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# Iran-North Korea-Syria Ballistic Missile and Nuclear Cooperation

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## Summary

Congress has at times expressed concern regarding ballistic missile and nuclear programs in Iran, North Korea, and Syria. This report focuses primarily on unclassified and declassified U.S. Intelligence Community (IC) assessments over the past two decades. These assessments indicate that

- there is no evidence that Iran and North Korea have engaged in nuclear-related trade or cooperation with each other, although ballistic missile technology cooperation between the two is significant and meaningful, and
- Syria has received ballistic missiles and related technology from North Korea and Iran and also engaged in nuclear technology cooperation with North Korea.

All three countries discussed in this report have short-range ballistic missiles. Iran and North Korea also have medium-range ballistic missiles; North Korea has intermediate-range ballistic missiles as well. North Korea has tested nuclear weapons on three occasions; Iran and Syria's nuclear programs have raised suspicions that those countries are pursuing nuclear weapons. However, Iran has, according to the IC, halted its nuclear weapons program, and Syria does not appear to have an active nuclear weapons program.

Congress has held numerous hearings regarding these countries' nuclear and missile programs. It has also passed legislation providing for sanctions on countries whose entities assist Iran, North Korea, and Syria to obtain weapons of mass destruction (WMD) and missile delivery systems. For example, the Iran, North Korea and Syria Nonproliferation Act (INKSNA, P.L. 106-178) imposes penalties on countries whose companies' exports assist the efforts of Iran, North Korea, and Syria to acquire WMD and missile delivery systems.

Congress has also established reporting requirements concerning these countries' missile and nuclear programs. Congress may wish to consider requiring additional reporting from the executive branch on WMD proliferation because the number of unclassified reports to Congress on WMD-related issues has decreased considerably in recent years.

This report describes the key elements of a nuclear weapons program; explains the available information regarding cooperation among Iran, North Korea, and Syria on ballistic missiles and nuclear technology; and discusses some specific issues for Congress.

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## Introduction

Congress has at times expressed concern regarding ballistic missile and nuclear programs in Iran, North Korea, and Syria. For decades, most in Congress have viewed these three countries with unease because these programs, coupled with the governments' strong anti-U.S. positions and their antagonism toward U.S. regional friends and allies, pose what are widely regarded as threats to U.S. national security interests. Congress has held numerous hearings and passed laws designed to slow and deter Iran, North Korea, and Syria from developing ballistic missiles and nuclear weapons. Congress has also established reporting requirements concerning these countries' missile and nuclear programs.

This report focuses primarily on unclassified and declassified U.S. Intelligence Community (IC) assessments and reports over the past two decades.<sup>1</sup> These assessments indicate that

- no public evidence exists that Iran and North Korea have engaged in nuclear-related trade or cooperation with each other, although ballistic missile technology cooperation between the two is significant and meaningful, and
- Syria has received ballistic missiles and related technology from North Korea and Iran and also engaged in nuclear technology cooperation with North Korea.

It should be noted that nonofficial assessments, including journal articles, foreign and domestic media reports, and Internet commentaries, are not always consistent with the official assessments summarized in this report. Although such unofficial sources allege a fairly significant and persistent level of cooperation among these three countries on their ballistic missile and nuclear programs, such reports lack the credibility of official assessments because they are often unsourced or attributed to anonymous government officials, frequently at odds with each other, and unverifiable.

This report begins with a description of the key elements of a nuclear weapons program. It then explains the available information regarding cooperation among Iran, North Korea, and Syria on ballistic missiles and nuclear technology. Last, the report discusses some specific issues for Congress.

## Nuclear Weapons Program Elements

An effective nuclear weapons program has three major elements, each of which presents its own unique challenges. Each of these elements must work together to create an operational and effective system.

1. The program must produce fissile material in sufficient quantity and quality for a nuclear device. Plutonium and weapons-grade highly enriched uranium (HEU) are the two types of fissile material used in nuclear weapons. Plutonium is obtained by separating it from spent nuclear reactor fuel—a procedure called “reprocessing.” Weapons-grade HEU is produced by enriching uranium—a process that increases the concentration of uranium-235 (the relevant fissile isotope). Both Iran and North Korea are in various stages of pursuing and

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<sup>1</sup> These include the IC's annual testimony to Congress regarding worldwide threat assessments, as well as other annual or regular reports to Congress on global developments in weapons of mass destruction technology.

