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***China's Nuclear Warhead Inventory:
Alternative Approaches for Research and Analysis***

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) remains the only original nuclear weapon state that is increasing its arsenal. While estimates vary, the Chinese People's Liberation Army (PLA) may be expected to double the number of warheads available for deployment on missiles that could target the United States by the mid-2020s. China's declared policy is maintenance of a minimal deterrent and a no-first-use pledge. Ambiguity surrounds how PLA planners define minimum deterrence, and the current and future scope of its nuclear warhead inventory. A general consensus holds that China is increasing its arsenal, including development and deployment of new nuclear-capable delivery vehicles. Yet questions remain as to the extent and intent of China's nuclear force modernization.

In 2006 testimony before the Senate Armed Services Committee, the Director, Defense Intelligence Agency (DIA) assessed that "the number of deployed Chinese nuclear-armed theater and strategic systems will increase in the next several years" and that China currently has more than 100 nuclear warheads. 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 China has around 240 nuclear warheads for delivery on approximately 180 missiles and aircraft. FAS also estimates that as many as 140 of the operational missiles are land-based and that 50 of those can reach the continental United States. The estimate of 240 warheads also includes devices supporting the PLA's future ballistic missile submarine force, weapons for bombers, and some for spares.

While these estimates appear reasonable, the potential for a margin of error exists, particularly with regard to future inventory. How many nuclear weapons does China have? How many warheads does China need? If we do not know with a high degree of confidence, what metrics or counting rules could produce the most accurate estimate? An assessment of

China's nuke inventory could include four different approaches: 1) strategic requirements; 2) delivery vehicles; 3) production capacity; and 4) storage and handling capacity.

Strategic Requirements

If one placed him or herself in the position of a nuclear force strategic planner, how would one develop requirements? Which specific organization is responsible for developing nuclear weapons requirements? To begin, an initial assumption should be established regarding whether or not a single staff organization develops requirements. While not confirmed, the Second Artillery may serve as the central authority for planning, programming, budgeting, storage, and handling of all nuclear weapons, including those that could be delivered from Air Force aircraft and Navy nuclear submarines. A preliminary review of PLA General Staff Department (GSD) organization does not reveal a nuclear-related bureau. Drivers and methodology that Second Artillery force planners adopt in developing strategic and technical requirements remain unknown.

More specifically, a tentative judgment is that the Second Artillery Equipment Department is responsible for nuclear force structure planning, with the Central Military Commission (CMC) and Central Committee Political Bureau (Politburo) having approval authority. Nuclear warhead inventory requirements may be developed by the Equipment Department's General Planning Department, with the acquisition carried out by the Special Equipment Management Department. The Second Artillery Equipment Research Academy may play a contributing role. The Second Artillery Headquarters Department Nuclear Security Bureau likely coordinates with nuclear regulatory agencies within China. The Second Artillery Equipment Department presumably oversees research and development (R&D), manufacturing, and follow-on support contracts with the China Academy of Engineering Physics (CAEP). The Second Artillery presumably ensures sufficient fissile material exists to satisfy warhead requirements. Acquisition officers within the Second Artillery likely work closely with the General Armaments Department (GAD) Services Department. Within this department, the Second Artillery and Nuclear Bureau may function as an acquisition policy coordinating body.

Planners may determine how much of a nation's population should be placed at risk in order to deter an opposing leadership from taking action viewed as contrary to Beijing's interests. For example, the Second Artillery may believe that holding at risk 5-10% of the population of other nuclear powers in urban areas, such as Los Angeles, New York, Chicago, and Houston, is sufficient to undercut the deterrent or coercive value of that country's nuclear force. Estimates may be made regarding attrition, or numbers 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 dampen incentives for fielding a large arsenal of tactical nuclear weapons.

Delivery Vehicles

The size of China's current and future nuclear warhead inventory likely would be related available means of delivery. Major agreements to limit or reduce offensive nuclear arms that were negotiated by the two superpowers during and immediately after the Cold War focused on

delivery vehicles and launchers. Warhead estimates appeared to be based on “counting rules” that credit numbers of deployed warheads to a particular delivery vehicle. In its most recent report to Congress on PRC military power, the U.S. Department of Defense (DoD) appears to assume one nuclear-capable ballistic missile per launcher. The DoD report assesses the PLA has 50-75 intercontinental ballistic missiles (ICBMs), with ranges between 5,400 and 13,000 kilometers (kms), and equal number of launchers in its inventory; between 5 and 20 intermediate range ballistic missiles (IRBMs) with ranges between 3000-5400 kms on an equal number of launchers; and 75-100 medium range ballistic missiles (MRBMs) – presumably DF-21 variants - with ranges above 1750 kms on an equal number of launchers. In all, between 130 and 195 ballistic missiles are assessed to be capable of delivering nuclear warheads.

Preliminary analysis indicates that China’s holds at least 207 warheads in its inventory, assuming one missile per launcher and one launcher per company. The principle discrepancy in DoD reporting could be DF-21 numbers, but this is unclear. Regardless, based on structure and certain assumptions regarding table of organization and equipment alone, China’s nuclear warhead inventory could be judged as no less than 200. This figure is based on a notional assessment of Second Artillery order of battle, including at least two DF-5 ICBM brigades capable of reaching targets in continental U.S.; one or two DF-4 IRBM brigades; at least three DF-31 brigades (at least one DF-31A, at least one DF-31, and one unknown DF-31 variant); 10 DF-21 MRBM/IRBM brigades; and one DF-3 brigade. This minimal figure does not include potential tactical warheads allocated to the six short range ballistic missile (SRBM) brigades under 52 Base, the corps-level Second Artillery organization opposite Taiwan, or at least two land attack cruise missile (LACM) brigades. The 200-warhead figure also does not include warheads developed for China’s nuclear submarines to be equipped with the JL-2 missile; or possible air-delivered nuclear munitions.

