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# Analysis of North Korea's 'Hwasong-18' Solid-Fuel ICBM Test Launch

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On December 19, North Korea's Rodong Sinmun made a report about the test launch of a 'Hwasong-18' solid-fuel intercontinental ballistic missile (ICBM) that took place on the previous day. This article analyzes the launch trends, patterns, command structure, technological characteristics, and strategic intentions of the ICBM launch.

### **Emphasis on the Transition from Launching Drill to Test Launch: Intention to Boast Response Readiness and Nuclear Second-strike Capabilities**

North Korea described the recent launch of 'Hwasong-18' as a "test launch." Among a total of three 'Hwasong-18' launches in 2023, this terminology change compared to the two previous launches, which were referred to as "experimental launches," seems to intentionally highlight a shift from launches having 'experimental' purposes to having 'training' purposes. If North Korea's assertion is true, this terminology change may indicate a deliberate political effort to reveal a preparatory stage aimed at verifying the operational capability of the weapon system, a stage between experimentation and actual deployment. Therefore, the use of the term 'test launch'

appears to carry strong political intentions. It aims to publicize the technological achievement and stability of the 'Hwasong-18' model. This could be viewed as an intentional effort to reveal its swift counteraction capabilities and nuclear 'second-strike capabilities' in response to the heightened surveillance, reconnaissance, and information-sharing among the ROK, the US, and Japan.

### ICBM Launch Trends and Patterns, a Dramatic Reduction in Transition Time from Test Launch to Launch Training

Since North Korea's first launch of the 'Hwasong-14' ICBM on July 4, 2017, up to the recent 'Hwasong-18,' a total of 14 ICBM launches have been conducted using four different models, both publicly and covertly. The success rate is 71.5%, with 10 successful launches and 4 failures. North Korea did not report about the 4 presumed failures. Of the 10 launches publicly reported, 7 were launching drills, and 3 were test launches. All launches referred to as 'test launches' were conducted in 2023, using three models: 'Hwasong-15,' 'Hwasong-17,' and 'Hwasong-18.' The common feature of the three test launch reports is the emphasis on 'mobility,' 'military readiness,' and 'war readiness.' Ultimately, the use of the words 'test launch' appears to be intentional, shifting the focus from the functional experimentation phase to highlighting the operational mobility of the missile systems. The Central Military Commission's decisions and additional test launches are anticipated in 2024 for the initial production, strategic development, and enhanced military capabilities for 'Hwasong-18.'

#### <History of North Korea's ICBM Launches>

Model	Experiment	Training	Transition Period from Experimentation to Training
'Hwasong-14' Liquid-fuel	July 4, 2017 July 28, 2017		
'Hwasong-15' Liquid-fuel	November 29, 2017	February 18, 2023	6 Years and 1 Month
'Hwasong-17' Liquid-fuel	March 16, 2022 (Failure)	March 16, 2023	1 Year

	March 24, 2022 May 4, 2022 (Failure) May 25, 2022 (Failure) November 3, 2022 (Failure) November 18, 2022		
'Hwasong-18' Liquid-fuel	April 13, 2023 July 12, 2023	December 18, 2023	8 Months

The transition period from the first experimentation to training for the three models that switched from experimentation to training was approximately 6 years and 1 month for 'Hwasong-15,' 1 year and 9 months for 'Hwasong-17,' and about 8 months for 'Hwasong-18.' The transition period from experimentation to training is becoming shorter, and the success rate of the launches has increased in the past year. Based on previous experiences of failure, the pace of ICBM development is accelerating. However, it is still doubtful whether they secured technological completeness and operational stability to shift to the training phase, where they prepare for actual operation with just one to three experimentations. Therefore, there is a possibility that continuous efforts will be made to make upgraded versions of the modified model of solid-fuel ICBM, increasing warhead weight and thrust based on 'Hwasong-18' in the future.

### Command Structure, the Central Military Commission's Order First, Kim, Jong-un's Approval After

One of the common features highlighted in the reports on the five ICBM launches conducted in 2023 is the mention of the launch command structure. The reports consistently describe a process that starts with an 'order' from the Central Military Commission, followed by on-site 'launch approval' from Kim, Jong-un, and then the 'issuance of the launch order' by the Head of the Missile General Bureau, leading to

the actual 'launch.' This marks a change from the previous practice, which briefly explained the command delivery by Supreme Commander Kim, Jong-un. In 2023, there is a shift towards detailing the specific procedure and system that begins with an order from the Central Military Commission, on-site approval from Kim, Jong-un, and the issuance of the launch order leading to the launch. The background for this change could be explained as follows: Firstly, during the development stages before weapon system completion and strategic development, it could be interpreted as taking the form of an 'order' from the Central Military Commission, which oversees the entire military-industrial complex and national defense projects under the Party's leadership. Secondly, the 'order' from the Central Military Commission is, in practice, carried out through the signing of the order by Kim, Jong-un, who serves as the Chairman of the Central Military Commission. In this sense, it can be perceived that Kim, Jong-un is effectively making decisions, issuing orders, and granting on-site launch approval. Thirdly, the emphasis on the form and procedure of orders being made by the Central Military Commission suggests an intention to demonstrate a certain procedural and systematic approach in the development, control, and operation of nuclear weapons.

