



A February 8, 2011 DigitalGlobe image of the Tae-sung Machine Factory (a.k.a., Chamjin Missile Factory) on the outskirts of P'yongyang (DigitalGlobe's Analysis Center).

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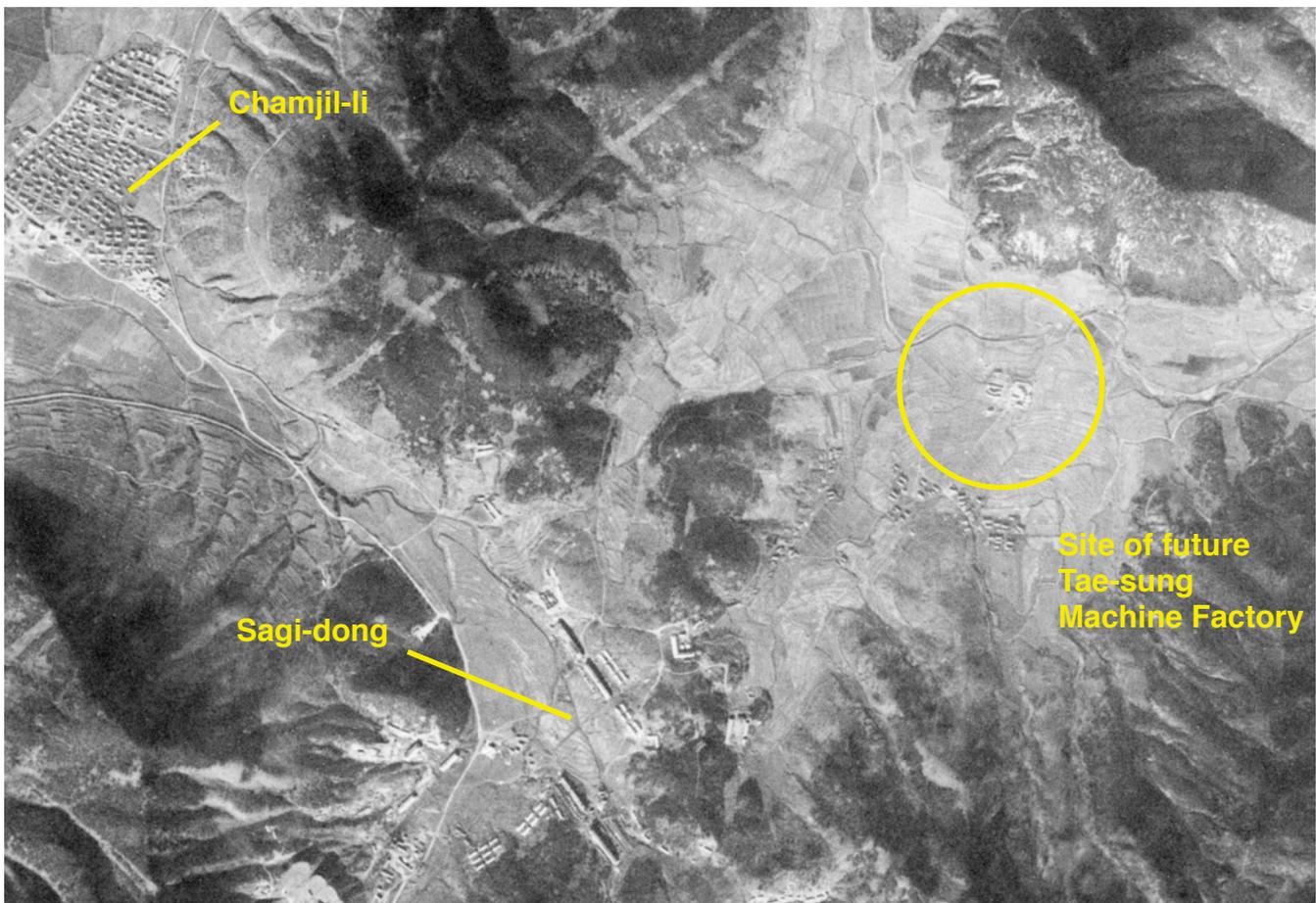
DPRK Ballistic Missile Infrastructure: The Tae-sung Machine Factory¹

By Joseph S. Bermudez Jr.

