

CHINA'S FUTURE NUCLEAR FORCE INFRASTRUCTURE:

A NOTIONAL BREAKOUT SCENARIO



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Mark Stokes
Executive Director

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As the United States and Russia continue a concerted effort to reduce the role and importance of nuclear weapons, the People's Republic of China (PRC) is the sole original nuclear weapon state that is proceeding with significant improvements to its nuclear arsenal. Conventional wisdom holds that Chinese People's Liberation Army (PLA) is expected to double the number of warheads capable of striking targets in the United States by 2025. China's declared policy is maintenance of a minimum deterrent and a no-first-use pledge. However, little public information is available describing how PLA planners define minimum deterrence and the assumptions that guide development of future nuclear force structure requirements remain the current and future scope of its nuclear warhead inventory.

To be sure, the PLA is increasing its arsenal, including development and deployment of new nuclear-capable delivery vehicles. Yet questions remain as to the extent and intention of China's nuclear force modernization. While external factors, such as threat perception and operational effectiveness are important, domestic political considerations, including bureaucratic rivalries, may also influence requirements. Which factors might drive a future force structure larger than currently envisioned? How might the PLA proceed? What are the implications? This paper attempts to address a scenario involving a significant expansion of China's nuclear weapons inventory.

Baseline Force Structure

An examination of the PLA command and control structure sets the stage for a scenario describing a significantly expanded nuclear force. First, authority over China's nuclear force resides with the Chinese Communist Party (CCP) Political Bureau (Politburo) and its seven-member Standing Committee. The Politburo delegates control of nuclear forces to the Central Military Commission (CMC). The CMC chairman is dual hatted as CCP Secretary General and exercises direct authority over China's nuclear arsenal with the advice of two CMC vice chairmen. The seven CMC members that report to the chairman include the Chief of General Staff (COGS); directors of the General Political Department (GPD), General Logistics Department (GLD), and General

Armaments Department (GAD). Since 2004, commanders of the PLA Navy, Air Force, and Second Artillery Force were elevated CMC members.

Each of the seven members carries equal authority within the CMC. But the COGS traditionally has been first among equals. The COGS oversees the PLA General Staff Department (GSD), a powerful organization that not only functions as joint staff headquarters. GSD also serves as ground forces headquarters. The COGS also oversees seven military regions that are roughly comparable to U.S. combatant commands.

While the PLA Navy and Air Force have been nominally independent, the COGS has exercised considerable control over the two services. As two of seven CMC members, service commanders now enjoy a grade equal to the COGS. However, Navy and Air Force component commands are operationally subordinate to the military region commander. For example, the Navy South Sea Fleet commander is dual hatted as one of five deputy commanders of the Guangzhou Military Region. As a result, the CMC chairman exercises command authority over Navy and Air Force operational assets through the COGS.

Unlike the Air Force and Navy, nuclear forces under Second Artillery fall outside of the command authority of the COGS and the GSD-led military regional command system. The CMC chairman exercises direct command authority over Second Artillery nuclear assets. The Second Artillery's six corps-level regional commands have been fully independent from military regions. While the PLA Navy and Air Force may operate platforms capable of delivering nuclear payloads, Second Artillery most likely has retained exclusive custodianship of China's nuclear warheads. Centralized management is facilitated by a minimal deterrence doctrine, which limits the number of warheads that must be stored and secured.

The Second Artillery also has functioned as the CMC's executive authority for nuclear policy, future requirements development, and acquisition of nuclear weapon systems. The China Academy of Engineering Physics (CAEP), a defense industrial enterprise under joint civilian-military management, supplies Second Artillery with nuclear warhead sub-systems. Other defense industrial enterprises are responsible for

engineering and production of ballistic missiles capable of delivering nuclear warheads out to intercontinental range.

Since production of China's first nuclear device almost 50 years ago, the CMC has maintained separate organizational systems for missiles and warheads. The Second Artillery leadership oversees six regional missile armies, referred to as bases. A missile base consists of between three and seven launch brigades and a number of support regiments responsible for training, transportation, warhead assembly, and communications. Each brigade is comprised of six battalions that each manage at least one mobile launcher or missile silo.