- producing different kinds of nuclear material. Syria does not appear to be producing fissile material.
2. The program must produce an effective and reliable means of delivering a nuclear weapon, such as a ballistic missile. Both Iran and North Korea have medium-range ballistic missiles, which have been assessed as capable of delivering a nuclear warhead should such a warhead capability be developed and deployed. Moreover, both countries have demonstrated the capability to launch an object into space orbit, but neither country currently has an intercontinental ballistic missile (ICBM) capability. Syria possesses only short-range ballistic missiles (SRBMs).<sup>2</sup>
  3. The program must produce a nuclear warhead that can be delivered to its intended target, especially at long-range.<sup>3</sup> The IC does not assess that any of the three countries discussed in this report has produced such a warhead, although North Korea has conducted several nuclear tests.

### **Iran, North Korea, and Syria: Major Nuclear and Missile Programs**

#### **Iran<sup>4</sup>**

##### **Nuclear:**

Iran has a gas centrifuge uranium enrichment program and is producing low-enriched uranium. Tehran is also building a heavy-water moderated nuclear reactor but does not have a reprocessing facility; such a facility is required to separate plutonium from spent reactor fuel. Iran has limited and reversed some aspects of these programs' progress since the government began implementing a November 2013 multilateral agreement designed to reduce concerns about Iran's nuclear program. Iran has, according to the U.S. intelligence community, halted its nuclear weapons program.

##### **Ballistic Missiles:**

The U.S. intelligence community assesses that Iran has the largest number of ballistic missiles in the Middle East. It also notes that Iran's ballistic missiles are inherently capable of delivering weapons of mass destruction and that Iran's progress on space launch vehicles improves Tehran's ability to develop longer-range missiles, including an intercontinental ballistic missile (ICBM).<sup>5</sup> Iran has fewer than 100 short-range ballistic missile (SRBM) launchers that could be reloaded and fewer than 50 silo and mobile medium-range ballistic missile (MRBM) launchers that could

<sup>2</sup> The National Air and Space Intelligence Center (Air Force) describes the following missile ranges: Short-Range Ballistic Missile: less than 1,000 kilometers; Medium-Range Ballistic Missile: 1,000-3,000 kilometers; Intermediate-Range Ballistic Missile: 3,000-5,500 kilometers; Intercontinental Ballistic Missile: 5,500 kilometers.

<sup>3</sup> Gen. Eugene Habiger, former Commander U.S. Strategic Command, has said that "the miniaturization of a nuclear warhead is probably the most significant challenge any proliferant would have to face." See General Eugene Habiger, "Problems and Prospects of New Alaska Missile Interceptor Site," Carnegie Endowment for International Peace September 20, 2004, <http://carnegieendowment.org/files/Habiger.pdf>. See also Joe Cirincione and Elise Connor, "How Iran Can Build a Bomb, Ploughshares Fund," July 2, 2010, <http://www.ploughshares.org/blog/2010-07-02/how-iran-can-build-bomb>.

<sup>4</sup> For more information about Iran's nuclear program, see CRS Report RL34544, *Iran's Nuclear Program: Status*, by Paul K. Kerr, and CRS Report R43333, *Iran Nuclear Agreement*, by Kenneth Katzman and Paul K. Kerr. For more information about Iran's ballistic missile program, see CRS Report R42849, *Iran's Ballistic Missile and Space Launch Programs*, by Steven A. Hildreth.

<sup>5</sup> The National Air and Space Intelligence Center (Air Force) describes the following missile ranges: Short-Range Ballistic Missile: less than 1,000 kilometers; Medium-Range Ballistic Missile: 1,000-3,000 kilometers; Intermediate-Range Ballistic Missile: 3,000-5,500 kilometers; Intercontinental Ballistic Missile: 5,500 kilometers.

reach targets throughout the Middle East and portions of NATO's southern flank.

#### **North Korea<sup>6</sup>**

Nuclear:

North Korea has produced plutonium in a nuclear reactor and reprocessing plant located at Yongbyon, where it is also building a gas centrifuge uranium enrichment facility. North Korea tested nuclear explosive devices in October 2006, May 2009, and February 2013. The first device contained plutonium; whether the others contained plutonium or highly-enriched uranium is unclear.

Ballistic Missiles:

North Korea has fewer than 100 road-mobile SRBM launchers that could be reloaded, fewer than 50 mobile No Dong MRBM launchers, and fewer than 50 mobile intermediate-range ballistic missile launchers (IRBMs) that could reach targets throughout the Asia Pacific region. The U.S. intelligence community believes North Korea has publicly displayed a road-mobile ICBM that has not been tested or fielded and that the country's space launch program can aid in the development of its ICBM program.

#### **Syria<sup>7</sup>**

Nuclear:

In 2007, Israel destroyed a Syrian nuclear reactor under construction. Syria does not appear to have an active nuclear weapons program.