The Tae-sung Machine Factory (a.k.a., Chamjin Munitions Factory, Chamjin Missile Factory, Chamjil Missile Factory, Chamjin Munitions Factory, or Chamjin Ammunition

Plant) is the DPRK's primary manufacturer of ballistic missiles, conducting final assembly of components and sub-systems it has produced or from those supplied to it from other facilities and sources. While the primary responsibility for the development of the Taepodong and Unha systems lies with the No. 7 Factory of the Second Academy of Natural Sciences (SANS), the Tae-sung Machine Factory has been associated with the production phase of these systems.

The Taepo Dong-2 missile, which was made at Chamjin Munitions Factory, was moved to a missile test site in Musudan-ri, Hwadae County, North Hamgyo'ng Province, in early May after passing through the 'Korean People's Army [KPA] No. 7 Factory,' an interim test factory under the Academy of National Defense Science [SANS]. An intelligence official noted: 'While tracking the main body of a missile that disappeared from the Chamjin factory using the surveillance satellite network, the ROK and the United States identified the camouflaged missile



A declassified 1968 CORONA KH-4B satellite image of the Chamjil-li - Sagi-dong area. The Tae-sung Machine Factory will eventually be built in the location occupied by a small cluster of buildings in the right-center of the image (USGS).

being transported aboard a large trailer to the test site in Musudan-ri.' ...North Korea has five missile research and production facilities, including, in addition to Chamjin Munitions Factory...²

It is unclear what, if any, role the Tae-sung Machine Factory performs in the manufacture of the Musudan intermediate-range ballistic missile, KN-02 (SS-21) tactical missile or newer systems.

In November 2008 the director of the Tae-sung Machine Factory was reported to be Kim Su-gil.³

Background

The Tae-sung Machine Factory is one of the oldest known ballistic missile production facilities within the DPRK. It was constructed on the western outskirts of P'yŏngyang during the 1980s following the DPRK's acquisition of Scud B missiles from Egypt and decision to initiate the domestic production of that system.⁴

The site was apparently chosen because of its proximity to P'yŏngyang, the number of nearby coal mines that could be converted into underground facilities to support manufacturing and storage, and its proximity to the large

Chŏllima Steel Complex and Kŭmsong General Tractor Plant.

Since existing rocket engine test stands and ranges within the DPRK at the time were designed for rocket artillery development, they were far too small for testing the Scud B. Plans for the new Tae-sung Machine Factory included the construction of a vertical rocket engine test stand, as well as the development of a new test range along the northeast coast—that would eventually develop into the Musudan-ni Launch Facility.

The first Scud missiles were delivered by the Tae-sung Machine Factory during the mid- to late-1980s and apparently consisted largely of systems that were either refurbished missiles acquired from various sources in the Soviet Union, Warsaw Pact countries and elsewhere, or were assembled from components acquired from similar sources. As production continued into the 1990s, a greater percentage of components were either manufactured within the DPRK or acquired from more diverse sources around the world. This was especially true for the development of the later Scud C, D and ER variants. Scud production appears to have tapered off dramatically during the 1990s following



An February 8, 2011 overview of the Chamjil-li - Sagi-dong area showing the main components of the Tae-sung Machine Factory (DigitalGlobe's Analysis Center).

the introduction of the Nodong and its variants. At present, it appears that the manufacture of new Scud systems has ceased, although existing systems are probably refurbished, or modified, at the Tae-sung Machine Factory. Likewise, Nodong production has probably been dramatically reduced or terminated. Although, as with the Scud, existing Nodong systems are probably also being refurbished, or modified, at the factory.

In addition to producing Scud and Nodong missiles, the Tae-sung Machine Factory is believed to have also produced static training missiles and training aides for both systems—possibly from defective operational missiles. It should be noted that the various Scud and Nodong missiles seen on display during military parades are most likely these static training aides rather than operational missiles—making assessments of DPRK missile development and technology particularly challenging.

