

Jane's Intelligence Review

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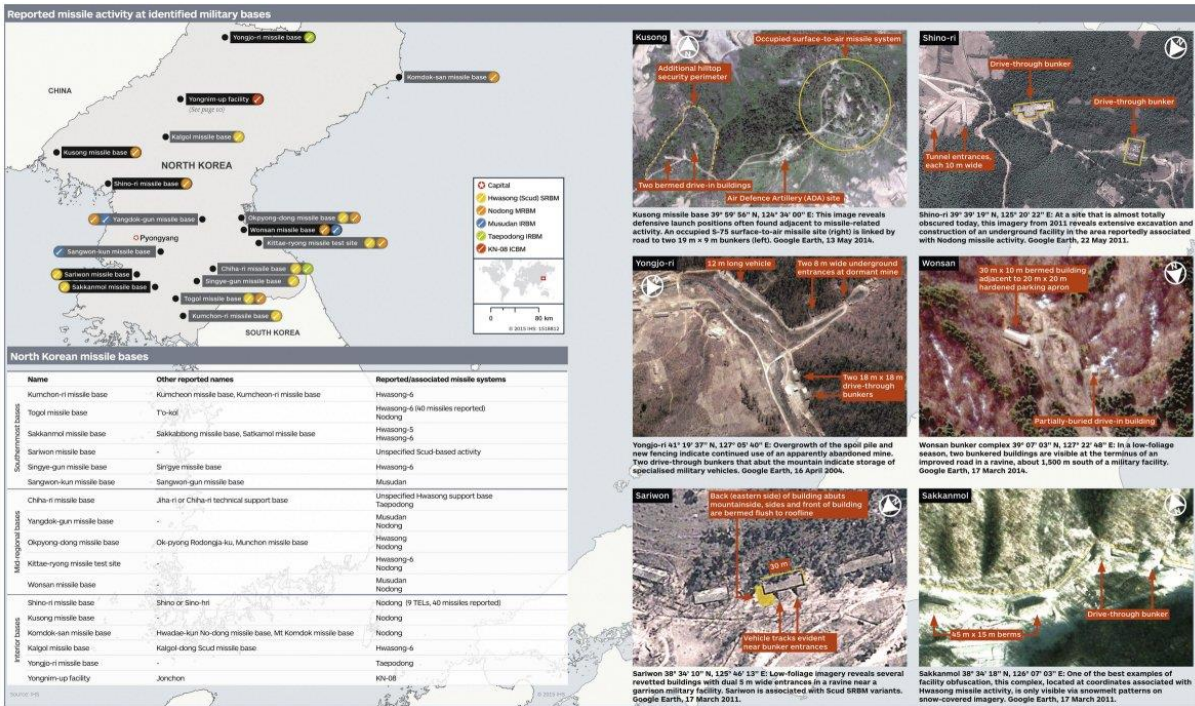
IHS Jane's examines North Korean missile bases

The ongoing development of North Korea's missile capability has the potential to bring into question the US's commitment to its regional allies. In a detailed survey of satellite imagery over North Korea, *Allison Puccioni* assesses the current state of the threat.

North Korea's ballistic missiles form an integral part of Pyongyang's strategic deterrent. The majority of its inventory is made up of shorter-range systems that span the country in three broad belts. Shorter-range systems are generally deployed closer to the Demilitarised Zone (DMZ) between North Korea and South Korea, with longer-range systems located in the strategic rear, closer to the border with China, to permit greater defence from South Korean and US forces. Although North Korea's missiles are too inaccurate for tactical use with conventional high-explosive warheads, they may still be suited to striking large targets such as cities in South Korea or Japan.

Although this configuration strongly suggests that Pyongyang still perceives its main threat to stem from the South, North Korea has steadily increased the range of its missiles. Given that it can already target Japan and South Korea, the strongest driver behind this programme is likely to be its desire to reach the continental United States. In April 2012, the country paraded six apparent road-mobile long-range missiles. These were later identified as KN-08 intercontinental ballistic missiles (ICBMs).

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Reported missile activity at identified military bases (© 2015 Google Earth/DigitalGlobe/IHS)

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Show of force



A KN-08 missile on a TEL at a military parade in Pyongyang on 15 April 2012. There is no evidence that the KN-08 is operational but North Korea continues to develop its ballistic missile programme. (PA)

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Public displays of the KN-08 showed a new missile, approximately 18 m in length, 2 m in diameter at its widest point, on top of a 16-wheeled transporter-erector-launcher (TEL). The 2013 edition of the US National Air and Space Intelligence Center's (NASIC's) *Ballistic and Cruise Missile Threat* attributed it a range of more than 5,500 kilometres (km) and described the North Korean name as the Hwasong-13. However, the true status of the missile has repeatedly been called into question. In January 2014, for example, the Asan Institute for Policy Studies, a prominent South Korean think-tank, published a report casting doubt on whether the KN-08 was capable of breaching the 5,500-km threshold that would allow it to be classed as an ICBM, noting, "A parade always is a show of force, intended to transmit a message. It is also a perfect setting for spreading disinformation."

