are completed.

North Korea also may raise another condition related to the Bush Administration's removal of Pyongyang from the U.S. list of state sponsors of terrorism. North Korean negotiators may assert that the Obama Administration must "complete" North Korea's removal through a second step of proposing and supporting financial aid to North Korea from the World Bank and/or the International Monetary Fund. The Bush Administration's removal of North Korea lifted the requirement in U.S. law that the President must oppose aid to North Korea from international financial agencies because of its inclusion on the terrorism-support list.³⁷

North Korea's negotiating agenda presents the Obama Administration with important decisions regarding any future round of nuclear talks. The Administration would have to decide whether to accept a North Korean assertion that the next round of talks focus exclusively on the dismantlement of Yongbyon (a position China could be expected to support) or whether the

³⁵ Selig A. Harrison, "Living with a nuclear North Korea," *Washington Post*, February 17, 2009, p. A13. According to Harrison, North Korean officials in Pyongyang went into detail with him over future negotiations over a dismantlement of Yongbyon.

³⁶ *Ibid.*

³⁷ For a hint of this North Korean position, see the January 2, 2009, article in *Choson Sinbo*, a North Korean newspaper in Japan. *Choson Sinbo* noted that "there was no immediate change in the conditions of [North Korean] international economic activities" after the removal from the U.S. terrorism support list and that the removal constituted "a first step toward a [U.S.] policy shift."

Administration would counter-propose that the issues of North Korea's atomic weapons, plutonium stockpile, and verification be the focus of talks. The Obama Administration could view this as a more attractive negotiating option than negotiating again over shutting down Yongbyon, especially if North Korea restarts operation of the Yongbyon facilities as it did in early 2003.³⁸

In negotiating over the dismantlement of Yongbyon, two of North Korea's likely demands would appear to present particular problems for the Obama Administration. North Korea's likely call for diplomatic relations in a dismantlement agreement (and/or prior to final denuclearization) runs counter to the longstanding U.S. position, reiterated by Secretary of State Clinton during her trip to East Asia, that the United States would normalize relations with North Korea only when North Korea's nuclear programs and weapons are eliminated.³⁹ North Korea's repeated demand for light water nuclear reactors also would force the Obama Administration to choose whether to go back into another light water reactor project that likely would take ten years or longer, or, alternatively, propose a package of incentives to North Korea, including energy incentives, that would not include light water reactors.

The Obama Administration would face a more fundamental decision if it sought early negotiations over North Korea's atomic weapons. North Korea has made clear that it will not accept a linkage between giving up its nuclear weapons and normalization of relations with the United States. Its heightened emphasis that the real linkage is with elimination of the "U.S. nuclear threat" would present the Obama Administration with the issue of whether it would be willing to negotiate major military concessions to North Korea regarding the composition and operations of U.S. forces in South Korea and around the Korean peninsula. Past U.S. administrations have refused to negotiate with North Korea over U.S. troops. The roles of South Korea and Japan in any U.S.-North Korean negotiations over U.S. forces also would be an important consideration.

Two other issues might be addressed by the Obama Administration in developing its negotiating strategy toward North Korea. One would be whether, in the next round of nuclear talks, to attempt to restore as negotiating issues North Korea's alleged highly enriched uranium program and its proliferation activities with Iran and Syria. The Bush Administration-North Korean agreements in effect removed these issues from the negotiating agenda. In its declaration of nuclear programs of June 26, 2008, North Korea did not admit to any uranium enrichment program or nuclear proliferation programs with Iran and Syria.⁴⁰ Restoring these issues in the negotiations would be difficult. North Korea could be expected to insist that the United States accepted its denials of these programs in 2008. China successfully urged the Bush Administration to remove these issues from the U.S. negotiating agenda with North Korea and concentrate on the plutonium program.⁴¹

³⁸ Jack Prichard, former State Department official who dealt with North Korea issues during the Clinton and Bush Administrations, proposed that the Obama Administration by-pass future negotiations over Yongbyon and focus its negotiating strategy, instead, on North Korea's nuclear weapons capabilities, atomic bombs and the plutonium stockpile. See Charles L. (Jack) Prichard, "The North Korean Nuclear Issue and the Future of North Korea." Presented at the Seoul-Washington Forum conference, April 16-17, 2009.

