Testimony before the U.S.-China Economic and Security Review Commission

Hearing on

“China’s Nuclear Forces”

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Co-chair Fiedler, Co-chair Wong, members of the commission, thank you for inviting me to appear before you today to discuss the nuclear forces of the People’s Liberation Army (PLA). My testimony draws on authoritative Chinese sources and recent scholarly work to examine aspects of continuity and change in China’s nuclear doctrine, the features and drivers of China’s nuclear strategy, and the way China might use nuclear weapons. I conclude with recommendations for Congress.

Continuity and Change in China’s Nuclear Forces

China’s nuclear doctrine may be understood through its declaratory policy, force structure, and operational practices.

Declaratory Policy

The basic tenets of China’s public declaratory nuclear policy, including a No-First-Use policy and negative security assurances, have remain unchanged. After conducting its first successful nuclear test in 1964, China publicly declared that “The Chinese Government hereby solemnly declares that China will never at any time and under any circumstances be the first to use nuclear weapons.”¹ China has reiterated the policy ever since. As an extension of its NFU policy, China also declares negative security assurances, undertaking “not to use or threaten to use nuclear weapons against non-nuclear-weapon States or nuclear-weapon-free zones at any time or under any circumstances.”² In addition to its NFU policy and negative security assurances, China’s declaratory nuclear policies include commitments not to engage in arms races and to eventual complete disarmament and the prohibition of nuclear weapons.³ These policies have been reiterated in authoritative texts, including China’s most recent defense white paper,⁴ and Chinese officials continue to publicly reaffirm the NFU policy.⁵

³ Statement by Vice Foreign Minister Li Baodong, Head of the Chinese Delegation at The General Debate in 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 27 April 2015, p. 4.
Despite consistency in official public statements and documents describing the unconditional nature of the NFU policy, there remains ambiguity about whether there are conditions under which both the NFU policy and negative security assurance might not hold. Chinese experts and officials and American researchers have suggested that China might use nuclear weapons first in certain situations.\(^6\) For instance, authoritative Chinese texts envision threatening nuclear use in response to conventional attacks against high-value targets within China, such as major cities, nuclear power reactors, or the Three Gorges Dams; however, these sections do not describe China actually launching a nuclear strike.\(^7\) Chinese experts and retired officials have publicly argued that conventional strikes against China's nuclear forces could (or should) justify a Chinese nuclear response.\(^8\) Some Chinese interlocutors have further suggested that this ambiguity is a deliberate attempt to confuse China's adversaries and enhance deterrence, reflecting China's emphasis on concealment and deception in the nuclear realm.\(^9\) There are also questions about whether or not China's NFU policy and negative security assurances would apply to non-nuclear states hosting U.S. military facilities such as Japan.\(^10\)

Much of this ambiguity and debate about the NFU policy existed prior to Xi Jinping's tenure as General Secretary.\(^11\) However, increasing Chinese concerns about U.S. capabilities in the nuclear domain, including ballistic missile defense systems and

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advanced conventional precision-strike weapons appear, to have intensified these debates in recent years.\textsuperscript{12}

\textit{Force Structure}

The nuclear force structure of the PLA has experienced moderate quantitative and significant qualitative change over time and, in particular, over Xi’s tenure as General Secretary.

China has steadily increased the size of its nuclear forces. In 2011, the year prior to Xi’s ascension to the office of General Secretary, the Defense Department estimated that China deployed roughly 60 ICBMs, including the relatively shorter-range DF-3 systems.\textsuperscript{13} In 2020, roughly a decade later, the Defense Department estimated China deployed 100 ICBMs.\textsuperscript{14} Over the same period, credible public estimates of China’s warhead stockpile grew from 178 to 272.\textsuperscript{15}

In addition to this moderate growth in the size of its nuclear forces, China has made significant qualitative enhancements to its nuclear arsenal. For several decades after China’s first nuclear test, the country deployed only a small and rudimentary nuclear force consisting of immobile, liquid-fueled, and highly vulnerable missiles. Today, China’s nuclear forces increasingly consist of advanced solid-fueled and road-mobile missiles.\textsuperscript{16} Some of these systems, such as the DF-31AG and the DF-41 are believed to have off-road capability and the ability to fire without pre-prepared launch sites.