### **Emphasis on the Rapidity and Mobility of Launches, Possibility of Stabilizing and Expanding the Application of Cold Launch Method**

When comparing the first three launches of the 'Hwasong-18' model, changes in the launch site and the canister's warhead cover are evident. The selection of locations and routes appears to align with the notion of 'training' aimed at confirming mobility. Additionally, in the past, the warhead cover of the canister, which serves as the launch tube and wraps around the missile during movement to prevent exposure, used to fall to the ground when opened. However, this time, it has changed to a method where it gets detached while still being attached to the vehicle. This can be seen as a minor change contributing to enhanced speed. Despite such changes, North Korea may be under significant pressure, as South Korea detected preliminary signs of the 'Hwasong-18' launch, and the secrecy of the launch was constrained by the meticulous reconnaissance activities of the US.

The combination of a transporter erector launcher (TEL), solid fuel, and cold launch

maximized the effectiveness of the operational deployment of ICBMs. By securing constant stability in launching and the ability for long-range flight through the use of the cold launch method in all three launches, the likelihood of applying to other weapon systems in the future increased. Notably, since the cold launch method of the polar-series solid-fuel SLBMs (Submarine-Launched Ballistic Missiles) was applied to the ICBM for stabilization, the possibility of extending the range of the forthcoming development of SLBMs is also a noteworthy aspect.

### **The Possibility of Accelerated Replacement in Solid-Fuel Medium to Long-Range Missile Lineup**

North Korea has already developed or is in the process of developing short-distance solid-fuel tactical nuclear missiles, SLBMs, hypersonic missiles, and other types. In addition to these, it appears that the solid fuelization of the medium to long-range ballistic missile (referred to by North Korea as "strategic nuclear weapons") lineup will be accelerated. This is particularly expected to be applied immediately to the development of new medium-range ballistic missiles. North Korea conducted an experiment on solid-fuel engines for new medium-range ballistic missiles on November 14. Currently, North Korea's medium-range ballistic missiles consist of only two types: the existing liquid-fuel 'Hwasong-12' and the outdated 'Hwasong-10 (Musudan).'<sup>1</sup> The purpose of medium-range ballistic missiles for North Korea is to deter the US Guam base, where strategic bombers are launched. In April, during the initial launch of the 'Hwasong-18,' North Korea claimed that it would significantly restructure the components of its "strategic deterrence" and transform the practicality of an aggressive military strategy. By solidifying the medium to long-range missile lineup with solid fuel, North Korea may express this as a significant "transformation" in its military strategy for deterring the US, emphasizing the term "military strategy" in the context of deterrence.

## **Possibility of North Korean Pursuit of Airborne Early Warning System for Swift Operation of ICBMs**

To establish a rapid response capability through the ICBM weapon system, an early warning system is essential. This year, there have been several indications in North Korea related to early warning system capabilities. Firstly, reconnaissance satellites play a crucial role. If there is technological support from Russia, there is a potential contribution to limited but early detection capabilities to identify preliminary signs. Secondly, there are movements indicating efforts to consistently secure capabilities for airborne warning and control systems (AWACS) or airborne early warning (AEW) using aircraft. Analysis suggests recent modifications and installations of rotating radar domes on North Korea's elite 'Ilyushin Il-76' cargo aircraft, indicating efforts to secure airborne early warning capabilities. The purposes could include tracking missile experiments, directing combat aircraft, enhancing air defense capabilities through integration with existing radar bases, and more. Thirdly, there is the use of high-altitude unmanned reconnaissance aircraft. While the capabilities of the unveiled 'Saetbyeol-4' in July have not been confirmed, if developed, it could enhance reconnaissance capabilities. A series of movements related to the development of reconnaissance and detection means outlined in the 5-year defense development plan seems to be aimed at improving missile operations, including ICBMs.