While the Tae-sung Machine Factory has also been associated with the manufacture of Taepodong and Unha systems, overall responsibility for these presently rests with the No. 7 Factory.⁵

Due to its central role in the missile-manufacturing infrastructure, the Tae-sung Machine Factory has been visited by a number of foreign military delegations to which the DPRK has sold, or would like to sell, ballistic missiles and related technologies. For example, according to numerous press reports Iranian, Libyan, Pakistani and Syrian officials visited the factory during the 1990s.⁶ Between 2001 to 2002 a Yemeni delegation is believed to have visited the factory. Finally, on November 28, 2008, factory director Kim Su-gil conducted a guided tour for a Myanmar military delegation led by General Thura Shwe Mann. Here the delegation "...observed in detail how missiles were produced in the factory."⁷ The trip report prepared by the delegation describes the Tae-sung Machine Factory.

It is located in a suburb in Pyongyang. It produces SCUD missiles. The component producing lines are kept in the underground tunnel. There are also above-ground factory where missile engines are assembled, where missile bodies are produced and assembled, and where complete missiles are assembled. In the factories that produce complete missiles, there are places that produce and assemble SCUD-D and SCUD-E. While SCUD-D can



An image of a Nodong on its construction trolley taken by the Myanmar military delegation during its November 28, 2008 visit to the Tae-sung Machine Factory. Early in the ballistic missile program the numbers painted on the missile's airframe had meaning, however, today they are there for display or deception purposes only, as is the camouflage scheme.

shoot a target up to 700 kilometers away, SCUD-E can shoot up to 1,500 kilometers, and SCUD-F can shoot up to 3,000 kilometers.⁸

Organization

The Tae-sung Machine Factory is located on the western outskirts of the capital Pyongyang, 2 km east of the town of Chamjil-li (a.k.a., Chamjin or Chamjin-ni) in Ch'öllima-guyök, Namp'o-si and 1.5 km south of the main P'yöngyang-Namp'o Highway. It is set in a narrow flat valley scattered with small farming villages and bounded by the hills of Ch'öngjin-san, Hyönam-san, Paegyang-san and Talman-san. The factory itself appears to be spread out around the town of Sagi-dong into several distinct areas—primary manufacturing, secondary manufacturing, housing, vertical engine test stand and underground facilities.

A 1,700 m long security fence encloses the primary manufacturing facility. It consists of approximately 36 buildings, including three large and three small construction halls. It is estimated that the facility has approximately 24,000 m² of manufacturing floor space.

A security checkpoint appears to be located approximately 600 m east of the main entrance to the facility on the main access road.

Four nearby structures are assessed to be support facilities due to their proximity to the primary manufacturing facility and their construction type. The first is located 150 m west-southwest of the main entrance, while the second is located approximately 350 m southwest of the main gate. Finally, 1.1 km east of the main gate, located on a small hill, are what appear to be two additional support facilities, possibly housing a security force or is otherwise related to the Talma-san underground facility (the entrance to which is located 350 m to the south).

Despite the economic crisis that has afflicted the DPRK for a number of years, construction activity at the Tae-sung Machine Factory has continued, with one building having been demolished and four new ones erected, including two small construction halls between 2002 and 2009. A new building was also constructed during 2009-2010 approximately 600 m east of the main entrance on the south side of the road across from the security checkpoint in 2009 to



A February 8, 2011 close-up of the main facility at the Tae-sung Machine Factory (DigitalGlobe's Analysis Center).



A close-up of the rocket engine test stand (bottom center) located approximately 500 m southwest of the main facility. The long shadow suggests that the tower has two, possibly three, platforms. The six buildings around the test stand are believed to be associated with it. The circular pad in the angle between the tower and closest support building is slightly obscured by snow and shadow (DigitalGlobe's Analysis Center).