greatly increasing their mobility, concealment, and, therefore, survivability. China has equipped some of its ICBMs with multiple independent reentry vehicle (MIRV) capability, which enhances their potential to penetrate missile defenses. China's nuclear-armed theater missile systems possess enhanced accuracy, potentially providing nuclear precision-strike capabilities. It has also deployed new missile systems capable of being armed with either conventional or nuclear warheads. There is limited evidence of Chinese interest in tactical nuclear weapons, though there is no indication that China ever fully developed or deployed these capabilities.

In addition to the growth and modernization of its land-based nuclear forces, the PLA is also developing sea and air legs of a nuclear triad with the fielding of a fleet of nuclear ballistic missile submarines (SSBNs) and the development of both a new nuclear-capable strategic bomber and an air-launched nuclear-capable ballistic missile.

Operational Practices

China has historically maintained relatively restrained operational practices for its nuclear forces. China has emphasized strict centralized control of its nuclear weapons

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17 王卫东 [Wang Weidong], “东风-31 甲改核导弹方队: 倚天长剑裹雷挟风 [DF-AG Nuclear Missile Unit: The Long Sword Envelopes the Thunder and Carries the Wind],” 解放军报 [PLA Daily], 2 October 2019.
and generally kept them at very low alert levels, with warheads and delivery systems stored separately.\textsuperscript{23}

Recently, however, there is evidence that China might be adjusting some of these practices in ways which make its nuclear forces more capable. With help from Russia, China is reportedly planning to develop an early warning system, potentially consisting of ground-based radars and space-based platforms, which could help support a launch-on-warning nuclear posture.\textsuperscript{24} U.S. government reports suggest China may be moving to a launch-on-warning posture and increasing peacetime readiness, though these developments remain to be seen.\textsuperscript{25} The PLA has set goals, according to a defense white paper, “to improve strategic early warning, command and control ... [and] rapid reaction,”\textsuperscript{26} and a retired Rocket Force researcher has alleged that the reaction time of the missile forces has been reduced “from days and hours to minutes.”\textsuperscript{27} The U.S. government has cited a Chinese defense industry publication and signs of activity at China’s nuclear testing site as evidence of possible interest in developing new warheads, including low-yield ones, though this evidence is not definitive.\textsuperscript{28}

\textit{Future Trajectory}

The future of China’s nuclear forces remains uncertain. As is explained later in this testimony, many of the recent shifts in China’s doctrine, structure, and operations

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\item \textsuperscript{26} \textit{China’s Military Strategy} (Beijing: State Information Council, 2015).
\item \textsuperscript{27} 杨承军 [Yang Chengjun], “核战略专家杨承军：不宜在网络上炒作涉核问题 [Nuclear strategy expert Yang Chengjun: It Is Not Appropriate to Hype Nuclear-Related Issues on the Internet],” 祖国 [Motherland], 13 May 2020.
are consistent with both a continued nuclear strategy of assured retaliation and with the adoption of a shift to a new and more expansive nuclear strategy. However, together, these changes cast doubt on elements of China’s nuclear doctrine and ease the technical constraints which, in the past, would have made it more difficult for the PLA to adjust its nuclear doctrine. Regardless of the limited strategic aims for which China might design its nuclear doctrine, forces, and operations, Chinese capabilities today can increasingly support more than merely an assured retaliation posture.

China’s nuclear forces are likely to continue to grow and become more capable. The Defense Intelligence Agency estimates that over the next decade China is likely to double its nuclear stockpile. The number of missile brigades has increased from 29 to 40 in just three years (though this growth includes conventional missile brigades as well). The addition of credible sea and air legs of the nuclear deterrent will further expand China’s nuclear forces.