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Strategic depth

North Korea's ballistic missile force is the largest missile force in the developing world. Pyongyang acquired the Scud-B missile from Egypt in the late 1970s/early 1980s, and reverse-engineered it to create the Hwasong-5. Further development led to the Hwasong-6 (Scud-C), and provided a capability to strike anywhere in South Korea. Other incremental improvements on the basic Scud are thought to include the Scud-D/ER and Scud-E. In addition, modified Soviet technology has enabled North Korea to develop longer-range systems such as the Musudan intermediate-range ballistic missile (IRBM), based on the R-27 (SS-N-6 'Srb'); the Nodong medium-range ballistic missile; the Taepodong 1 and 2 ICBMs; and the KN-08.

North Korea's missiles have traditionally been deployed across the country in three broad belts - two close to the DMZ and the other in the strategic rear. After interviewing defence and intelligence officials and vetting media reports relating to missile bases, in 2009 *IHS Jane's* concluded that North Korea had approximately 22-28 operating bases.

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Telltale signature

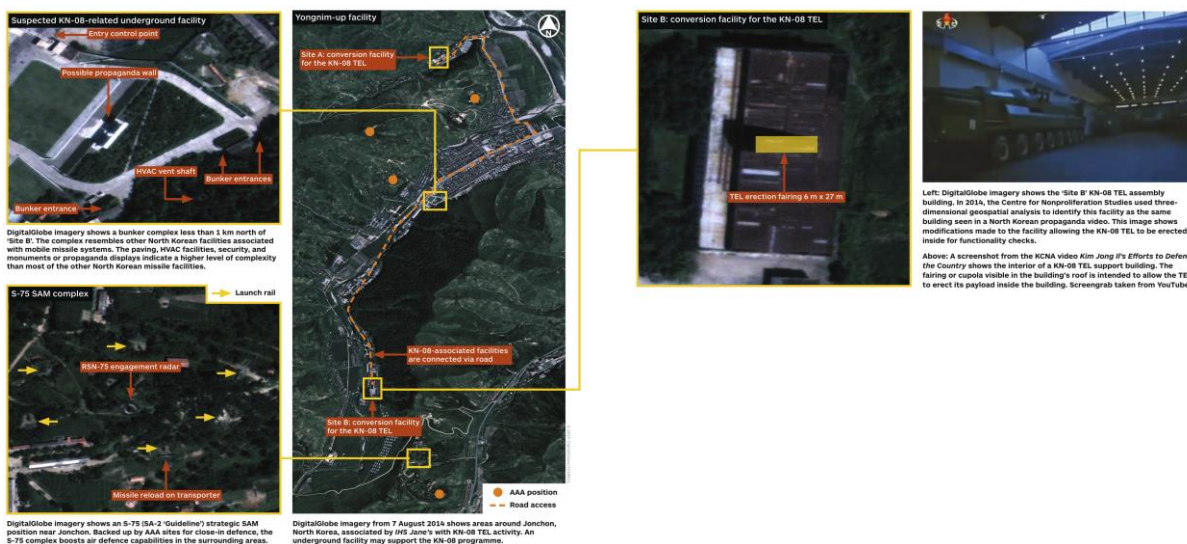
After comprehensively surveying satellite imagery over North Korean territory, *IHS Jane's* found bunkers indicative of mobile-missile activity at 16 bases throughout the country, and a pattern of visual signatures that indicate heavily concealed bunkered vehicle storage. Because bunkered facilities are difficult to build (especially in industrial resource-poor North Korea) and serve no purpose other than to store high-value vehicles or payloads with volatile material, these bunkers are the strongest indication of activities associated with mobile missiles.

North Korea employs ballistic missiles largely through mobile missile launchers, which are parked in highly concealed, fortified bunkers. When deployed, the TEL vehicles, carrying a missile, exit the bunkers to a cleared area, launch the missile, and quickly retreat back into the bunkers before their location can be determined. Once inside, they can reload and repeat the process.

These bases were built with concealment from outside forces and overhead surveillance in mind. Operational variations of this include various support systems and missile carriers exiting protective bunkers separately and converging at different pre-surveyed reload and launch sites in order to complicate

enemy targeting. In addition to providing focal points for missile operators, pre-sighted sites also aid missile accuracy and, with a known start point, speed up the preparations for the missile's inertial navigation system.