³⁹ "Clinton reaffirms pledge for N. Korea's nuclear dismantlement," *Asia Pulse*, February 18, 2009.

⁴⁰ Helene Cooper, "Past deals by N.Korea may face less study," *New York Times*, April 18, 2008, p. A5. Anne Gearan, "U.S. official: North Korea has agreed to intensive US verification of its plutonium production," Associated Press, June 26, 2008.

⁴¹ Nicholas Kravlev, "U.S. urges monitoring flow of nuclear materials," *Washington Times*, February 26, 2008, p. A1.

A second possible issue is whether the United States should continue to give close to 100% priority to the nuclear issue in its North Korean policy or whether it should begin to bring other issues into its North Korea policy. Selig Harrison testified that North Korean officials indicated to him that Pyongyang might be willing to negotiate with the Obama Administration over North Korea's missile programs. Another potential issue would be whether to follow through on U.S. and South Korean offers of late 2007 that once significant progress had been made on the nuclear issue, the United States and South Korea would be willing to begin a separate negotiation with North Korea over a Korean peace treaty to replace the 1953 armistice 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 and by the freeze and disablement provisions in Phases One and Two of the February 2007 Six Party Nuclear Agreement. The key installations are as follows:⁴²

- *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. Under the February 2007 six party agreement, North Korea shut down the reactor in July 2007. As of late 2008, North Korea had completed eight of the eleven steps of the disablement of the reactor, including the removal of equipment from the reactor and the blowing up of reactor's cooling tower.
- 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 re-opened 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

⁴² Albright, David and O'Neill, Kevin. *Solving the North Korean nuclear puzzle*. Washington, DC, Institute for Science and International Security Press, 2000. pp. 57-82.

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, and it remained shut down into early 2009.

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.⁴³ 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.”⁴⁴

The CIA estimated publicly in November 2002 that North Korea could produce two atomic bombs annually through HEU beginning in 2005;⁴⁵ 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

⁴³ Kim Min-cheol. “Hwang tells of secret nuke program.” *Choson Ilbo* (Seoul, internet version), July 5, 2003.

⁴⁴ Pincus, Walter. “N. Korea's nuclear plans were no secret.” *Washington Post*, February 1, 2003. p. A1.

⁴⁵ CIA unclassified point paper distributed to Congress, November 19, 2002.

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.⁴⁶

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.⁴⁷

Nuclear Collaboration with Iran and Syria

In April 2008, the Bush Administration disclosed that a facility at Al Kibar in northeast Syria bombed by Israel on September 6, 2007, was a plutonium nuclear reactor under construction with the apparent aim of producing nuclear fuel rods that could be converted into nuclear weapons-grade plutonium. For months after the Israeli bombing, press reports had cited information and evidence that the facility was a nuclear reactor and that North Korea was assisting Syria in its construction. This nuclear collaboration reportedly was ongoing since 1997.⁴⁸ U.S. intelligence officials on April 24, 2008, privately briefed Members of Congress on North Korea's role, and they provided a background news briefing to the media.⁴⁹ (See CRS Report RL33487, *Syria: Background and U.S. Relations*.)

U.S. officials presented several forms of evidence for North Korean involvement in the Syrian reactor. A U.S. photograph showed a top North Korean nuclear official visiting Syrian nuclear experts. U.S. intelligence officials released photographs of the outside and inside of the reactor showing marked similarities with the North Korean nuclear reactor at Yongbyon. The photos of the interior of the reactor reportedly showed North Koreans inside the reactor.⁵⁰ A leading South Korean newspaper had reported that U.S. intelligence agencies had obtained a list of North Korean officials involved in the Syrian reactor project and that chief U.S. negotiator, Christopher Hill, had confronted North Korean nuclear negotiators with the list.⁵¹

⁴⁶ Kessler, Glenn. "New doubts on nuclear efforts by North Korea." *Washington Post*, March 1, 2007. p. A1.

⁴⁷ "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.

⁴⁸ Sara A. Carter and Bill Gertz, "Intelligence on Syria delayed to avoid fight," *Washington Times*, April 25, 2008, p. A1.

⁴⁹ David E. Sanger, "Bush Administration released images to bolster its claims about Syrian reactor," *New York Times*, April 25, 2008, p. A1.

⁵⁰ Robin Wright, "N. Koreans taped at Syrian reactor," *Washington Post*, April 24, 2008, p. A.1.