Ongoing trends within China’s nuclear forces will likely increase pressures for raising their alert status. The fielding of a SSBN fleet may motivate China to adopt peacetime mating and may encourage pre-delegation of launch authority. The continued vulnerability of silo-based ICBMs and nuclear aircraft also increase pressures for peacetime mating and higher alert status, lest China confront a use-or-lose scenario. The growing entanglement of conventional and nuclear forces may lead nuclear units to adopt practices and policies previously isolated to the

conventional forces which could also lead to increased readiness among nuclear units.\textsuperscript{35}

However, there would be technological and organizational challenges to some of these changes. For instance, adopting a launch-on-warning posture would require the development of a sophisticated early warning system consisting of space-based sensors, ground-based radars, intelligence fusion capabilities, and a command and control structure to quickly disseminate launch orders. To permit the rapid response necessary for a launch-on-warning posture, China would also have to place its forces on continuous alert and either pre-delegate launch authority or exclude some members of the CMC or the Politburo Standing Committee from nuclear launch decisions.\textsuperscript{36} Given China’s traditionally strong centralized civilian control over nuclear weapons, these would constitute significant changes.

\section*{Drivers of China’s Nuclear Strategy}

China’s nuclear strategy is best characterized as one of “assured retaliation.”\textsuperscript{37} Under this strategy, the PLA would use nuclear weapons against an adversary’s strategic targets, typically understood to be major cities, in order to inflict unacceptable punishment and only after China has suffered a nuclear strike (though, as discussed earlier, there remains some ambiguity about whether the NFU policy might not hold under certain conditions).\textsuperscript{38} China claims to have the goals of maintaining a “lean and effective” nuclear force and to “keep[] its nuclear capabilities at the minimum level required for national security.”\textsuperscript{39} In authoritative texts describing the PLA’s operational nuclear doctrine, the only campaign involving the use of nuclear weapons is the nuclear counterstrike.\textsuperscript{40}

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\textsuperscript{36} I thank Phillip C. Saunders for this point.


\textsuperscript{38} 孙向丽 [Sun Xiangli], 核时代的战略选择: 中国核战略问题研究 [\textit{Strategic Choices in the Nuclear Age: Research On Questions of China’s Nuclear Strategy}] (Beijing: 中国工程物理研究院 [China Academy of Engineering Physics Research Center], 2013), pp. 137-139.

\textsuperscript{39} \textit{China’s National Defense in the New Era} (Beijing, State Information Council, 2019).

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As discussed, signs of (potential) change in China’s approach to nuclear weapons, including the pursuit of a nuclear triad, enhanced readiness, and a potential move to a launch-on-warning posture might be understood as efforts to maintain its assured retaliation strategy in the face of perceived threats to its nuclear deterrent, though they nonetheless ease long-standing technical constraints. China’s nuclear doctrine and strategy, including changes to them, are shaped by strategic, bureaucratic, and status drivers.

**Strategic Drivers**

Strategic drivers are primarily responsible for China’s ongoing modernization efforts, which largely aim at maintaining a credible secure second-strike nuclear capability to deter and respond to nuclear use against China. However, the size and type of nuclear forces necessary to maintain a secure second-strike capability depend on the perceived threat to China. Concerns about the vulnerability of its nuclear deterrent and U.S. pursuit of absolute security have centered on U.S. advances in ballistic missile defense, precision-guided conventional weapons, and intelligence, surveillance, and reconnaissance (ISR) capabilities.\(^1\) By increasing the size, mobility, and readiness of its nuclear forces, China likely hopes to increase their survivability to a potential U.S. strike. MIRV capabilities increase the ability of Chinese warheads to penetrate U.S. ballistic defense systems.\(^2\) Chinese scholars have cited the ability of SSBNs to potentially evade the coverage areas of U.S. homeland BMD capabilities.\(^3\) In addition, ongoing nuclear modernization by other states, including the United States, provides additional impetus for China’s own modernization.