Ballistic Missiles:

Syria possesses less than 100 road-mobile SRBM launchers (mostly older SCUD missiles) that could strike U.S. friends and allies in the Middle East and NATO's southern flank.

## **Ballistic Missile Cooperation**

### **Iran and North Korea**

Iran has developed a close working relationship with North Korea on many ballistic missile programs, starting with acquisition of Scud missiles from North Korea in the 1980s. In the mid-1980s, North Korea developed the 300-kilometer range Scud B ballistic missile "from prototypes obtained from Egypt" and subsequently began to export them.<sup>8</sup> Pyongyang developed the 500-kilometer range Scud C in 1991.<sup>9</sup> North Korea sold both types of missiles, as well as missile production technology, to several countries in the Middle East, including Iran and Syria.<sup>10</sup> In 1992 testimony, then-Director of Central Intelligence (DCI) Robert Gates identified Iran and Syria as recipients of North Korean Scud missiles.<sup>11</sup> In 1993, then-DCI R. James Woolsey<sup>12</sup> provided more detail, stating that North Korea had sold Syria and Iran extended range Scud C missiles and apparently agreed to sell other forms of missile technology. A Russian intelligence report, which

<sup>6</sup> For more information about North Korea's nuclear weapons program and ballistic missile program, see CRS Report RL34256, *North Korea's Nuclear Weapons: Technical Issues*, by Mary Beth D. Nikitin.

<sup>7</sup> For more information about Syria's ballistic missile program, see CRS Report R42848, *Syria's Chemical Weapons: Issues for Congress*, coordinated by Mary Beth D. Nikitin.

<sup>8</sup> *Nonproliferation Delivery Systems Problem Countries: North Korea*, Department of State, 1993; *North Korean Missile Proliferation*, Department of State, April 16, 1997.

<sup>9</sup> *North Korean Missile Proliferation*, 1997.

<sup>10</sup> *Ibid.*

<sup>11</sup> *Threat Assessment, Military Strategy, and Defense Planning*, Senate Committee on Armed Services, January 22, 1992.

<sup>12</sup> *Proliferation Threats of the 1990's*, Senate Committee on Governmental Affairs, February 24, 1993.

the U.S. IC deemed “credible,”<sup>13</sup> stated that Iran’s missile potential during this period was confined to Scud B SRBMs received from Syria and North Korea.

During the 1990s, IC annual threat assessments described several recurring trends between Iran and North Korea. First, North Korea’s ongoing export of ballistic missiles provided a qualitative increase in capabilities to countries such as Iran. Second, Iran was using North Korean ballistic missile goods and services to achieve its goal of self-sufficiency in the production of medium-range ballistic missiles. Third, Iran’s acquisition of missile systems or key missile-related components, including potentially significant inputs of space launch vehicle technology and support, could significantly improve Iran’s ability to produce an ICBM. In the latter 2000s, the IC continued to assess that North Korean cooperation with Iran’s ballistic missile programs was ongoing and significant. More recently, 2013, 2014, and 2015 Department of Defense reports to Congress on North Korea’s military capabilities and proliferation activities identified Iran as a past recipient of North Korean ballistic missiles and associated technology.<sup>14</sup> “Of late ... there has not been a great deal of interchange” between Iran and North Korea, Clapper told the Senate Armed Services Committee on February 9, 2016.

In 2006, Iran publicly acknowledged for the first time that it had obtained missiles from North Korea during the Iran-Iraq war in the 1980s, but added that it no longer needed Pyongyang’s assistance: “We received these [Scuds] from foreign countries like North Korea but 17 years after the war we were able to design all of these pieces and even their fuel,” said the chief commander of the Islamic Revolutionary Guard Corps.<sup>15</sup>

Iran has likely exceeded North Korea’s ability to develop, test, and build ballistic missiles. But Tehran may, to some extent, still rely on Pyongyang for certain materials for producing Iranian ballistic missiles, Iran’s claims to the contrary notwithstanding. For example, some observers argue that Iran may not be able to produce even its Scud B and Scud C equivalents (Shahab-1 and Shahab-2, respectively) without some foreign support for key materials or components.<sup>16</sup> Nevertheless, Director of National Intelligence (DNI) James Clapper stated during a February 11, 2014, Senate Armed Services Committee hearing that Iran is not currently receiving assistance with its ICBM program.<sup>17</sup>

## Syria: Cooperation with Iran and North Korea

Syria acquired both Scud B and Scud C missiles from North Korea, according to a 1995 CIA assessment.<sup>18</sup> Damascus has also produced missiles with North Korean-supplied equipment,

<sup>13</sup> In response to hearing questions, the IC responded thusly some months later. See *Proliferation Threats of the 1990's*, 1993.