⁵¹ "U.S. called N. Korea's bluff over Syria," *Chosun Ilbo* (internet), April 1, 2008.

At the time of the Bush Administration's disclosures, South Korean intelligence officials stated that they had information that the Israeli bombing had killed ten North Koreans.⁵²

U.S. officials said that the Al Kibar reactor was nearly operational at the time of the Israeli bombing. However, non-government nuclear experts questioned that assertion, asserting that there was no evidence of a plutonium reprocessing plant and a facility to produce nuclear fuel for the reactor in Syria.⁵³

One potential answer to the question of the absence of other reactor-related plutonium facilities in Syria came in reports later in 2008 that Iran also was involved in the Syrian reactor with North Korea and that a plutonium reprocessing plant was in Iran. The online service of the German news publication *Der Spiegel* cited "intelligence reports seen by *Der Spiegel*" that North Korean and Iranian scientists were working together at the reactor site at the time of the Israeli bombing. Some of the plutonium fuel rod production from the reactor was to have gone to Iran, which viewed the reactor as a "reserve site" to produce weapons-grade plutonium as a supplement to Iran's own highly enriched uranium program.⁵⁴ A similar description of North Korean-Iranian cooperation in the Syrian reactor came in two reports from Washington in the Japanese newspaper *Sankei Shimbun*. The newspaper reported in September 2008 information from "a source familiar with the Syrian nuclear issue" that "a secret Iranian Revolutionary Guards base" in Iran housed a plutonium reprocessing facility designed to reprocess nuclear fuel rods from the Syrian reactor.⁵⁵ *Sankei Shimbun* reported from Washington in July 2008 several visits of Iranian officials to the Syrian reactor in 2005 and 2006.⁵⁶

Additional information pointing to North Korean-Iranian collaboration in plutonium nuclear development came from European and Israeli defense officials in early 2007. They stated that North Korea and Iran had concluded a new agreement for North Korea to share data from its October 2006 nuclear test with Iran.⁵⁷

These reports describe a direct collaborative relationship between North Korea and Iran in developing nuclear weapons. Additionally, since the early 1990s, a body of reports has accumulated pointing to a significant collaborative North Korean-Iranian nuclear relationship inside Iran, with North Korea's principal interlocutor being the Iranian Revolutionary Guards (IRGC). Some of these reports cite the Central Intelligence Agency or Western intelligence sources as sources of information. Other reports seem to be based, at least in part, on Israeli intelligence sources. Specific events or factors in the alleged North Korean-Iranian nuclear collaboration are described in multiple reports.

⁵² "N.Koreans killed in Syria during Israeli raid," *Chosun Ilbo* (internet), April 29, 2008. "N. Koreans may have died in Israel raid in Syria—NHK," Reuters, April 28, 2008.

⁵³ Nicholas Kravev and Sara A. Carter, "Syria's nuke facility was nearly finished," *Washington Times*, April 24, 2008, p. A1. Robin Wright, "N. Koreans taped at Syrian reactor," *Washington Post*, April 24, 2008, p. A1.

⁵⁴ "Asad's risky nuclear game," *Spiegel Online*, June 23, 2008.

⁵⁵ Takashi Arimoto, "Reprocessing facility of bombed nuclear base in Iran; intimate ties between Syria and North Korea," *Sankei Shimbun* (internet), September 12, 2008.

⁵⁶ Takashi Arimoto, "Iran involved in nuclear program: trilateral cooperation of Syria, Iran, North Korea," *Sankei Shimbun* (internet), July 12, 2008.

⁵⁷ Jin Dae-woong, "Concerns grow over missile links between N. Korea, Iran," *Korea Herald* (internet), January 28, 2007. "UK press: North Korea aids Iran in nuclear testing," *Dow Jones International News*, January 24, 2007. "Israel PM to charge NKorea link with Iran, Syria," *Agence France Presse*, February 26, 2008.

