

Open Nuclear Network's

**NUCLEARIZATION OF
THE KPAN: EXPANSION
OF THE DPRK'S SEA-
BASED NUCLEAR
CAPABILITIES
STRATEGIC DELIVERY VEHICLE
DEVELOPMENT SERIES**

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NUCLEARIZATION OF THE KPAN: EXPANSION OF THE DPRK'S SEA- BASED NUCLEAR CAPABILITIES

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21 September 2023

KEY TAKEAWAYS

- The conversion of an old submarine into an underwater nuclear weapon launch platform likely represents a relatively fast and economical way to establish a sea-based nuclear deterrence.
- If the DPRK converts its entire Type 033 fleet in the next ten years, the DPRK could have a submarine-based arsenal consisting of 20-200 nuclear weapons.
- The DPRK leader ordered the defence industry to increase efforts in building nuclear-powered submarines and to build various kinds of modern warships needed for coastal defence, maritime patrol duty and offensive operations that are powered by modern naval engines. The timeline for these projects is unknown.
- The nuclearization of the Korean People's Army (KPA) Navy (KPAN) is in line with (1) the DPRK's long-time effort to increase the number of nuclear weapons and diversify their means of delivery and (2) the development trajectory of a KPA that is increasingly centred around nuclear weapons.
- Arming the KPA Ground Force and the KPAN with nuclear weapons raises the possibility that the DPRK could eventually pursue a nuclear triad. However, there is no evidence the DPRK is currently pursuing this capability.

CONTENTS

I.	THE NO. 841 SUBMARINE	1
II.	FUTURE NUCLEARIZATION PLANS	2
	A. Conversion of Type 033 Submarines.....	2
	B. Nuclear-Powered Submarines	2
	C. Modern Warships.....	2
III.	FURTHER IMPLICATIONS	3
IV.	APPENDIX: OVERVIEW OF THE NO. 841 SUBMARINE CONVERSION PROJECT	4
	ENDNOTES.....	7

I. THE NO. 841 SUBMARINE

On 6 September 2023, the DPRK launched its first “tactical nuclear attack submarine” - the “No. 841 Hero Kim Kun Ok” - at Pongdae Submarine Factory in Sinpo, South Hamgyong province. The new submarine, rebuilt on the basis of a Chinese Type 033 diesel submarine, has a total of ten vertical missile launch tubes that can potentially accommodate both nuclear-armed short-range ballistic missiles and nuclear-armed land-attack cruise missiles.

The KPAN has approximately 20 Chinese Type 033 medium-size submarines,¹ which are the largest submarines operated by the KPAN to date. After over 40 years since their introduction into the KPAN, these submarines are unlikely to still be capable of searching and destroying enemy vessels in a high-threat environment. In previous naval exercises, the Type 033 submarines were seen firing torpedoes at fixed targets while being surfaced (Figure 1). Except for theatrical effects, such practices have little practical value.

Converting these obsolete submarines into nuclear weapon launch platforms could represent a relatively fast and economical way to establish a sea-based nuclear deterrence.³ In his speech given at the launch ceremony, Kim Jong Un described the conversion as a “low-cost, hi-tech” approach that ensures “maximum efficiency in the light of the defense and economic strategy.”⁴

This shortcut also has drawbacks. The No. 841 submarine is likely longer than the original design (see Appendix); coupled with a new, large missile bay, the displacement of the submarine has increased. Commenting on the launch of the No. 841 submarine, an ROK Joint Chiefs of Staff official stated that “the submarine is not in a shape that can be operated normally.”⁵ However, it is likely that the KPAN would adopt a more tolerant acceptance level. As a nuclear weapon launch platform, the No. 841 may be certified operational as long as it can perform basic manoeuvres and launch missiles in waters relatively well-guarded by other KPA assets.⁶



Figure 1: A Type 033 submarine fires torpedoes at an island while surfaced.
Image: Rodong Sinmun²

II. FUTURE NUCLEARIZATION PLANS

The launch of the No. 841 submarine is the first step in a series of developments pledged by Kim Jong Un. In his speech given at the launch ceremony of the No. 841 submarine, Kim emphasized three major steps for the future:⁷

- To rapidly convert all Type 033 submarines into “tactical nuclear attack submarines” with the No. 841 being the “standard type”;
- To increase efforts in building nuclear-powered submarines; and
- To build various kinds of modern warships needed for coastal defence, maritime patrol duty and offensive operations that are powered by modern naval engines.

As Kim Jong Un has stated previously that the KPAN should become “a component of the state nuclear deterrence carrying out the strategic duty”,⁸ there is little doubt that follow-on submarines are also intended to be nuclear-capable. Judging by a corvette inspected by Kim Jong Un in August 2023,⁹ some of the future KPAN surface combatants could also be nuclear-capable.