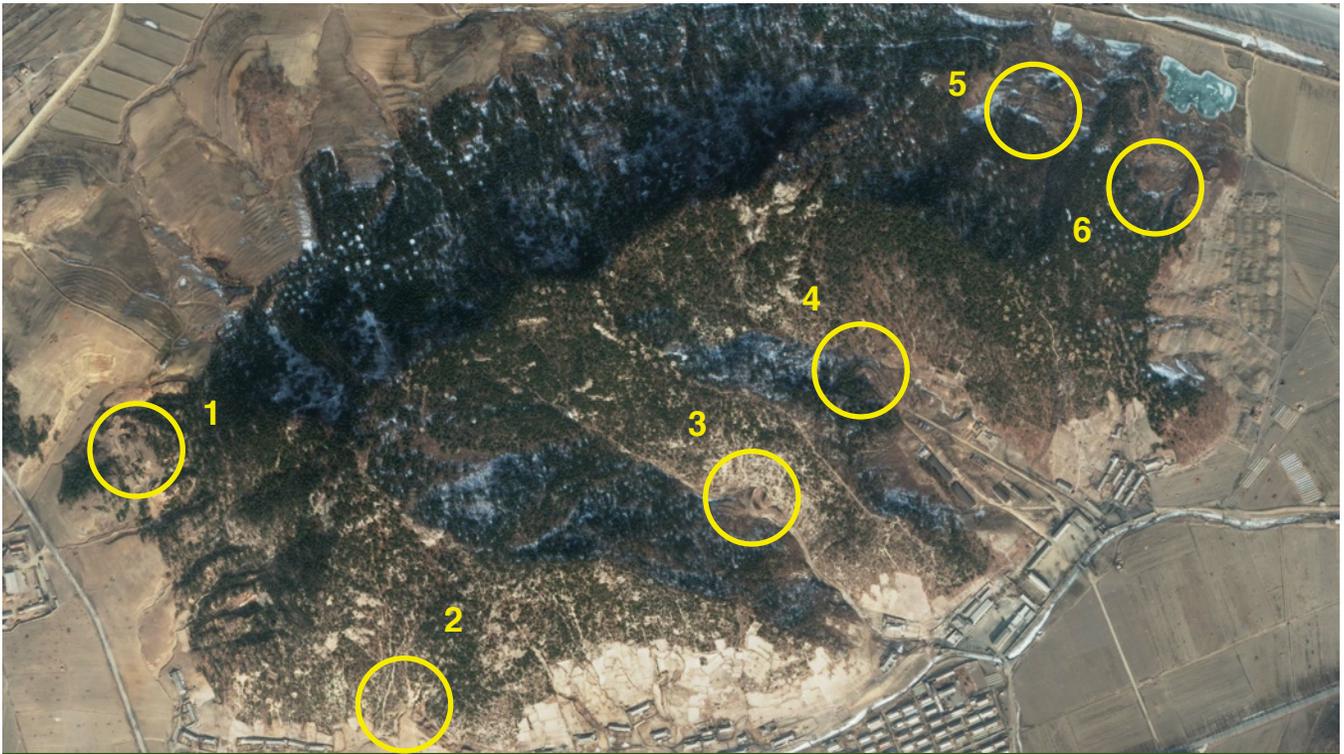
2010. Finally, during the mid-2000s preliminary work was carried out to extend a heavy-duty electrified rail branch line from the Kangsŏn Station on the main P'yŏngyang-Namp'o line to the village of Chamjil-li. This project, however, has made only minor progress since 2009 and is well short of reaching Chamjil-li.

What is believed to be a secondary manufacturing facility is located within the town of Sagi-dong. It consists of approximately 21 buildings, of which four are small construction halls with a total of approximately 9,700 m² of manufacturing floor space. Also located in Sagi-dong are approximately nine large housing units which are believed to be for the personnel working at the Tae-sung Machine Factory.

The vertical engine test stand is located approximately 500 m southwest of the main manufacturing facility and adjacent to Sagi-dong. While generally similar in design to

those at the Musudan-ni and Tongch'ang-dong Launch Facilities, it is noticeably smaller and more rudimentary. The rocket engine test stand consists of a 17 m circular pad connected to a 22 x 15 m rectangular pad, a 25 m tall vertical engine test stand and approximately six support buildings. It is capable of holding not only a Scud engine but also a complete missile in the vertical position. It can also hold a Nodong engine, although a complete Nodong missile may not be practical. Despite appearing to be well maintained, the test stand does not appear to have been frequently used during 2006 to 2011. This is likely due to the larger and more modern test facilities at the Musudan-ni Launch Facility (Tonghae Satellite Launching Ground) and Tongch'ang-dong Launch Facility (Yongsang-li Launch Facility).

