

## **An Overview of North Korea's Ballistic Missiles**

### **Introduction**

The DPRK acquired its first advanced missile system, the Soviet Scud B, from Egypt in the 1970's in exchange for its support during the Yom Kippur War.<sup>1</sup> The DPRK, long accused by the US government of being "the single biggest proliferator of missile technology,"<sup>2</sup> rose to prominence in the global arms market during the 1980's.<sup>3</sup> As with other nations, North Korea derives much of its missile development from the technology and hardware of more advanced nations, including the Soviet Union between 1969 and 1970, and China in the late 1970's.<sup>4</sup> Since then the DPRK has developed several advanced missile systems and has an extensive list of customers. Ballistic missile sales were thought to account for North Korea's largest source of foreign exchange in the mid-1990's.<sup>5</sup> The DPRK is a key participant in the scud missile trade, a network of countries which reproduce Soviet Scud technology and also develop and sell their own indigenous versions.<sup>6</sup>

### **Laws, the Moratorium and UN Resolution 1695**

Currently, there is no legally binding international framework for prohibiting or restricting the sale of ballistic missiles or the related technology. In the absence of such a legal framework, the Missile Technology Control Regime (MTCR), a multinational association formed in 1987 to control the proliferation of ballistic missile systems, establishes and coordinates export control guidelines and national export licenses on ballistic missile and other technologies.<sup>7</sup> Thirty-four countries have joined this voluntary regime. As of 2007, the DPRK is not a member; similar to other prominent non-members such as China and Pakistan, it is significantly involved in the weapons industry.

The United States and North Korea held their first round of missile negotiations in April 1996. The United States urged the DPRK to adhere to the rules of the MTCR; North Korea allegedly refused to do so unless the United States provided compensation for lost revenues. In the following month, the United States initiated sanctions on North Korea for transfers related to missile sales. However, pre-existing sanctions rendered the new sanctions largely symbolic.<sup>8</sup>

Without prior notice to its neighboring countries, North Korea conducted its first launch of the Taepodong-1, a three-stage long-range missile, in August 1998. The launch was an attempt to place a small satellite, the Kwangmyŏngsŏng, into low earth orbit, but the third stage failed. The launch, which passed over Japan, evoked swift criticism. The US, South Korea and Japan issued a joint statement condemning the launch, but reaffirming support for the 1994 Agreed Framework.<sup>9</sup>

On October 1, 1998, the United States re-opened missile talks with the DPRK. In September 1999, the DPRK agreed<sup>10</sup> to a moratorium on long-range missile testing as long as diplomatic talks continued.<sup>11</sup> The US reciprocated by partially lifting economic sanctions in 2000.<sup>12</sup> The self-imposed moratorium on long-range missile tests did not include a provision to prohibit missile sales, and North Korea's missile sales remained robust during the entire period.

The newly elected Bush administration suspended negotiations in March 2001 pending a policy review, and later that month, the North Korean government stated that it would be difficult for the DPRK to maintain the unilateral moratorium "indefinitely."<sup>13</sup> However, the DPRK agreed to extend the moratorium at least through 2003 during Japanese Prime Minister Koizumi's September 2002 visit to Pyongyang.<sup>14</sup>

On March 3, 2005, the DPRK announced that it ended the self-imposed moratorium, a day after North Korea conditioned its return to nuclear negotiations on a US apology for calling it part of an "axis of evil" and one of the "outposts of tyranny."<sup>15</sup> On July 5, 2006, the DPRK flight-tested an array of ballistic missiles, including a long-range Taepodong-2. Although the Teapodong-2 test failed, ten days later the United Nations Security Council adopted Resolution 1695, which demands that member states prohibit the procurement of "missile and missile-related items, materials, goods and technology" to or from the DPRK; it also included a prohibition on the transfer of "financial resources in relation to the DPRK's missile or WMD programmes."<sup>16</sup>

### North Korea's Top Sellers

Comprehensive analyses of the DPRK's missile program are readily available on the web. Please see the links below for several excellent resources on both the ballistic missiles profiled below and other DPRK missiles.