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Detailed imagery from the Yongnim-up (Jonchon) facility. (© 2015 DigitalGlobe/IHS)

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Bunker busting

In 2013, North Korea released a propaganda video entitled *Kim Jong Il's Efforts to Defend the Country*, in which Kim Jong-Il was shown touring a KN-08 TEL support building (meaning the video was filmed before his death in December 2011). In the video, Kim stood next to an apparent KN-08 in a building with an unusual roofline. Using this media footage, in 2014 the US-based James Martin Center for Nonproliferation Studies (CNS) determined that the location of this KN-08-related building was one of two sites, both located at the Yongnim-up facility at Jonchon in the centre of North Korea. The CNS located 'Site A' at 40° 38' 43.80" N, 126° 25' 57.66" E, and 'Site B' at 40° 36' 42.90" N, 126° 25' 34.49" E.

Both sites are drive-in facilities with a rooftop superstructure, or cupola, built into each roof to allow a missile TEL to be erected within. The interiors show a marked lack of missile or propellant handling features; combined with previous reporting indicating that the locations supported TEL development for the Nodong missile system, this leads *IHS Jane's* to assess that the two locations serve as fabrication plants for converting imported Chinese WS51200-series chassis into TELs for the KN-08. Although both buildings look like the interior shown in the video, Site B was determined to be the likelier match and this location is now widely accepted by the open-source intelligence community as supporting the KN-08 system.

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Digging deeper

Further to the work conducted by the CNS, *IHS Jane's* has identified a sophisticated underground complex connected by a dedicated road to the KN-08-associated building Site B. This complex has imagery signatures similar to other mobile missile facilities in North Korea: it is built against a mountain with excavated entrances, counter-surveillance measures have been taken to obfuscate the location and entrances, and it is connected by a road to nearby military facilities.

This bunker complex appeared to be under excavation and construction in 2004, and at least partially complete by 2011. The site itself is secured behind a gate with a checkpoint facility. Beyond the gate, two 8 m-wide paved ramps lead towards the mountain and into three apparent entrances into the facility.

A small ventilation stack beyond the entrances suggests that the bunkers are connected. Furthermore, the ventilation stack suggests long-duration occupation or a requirement for controlled temperature or humidity. Such a feature could support the storage of missile components or combustible fuels. This bunker complex is connected by a hardened, dedicated road to a building identified by the CNS as being from the Kim Jong-Il video.

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Strategic goal

Although North Korea has demonstrated its nuclear ambitions by withdrawing from the nuclear Non-Proliferation Treaty (NPT) and by conducting three nuclear tests, it remains unlikely that it has successfully developed the three components required for a strike capability. These are a reliable long-range missile, a nuclear weapon small enough to be mounted on the missile, and a workable exoatmospheric re-entry vehicle.

The KN-08 is the only known North Korean road-mobile ICBM to date. In 2013 and 2014, *IHS Jane's* identified KN-08 first-stage motors undergoing testing at a rocket test stand adjacent to Sohae. However, the system has yet to be observed undergoing a true full-scale flight test, and therefore cannot conclusively be classified as operational. The 2013 NASIC report attributes a range of at least 5,500 km to the KN-08, but gives little other information. Although a range of 5,500 km would mean the missile was capable of hitting Alaska, the lack of an upper limit leaves open the potential for strikes in the rest of the US mainland.

In April 2013, the US Defense Intelligence Agency (DIA) concluded with "moderate confidence" that North Korea might be capable of developing a nuclear weapon small enough to fit on a ballistic missile, although it also cautioned that the reliability of the warhead would be "low".

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Outlook

The bulk of North Korea's missile inventory is distributed throughout the country and is capable of striking regional targets, not just in South Korea. Despite this ability to strike targets within the region, North Korea's freedom of action is constrained by the continued presence of the US in Asia and its security assurances to regional allies. Although ICBMs alone are unlikely to effect change, combining North Korea's

nuclear programme with its apparent long-range missile ambitions has the potential to disrupt the strategic calculus of the US and undermine the credibility of US assurances in the region.

Building on the identification of the KN-08 facilities by the CNS, *IHS Jane's* assesses that the newly identified bunker system is a potential support location for North Korea's nascent ICBM programme. If confirmed, this would suggest that, despite ongoing doubts as to its status, the KN-08 system is being prepared for integration into the North Korean armed forces concurrently with its component testing programmes, allowing for swifter service adoption following test completion.

Pyongyang is yet to demonstrate all the requisites for a nuclear strike, such as a miniaturised warhead design, a successful long-range missile, and a working re-entry vehicle. Given the absence of these conditions, the existence of the KN-08 should not be conflated with a nuclear strike capability. However, as General Curtis Scaparrotti, commander of US Forces Korea, said in October 2014, "I don't think as a commander we can afford the luxury of believing perhaps they haven't gotten there."



A television news broadcast showing a North Korean missile launch, at Seoul train station, South Korea, on 26 June 2014. All of South Korea is within range of North Korean ballistic missiles. (PA)

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