Infrastructure dispersion, hardening and underground facilities occupy a central role in the protection of the



Located immediately north of the Tae-sung Machine Factory Paegyang-san has at least six entrances to underground facilities. The two identified here are the largest and are most likely associated with the Tae-sung Machine Factory (DigitalGlobe's Analysis Center).



A close-up of two of the Paegyang-san underground facilities entrances (DigitalGlobe's Analysis Center).



The entrance to the Talman-san UGF located approximately 900 m east of the Tae-sung Machine Factory (DigitalGlobe's Analysis Center).



A close-up of a section of Sagi-dong showing what are believed to be secondary production facilities for the Tae-sung Machine Factory (center) and housing units (top center) for workers (DigitalGlobe's Analysis Center).

DPRK's munitions production infrastructure. The majority of such facilities are hardened to some extent—most being built partially underground, having redundant critical components located underground, or having underground facilities prepared to accept the transfer of equipment in times of conflict. The 2008 trip report by the Myanmar military delegation noted above describes a distinct separation of responsibilities at the Tae-sung Machine Factory between the underground facilities and those above ground. Those facilities located underground are responsible for engine and missile component production, while those located above ground are responsible for the production of the airframe, engine assembly and final assembly. The above ground construction halls are also noted as having distinct production lines for Scud D and Nodong (identified in the report as “SCUD E”) missiles.⁹

While there are no obvious signs of hardening at the Tae-sung Machine Factory itself, there are numerous underground facilities located within the area. While many of these are for air defense and paramilitary units, at least two within Paegyong-san and Talman-san appear to have been constructed, or repurposed, to specifically support the missile factory. The first underground facility is located approximately 900 m southeast of the factory within Talman-san, while the second facility has entrances that are located approximately 900 m and 1,000 m to the northeast within Paegyong-san. Additional reports indicate that some of the former coal mines within Taebo-san, 3.5 km to the north of the factory, may have also been converted for use in relation to the Tae-sung Machine Factory.¹⁰

Gazetteer

Tae-sung Machine Factory

Main Factory	38 57 22.64 N	125 34 24.84 E
Secondary Factories	38 57 55.08 N	125 33 35.42 E
Support	38 57 31.64 N	125 34 45.23 E
Support	38 57 32.84 N	125 35 05.26 E
Engine test stand	38 57 04.46 N	125 34 12.84 E
Chamjil-li (Chamjin-ni)	38 57 31.19 N	125 32 59.01 E
Paegyong-san UGF 1	38 57 52.25 N	125 34 50.98 E
Paegyong-san UGF 2	38 57 48.86 N	125 35 45.99 E
Sagi-dong (housing area)	38 57 10.06 N	125 33 36.29 E
Talma-san UGF	38 57 21.32 N	125 35 08.60 E

Addendum: The Hydrometeorological Service

With reference to the “Hydrometeorological Service” article in the April 2011 issue of *KPA Journal*, KCNA reported that the DPRK was conducting both atmospheric and oceanographic monitoring for any contamination escaping from Japan's Fukushima Dai-ichi Nuclear Power Plant, which was

damaged following the Tōhoku earthquake and subsequent tsunami on 11 March 2011.¹¹

On 19 April KCNA reported that “...radioactivity monitoring stations across the country,” more specifically atmospheric monitoring stations at Wonsan and Chongjin, were detecting elevated levels of iodine-131 and cesium-137 isotopes in the atmosphere.

Additionally, it reported that oceanographic

...monitoring stations, set up in coastal areas including Chŏngjin, Hamhŭng, Wŏnsan and Haeju, are intensifying the survey into seawater, fish and sea plants since Japan discharged a large amount of contaminated water to the sea.

Given these descriptions and locations it is clear that KCNA was referring to the Hydrometeorological Service's atmospheric and oceanographic monitoring networks.

While there do not appear to have been any open source reports concerning the Nuclear-Chemical Defense Bureau's network of “Anti-Nuclear/Anti-Atomic Observation Posts” it is reasonable to assume that they may have also been involved in similar monitoring activities.