<sup>14</sup> Office of the Secretary of Defense, *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, February 15, 2013; Office of the Secretary of Defense, *Military and Security Developments Involving the Democratic People’s Republic of Korea*, February 4, 2014; *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2015.

<sup>15</sup> “Iran Admits Buying Missiles from North Korea During Iraq War,” *BBC Monitoring Asia Pacific—Political*, November 7, 2006, translated from *Nezavisimaya Gazeta*, November 3, 2006, p. 7.

<sup>16</sup> Michael Elleman, *Iran’s Ballistic Missile Capabilities: A Net Assessment* (London: The International Institute for Strategic Studies, 2010), pp.91-92.

<sup>17</sup> James Clapper, Director of National Intelligence, *Sen. Carl Levin Holds A Hearing On Worldwide Threats*, Senate Committee On Armed Services, February 11, 2014.

<sup>18</sup> *The Weapons Proliferation Threat*, Central Intelligence Agency, 1995. North Korea had “sold hundreds of Scuds” to several countries in the Middle East, including Iran and Syria, a 1997 State Department document said (*North Korean Missile Proliferation*, 1997).

according to official U.S. accounts; a 1997 State Department document indicated that Syria had received missile “production technology” from North Korea and was producing “Scuds with North Korean assistance.”<sup>19</sup> Furthermore, a State Department report to Congress covering 2008 explained that:

Over the past decade, Syria has focused on enhancing the capabilities of this [SRBM] force while also achieving self-sufficiency in indigenous missile production. With North Korean assistance, Syria has made progress toward domestic production of Scud missile variants.<sup>20</sup>

Syria continues to rely on North Korean and Iranian assistance for its missile programs, according to official U.S. accounts. Defense Intelligence Agency Director Michael Flynn testified on April 18, 2013, that “Syria’s liquid-propellant missile program”—apparently a reference to Syria’s Scud B, Scud C, and Scud D missiles—“depends on essential foreign equipment and assistance, primarily from North Korean entities.”<sup>21</sup> Flynn also stated that “Damascus relies on foreign help, mainly from Iran, to advance its solid-propellant rocket and missile development and production capability.”<sup>22</sup>

## Nuclear Technology Cooperation

According to official sources, Iran, North Korea, and Syria have engaged in various forms of clandestine nuclear cooperation possibly related to nuclear weapons. North Korea and Iran obtained designs and materials related to uranium enrichment from a clandestine procurement network run by former Pakistani nuclear official Abdul Qadeer Khan.<sup>23</sup> The CIA expressed concern in 2004 that the network could also have transferred nuclear “expertise or technology” to Syria,<sup>24</sup> but there appears to be no public official evidence that this potential transfer is still a matter of concern.<sup>25</sup> Syrian President Bashar al Asad stated in a 2007 newspaper interview that his government had been approached by the Khan network but had conducted no transactions with it.<sup>26</sup>

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<sup>19</sup> *North Korean Missile Proliferation*, 1997.

<sup>20</sup> *Report on the Proliferation of Missiles and Essential Components of Nuclear, Biological, Chemical and Radiological Weapons, January 1 – December 31, 2008*, Department of State, April 22, 2009. It is worth noting that a 2006 report from the National Air and Space Intelligence Center described Syria as a “producer” of Scud-D SRBMs (*Ballistic and Cruise Missile Threat*, National Air and Space Intelligence Center, March 2006).

<sup>21</sup> Michael Flynn, Director, Defense Intelligence Agency, *Current and Future Worldwide Threats*, Senate Armed Services Committee Hearing, April 18, 2013. Flynn issued a similar assessment during a 2014 hearing (*Worldwide Threats to National Security*; Senate Armed Services Committee Hearing, February 11, 2014). See also *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions*, 1 January-31 December 2011.

<sup>22</sup> Syria has SS-21 SRBMs and M600 ballistic missiles; Flynn described the latter as a “domestic version of the Iranian 600 mm Fateh-110 SRBM.” Both of these missiles use solid fuel.

<sup>23</sup> See CRS Report RL34248, *Pakistan’s Nuclear Weapons*, by Paul K. Kerr and Mary Beth D. Nikitin.

<sup>24</sup> *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions*, 1 January-31 December 2004.

<sup>25</sup> An October 2012 speech by Assistant Secretary of State Thomas Countryman named Iran, Libya, Pakistan, and North Korea, but not Syria, as Khan network customers. (Thomas Countryman, Assistant Secretary, Bureau of International Security and Nonproliferation, “Addressing Next Generation Proliferation Challenges,” October 26, 2012.)