In developing a minimal figure, the premise is that the Second Artillery basic missile launch unit is the brigade, with each brigade having six launch battalions with two companies each (e.g., a “6/2” structure). Each company likely has a launch platform (either silo or mobile launcher) and associated support vehicles in its table of organization and equipment, and stores the equipment in battalion garrison facilities. Therefore, each brigade’s table of organization and equipment s assigned at least 12 launch platforms. Other battalions within a brigade are responsible for missile diagnostics, check out, warhead mating, and other functions, usually in an underground facility (referred to as a “central depot”) operated by the brigade’s site management battalion. As many as six subordinate companies under a site management battalion oversee missile-related preparation, pre-surveyed launch sites, storage, and other facilities. Among site management battalion responsibilities include underground facility management such as power and electricity, water, air conditioning, and ventilation. A service battalion is responsible for security and concealment, camouflage, and deception.

A complicating factor in assessing warhead numbers is that the Second Artillery Equipment Department does not appear to assign nuclear warheads, and perhaps even missiles, to a missile brigade’s permanent table of organization and equipment. A central warhead base (known as “22 Base” in Taibai County, Shaanxi Province) and storage regiments under each of the six missile bases (referred to as “Equipment Inspection” regiments) likely maintain custody of warheads, and possibly missiles, during peacetime. Warheads and missiles may be dispatched

to site management battalions that are subordinate to missile brigades for assembly in underground facilities for training and during periods of elevated readiness. As a result, the system is heavily dependent upon transportation regiments, reporting directly to missile base headquarters. This hypothesis regarding the relationship between brigades and regiments requires more research. Under this system, the PLA could have few or no “operationally deployed strategic nuclear weapons,” which are defined as warheads that are loaded on delivery vehicles and ready for launch.

Production Capacity

The infrastructure supporting nuclear weapon R&D and production also likely shapes inventory size. Assessments of China’s nuclear warhead inventory often are 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.” 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. Assessments of current and future warhead inventory are founded upon estimated amount of plutonium or highly enriched uranium (HEU) needed for a warhead. Assessments of China’s fissile material stockpile appear credible. However, research to date should be augmented by a more detailed understanding of China’s nuclear weapon R&D and production infrastructure, specifically CAEP. Also useful would be details regarding storage and handling of weapon-grade fissile material. For example, which specific organization – PLA or civilian – is responsible for storage and handling of military-use fissile material?

Storage and Handling

China's capacity for warhead storage and handling also may shape the size of the country’s nuclear weapon stockpile. With stockpile security appearing to be of equal or greater importance to operational efficiency and effectiveness, China’s warhead storage and handling system is centralized. However, it appears designed to survive a first strike and retain sufficient operational capability for retaliation. Expansion of underground facilities directly supporting handling and storage of nuclear weapons, components, and fissile material could indicate an increase in warhead inventory. While underground facilities could be an indicator, greater precision is warranted. Reliable sources report that the Second Artillery centrally stores most of the country’s nuclear warheads in Taibai County, deep in the Qinling Mountains of Shaanxi Province. Base 22 was established under the PLA’s Commission of Science, Technology, and Industry for National Defense (COSTIND) in the mid-1960s adjacent to the original manufacturing base in Qinghai Province. Within a few years, the base was relocated to Taibai County in the Qinling Mountains west of Xian and eventually subordinated to the Second Artillery in 1979.

Working closely with the central storage complex in Taibai, each missile base manages a smaller nuclear warhead and missile storage depot. According to an internal Second Artillery account, the depot under each of the six corps-level missile bases store a minimal number of nuclear warheads at any one time. Depots under each of the Second Artillery’s six missile bases are referred to as Equipment Inspection regiments. Each regiment oversees at least three

battalion-level facilities (literally “equipment inspection sites”) with each having as many as seven subordinate facilities (e.g., 21 possible storage sites per base). Missiles appear to be stored separately from warheads.

Conclusion

In summary, uncertainty surrounds China’s current and future inventory of nuclear warheads. While existing estimates appear reasonable, the potential for a margin of error exists. At least one approach to validating existing estimates is to examine perceived strategic requirements; operational infrastructure, and current/future nuclear-capable delivery vehicle inventory; industrial R&D and manufacturing infrastructure; and warhead and fissile material storage and handling capacity. Planning assumptions regarding warheads, delivery vehicles, and launch vehicles/platforms remain unknown. A minimal inventory estimate could assume one warhead per missile, one nuclear-capable missile per launch platform (mobile launcher or silo), and two launch platforms per company (two companies per battalion and six battalions under each launch brigade). Based on these assumptions, a preliminary minimal estimate of China’s existing inventory is 240 warheads. Additional missiles and warheads available for each mobile launcher could expand this figure. However, beyond assessments of China’s fissile material stockpile, another limiting factor could be China’s stress on security, as exemplified by its centralized approach to warhead storage and handling, over operational efficiency and effectiveness.