Addendum: KPAF in 1953

Reader Marcello has submitted a comment regarding the “KPAF in 1953” article in the March 2011 issue of *KPA Journal*

Also the KPAF was supplied with IL-10 (mostly early production examples as far as it can be seen from pictures), not IL-2, though contemporary US intelligence may have assumed such. A number of La-9 (one is still sitting in the Fatherland Liberation War Museum) and possibly La-11 was supplied after the start of the war.

Correction: MiG-29 in KPAF Service

The caption for the lower image on page 8 of the April 2011 issue (Vol. 2, No. 4) is incorrect. It should read

A KPAF propaganda video showing pilots running to their MiG-29s. This image, and those following, may have been taken along the southeast taxiway at Sunchŏn Airbase. This images shows what appears to be five MiG-29s.

A revised copy of the article has been uploaded to the website. Thanks to Keith Jacobs for pointing this out.

Publications of Interest

During the past several months I have received three new publications that I would like to share with readers of *KPA Journal*. In the interests of full disclosure the authors of the following three works are friends and colleagues.

The first is *Taken!, North Korea's Criminal Abduction of Citizens of Other Countries* (ISBN 978-0-9771111-3-8) pub-

lished by The Committee for Human Rights in North Korea. The report details not only the many cases of abduction, but also how abductees were treated in captivity, how the regime used them, the organizations which abducted them, and much more. With this report Chuck Downs, the executive director of CHRNK, has overseen an herculean task and succeeded admirably. I recommend the report to all readers. The report can be found at, <http://www.hrnk.org/>. While there readers should also take a look at the other publications produced by the CHRNK.

The next publication of interest is Richard L. Kiper's *Army Raiders, The Special Activities Group in Korea* (ISBN 978-1-60635-084-3). To quote the recommendation I had written for the book

With Army Raiders Richard Kiper provides a valuable contribution to our understanding of U.S. Army special operations during the Korean War. If the Korean War was the 'Forgotten War,' then the subject of the Far East Command's Raider Company is the forgotten chapter of the Forgotten War, as this unit is almost completely ignored by historians and writers. Using official records, declassified documents, and first-person accounts Kiper has produced a thoroughly researched, insightful, and well-written account of this extraordinary unit.

I stand behind this and strongly recommend the book to anyone interested in the Korean War or special operations.

The last publication is Andrew Salmon's *Scorched Earth, Black Snow* (ISBN 978-1-84513-619-2). With this book Andrew writes the prequel to his earlier book *To the Last Round: The Epic British Stand on the Imjin River, Korea, 1951* (ISBN 978-1-84513-533-1). Using the official unit records, captured documents, declassified documents and extensive first-person accounts Andrew provides a unique in-depth account of the British and Australian units during those first chaotic months of the Korean War. In reading several of the draft chapters for the book I was extremely pleased when Andrew's research helped me fill in a number of significant gaps in the history of several KPA units during their disorganized retreat north and attempts to slow the UNC advance. Both of Andrew's books are highly recommended.

Addendum: Ri Chun Hui

With reference to the "Ri Chun Hui" article in the October 2010 issue of *KPA Journal*, a more recent photograph has come to light of the DPRK's aging yet most indefatigable news personality.

Editor's Notes

Once again I would like to extend my sincere thanks to the *DigitalGlobe* Analysis Center for permission to use the sat-



Ri Chun Hui on April 15, 2011. (KCTV)

ellite imagery which appears in the article covering the Taesung Machine Factory. Additionally, I would like to thank Kim Ji Eun, Michael Madden, George Mellinger, Dwight Rider and Rebecca Weglarz for their assistance in the preparation of various aspects of this issue.

As the readers of *KPA Journal* are well aware, this issue is long delayed, being released in August instead of May. The reason for this is simple; I have had very little free time during the past five months as I have been engaged in a number of large projects concerning the DPRK, East Asia and the Middle East. I am hoping that during the next three-four weeks that I will succeed in publishing the June-August issues. I would like to thank longtime readers for the patience and support, and to inform new readers of my words in the first issue of *KPA Journal*,

While it is my hope that KPA Journal will eventually be a monthly publication, initially it will be distributed on an irregular basis until the time arrives when I can dedicate more energy to it.