Numerous reports have asserted that the IRGC occupies a leadership role in Iran's nuclear program. A State Department's 2007 Fact Sheet asserted that "the IRGC attempted, as recently as 2006, to procure sophisticated and costly equipment that could be used to support Iran's ballistic missile and nuclear program."⁵⁸

Nuclear collaboration reportedly began at the same time North Korea negotiated with the IRGC for cooperation in developing and manufacturing Nodong missiles. The first reports, in 1993 and 1994, said that North Korea and Iran had signed an initial agreement for nuclear cooperation. An *Economist Foreign Report* cited "CIA sources" that Iran was helping to finance North Korea's nuclear program and that North Korea would supply Iran with nuclear technology and equipment.⁵⁹ A report of the U.S. House of Representatives Republican Research Committee claimed that Iran would provide \$500 million to North Korea for the joint development of nuclear weapons.⁶⁰ The "CIA sources" cited by the *Economist Foreign Report* mentioned the development of enriched uranium as a goal of the new North Korean-Iranian agreements.

The next reported stage in nuclear collaboration, in 2003 and afterwards, appears to have been connected to the reported joint advancement of the program to produce a model of North Korea's Nodong intermediate ballistic missile in Iran. Production of the Nodong in Iran was a main element of the reported North Korean-Iranian agreements of 1993. By 1997, North Korean missile experts were working in Iran with the IRGC to produce the Shahab 3 and Shahab 4 missiles, the Iranian name for the Nodong.⁶¹ Success in developing and testing the Shahab missile reportedly led to a North Korean-Iranian agreement, probably in 2003, to either initiate or accelerate work to develop nuclear warheads that could be fitted on the Shahab missile. Iran was reported to have offered shipments of oil and natural gas to North Korea to secure this joint development of nuclear warheads.⁶² North Koreans reportedly were seen at Iranian nuclear facilities in 2003. By this time, a large number of North Korean nuclear and missile specialists reportedly were in Iran.⁶³ *Der Spiegel* quoted "western intelligence service circles" as describing Iran in 2005 as offering North Korea economic aid if Pyongyang "continues to cooperate actively in developing nuclear missiles for Tehran."⁶⁴

In 2006 and 2008, U.S. intelligence officials, the International Atomic Energy Agency, and other diplomatic sources disclosed that Iran was trying to modify the Shahab missile, especially the

⁵⁸ U.S. Department of State, Fact Sheet: Designation of Iranian Entities and Individuals for Proliferation Activities and Support for Terrorism, October 25, 2007.

⁵⁹ "An Israeli lesson for North Korea?" *Economist Foreign Report*, April 22, 1993, p. 2. See also: "DPRK reportedly aids Iranian nuclear project," Yonhap News Agency, January 26, 1993. "DPRK military delegation's Iran visit reported," Seoul KBS-1 Radio Network, February 24, 1994.

⁶⁰ "U.S. report on DPRK-Iran missile deal cited," Yonhap News Agency, July 16, 1993. The \$500 million figure also was cited in: "Iran funds North Korea's drive to build nuclear bombs," *U.S. News and World Report*, March 29, 1993, p. 18.

⁶¹ Con Coughlin, "China, N. Korea send experts to hone Iran's long-range missiles," *London Daily Telegraph*, November 23, 1997, p. A5. Bill Gertz, "North Korea send missile parts technology to Iran," *Washington Times*, April 18, 2001, p. A3.

⁶² Douglas Frantz, "Iran closes in on ability to build a nuclear bomb; Tehran's reactor program masks strides toward a weapons capability, a Times investigation finds," *Los Angeles Times*, August 4, 2003, p. A1. "Military source: DPRK, Iran planning joint development of nuclear warheads," *Sankei Shimbun* (internet version), August 6, 2003.

⁶³ "Iranian nuke experts visited N. Korea this year," Kyodo World Service, June 10, 2003. Douglas Frantz, "Iran closes in on ability to build a nuclear bomb," *Los Angeles Times*, August 4, 2003, p. A1. "Military source: DPRK, Iran planning joint development of nuclear warheads," *Sankei Shimbun* (internet), August 6, 2003.