<sup>26</sup> George Jahn, “Syrian Leader Says His Country Was Approached By Head Of Nuclear Black Market,” *Associated Press*, December 19, 2007.



## North Korea and Syria<sup>27</sup>

North Korea assisted Syria with building a nuclear reactor that may have been part of a Syrian nuclear weapons program, according to U.S. official accounts.<sup>28</sup> Both the United States and the International Atomic Energy Agency (IAEA) assessed that Damascus was building a nuclear reactor; Israel destroyed the facility in a September 2007 air strike.<sup>29</sup> According to a May 2011 IAEA report, the agency assessed that the destroyed Syrian structure “was very likely a nuclear reactor,” a claim Syria denied.<sup>30</sup> The IC assessed that the reactor’s purpose was to produce plutonium for nuclear weapons, a senior intelligence official stated during an April 2008 briefing, but added that the IC had “low confidence” in this judgment.<sup>31</sup> According to a 2013 State Department report, the United States assessed that “the reactor’s intended purpose” was to produce plutonium, rather than to conduct research or produce electricity, “because the reactor was not configured for power production, was isolated from any civilian population, and was ill-suited for research.”<sup>32</sup>

Syria was constructing the reactor with “North Korean assistance,” the same 2013 report said.<sup>33</sup> A senior U.S. intelligence official stated during the 2008 briefing that “North Korea has assisted Syria with this reactor,” citing similarities between the Syrian reactor and the North Korean reactor that has produced plutonium for that country’s nuclear weapons program.<sup>34</sup> The official also cited the “involvement of nuclear-related North Koreans in a project somewhere in the area,” as well as “evidence of cargo being transferred from North Korea, most likely to [the] reactor site,

<sup>27</sup> In addition to its dealings with Syria, North Korea was also a probable supplier to Libya’s nuclear weapons program. According to a February 2013 Defense Department report, “North Korea provided Libya with uranium hexafluoride,” which is the material fed into the uranium enrichment process. (*Military and Security Developments Involving the Democratic People’s Republic of North Korea*, February 15, 2013). Conveying slightly less certainty about the matter, a September 2011 International Atomic Energy Agency report stated that “it is very likely that” natural uranium hexafluoride contained in a cylinder that Libya received in 2001 via the Khan network “originated in” North Korea (*Application of Safeguards in the Democratic People’s Republic of Korea*, GOV/2011/53-GC(55)/24, September 2, 2011).

<sup>28</sup> Although there have been press reports regarding nuclear cooperation between Syria and Iran, they are not corroborated by official U.S. open-source assessments. See, for example, Erich Follath and Holger Stark, “The Story of ‘Operation Orchard’: How Israel Destroyed Syria’s Al Kibar Nuclear Reactor,” *Der Spiegel*, February 11, 2009; and Hans Rühle, “How Iran Pushed Forward Syria’s Nuclear Armament; Background of the Israeli Action Against the Reactor of Al-Kibar,” *Neue Zürcher Zeitung*, March 19, 2009.

<sup>29</sup> Richard Cheney, Vice President during the George W. Bush Administration, wrote in 2011 that Israel destroyed the reactor. (Dick Cheney, *In My Time: A Personal and Political Memoir* [New York: Threshold Editions], 2011, p. 472.) See also George W. Bush, *Decision Points* (New York: Crown Publishing), 2010, p. 422; and Elliott Abrams, “Bombing the Syrian Reactor: The Untold Story,” *Commentary*, February 2013.

<sup>30</sup> *Implementation of the NPT Safeguards Agreement in the Syrian Arab Republic*, GOV 2011/30 May 24, 2011. The IAEA also wants information about “three other locations allegedly functionally related” to the reactor site, the May 2011 report said. According to an August 2012 IAEA report, the IAEA “remains unable to provide any assessment concerning” these sites’ “nature or operational status.” (*Implementation of the NPT Safeguards Agreement in the Syrian Arab Republic*, GOV 2012/42, August 30, 2012). Syria has not since complied with the board’s request.

<sup>31</sup> “Background Briefing with Senior U.S. Officials on Syria’s Covert Nuclear Reactor and North Korea’s Involvement,” April 24, 2008.

<sup>32</sup> *Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments*, Department of State, July 2013.

<sup>33</sup> *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2013.