I continue to solicit readers' thoughts and suggestions on how to both improve *KPA Journal* and to tailor it more closely to your needs and interests, as well as those of the organizations you represent. Please feel free to contact me with any and all recommendations.

Please feel free to share *KPA Journal* with your colleagues and friends. If you are a new reader and would like to be added to the *KPA Journal* mailing list please do so by sending me an email via the *Contact* feature on the website (www.kpajournal.com).

Thank you, one-and-all for your emails, encouragement and support.

—Joseph S. Bermudez Jr.

Endnotes

- ¹ This article is based upon an extensive report on the DPRK's ballistic missile infrastructure written by the author. A small section of this longer report was used in the following article Bermudez Jr., Joseph S. "Behind the Lines - North Korea's Ballistic Missile Units," *Jane's Intelligence Review*, July 2011, pp. 48-53, www.janes.com. Reader's are encouraged to look at this article as it details the organization and deployment of the KPA's ballistic missile units. This current article expands, updates and corrects both the original report and the *Jane's Intelligence Review* article. Interview data acquired by Joseph S. Bermudez Jr.
- ² "High-Ranking' ROK Official Comments on DPRK's Missile Research, Manufacture Facilities," *JoongAng Ilbo*, June 20, 2006.
- ³ Kim Su-gil greeted a Burmese military delegation led by Gen Shwe Mann during November 2008. http://burmatoday.net/regime/Shwe_Mann_NKorea_Trip_Photos.pdf, accessed on July 8, 2009; and "A Visit to North Korea's Arms Factories," *Irrawaddy*, June 26, 2009, http://www.irrawaddy.org/burma_north_korea.php?art_id=16161, accessed July 30, 2009.
- ⁴ Interview data acquired by Joseph S. Bermudez Jr.
- ⁵ The small numbers of reports that were published in 2006 describing this association with the Taepodong and Unha programs appear to have the same original source, see "High-Ranking' ROK Official Comments on DPRK's Missile Research, Manufacture Facilities," *JoongAng Ilbo*, June 20, 2006; and "Missile Launch Retaliation for US Assassination Attempts on Kim Jong Il," *Shukan Gendai*, July 8, 2006, pp. 34-37.
- ⁶ For example see, "Iran Attends DPRK Test," *Iran Brief*, No. 50, September 8, 1998; "Second Shahab Test Planned," *Iran Brief*, No. 55, February 8, 1998; Bermudez Jr., Joseph S., and Gerardi, Greg, "An Analysis of North Korean Ballistic Missile Testing," *Jane's Intelligence Review*, Volume 7, Number 4, April 1995, pp. 184-191; Gertz, Bill, "N. Korea as Nuclear Exporter?," *Washington Times*, June 8, 1994, p. A1; "North Korea Strengthens Ties With Syria, Iran and Pakistan - Foreign Minister Makes Official Tours," *North Korea News*, No. 645, August 24, 1992, pp. 5-6; Weymouth, Lally, "In Israel, a New View of Syria," *Washington Post*, July 6, 1992, p. A1; Gertz, Bill, "Iran-Bound Mystery Freighter Carried Parts for Missiles," *Washington Times*, July 16, 1992, p. A3; Gertz, Bill, "Iran-Syria Deal Revealed as Scuds Near Gulf Ports," *Washington Times*, March 10, 1992, p. A3; and Gertz, Bill, "Libya May Buy N. Korea Missiles," *Washington Times*, June 4, 1991, p. A4.
- ⁷ http://burmatoday.net/regime/Shwe_Mann_NKorea_Trip_Photos.pdf, accessed on July 8, 2009; and "A Visit to North Korea's Arms Factories," *Irrawaddy*, June 26, 2009, http://www.irrawaddy.org/burma_north_korea.php?art_id=16161, accessed July 30, 2009.
- ⁸ Ibid.
- ⁹ Ibid.
- ¹⁰ Interview data acquired by Joseph S. Bermudez Jr.
- ¹¹ "Radioactive Substances Ceaselessly Found," *KCNA*, April 19, 2011, <http://www.kcna.co.jp/item/2011/201104/news19/20110419-28ee.html>