In this respect, U.S. policy choices may shape China’s nuclear trajectory. In particular, continued U.S. advancements in BMD, including the development of the SM-3 Block IIA interceptor with higher burnout velocities and the forward deployment in East Asia of systems such as Aegis Ashore and the Long-Range Discrimination Radar, might further heighten Chinese threat perceptions, providing stronger impetus for the continued expansion and modernization of China’s nuclear forces.\(^4\)

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Bureaucratic Drivers

Bureaucratic drivers are important secondary factors shaping China’s nuclear forces and strategy. During Xi’s tenure, nuclear constituencies have been created or elevated across the PLA, creating more domestic political actors with an interest in expanding nuclear capabilities. In 2015, the military arm that controls China’s land-based nuclear weapons was renamed the Rocket Force and promoted in rank to the status of a full service, for the first time making it equal to the Army, Navy, and Air Force. The addition of sea and air components of a nuclear triad create new communities with an interest in expanding the nuclear mission set. Interservice rivalry, particularly in the face of possible slower growth in military spending, encourages the creation of new operational requirements and forces in the nuclear domain. For instance, the development of a new nuclear-capable strategic bomber and air-launched ballistic missile for the PLA Air Force, which make little sense strategically, may be better understood as a result of bureaucratic dynamics. The potential “bleeding” of operational practices from conventional to nuclear communities provides opportunities and pressures for adjusting nuclear forces and practices, including through greater accuracy, dynamic retargeting, realistic battlefield training, and higher readiness levels.

Status Drivers

Status drivers are less important in shaping China’s nuclear forces and strategy but there is some evidence to suggest they reinforce strategic and bureaucratic drivers. Chinese officials frequently highlight the international prestige generated by China’s nuclear forces and Xi Jinping has referred to the Rocket Force as “the strategic pillar of China’s great power status.” Developments like MIRV capability and the SSBN fleet are seen as important technological achievements. To the extent that Chinese officials believe that advances in the nuclear domain demonstrate China’s technological superiority to domestic and international audiences, they will be more

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likely to push for further growing and advancing the nuclear force, including potentially in ways which make less sense from a purely strategic perspective.

**Chinese Use of Nuclear Weapons**

The Central Military Commission tightly controls China's nuclear weapons and any decision to use them would be made by the CMC and the Politburo Standing Committee. This tight control is reflected in the separation of the PLA's warhead handling infrastructure from the missile bases which command the Rocket Force's brigades, the comparatively restrained operational practices of China's nuclear forces, and the PLA's strong emphasis on political reliability of military personnel assigned to nuclear units.

China emphasizes the ability to retain a survivable second-strike capability as the cornerstone of nuclear deterrence. However, beyond simply maintaining the capability to deter, Chinese writings emphasize “displaying the will and capability to use force as the key means of deterring an enemy” [italics added]. PLA doctrinal and curricular texts envision several types of missile signaling operations to enhance deterrence. These include raising the alert level of missile forces, dispersing mobile systems from their garrisons, test launches of strategic missiles, and publicly suggesting a willingness to lower the nuclear threshold. Some of the more escalatory deterrence signaling measures include launching ICBMs without nuclear warheads toward maritime areas and launching ICBMs armed with conventional warheads.

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54 Ibid., p. 23.


warheads against key targets on the adversary’s homeland. These measures could easily be misinterpreted as preparations for an actual nuclear launch, potentially escalating a crisis or conflict and leading to nuclear use.

China’s nuclear forces are intended primarily to prevent nuclear coercion and deter nuclear attack; Rocket Force training largely reflects these purposes and indicates that the PLA envisions using nuclear weapons in retaliation for a nuclear strike. Public military reporting of Rocket Force training involving nuclear units consistently describes the simulated launches occurring after China has already suffered a nuclear strike. Rocket Force training has operators spend several days (or longer) in protected underground facilities to simulate the need to shelter from the aftermath of a nuclear strike before executing China’s own retaliatory nuclear launches. Rocket Force units are frequently described as operating under conditions of nuclear attack or in a post-attack environment. There is little to no information about nuclear training involving either the Navy or the Air Force, though flushing of