<sup>34</sup> “Background Briefing with Senior U.S. Officials on Syria’s Covert Nuclear Reactor and North Korea’s Involvement,” April 24, 2008.

in 2006.” More recently, 2014 and 2015 Defense Department reports stated that North Korea “provided Syria with nuclear reactor technology until 2007.”<sup>35</sup>

It is worth noting that an IAEA investigation discovered Syrian uranium conversion activities that the government had failed to declare to the IAEA. Uranium conversion is the process by which uranium hexafluoride (the feedstock for centrifuges) is produced. However, the IAEA has apparently resolved its concerns regarding these activities.<sup>36</sup>

## **Iran and North Korea**

Secretary of Defense Ashton Carter stated during an April 2015 interview that North Korea and Iran “could be” cooperating to develop a nuclear weapon.<sup>37</sup> Moreover, U.S. intelligence officials have expressed concern that North Korea might export its nuclear technology or fissile material. According to testimony from DNI Clapper before Congress in February 2012, North Korea’s export of “ballistic missiles and associated materials,” as well as its assistance to Syria’s nuclear reactor, “illustrate the reach of the North’s proliferation activities.” The IC “remain[s] alert to the possibility that North Korea might again export nuclear technology,” he added.<sup>38</sup>

North Korea’s nuclear weapons program has been based on plutonium produced in a nuclear reactor located at Yongbyon. North Korea also has a gas centrifuge uranium enrichment program. North Korea tested nuclear explosive devices in October 2006, May 2009, February 2013, and January 2016. The first device contained plutonium; whether the others contained plutonium or HEU is still unclear.<sup>39</sup>

Iran has a gas centrifuge uranium enrichment program and is building a heavy-water moderated nuclear reactor. However, the reactor program is a lesser proliferation concern because Iran does not have a reprocessing facility, which, as noted, is required to produce plutonium for weapons. A November 2007 National Intelligence Estimate assessed that Iran “halted its nuclear weapons program” in 2003. The estimate, however, also assessed that Tehran is “keeping open the option to develop nuclear weapons.”<sup>40</sup> The intelligence community has reaffirmed this conclusion on several occasions.<sup>41</sup>

Then-DNI Dennis Blair discussed in 2009 the circumstances under which North Korea might transfer nuclear weapons or fissile material:<sup>42</sup>

Pyongyang is less likely to risk selling nuclear weapons or weapons-quantities of fissile material than nuclear technology or less sensitive equipment to other countries or non-

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<sup>35</sup> *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2014; *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2015.

<sup>36</sup> GOV 2011/30.

<sup>37</sup> Ashton Carter, *Erin Burnett Outfront*, CNN, April 10, 2015.

<sup>38</sup> Clapper, *Unclassified Statement for the Record on the Worldwide Threat Assessment of the US Intelligence Community*, Senate Committee on Armed Services, February 16, 2012.

<sup>39</sup> According to open sources, the second and third tests did not vent gases that could be used to identify the type of fissile material used in the explosive device. See also CRS Report R41160, *North Korea’s 2009 Nuclear Test: Containment, Monitoring, Implications*, by Jonathan E. Medalia, and CRS Insight IN10428, *North Korea’s January 6, 2016, Nuclear Test*, by Mary Beth D. Nikitin.

<sup>40</sup> See *Iran: Nuclear Intentions and Capabilities*, National Intelligence Estimate, November 2007.

<sup>41</sup> See CRS Report R43333, *Iran Nuclear Agreement*, by Kenneth Katzman and Paul K. Kerr.

<sup>42</sup> Dennis C. Blair, Director of National Intelligence, *Annual Threat Assessment of the Intelligence Community for the Senate Select Committee on Intelligence*, February 12, 2009.

state actors, in part because it needs its limited fissile material for its own deterrent. Pyongyang probably also perceives that it would risk a regime-ending military confrontation with the United States if the nuclear material was used by another country or group in a nuclear strike or terrorist attacks and the United States could trace the material back to North Korea. It is possible, however, that the North might find a nuclear weapons or fissile material transfer more appealing if its own stockpile grows larger and/or it faces an extreme economic crisis where the potentially huge revenue from such a sale could help the country survive.

Nuclear-related cooperation could also include sharing technology related to nuclear weapons material production, or data from nuclear or explosive testing. Some analysts have argued that both Pyongyang and Tehran could benefit if the former were to provide nuclear test data to the latter in exchange for Iranian information about enrichment, missile, or other nuclear-related expertise.<sup>43</sup> Iran could also pay for North Korean nuclear assistance with currency or petroleum.<sup>44</sup>

Some press reports have pointed to alleged instances of nuclear-related cooperation, such as the possibility of Iranian officials witnessing North Korean nuclear tests.<sup>45</sup> However, this information remains speculative and unconfirmed by official sources. Furthermore, U.S. intelligence assessments have not mentioned nuclear cooperation between the two countries, even though such assessments have described cooperation on ballistic missiles. For example, although the 2013, 2014, and 2015 Defense Department reports did, as noted, describe North Korean nuclear assistance to Libya, they did not indicate that North Korea had provided or received nuclear assistance to or from Iran.<sup>46</sup>