A. Conversion of Type 033 Submarines

Normally, a new submarine is expected to undertake harbour and sea acceptance tests before it is delivered to the user. Such tests could take many months, if not longer.¹⁰ Though the No. 841 submarine likely inherited a wide range of subsystems from the original Type 033 hull, it may still undergo such acceptance tests due to the major modifications made and the increase in tonnage (see Appendix). Thus, conversion of the remaining Type 033 submarines may not be executed until the No. 841 successfully completes all key tests, including missile testfires. However, considering the urgency expressed during Kim Jong Un’s speech to convert all existing Type 033 submarines “at one go in the true sense of the word”,¹¹ the testing phase of the No. 841 is likely to be put on a fast track.

During his speech, Kim Jong Un called for the KPAN to “usher into a new era” in the “next five or ten years.”¹² This remark might reflect Kim’s expectation for the timeline of the conversion project. If the DPRK converts two submarines each year, the entire Type 033 fleet (consisting of about 20 hulls) could become nuclear weapon launch platforms in the next ten years. Assuming that each converted submarine accommodates between one and ten nuclear-armed missiles, a full fleet conversion could involve an arsenal of 20-200 nuclear weapons.

However, it remains unclear if a few Type 033 hulls would be kept back as donors for the “tactical nuclear attack submarine” fleet. A conversion of all existing hulls would indicate that the DPRK is able to manufacture or procure replacement parts for all subsystems of the Type 033 submarine.

B. Nuclear-Powered Submarines

The DPRK is not known to operate any pressurised water reactors, a type of nuclear reactor that is widely used for naval propulsion systems. The timeline for accomplishing this task is unclear.¹³

C. Modern Warships

The modern naval engines for surface combatants referred to by Kim Jong Un most likely involve gas turbine engines,¹⁴ which are sophisticated machines required to work reliably for a long duration.¹⁵ The timeline for accomplishing this also remains unknown.

On 21 August 2023, the Korean Central News Agency (KCNA) reported Kim Jong Un’s inspection of a corvette named “Patrol Ship No. 661.” During the inspection, the corvette reportedly launched at least one “strategic cruise missile,” which is presumed to be nuclear-capable.¹⁶ Thus, it is plausible that some new warships to be built in the future will also serve as nuclear weapon launch platforms.

III. FURTHER IMPLICATIONS

The nuclearization of the KPAN and the deployment of nuclear-capable missiles to KPA Ground Force units indicate that the KPA continues to advance its nuclear war-fighting posture by introducing nuclear weapons to previously conventionally-armed military branches. This development is also in line with (1) the DPRK's long-time effort to increase the number of nuclear weapons and diversify their means of delivery and (2) the development trajectory of a KPA that is increasingly centred around nuclear weapons.

Arming the KPA Ground Force and the KPAN with nuclear weapons raises the possibility that the DPRK could eventually pursue a nuclear triad. Light bombers of the KPA Air and Anti-Air Force could in theory have the capacity to carry and launch land-attack cruise missiles or even light-weight aeroballistic missiles.¹⁷ However, there is no evidence the DPRK is currently pursuing this capability.

IV. APPENDIX: OVERVIEW OF THE NO. 841 SUBMARINE CONVERSION PROJECT

The existence of a relatively large¹⁸ ballistic missile submarine has been known to external observers since July 2019, when DPRK leader Kim Jong Un inspected a Type 033 submarine that was apparently undergoing conversion into a ballistic missile submarine at the Pongdae Submarine Factory. Since then, this submarine has not

been seen until its launch ceremony on 6 September 2023,²² when it reappeared as the No. 841 submarine with several new features, including:

- Rounded bow (Figure 2);
- Diving planes moved from the bow to the sail (Figure 3); and
- Modification of the sail and missile bay (Figure 3).



Figure 2. The submarine under conversion in July 2019 (upper left) with the original bow structure of the Type 033 class (upper right). The No. 841 launched in September 2023 with a rounded bow (bottom). It remains unclear if the No. 841 has kept the six bow torpedo tubes of the Type 033 class.

Images: KCNA (upper left,¹⁹ bottom²⁰), ce.cn (upper right²¹)