⁶⁴ "Mullahs helping Stalinists," *Der Spiegel* (internet), November 28, 2005.

nose cone, so that it could carry a nuclear warhead. U.S. intelligence officials described this work as part of an Iranian Project 111—“a nuclear research effort that includes work on missile development.”⁶⁵ In March 2006, Reuters reported “an intelligence report given to Reuters by a non-U.S. diplomat” that described Iran’s plans to develop nuclear warheads for the Shahab 3 missile.⁶⁶ Two years later, the International Atomic Energy Agency confronted Iran at several 2008 meetings with documents and photographs showing Iranian work in redesigning the nose cone of the Shahab-3 missile in order for it to carry a nuclear warhead.⁶⁷

The National Council of Resistance of Iran is an exiled opposition group that in 2002 had revealed correctly the existence of secret Iranian nuclear facilities at Natanz and Irak. It issued a report in February 2008 that gave reputed details of North Korean-Iranian collaboration in nuclear warhead development. It alleged that the Iranian Defense Ministry has a secret facility at Khojir on the edge of Tehran, code-named B1-Nori-8500, that is engaged in the development of nuclear warheads for intermediate range ballistic missiles. North Korean specialists were at this facility, according to the National Council.⁶⁸

The Japanese newspaper *Sankei Shimbun* reported on March 2, 2009, that North Korean missiles experts had worked with Iranian counterparts in Iran’s launch of a satellite on February 2, 2009. Iran’s Safir 2 missile, reportedly based on the North Korean Taepodong missile, was launch vehicle for the February 2 satellite.⁶⁹

Another form of North Korean-Iranian nuclear collaboration reportedly involved a huge Iranian project to develop underground bunkers and tunnels for elements of Iran’s nuclear program. The project, estimated to have cost hundreds of millions of dollars, included the construction of 10,000 meters of underground halls for nuclear equipment connected by tunnels measuring hundreds of meters branching off from each hall. Specifications reportedly called for reinforced concrete tunnel ceilings, walls, and doors resistant to explosions and penetrating munitions.⁷⁰

The IRGC implemented the project. North Korea reportedly participated in the design and construction of the bunkers and tunnels. In early 2005, Myong Lyu-do, a leading North Korean expert on underground facilities, traveled to Tehran to run the program of North Korean assistance.⁷¹ North Korea is believed to have extensive underground military installations inside North Korea. Its collaboration with the IRGC reportedly has involved extensive aid to Hezbollah in constructing underground military installations in Lebanon. (See CRS Report RL30613, *North Korea: Terrorism List Removal*)

⁶⁵ Dafna Linzer, “Strong leads and dead ends in nuclear case against Iran,” *Washington Post*, February 8, 2006, p. AO1.

⁶⁶ Louis Charbonneau, “Iran said to step up plans for Shahab missiles,” Reuters, March 6, 2006.

⁶⁷ David E. Sanger, “Nuclear agency says Iran has used new technology,” *New York Times*, February 23, 2008, p. A3. Mark Heinrich, “IAEA shows photos alleging Iran nuclear missile work,” Reuters, September 16, 2008.

⁶⁸ “Iran still developing nuclear warheads: exiled opposition group,” Agence France Presse, February 20, 2008. Marc Champion, “Iran arms claim is lodged—Tehran is developing nuclear warheads, exile group tells U.N.,” *Wall Street Journal Asia*, February 21, 2008, p. 9. Koki Mirua, “Anti-Iranian government organ points to ‘DPRK’s cooperation in Iran’s nuclear development,’” *Tokyo Shimbun* (internet), September 24, 2008.

⁶⁹ Takashi Arimoto, North Korea cooperates in Iran’s satellite launch, secretly linked to development of long-range ballistic missiles, *Sankei Shimbun Online*, March 2, 2009.

⁷⁰ “Nukes too deep to hit.” *Newsweek*, November 3, 2008, p. 8, 10.

⁷¹ Robin Hughes, “Tehran takes steps to protect nuclear facilities,” *Jane’s Defence Weekly*, January 25, 2006, p. 4-5.

The Japanese newspaper, *Sankei Shimbun*, reported two visits of high level Iranian officials to North Korea in February and May 2008. The Iranian delegation included officials of Iran's Atomic Energy Organization and National Security Council. The apparent purpose of these visits, according to the reports, was to ensure that North Korea would maintain secrecy about its nuclear collaboration with Iran in its negotiations with U.S. Assistant Secretary of State Christopher Hill.⁷²