## **The Limitations of Demonstrative Diversification for Strong and Assertive Responses**

In the recent missile launch, North Korea described the 'Hwasong-18' as "a refined offensive capability and an absolute nuclear deterrent." During the initial launch on April 13, it was characterized as "a prospective key component of the Republic's strategic capabilities." Deterrence becomes effective when the adversary acknowledges the capability and genuinely perceives the threat. Therefore, in response to low technical assessments, North Korea may prioritize stabilizing the solid-fuel ICBM model to enhance its deterrent capability against the US. By solidifying the strategic nuclear weapons with solid fuel, North Korea aims to secure rapidity,

potentially leading to an improved retaliatory and deterrent capability. This move may open up the possibility of a more assertive strategic stance beyond defensive or passive deterrence levels. The intention could be seen as ultimately driving a shift in the US' attitude.

North Korea is estimated to possess and develop over 30 types of missiles with varying ranges. However, when excluding those that are outdated, undergoing improvement, or in the development phase, the number of practically operational missiles seems limited. While North Korea's intention to pursue the development of missiles with diverse ranges for deterrence against the US is clear, the development, production, and operational deployment of a variety of missiles pose challenges in terms of cost and tactical efficiency.

### **Considering Realistic Risks in the Event of a Launch at Normal Angle, Power Adjustment, or Indirect Verification through Medium-Range Missiles**

To assess the technical capabilities of an ICBM, it is necessary to conduct experimental launches at a normal angle. When launched at a normal angle, there are broadly four possible directions: (1) Northward trajectory passing over Hawaii, with potential impact near the US West Coast, (2) Southward trajectory passing over Hawaii, with potential impact near the US West Coast, (3) Direction toward South America, and (4) Overflight of Australia and impact in front of the Antarctic continent. For trajectories (1) and (2), the activation of the US Ground-Based Interceptor (GBI) missiles in Alaska could create extreme military tension between North Korea and the US, centered around the interception of the missile. If interception is successful, it may undermine the effectiveness of North Korea's ICBM, and in the event of interception failure, there is a high likelihood of US military retaliatory measures against a North Korean impact near the US West Coast. In the case of a launch toward South America, it may be challenging to observe the impact, and conflicts with non-hostile South American countries could arise, potentially leading to significant international and US backlash. Similarly, launching towards the Antarctic region, passing over Australian airspace, may face opposition from Australia and the

international community. Considering the strengthened security cooperation among the US, Australia, and Japan, there is a high likelihood of military pressure and retaliation against North Korea. Therefore, in future launches, there is a possibility of adjusting the power to launch at a higher angle than a normal trajectory, avoiding Hawaii, or opting for an indirect technological verification through the launch of medium-range ballistic missiles.

### **Possibility of Focusing on Demonstrating Deterrence Against the US Through Additional ICBM Launches Before the US Presidential Election**

North Korea has claimed that the recent launch serves as a 'strong warning response' to the second meeting of the US-ROK Nuclear Consultative Group (NCG), joint retaliatory nuclear strike exercise plans between the US and South Korea, and the entry of the attack submarine 'USS Missouri' into Korean waters. Kim, Jong-un particularly emphasized that "this launch is a clear demonstration of North Korea's swift readiness and decisive choices when Washington makes a misguided decision against them." While an immediate warning to the Biden administration, this message also carries implications for the next US administration. North Korea is likely to present specific defense-strengthening tasks based on the pretext of the current situation, keeping in mind the upcoming US presidential election. This is aimed at firmly imprinting the notion of 'irreversible possession of nuclear weapons' and 'denuclearization is not an option' in the lead-up to the election. A noteworthy aspect in this year's ICBM launch report is the use of the term "the US" instead of the previously employed 'US imperialism' when addressing the US, as seen during past aggressive posturing. This subtle change could be interpreted as a consideration for future negotiations between nuclear states, indicating a potential willingness to engage in diplomatic discussions as a nuclear state.

North Korea decorated the finale of the Army Day parade on February 8, 2023, with a display of four 'Hwasong-18' missiles. With three launches conducted so far, it is highly likely that North Korea currently possesses at least one remaining missile or has the potential for additional production, making it possible for them to conduct further experiments under the pretext of "training" in the future. Given the stabilization



of the flight itself in the first three launches, there appears to be a possibility of additional launches for political messaging purposes before the 2024 US presidential election. This could be driven by an intention to highlight the failure of the Biden administration's North Korea policy and to exert a certain influence on the election. Additionally, there is a possibility of other strategic moves, such as (1) experiments with solid-fuel medium-range missiles targeting the Guam region, (2) additional launches of military reconnaissance satellites, (3) submarine modifications and SLBM launches, (4) experiments with sea-launched cruise missiles (SLCM), (5) development experiments of ground-to-surface and ground-to-air missiles, and (6) displays of unmanned reconnaissance aircraft and attack aircraft. ©KINU 2023

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