North Korea's **line of scud ballistic missiles** are believed to top the list of its exports. Based on Soviet technology, North Korean-designed scuds have been imported by an extensive list of countries.<sup>17</sup> Although the Soviet Scud-B has limited capabilities, most notably its poor accuracy, this model has been replicated by a number of Third World countries.<sup>18</sup> This is because its technology is widely available, especially among Middle Eastern and former Eastern Bloc countries.<sup>19</sup>

#### **SCUD-B (Hwasŏng-5)**

The Scud-B is a road-mobile, Soviet-made, tactical ballistic surface-to-surface missile system.<sup>20</sup> Modeled after the Nazi V-2 rocket, the Soviet Union began producing the short-range Scud series shortly after World War II.<sup>21</sup> Many countries produce variants of the original Soviet Scud-B.

The DPRK produces a variant of the missile called the Hwasŏng-5. The Hwasŏng-5's height is approximately 11m and its suspected maximum range is about 320km, which puts Seoul within striking distance.<sup>22</sup> The Scud's payload is roughly about 987 kg.<sup>23</sup> The Scud-B missiles are equipped with high explosive (HE) warheads, although it is believed that they may also be capable of carrying chemical weapons.<sup>24</sup> Some sources indicate that the DPRK has about 300 Scud-B missiles as well as the launch systems.<sup>25</sup>

North Korea sold its version of the Scud-B to Iran in the 1980's during the Iran-Iraq war.<sup>26</sup> The DPRK also sold the technology back to Egypt to improve their indigenous version of the missile. Republic of Congo, Cuba, Ethiopia, Egypt, Iraq, Syria, Iran, Libya, UAR, Vietnam, and Yemen have imported the North Korean Scud-B and its technology.<sup>27</sup>

### **SCUD-C (Hwasŏng-6)**

In the late 1980's North Korea began to develop a modified version of the short-range Scud-B, which is known as the Scud-C, or Hwasŏng-6. The Scud-C's length is approximately 10.94 m, which makes it slightly longer than that of its predecessor, the Scud-B.<sup>28</sup> The weight of the warhead has been decreased to 770 kg, which contributes to its longer range of about 500 km.<sup>29</sup> The entire southern half of the peninsula is within range of the Scud-C. However, since the North Koreans did not upgrade the missile's guidance system, the Scud-C has poor accuracy.<sup>30</sup> This missile's warhead may be equipped with HE, chemical, or sub-munitions.<sup>31</sup>

The DPRK sold the Hwasong-6 to Iran, after which Iran produced its indigenous version known as the Shahab-2.<sup>32</sup> The Iranian government also imported Scud-C production equipment during the 1990's to update its own missile development program.<sup>33</sup> In addition, North Korea has used Iran as a transit point to transfer Scud-C's and other technology to Syria.<sup>34</sup> In 1999, India intercepted the North Korean vessel Ku Wŏl San en route to an unknown destination, possibly Pakistan or Libya.<sup>35</sup> Yemen also purchased Scud-C technology from the DPRK between 1999 and 2000, incurring U.S. sanctions.<sup>36</sup>

### **Nodong-1**

The Nodong-1 is a medium range ballistic missile. Its development may have begun in the late 1980's.<sup>37</sup> The Nodong-1 has a range of about 1,000km, which could make Japan a potential target.<sup>38</sup> The Nodong-1 has poor accuracy; however, its suspected use for carrying nuclear or chemical warheads would allow it to make significant damage to cities or military installations.<sup>39</sup> US Forces Korea commanders have recently said the number of deployed Nodongs is about 200,<sup>40</sup> while South Korea states that there are nine and Japan estimates between 15 and 100.<sup>41</sup>

North Korea has sold the larger and more sophisticated Nodong-1 to countries seeking the DPRK's advanced missile technology. Iran's Shahab-3 was designed using Nodong-1 features.<sup>42</sup> Pakistan duplicated the Nodong-1 and called its version the Ghauri. In 1999, British customs intercepted a shipment of Nodong and other Scud missile components headed for Libya.<sup>43</sup> Unconfirmed reports suggest that Egypt imported Nodong-1 components in 2001; however, Egyptian authorities claimed that missile cooperation with the DPRK ended in 1996.<sup>44</sup>

## **Additional Missiles**

### **Taepodong-2 – in the News**

Although there are no reports of sales of the Taepodong-2, its development has garnered great interest. The Taepodong-2 is believed to be a two- or three-stage missile. With a possible range of 5,000-6,000km, a functioning three-stage Taepodong-2 might have the capability to reach the Alutian Islands off Alaska, although some range estimates are lower.<sup>45</sup> US intelligence reports state that by 1999 the Taepodong-2 vehicle was complete and that it was stored near a launch

pad.<sup>46</sup> North Korea does much of its work on missiles underground,<sup>47</sup> and there were no reported flight tests of this missile until July 5, 2007 (July 4 in US) when North Korea test-launched the Taepodong-2 and other types of missiles.<sup>48</sup>