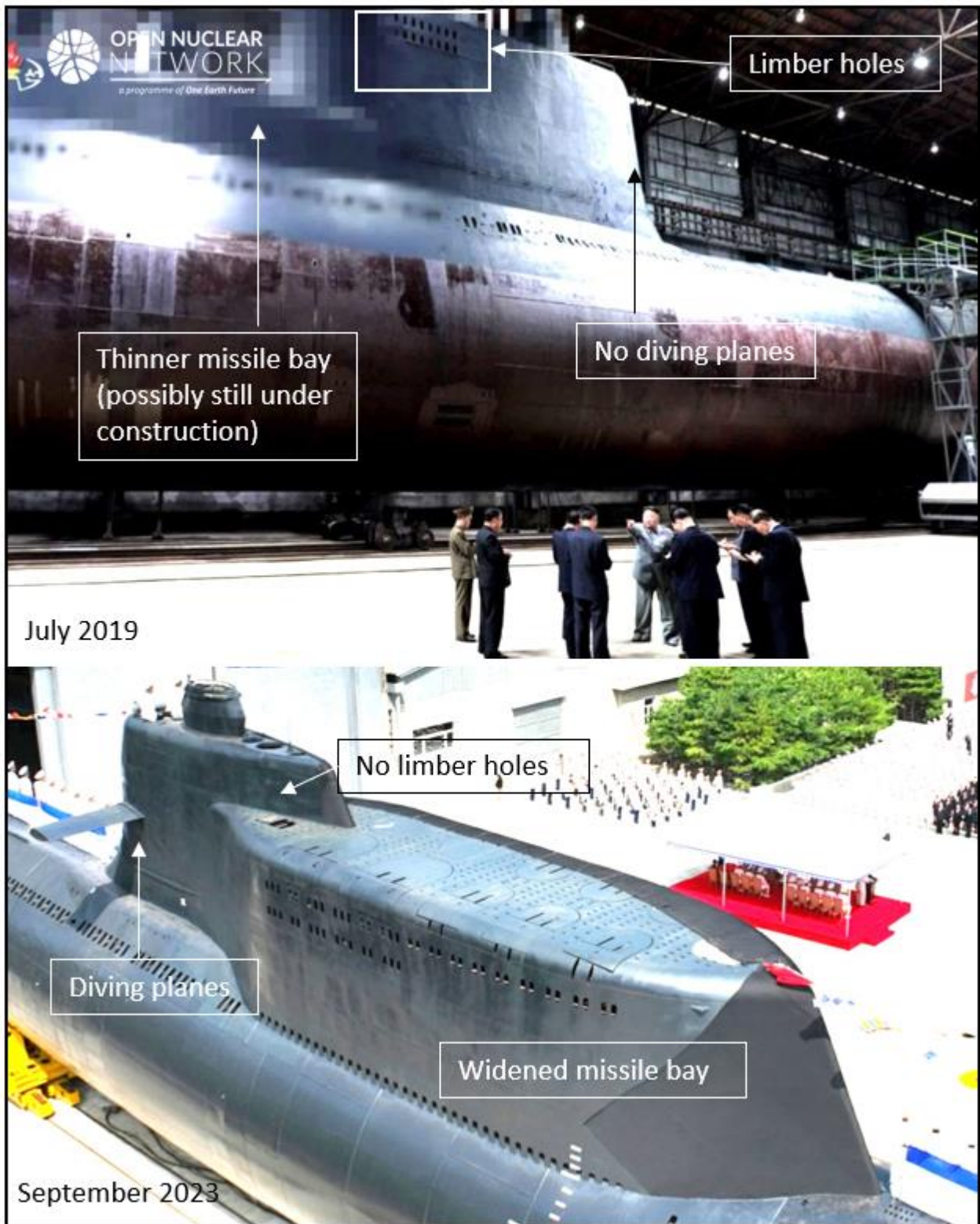


Figure 3. Differences between the sail and missile bay of the submarine under conversion in July 2019 (top) and the No. 841 launched in September 2023 (bottom). The missile bay has four larger vertical launch tubes and six smaller ones.

Images: Korean Central Television (KCTV, top²³), KCNA (bottom²⁴)

These new features were likely introduced to follow Kim's instructions. In a speech given at the launch ceremony, Kim Jong Un mentioned that during his July 2019 trip he "gave the task of introducing advanced power systems in the existing medium-sized submarine and improving their overall underwater operation capabilities."²⁵ Technological hurdles might also be one of the factors contributing to the longer-than-expected interval between the submarine's July 2019 debut and its launch in September 2023.²⁶

The possibility that the No. 841 submarine and the submarine inspected by Kim Jong Un in July 2019 are two different submarines can not be entirely ruled out at this point.²⁷

Though considering Kim Jong Un's command to rapidly convert all existing Type 033 submarines into "tactical nuclear attack submarines" (with No. 841³⁰ being the "standard type") and the lack of evidence pointing to a second submarine under another conversion project, this possibility remains unlikely.

Using KCTV footage (Figure 4) and the Google Earth measurement tool, the No. 841 has a measured length of approximately 80 m, which is roughly 3 m longer than the Type 033 submarine.³¹ As of 19 September 2023, the No. 841 submarine is no longer visible at the pier. It is possible that the submarine has been moved to another location at the shipyard, such as under the roof of a nearby boat basin.



Figure 4. A grid is established²⁸ to eliminate errors caused by perspectives and to virtually move the submarine to the same vertical plane where a measurable reference exists, which enables the ground distance covered by the submarine (the actual length) to be measured on Google Earth.

Image: KCTV²⁹

ENDNOTES

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