Moreover, U.S. officials have stated publicly that there is no nuclear cooperation between Iran and North Korea. During a February 27, 2007, Senate Armed Services Committee hearing, U.S. officials stated that there is “no evidence” that Iran and North Korea are cooperating to develop nuclear capabilities. Furthermore, senior U.S. intelligence officials stated during an April 24, 2008, background briefing that the two countries are not cooperating on “nuclear issues.” More recently, Assistant Secretary of State Thomas Countryman indicated in June 2013 that North Korea and Iran were not engaged in nuclear cooperation, but added that “it’s a valid reason to be concerned and we keep an eye on it.”<sup>47</sup> Similarly, when asked during a February 20, 2014, press briefing about nuclear cooperation between Iran and North Korea, a senior Administration official responded only by noting that the United States “is always concerned about reports of shared technology and proliferation of technology and of nuclear weapons technology.”<sup>48</sup> Lastly, knowledgeable current and former U.S. officials contacted by CRS said that they were unaware

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<sup>43</sup> “Hecker Takes Hard Look At N. Korean Test,” CISAC website, February 14, 2013, [http://cisac.stanford.edu/news/hecker\\_takes\\_hard\\_look\\_at\\_north\\_koreas\\_nuclear\\_test\\_20130214/](http://cisac.stanford.edu/news/hecker_takes_hard_look_at_north_koreas_nuclear_test_20130214/); Siegfried S. Hecker and William Liou, “Dangerous Dealings: North Korea’s Nuclear Capabilities and the Threat of Export to Iran,” *Arms Control Today*, March 2007.

<sup>44</sup> Hecker and Liou, 2007.

<sup>45</sup> See, for example, “N. Korea Conducts Nuke Test in Presence of Iranian Scientists: Source,” *Kyodo News*, February 15, 2013. See also: Choe Sang-Hun, “North Korean Missile Said To Have Military Purpose,” *The New York Times*, December 24, 2012; “Iran Defence Team Visited North Korea, Discussed Uranium Enrichment – Agency,” *Kyodo News Service*, January 7, 2012; Con Coughlin, “Iran ‘Is Seeking N Korea’s Nuclear Expertise,’” *The Daily Telegraph (London)*, April 17, 2007; and “Hundreds of NK Nuclear And Missile Experts Working In Iran,” *Korea Times*, November 13, 2011.

<sup>46</sup> *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2013; *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2014; *Military and Security Developments Involving the Democratic People’s Republic of North Korea*, 2015.

<sup>47</sup> Thomas Countryman, “The Implications of the NPT (Non-Proliferation Treaty) Regime for Nonproliferation,” June 18, 2013.

<sup>48</sup> “Background Briefing on the P5+1 Talks,” February 20, 2014.

of official unclassified U.S. government evidence of nuclear cooperation between Iran and North Korea.

In a September 2014 interview, Iran's ambassador to South Korea denied that Tehran and Pyongyang had cooperated on nuclear weapons.<sup>49</sup> The two countries may not have recently engaged in nuclear cooperation because Iran has, according to the IC, apparently halted its nuclear weapons program. Furthermore, the extent to which Iran and North Korea could benefit from nuclear-related cooperation is uncertain. Although some analysts have argued that Pyongyang could provide nuclear test data to Tehran, the extent to which Iran could benefit from such data is unclear. North Korea's nuclear weapons program to date has apparently been based on plutonium;<sup>50</sup> Iran would most likely use weapons-grade HEU, rather than plutonium, as fissile material in nuclear weapons, at least in the short term.<sup>51</sup> Although Tehran could provide Pyongyang with access to Iran's enrichment technology, such access would be of limited benefit to North Korea because North Korea's centrifuge appears to differ from the two types of centrifuges that Iran has installed.<sup>52 53</sup>

It is also possible that, rather than collaborating, the two countries may be competing with each other in their efforts to circumvent international sanctions by obtaining dual-use technologies from the same supply networks, particularly via trading companies in China. Both Tehran and Pyongyang remain dependent on foreign suppliers for their nuclear program, and some components may be in demand by both countries. The Institute for Science and International Security has concluded from examining procurement data that both countries have well-established supply chains in China, but North Korea is able to secure shipments with greater ease than is Iran.<sup>54</sup> The two countries may be reluctant to export components to one another that they themselves have difficulty procuring. Moreover, involved Chinese trading companies would have a financial interest in maintaining business with both Iran and North Korea.