North Korea's Delivery Systems

North Korea's missile program since the early 1990s has developed on four levels. The first three are types of missiles developed for North Korea's arsenal. North Korea is estimated to have more than 600 Scud missiles with a range of up to 300 miles. Newer versions tested in July 2006 are solid-fuel Scuds, which can be fired quickly, in contrast to liquid-fuel missiles. The range of the Scuds could cover all of South Korea. The second level is the development of intermediate range missiles, where North Korea also has made progress. North Korea is estimated to have deployed approximately 200 intermediate-range Nodong missiles. The Nodongs have an estimated range of 900 miles, which could reach most of Japan. North Korea reportedly has developed since 2003 a more accurate, longer-range intermediate ballistic missile. This new missile, dubbed the Taepodong X or the Musudan, appears to be based on the design of the Soviet SS-N-6 missile. It is believed to have a range of 1,500 to 2,400 miles, sufficient to reach Okinawa and Guam, the site of major U.S. military bases and thousands of U.S. military personnel and their families and Guamanian U.S. citizens.⁷³ South Korea's Defense Ministry may have been referring to the Musudan when it states in a report of February 22, 2009, that North Korea had deployed a new medium-range missile with a range of at least 1,800 miles.⁷⁴

Evaluations of North Korea's launches of several Scud and Nodong missiles 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 these 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.⁷⁵ (For additional information, see CRS Report RS21473, *North Korean Ballistic Missile Threat to the United States*, by Steven A. Hildreth.)

In contrast, North Korea has failed to develop a workable long-range missile that could reach Alaska, Hawaii, or the U.S. west coast. North Korea attempted a test of the Taepodong II on July 4, 2006, but the first stage of the missile crashed into the Sea of Japan after about 40 seconds. On April 5, 2009, North Korea attempted to test launch a three stage Taepodong II, claiming that the third stage apparently consisting of a satellite. This time, the first and second stages separated successfully, and the second stage landed about 1,984 miles from the launch site in the Pacific Ocean.⁷⁶ This, however, was about 200 miles short of the landing zone that North Korea had designated for the second stage in international notifications it issued prior to the launch.

⁷² Takashi Arimoto, "Iranian delegation makes top secret visit to North Korea in late February; for discussions on nuclear issue?" *Sankei Shimbun* (internet), March 20, 2008. "Iran involved in nuclear program: trilateral cooperation of Syria, Iran, North Korea," *Sankei Shimbun* (internet), July 12, 2008.

⁷³ "Factbox—a look at North Korea's missile arsenal," *Reuters News*, March 28, 2008.

⁷⁴ Jae-soon Chang, "SKorea: NKorea has deployed new ballistic missile," Associated Press, February 23, 2009.

⁷⁵ "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.

⁷⁶ Pamela Hess, "Pentagon official calls missile test a failure," *Washington Times*, April 7, 2009, p. A11.

Moreover, the third stage allegedly carrying the satellite either did not separate from the second stage, or if it did separate, it landed nearby in the Pacific Ocean.⁷⁷ U.S. officials and most independent experts judged the test a failure, concluding that North Korea had not mastered key elements of long-range missile technology.⁷⁸ If the Taepodong II had been targeted at Anchorage, Alaska, the closest major U.S. target in the 50 U.S. states, the second and third stages would have fallen short by over 1,500 miles.

The fourth level of North Korea's missile program has been the export of missiles to other countries in the Middle East and South Asia and joint collaboration in the development of missiles with Iran and Pakistan. In the 1990s, North Korea exported Scud and Nodong missiles to Pakistan, Iran, Yemen, Syria, and reportedly Egypt. It entered into joint development programs with both Pakistan and Iran. The collaboration with Iran has continued. An Iranian delegation reportedly attended the April 5, 2009, launch. Many experts believe that a key North Korean objective behind the April 5 launch was to bring Iran into another joint development project for the Taepodong II.

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.⁷⁹ 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 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.⁸⁰

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 in 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.⁸¹

⁷⁷ Ibid. "N. Korea satellite launch fails," *Chosun Ilbo* (online), April 6, 2009.

⁷⁸ "NKorea's rocket launch was a failure: analysts," Agence France Presse, April 6, 2009. William J. Broad, "Korean missile was a failure, trackers say," *New York Times*, April 6, 2009, p. 1.

⁷⁹ Sanger, David E. "North Korea's bomb: untested but ready, C.I.A. concludes," *New York Times*, November 9, 2003, p. 4.

⁸⁰ Edith M. Lederer, "Fuel for speculation; reactor shutdown seen as N. Korean nuke source," *Washington Times*, January 10, 1994, p. 1. David Albright, "North Korean Plutonium Production." ISIS Paper, 1994, p. 10-13.