SSBNs from home ports or scrambling nuclear bombers could both be important deterrence signals.\(^6^2\)

**No Clear Distinction between Strategic and Theater Forces**

China’s land-based nuclear forces consist of both strategic and theater systems. China does not deploy tactical nuclear weapons of the kind typically conceptualized in the United States with very small yields and very short ranges.\(^6^3\) China’s strategic and theater systems are distinguished by their basing, ranges, locations, and, to a lesser extent, yields. The strategic systems consist of primarily silo-based and some road-mobile intercontinental-range systems garrisoned in the heart of the country and armed with warheads of a few hundred to a few thousand kilotons. The theater systems consist of road-mobile systems with ranges of a few thousand kilometers, garrisoned largely near China’s borders and armed with warheads of a few hundred kilotons.\(^6^4\) The available evidence does not indicate that China distinguishes between the roles assigned to these strategic and theater nuclear forces.\(^6^5\)

It is unclear precisely how China envisions using its theater nuclear forces, though they might be used in several ways.\(^6^6\) First, China might use them as part of a limited nuclear counterstrike campaign, presumably against U.S. military forces in the region. Although China does not appear to plan for limited nuclear strikes, some language from doctrinal materials suggests the PLA envisions at least two waves of nuclear counterstrikes and that they might involve one or more than one missile base, implying that Chinese nuclear strikes might have some flexibility in how they are conducted.\(^6^7\) Chinese decision-makers could always attempt to order a tailored nuclear strike in a contingency. Second, China might use its theater nuclear forces to threaten a nuclear strike or engage in nuclear signaling operations to reestablish deterrence during a conflict, though this might violate China’s NFU policy. The

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location of China’s theater nuclear forces suggests they are oriented toward missions involving India, the South China Sea, and the East China Sea.\(^{68}\)

**Recommendations for Congress**

Based on the above analysis, I make the following recommendations for Congress.

*First, Congress should support open-source collection and analysis on China’s nuclear weapons.* Research on any state’s nuclear weapons policies and practices is difficult. This is especially true of China, which is remarkably opaque about its nuclear forces. Open-source research, including from military reporting, news media, PLA doctrinal and curricular materials, public-facing government documents, and academic reports, is incredibly valuable to better understanding China’s nuclear weapons programs, including the roles China assigns to its theater nuclear weapons systems, the drivers and future trajectory of China’s nuclear forces, and the role of the emerging air and sea legs of China’s nuclear triad. However, the U.S. government has erected obstacles to open-source research. In June 2019, the Open Source Enterprise (OSE) was decommissioned and its contents transferred to restricted networks.\(^{69}\) The OSE had previously provided valuable access to open source information about the Chinese military and its nuclear forces. This access is particularly valuable given the increasing challenges of conducting fieldwork in China. In its 2019 annual report to Congress, the Commission recommended “direct[ing] the Office of the Director of National Intelligence to restore the unclassified Open Source Enterprise website to all of its original functions for U.S. government employees. Access to the Open Source Enterprise should also be expanded by making appropriate materials available to U.S. academic and research institutions.”\(^{70}\) However, the Commission’s 2020 annual report omitted this recommendation and there has been no indication of movement in restoring OSE or a replacement service. Congress should direct the Director of National Intelligence to restore the unclassified OSE, make it available to U.S. academic and research institutes, and ensure appropriate funding for the secure collection, translation, and dissemination of open sources.