## **Iran, North Korea and Syria Nonproliferation Act**

Congress has passed legislation providing for sanctions on countries whose entities assist Iran, North Korea, and Syria to obtain weapons of mass destruction (WMD) and missile delivery

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<sup>49</sup> "Iran Envoy in South Korea Says No Similarity to North Nuclear Programme – Yonhap," *Yonhap News Agency*, September 25, 2014.

<sup>50</sup> As noted, there is no public official evidence regarding the fissile material used in the second and third nuclear explosive devices tested by North Korea.

<sup>51</sup> Iran's enrichment program is considerably more advanced than its heavy-water reactor program. Moreover, there is no evidence that Iran has a reprocessing program; a reprocessing facility is necessary to separate plutonium from spent nuclear fuel.

<sup>52</sup> Iran is enriching uranium with some of its IR-1 centrifuges and has installed significant numbers of IR-2m centrifuges; the latter have not yet produced enriched uranium. *Implementation of the NPT Safeguards Agreement and Relevant Provisions of Security Council Resolutions in the Islamic Republic of Iran*, GOV/2014/10, February 20, 2014. Iran is also testing other types of centrifuges.

<sup>53</sup> Iran's IR-1 centrifuge is of a different design than the North Korean centrifuge and has rotors made primarily of high-strength aluminum with small maraging steel components. The more-advanced IR-2m is also of a different design and is made of different materials. The IR-2m rotors are made primarily of carbon fiber, whereas the North Korean centrifuges are reportedly made of maraging steel. (Knowledgeable former U.S. official, August 7, 2013; Simon Henderson and Olli Heinonen, "Nuclear Iran: A Glossary of Terms," *Policy Focus 121*, May 2013; Olli Heinonen, Arms Control Association, "The Status of Iran's Nuclear and Missile Programs," Transcript, November 22, 2010; *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, GOV/2004/11, February 24, 2004).

<sup>54</sup> David Albright and Christina Walrond, *North Korea's Estimated Stocks of Plutonium and Weapon-Grade Uranium*, Institute for Science and International Security, August 16, 2012.

systems.<sup>55</sup> For example, the Iran, North Korea and Syria Nonproliferation Act (INKSNA, P.L. 106-178) imposes penalties on countries whose companies assist the efforts of Iran, North Korea, and Syria to acquire WMD and missile delivery systems. Congress originally targeted only Iran's proliferation activities, but amended the law in 2005 to address Syria (P.L. 109-112, the Iran Nonproliferation Amendments Act). In 2006, Congress added North Korea (P.L. 109-353). INKSNA requires a biannual report from the President to Congress on any transfers of controlled items from any foreign person to Iran, North Korea, or Syria. INKSNA and other sanctions laws are aimed at discouraging foreign entities from assisting any WMD and missile programs of these three countries. Congress also authorizes U.S. nonproliferation programs, such as export control assistance, that are meant to bolster the ability of other countries to detect and interdict such transfers. In addition, U.N. sanctions on Iran and North Korea prohibit the transfer of nuclear or ballistic missile technology to them.<sup>56</sup> It is also worth noting that international export control regimes, such as the Nuclear Suppliers Group and Missile Technology Control Regime, restrict the transfer of nuclear and missile technologies.<sup>57</sup>

## Issues for Congress

Congress may wish to consider requiring additional reporting from the executive branch on WMD proliferation. The number of unclassified reports to Congress on WMD-related issues has decreased considerably in recent years. Most recently, Section 310 of the Intelligence Authorization Act for Fiscal Year 2013 (P.L. 112-277) repealed the requirement for the IC to provide an unclassified annual report to Congress regarding the "Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions." The report had been required by Section 721 of the Intelligence Authorization Act for Fiscal Year 1997 (P.L. 104-293). Congress also may wish to consider requesting information from the executive branch, through hearings or reports, regarding the extent to which entities in countries other than Iran, North Korea, and Syria aid those three countries' unconventional weapons programs.

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<sup>55</sup> For more information on nonproliferation sanctions, see CRS Report RL31502, *Nuclear, Biological, Chemical, and Missile Proliferation Sanctions: Selected Current Law*, by Dianne E. Rennack. For more information about sanctions on Iran, see CRS Report RS20871, *Iran Sanctions*, by Kenneth Katzman.

<sup>56</sup> For more information about the effects of sanctions on Iran's nuclear and ballistic missile programs, see CRS Report RL34544, *Iran's Nuclear Program: Status*, by Paul K. Kerr.

<sup>57</sup> For further information, see CRS Report RL31559, *Proliferation Control Regimes: Background and Status*, coordinated by Mary Beth D. Nikitin.