A separate organization, equal in grade to a missile army (base), functions as central custodian for Second Artillery nuclear warheads. Base 22, the central nuclear warhead complex, is located in Taibai County, deep in the Qinling Mountains of Shaanxi Province. Between 1965 and 1979, the CMC's defense acquisition and technology department fulfilled this function. In 1979, 22 Base was resubordinated to Second Artillery. While 22 Base retains control over most of the PLA's inventory of nuclear warheads, a small number are distributed to each of the six missile bases. A specialized regiment with a dual chain of command (missile base and warhead base) is responsible for warhead inspection, assembly, and other pre-launch preparations. According to one authoritative Second Artillery account, depots under each of the six missile bases only store a minimal number of nuclear warheads at any one time.¹

The PLA is focused upon a survivable nuclear second strike involving deployment of expanded range and submarine-launched variants of the DF-31 ICBM and possible introduction of a mobile ICBM capable of delivering multiple independently targetable re-entry vehicles (MIRVs). For many years, the silo-based DF-5 was the principle flight vehicle for strikes against targets in the continental United States. In addition to possible introduction of a MIRV variant of the DF-5, the Second Artillery is increasing the number of brigades equipped with the DF-31A and introducing a variant of the DF-31 ICBM – the JL-2 – that is capable of launch from PLA Navy submarines. The Second Artillery also appears to be investing in R&D on a mobile ICBM capable of delivering MIRV payloads.

Guided by a principle of minimal deterrence and overriding concern over stockpile security, most public assessments conclude that the PLA maintains a relatively limited number of nuclear weapons, perhaps around 250 warheads. In a 2006 statement before the Senate Armed Services Committee, a senior Defense Intelligence Agency (DIA) authority assessed that China currently has more than 100 nuclear warheads and that “the number of deployed Chinese nuclear-armed theater and strategic systems will increase in the next several years.” DIA assessed that China likely has fewer than 50 intercontinental ballistic missiles (ICBMs) that could strike the U.S., but that figure could double by 2025.

Based on fissile material and delivery vehicle estimates, the Federation of American Scientists (FAS) assesses that around 240 nuclear warheads are available for delivery on approximately 180 missiles and aircraft. As many as 140 of the operational missiles are land-based and that 50 of those can reach the continental United States. The remaining warheads are believed to be spares or earmarked for submarine-launched ballistic missiles and bombers. While these estimates appear reasonable, a margin of error exists, particularly with regard to future inventory.

Drivers for an Expanded Force Structure

In 2002, Secretary of Defense Donald Rumsfeld highlighted a scenario in which a nuclear force, such as China’s, could “sprint to parity” as US and Russia reduce the number of nuclear weapons and launchers.² There are a number of plausible reasons why China would not make that choice. While unlikely, thinking through a breakout scenario or “rush to parity” could be a useful exercise. In evaluating a rush to parity scenario, a first question relates to motives: why would the CCP Politburo Standing Committee and CMC pursue a significant expansion of the PLA’s nuclear weapon inventory?

Threat Perception

First, senior leaders develop requirements based on threat perception, calculated deterrence, and operational doctrine. China’s nuclear operations doctrine calls for force equipped with the minimal number of warheads required to deter a potential adversary

from launching a nuclear attack against Chinese territory. Minimal deterrence entails a credible ability to reconstitute after a nuclear attack and then an assured ability to retaliate in kind.

Such a doctrine requires detailed and accurate calculations of how much pain the US and other potential nuclear powers could endure. Deterrence and psychological operations enjoy a symbiotic relationship. The PLA General Political Department (GPD), which manages the PLA's political work system, oversees a powerful organization responsible for strategic psychological operations and attenuating or amplifying the political effects of existing or latent nuclear weapons. Regular assignments of career Second Artillery officers to senior GPD positions reflects the intimate linkage between military operations and desired political effects.

Determination of required number of warheads may be based on estimated attrition of payloads expected to reach their targets due to losses on the ground or inception in flight. Planning for use of nuclear weapons to support warfighting could increase requirements significantly. However, increasingly accurate and lethal conventional payloads able to achieve the desired effects may decrease incentives for fielding a large arsenal of tactical nuclear weapons.

Force planners and political analysts may perceive a shift in the threat environment that could reduce PLA confidence in its assured retaliatory capable and adequacy of its nuclear weapon inventory. Nuclear states of potential concern include the United States, Russia, and India among others. A number of scenarios could trigger a significant expansion of China's inventory of nuclear weapons. Loss of confidence in U.S. extended deterrence could reverse Japan's traditional aversion to nuclear weapons and trigger an independent nuclear capability. A second scenario could be Russian withdrawal from the Intermediate Range Nuclear Forces (INF) Treaty and subsequent deployment of nuclear-capable missiles that had been previously restricted under terms of the treaty.