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Second, Congress should facilitate strategic nuclear dialogue between China and the United States. Dialogues, whether official or at the Track-1.5 and Track-2 levels, can be incredibly valuable in gaining insights into Chinese nuclear weapons issues and communicating the policies and views of the U.S. government. The United States can use dialogues to seek clarity about the role of China’s theater nuclear forces, the drivers and extent of Chinese conventional-nuclear entanglement, Chinese views of escalation and signaling dynamics, and China’s requirements and goals for nuclear forces. In the past, the Defense Threat Reduction Agency (DTRA) played an important role in funding and supporting U.S.-China dialogues on nuclear issues. In 2019, however, DTRA ended its support amid frustration with inconsistent Chinese participation and the Chinese government’s continued refusal to commit to an official dialogue. Congress can support dialogue in several ways. First, Congress can direct the Secretary of Defense, through DTRA, to fund and support unofficial and official dialogues between the United States and China on nuclear weapons issues. Second, Congress should provide the appropriate funding necessary to realize this goal. Third, Congress can investigate the role of U.S. policy in facilitating or hindering official dialogues, including, for instance, the costs and benefits of the United States acknowledging nuclear mutual vulnerability with China, which has been a key Chinese prerequisite for initiating official dialogue.

Third, Congress should investigate the role of U.S. BMD developments in driving undesirable Chinese nuclear policy choices and consider options to appropriately adjust U.S. BMD policy. As discussed, Chinese concerns about U.S. BMD capabilities are a key driver of China’s nuclear insecurity. While these concerns may be misplaced or disputable, they appear sincerely held. Recent U.S. actions on BMD have only exacerbated those concerns. For instance, the 2017 National Defense Authorization Act (NDAA) revised the 1999 National Missile Defense Act by removing the word “limited” from descriptions of planned U.S. BMD deployments. This deletion, along with analogous statements from administration officials, signaled a more expansive BMD goal, one which might potentially impact China’s nuclear forces and further drive China’s nuclear expansion. The 2018 NDAA reinforced this move by

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significantly expanding the work of the Missile Defense Agency (MDA).\textsuperscript{75} Congress can direct appropriate U.S. government agencies to study issues such as the role of U.S. BMD capabilities in driving Chinese nuclear programs, the potential threat U.S. BMD capabilities might present to China’s nuclear deterrent, the technical feasibility of distinguishing between theater and strategic BMD capabilities, and the potential strategic costs and benefits of specific BMD programs. This may help the U.S. government better balance the benefits of BMD developments with their potential costs.

\textit{Finally, Congress can lay the foundation for cooperative nuclear arms control with China, focused on crisis stability mechanisms.} The United States government has expressed an interest in enlisting China’s participation in nuclear arms control, which could address many U.S. concerns. The near-term likelihood of any formal U.S.-China arms control agreements is very low, but the United States can work now to lay the groundwork for future initiatives. Areas of possible cooperation include crisis-communications and crisis-management capabilities such as through the National and Nuclear Risk Reduction Center, joint technical assessments of BMD systems, Chinese observer participation in (mock) New START inspections, and advanced notification agreements covering major exercises and launches. Congress could eventually support the development of relationships between the National Nuclear Security Administration (NNSA) and the U.S. National Laboratories and Chinese counterparts.\textsuperscript{76} Some of these efforts might be hampered by current legal restrictions on U.S.-China military-to-military exchanges. Section 1201 of the 2000 NDAA states that “The Secretary of Defense may not authorize any military-to-military exchange or contact ... if that exchange or contact would create a national security risk due to an inappropriate exposure,” including in the areas of nuclear operations, advanced combined-arms and joint combat operations, surveillance and reconnaissance operations, military space operations, release of classified or restricted information, and access to a Department of Defense laboratory. Although the current level of military-to-military contacts does not come close to violating the restrictions, the U.S. government might desire future contacts which might be restricted. For instance, in 2014, the Chairman of the Joint Chiefs of Staff suggested that, depending on Chinese participation in the RIMPAC exercises, Congress might reconsider the 1201 restrictions.\textsuperscript{77} Congress could direct the Congressional Research Service or the Secretary of Defense to investigate whether and to what extent the


Section 1201 restrictions would hamper potentially beneficial cooperation and consider revising the restrictions as necessary.\textsuperscript{78}

\textsuperscript{78} For some more suggestions about reexamining U.S.-China military-to-military contacts, see Joel Wuthnow, “Projecting Strength in a Time of Uncertainty: China’s Military in 2020,” Testimony before the U.S.-China Economic and Security Review Commission, 9 September 2020, pp. 22-23.