### **Musudan (Nodong-B – Mirim)**

The Musudan, also known as the Nodong-B and Mirim, is an intermediate-range ballistic missile (IRBM) with a range between 2,500 and 5,000 km, although some experts believe that 5,000 km is beyond its capability.<sup>49</sup> The missile's design is based on that of the Soviet-era SS-N-6, a submarine-launched ballistic missile.<sup>50</sup> North Korea began developing the missile 15 years ago, and it first displayed it in public during an April 2007 military parade.<sup>51</sup> According to some media reports, South Korean and US intelligence officials are trying to confirm claims that Iran test-launched the Musudan in 2006.<sup>52</sup> North Korea reportedly signed an agreement with Tehran to sell to Iran 18 Musudan missiles that same year.<sup>53</sup> There are no other signs that Pyongyang has successfully flight-tested the Musudan since the 2006 launch in Tehran.<sup>54</sup>

### **KN-02**

North Korea developed the KN-02 using the designs of the Soviet made-SS-21, which it received from Syria in 1996.<sup>55</sup> Although it is believed to be the most accurate of North Korea's missile arsenal,<sup>56</sup> the KN-02's range is only about 100 to 120 km. As a short-range ballistic missile, the KN-02's target is likely South Korea.<sup>57</sup> In addition to being road-mobile and using solid fuel,<sup>58</sup> the KN-02 can carry a nuclear, chemical or conventional warhead.<sup>59</sup> The KN-02 is a mobile, accurate, truck-mounted missile capable of carrying a variety of warheads, including high explosives, anti-personnel fragmentation with multiple bomblets, anti-radar and electromagnetic pulse variants, and tactical nuclear warheads.<sup>60</sup> This missile is still in the testing stage. One analysis determined that if the KN-02 were successfully developed, its small size would hypothetically allow for easier transport and covert trade.<sup>61</sup>

## **Resources**

**Arms Control Association:** <http://www.armscontrol.org/country/northkorea/>

The Arms Control Association (ACA), founded in 1971, is a national nonpartisan membership organization dedicated to promoting public understanding of and support for effective arms control policies. *ACA provides key news articles, documents and analyses related to DPRK-US relations and the nuclear negotiations process.*

**Federation of American Scientists:** <http://www.fas.org/nuke/guide/dprk/index.html>

The Federation of American Scientists (FAS) was formed in 1945 by atomic scientists from the Manhattan Project who felt that scientists, engineers and other innovators had an ethical obligation to bring their knowledge and experience to bear on critical national decisions. *FAS has detailed information about each of the DPRK's ballistic missiles and missile systems, and is a useful resource for technical specifications, range, payload, etc. It was last updated December 2005. FAS also has links to other North Korea-related sources.*

**GlobalSecurity.org:** <http://www.globalsecurity.org/wmd/world/dprk/index.html>

According to its website, GlobalSecurity.org is the leading source of background information and developing news stories in the fields of defense, space, intelligence, WMD, and homeland security. *Global Security is a source for information on North Korea's ballistic missiles, military capabilities, ideology, nuclear programs and intelligence agencies.*

**Nuclear Threat Initiative:** [http://www.nti.org/e\\_research/profiles/NK/index.html](http://www.nti.org/e_research/profiles/NK/index.html)

The Nuclear Threat Initiative (NTI) is an operational organization — actively engaged in developing and implementing projects that bring new strategies, new partnerships and effective action to reduce the dangers from nuclear, biological and chemical weapons. *Refer to NTI for details and chronologies on North Korea's missile systems and its biological, chemical and nuclear weapons development. The website also contains a comprehensive timeline covering North Korea's imports and exports of ballistic missiles.*

**The WMD Insights project:** <http://www.wmdinsights.com/introeastasia.htm>

The WMD Insights project is sponsored by the Advanced Systems and Concepts Office (ASCO) at the Defense Threat Reduction Agency (DTRA). ASCO identifies, encourages, and executes high-impact projects to promote new thinking, address technology gaps and improve the operational capabilities of DTRA, DOD and other government agencies in response to weapons of mass destruction (WMD) and related threats. *This website offers frequently updated articles on weapons-of-mass-destruction, covering issues according to region.*

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