⁸¹ 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.

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 Yongbyon nuclear complex in January 2004 and since has visited several times. 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.⁸² 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.⁸³ 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. As stated previously, Dr. Hecker has estimated that if North Korea restarts its plutonium reprocessing plant in 2009, it could reprocess quickly available nuclear fuel rods into enough plutonium to produce one nuclear bomb; and if North Korea restarts the nuclear reactor at Yongbyon, the Yongbyon complex could produce enough plutonium for one nuclear bomb annually.

The question of whether North Korea produced additional nuclear weapons with the plutonium that it apparently acquired after 2003 may depend on the degree of success/failure of North Korea's nuclear test of October 2006 and whether North Korea is able to develop a nuclear warhead that could be fitted onto its missiles. Experts believe that any atomic bombs developed likely are similar to the 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.

⁸² 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.

⁸³ David Albright and Paul Brannan, "The North Korean Plutonium Stock," Institute for Science and International Security, February 20, 2007.

or Japanese target. Thus, Pyongyang probably would not produce additional Nagasaki-type bombs but would retain sufficient weapons-grade plutonium until it could use it to produce a nuclear warhead. A key North Korean objective of the May 2009 nuclear test may have been to make technical progress toward development of a nuclear warhead. Statements by U.S. officials reflect an apparent uncertainty over whether North Korea has achieved a warheading capability,⁸⁴ and they have not addressed publicly the reports of North Korean-Iranian collaboration in nuclear warhead development.

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.⁸⁵ 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.⁸⁶ 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].”⁸⁷ (See also CRS Report RL34256, *North Korea's Nuclear Weapons*, by Mary Beth Nikitin.)

Select Chronology

10/9/06—North Korea announced that it has carried out an underground nuclear test.

2/13/07—The six party governments negotiating over North Korea's nuclear programs announced an agreement for a freeze and disablement of North Korea's nuclear facilities accompanied by energy and diplomatic benefits to North Korea.

6/25/07—A diplomatic deadlock involving \$24 million in frozen North Korean funds in a Macau bank, Banco Delta Asia, was ended when U.S.-initiated measures to unfreeze the money and transfer it to North Korea.

7/18/07—The International Atomic Energy Agency announced that nuclear facilities at Yongbyon are shut down in accordance with the freeze provisions of the February 2007 six party nuclear agreement.

10/3/07—The six parties issued a statement to implement the second phase of the February 2007 nuclear agreement, focusing on the disablement of Yongbyon, a North Korean declaration of its

⁸⁴ 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, February 28, 2005.

⁸⁵ Kessler, “N. Korea nuclear estimate to rise,” *Washington Post*, April 28, 2004. p. A1.

⁸⁶ Albright and Hinderstein, *Dismantling the DPRK's nuclear weapons program*, pp. 35-36.

⁸⁷ “Parties concur N.K. has HEU material, but disagree on program's progress: Hill,” Yonhap News Agency, September 29, 2005.

nuclear programs, and a U.S. promise to lift economic sanctions on North Korea and remove North Korea from the U.S. list of state sponsors of terrorism.

4/8/08—Assistant Secretary of State Christopher Hill and North Korea's Kim Kye-gwan negotiated an agreement reportedly limiting the information that North Korea would have to provide in a declaration of nuclear programs.

6/26/08—North Korea transmitted a declaration of nuclear programs to China, the chairman of the six party talks. President Bush announced a lifting of economic sanctions on North Korea and an intention to remove North Korea from the U.S. list of state sponsors of terrorism by August 11, 2008.

8/11/08—The Bush Administration announced that it would not remove North Korea from the list of state sponsors of terrorism because Pyongyang rejected U.S. proposals for a verification system of inspections inside North Korea.

10/3/08—Assistant Secretary of State Hill and North Korean officials negotiate an agreement in Pyongyang for a verification system.

4/14/09—North Korea announces that it was withdrawing from the six party talks, citing the statement of the U.N. Security Council criticizing its missile test of April 5, 2009.

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. 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 Steven A. Hildreth.

CRS Report RL33324, *North Korean Counterfeiting of U.S. Currency*, by 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 RL34256, *North Korea's Nuclear Weapons*, by Mary Beth Nikitin.

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