Expansion of Comprehensive National Power

Drivers shaping future force structure may not be limited to rational considerations, such as threat perception and calculations of deterrence, coercion, and counter-coercion. Insecurities and values that are unique to China's political system may influence how leaders perceive the utility of nuclear weapons. As an important source of legitimacy, nuclear weapons are not only instruments of mass destruction, but also powerful symbols of a state's standing in the world. Analysts have evaluated China's relative position in terms of comprehensive national power and assessed steps needed to elevate its relative standing. As the US and Russia pare their strategic nuclear arsenals down to a level that the PLA could reasonably match, the political advantages of establishing parity with the two largest nuclear powers may outweigh perceived costs.

Decentralization

The PLA and other defense establishments around the world are characterized by competition among military services for prestige and share of resources. Since initiating its nuclear program in the 1950s, Chinese political leaders have granted nuclear warheads special political significance. Bureaucratic rivalries within the PLA that result in decentralization of custodianship also could drive an expansion of the PLA's nuclear warhead inventory. In the domestic Chinese context, nuclear weapons carry significant value as symbols of power and authority. One of the most quoted principles of Mao Zedong is "political power grows out of the barrel of a gun." There is no gun more powerful than a nuclear weapon.

China's nuclear force was born during an era of tremendous political chaos. The Cultural Revolution, which began in 1966 and ended by 1976, produced enduring fears of political instability and concerns over warhead security after a move by a rival faction to seize China's nuclear arsenal in its early stage of development. Presumably, the side that asserted control over the PLA's most tangible symbols of military power likely would dominate the political agenda as well. Since then, security appears to have been a central factor in how the CMC assigns custodianship and ensures strict political control over its nuclear warheads.

Since the end of the Cultural Revolution, the Politburo Standing Committee and CMC chairman appear to have entrusted Second Artillery as sole custodians of China's

limited nuclear weapon stockpile. During peacetime, the CMC chairman exercises political control through the Second Artillery Party Committee and politically reliable officers at Base 22 deep in the Qinling Mountains.

However, the introduction of a viable submarine launched ballistic missile force and an increasingly powerful PLA Navy could result in decentralization of warhead custodianship. Whether or not the Navy has or will manage an independent inventory of nuclear warheads can not be determined at the current time based on available information. A specialized unit under Second Artillery 22 Base could manage warheads on behalf of Navy submarine force during peacetime. Upon CMC orders, 22 Base could deliver warheads for integration with SLBMs for training purposes or in a crisis situation. Alternatively, the PLA Navy may seek independent peacetime custodianship. Specialized nuclear warhead transport units subordinate to the two PLA Navy submarine bases have been noted. Navy peacetime custodianship could create pressures for the PLA Air Force for similar responsibilities, and perhaps by missile bases within the Second Artillery who advocate for greater peacetime custodian responsibilities.

Conclusion: A Notional Pathway to an Expanded Force

A notional PLA pathway to nuclear parity would be marked by administrative issues associated with acquisition management, adjustments in China's civilian engineering R&D and production, and adjustments to operational infrastructure. First, decentralization of nuclear warhead custodianship may be accompanied by new organizational responsibilities for requirements development and acquisition management.

Without a dedicated staff familiar with nuclear strategy and operations, the CMC likely delegates PLA-wide nuclear force planning and acquisition management to Second Artillery.³ The intellectual center of Second Artillery's long term nuclear force planning resides within its Equipment Department. The Second Artillery Equipment Department also is responsible for managing individual programs. Strategic weapon systems are developed and acquired in three phases: 1) concept development and program validation; 2) system engineering R&D; and 3) and design finalization and low rate initial production.

The Second Artillery works closely with the PLA General Armaments Department (GAD) in leveraging national-level technology development programs and ensuring that the production of safe and reliable warheads and components. The GAD develops, coordinates, and oversees broad defense acquisition and technology policies for the CMC.⁴ GAD supports Second Artillery program managers in the detailed design, engineering development, and manufacturing of nuclear warheads. GAD manages allocation of resources directed toward basic and applied defense technologies, including potential future nuclear-related technologies.

GAD and the civilian authorities responsible for defense industrial enterprises jointly oversee the China Academy of Engineering Physics (CAEP). CAEP is responsible for nuclear warhead design, engineering R&D, and manufacturing. Research institutes under CAEP manage a complex supply chain that includes power supplies, firing/safing switches, high explosives, deuterium, tritium, neutron sources, environmental sensing devices, detonators, pits, etc.

CAEP's existing engineering R&D and manufacturing infrastructure likely could support expanded production with minimal adjustment. With support from CMC and State Council, fissile material probably would not be a limiting factor. Assessments of China's existing nuclear warhead inventory have in large part been based upon estimates of plutonium production and reserves. In 2009 testimony, DIA assessed that "China likely has produced enough weapon-grade fissile material to meet its needs for the immediate future."⁵ The International Panel on Fissile Materials estimates that China's two production facilities at Jiuquan and Guangyuan have produced about 20 tons of highly enriched uranium and two tons of weapon-grade plutonium.⁶

The Second Artillery's basic operational infrastructure likely would require minimal adjustment should political authorities decide to expand China's nuclear force posture. A conventional missile brigade currently consists of six battalions, each equipped with six launchers, for a total of 36 launchers. Nuclear-capable brigades equipped with medium, intermediate, and intercontinental range missiles also consist of six battalions, each with at least one launcher or silo. Presumably, at least one missile and one warhead are programmed and available per launch platform. An expansion of

China's nuclear force, or rush to parity with US and Russian nuclear forces, could be achieved by adjusting existing nuclear brigade-level force structure along similar lines as conventional missile brigades (eg., 36 launchers per brigade vice current six-12 launchers). Multiple missile reloads and warheads presumably would be available for each launch platform.

¹ Yu Jixun (ed.), *Second Artillery Campaign Science* (第二炮兵战役学), Beijing: PLA Press, (jimi), 2004, p. 202.

² Among various sources addressing the possibility or unlikelihood of a “sprint to parity” breakout scenario, see Brad Roberts, “On Order, Stability, and Nuclear Abolition,” in George Perkovich and James M. Acton (eds), *Abolishing Nuclear Weapons: A Debate* (Wash DC: Carnegie Endowment for Peace, 2009), pp. 163-166; Michael O. Wheeler, *Nuclear Parity with China?*, (Alexandria, VA: Institute for Defense Analysis, 2012); Jeffrey Lewis, “The Ambiguous Arsenal,” *Bulletin of Atomic Scientists*, May/June 2005 (vol. 61, no. 03), pp. 52-59, at http://web.archive.org/web/20050525064447/http://www.thebulletin.org/article.php?art_ofn=mj05lewis; Gregory Kulacki, “China’s Nuclear Arsenal: Status and Evolution,” *Union of Concerned Scientists*, October 2011, at http://www.ucsusa.org/nuclear_weapons_and_global_security/solutions/us-china-cooperation/chinas-nuclear-arsenal.html; and Caroline S. Reilly, “Assessing the Prospect of China’s Potential ‘Sprint to Parity’,” in *A Collection of Papers from the 2011 Nuclear Scholars Initiative* (Washington, DC: Project on Nuclear Issues, Center for Strategic and International Studies, December 2011), 156–73.

³ In 1993, Second Artillery published guidelines outlining coordination procedures for nuclear warhead R&D. The Second Artillery guidelines (GJB-1568-1992; *Nuclear Warhead R&D Coordination Procedures and Requirements* (核弹头研制协调程序及要求) are classified and unavailable.

⁴ GAD was created in a reorganization in 1998 intended to address shortcomings in oversight of defense technology development. Its predecessor, the Commission for Science, Technology, Industry, for National Defense (COSTIND), was split into military and civilian functions, with the General Armaments Department absorbing defense acquisition functions of COSTIND and GSD Equipment Bureau. For background, see Harlan W. Jencks, “COSTIND Is Dead, Long Live COSTIND! Restructuring China’s Defense Scientific, Technical, And Industrial Sector,” in James C. Mulvenon and Richard H. Yang (ed.), *The People's Liberation Army in the Information Age* (Santa Monica: RAND Corporation, 2004), pp. 59-77; Evan S. Medeiros, Roger Cliff, Keith Crane, and James C. Mulvenon, *A New Direction for China's Defense Industry* (Santa Monica, CA: Rand Corporation, 2005), at http://www.rand.org/pubs/monographs/2005/RAND_MG334.pdf. The GAD Comprehensive Planning Department [综合计划部] probably is responsible for overall acquisition planning and policy. Bureaus within the GAD Service probably function as coordinating bodies. For a good GAD overview, see Harlan Jencks, “The General Armaments Department.” in James Mulvenon and Andrew N.D. Yang eds., *The PLA As Organization*, Washington, D.C.: RAND, 2002, http://www.rand.org/pubs/conf_proceedings/CF182/CF182.ch7.pdf.

⁵ <http://armed-services.senate.gov/statemnt/2009/March/Maples%2003-10-09.pdf>

⁶ *Global Fissile Material Report 2010: Balancing the Books: Production and Stocks* (Fifth annual report of the International Panel on Fissile Materials), at http://www.fissilematerials.org/ipfm/site_down/gfmr10.pdf.

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