# 11. THE CHINESE SECOND ARTILLERY CORPS: TRANSITION TO CREDIBLE DETERRENCE

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## INTRODUCTION

The concepts, history, organization, force structure, and posture of China's Strategic Rocket Forces (also known as the "Second Artillery" from the Chinese *Dierpaobing*) remain some of the most heavily shrouded and poorly understood aspects of the Chinese military. Yet, as China undergoes a continued qualitative and quantitative modernization of its nuclear and conventional missile forces, to include improved mobility, reliability, accuracy and firepower, concerned analysts are compelled to understand and analyze the Second Artillery more precisely, including its evolving history, organization, and hardware, and their implications for international security.

To date, the most prominent work on these questions has either dwelled primarily on hardware and R&D[1143], focused on doctrinal debates[1144], or described the

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[1143] See, for example, Mark A. Stokes, *China's Strategic Modernization: Implications for the United States*, Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, September 1999; Robert S. Norris, Andrew S. Burrows, and Richard Fieldhouse, *Nuclear Weapons Databook, vol. 5, British, French, and Chinese Nuclear Weapons* Boulder: Westview Press, 1994; and Robert S. Norris and William M. Arkin,

technological development of Chinese strategic forces in the form of political-military histories.[1145] Some past work, now more than ten years old, attempts to weave several of these strands together to present a "cultural" analysis of these issues.[1146] More recent work from the mid-1990s by Johnston and Xue goes farthest in providing more unifying analyses which carefully draw together aspects of doctrine and force structure, yet this work to requires some reexamination in light of China's current strategic modernization efforts.[1147]

An updated and more comprehensive framework is needed to understand the Second Artillery's past, present, and future. Such an analysis would fully pull together China's declared nuclear principles with an empirical assessment of the Second Artillery's history, organization, and force structure. Taking such an approach, we reach several key findings on the Second Artillery's nuclear and conventional posture:

- The organizational history of the Second Artillery appears to be largely shaped by the introduction of *successively more sophisticated missile systems* in its arsenal, necessitating modifications of deployment, command and control, and procedures;
- One important trend in the current organizational structure is the introduction of *conventional missile units* alongside the traditional nuclear forces, suggesting a new tactical dimension to the force's roles and missions, including greater operational integration with other services of the PLA.
- From a technical perspective, while we agree with analysts who highlight the role of technology in shaping Chinese doctrine, we go beyond the somewhat simplistic understanding that technology drives doctrine. Rather, we see patterns of rational strategic choice made for China's nuclear posture, though technology limited the realm of the possible for Chinese leaders. Perhaps it

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"British, French, and Chinese Nuclear Forces," *Bulletin of the Atomic Scientists,* November/December 1996.

[1144] Alastair Iain Johnston, "China's New 'Old Thinking': The Concept of Limited Deterrence," *International Security*, vol. 20, no. 3, winter 1995/96.

[1145] See, for example, John Wilson Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age*, Stanford: Stanford University Press, 1994; and John Wilson Lewis and Xue Litai, *China Builds the Bomb*, Stanford, CA: Stanford University Press, 1988.

[1146] Chong-pin Lin, *China's Nuclear Weapons Strategy: Tradition within Evolution*, Lexington, Massachusetts: Lexington Books, 1988.

[1147] Alastair Iain Johnston, "Prospects for Chinese Nuclear Force Modernization: Limited Deterrence Versus Multilateral Arms Control," *China Quarterly,* June 1996; and Litai Xue, "Evolution of China's Nuclear Strategy," in John C. Hopkins and Weixing Hu, eds., *Strategic Views from the Second Tier: The Nuclear Weapons Policies of France, Britain, and China*, New Brunswick, New Jersey: Transaction Publishers, 1995.

could be said that the Chinese made a *virtue out of necessity* in the construction of their nuclear deterrent, accepting the technological constraints of the system and making rational choices under those constraints.

- The evolution over time of China's doctrine and force structure is the story of trying to close the gap between real capability on the one hand, and what one might call "aspirational doctrine" on the other. In the U.S., the appropriate analog would be a comparison of current operational doctrine, as outlined in the Joint Doctrine publications series, with an aspirational doctrine, such as Joint Vision 2010. In the Chinese case, the discontinuity between reality and aspiration is oftimes referred to as the "capabilities-doctrine gap." At the present stage in the Second Artillery's modernization, China is nearing an historic convergence between doctrine and capability, allowing it to increasingly achieve a degree of *credible minimal deterrence* vis-à-vis the continental United States – a convergence of its doctrine and capability it has not confidently possessed since the weaponization of China's nuclear program in the mid-1960s.
- Looking ahead, the doctrine and force structure of China's Second Artillery should be analyzed at three distinct levels, reflecting a multi-faceted force with very different missions: a posture of *credible minimal deterrence* with regard to the continental United States and Russia; a more offensive-oriented posture of *limited deterrence* with regard to China's theater nuclear forces; and an *offensively-configured, preemptive, counterforce warfighting posture* of "active defense" or "offensive defense" for the Second Artillery's conventional missile forces.

In reaching these findings, the work proceeds in six sections. First, we briefly consider several *declaratory principles* which have traditionally defined the Second Artillery's mission. Second, we provide an *historical overview* of the Second Artillery. In the next two sections, we detail the *operational organization* and *force structure* of the Second Artillery. A final two sections draw this analysis together to reach conclusions about the Second Artillery's *likely future force posture*, and its implications for international security.

## CHINA'S NUCLEAR WEAPONS PRINCIPLES

We begin our analysis with an overview of China's traditionally declared nuclear-weapons principles. These principles are as close as China gets to a publicly declared "doctrine" for nuclear weapons. In the absence of an open and official declaration of the Second Artillery's doctrine, we examine these principles as a way to introduce China's conceptual approach to its strategic forces, and to inferentially deduce certain aspects of China's nuclear posture. In addition, a close examination of these principles reveals certain unanswered questions and inconsistencies which open the door to new and evolving missions for the Second Artillery. We consider these declared principles in

three parts: China's no-first-use principle, its negative and positive security assurances, and its declared adherence to nuclear weapon free zone agreements.[1148]

**No First Use**

Public Chinese statements consistently reiterate the "defensive" purpose of Chinese nuclear weapons to counterbalance foreign threats. Chinese leaders decided to pursue nuclear weapons in January 1955 due to U.S. nuclear threats during the Korean War and Taiwan Straits crisis of the early 1950s.[1149] In a statement issued on the day of its first nuclear explosion in October 1964, China cited this achievement in its "struggle to strengthen [its] national defense and oppose the U.S. imperialist policy of nuclear blackmail and nuclear threats":

> China cannot remain idle in the face of the ever-increasing nuclear threats from the United States. China is conducting nuclear tests and developing nuclear weapons under compulsion...China is developing nuclear weapons for defense and for protecting the Chinese people from U.S. threats to launch a nuclear war.[1150]

This declared "defensive" nuclear policy has changed little in the subsequent 35-plus years that China has been a nuclear weapon state. In a July 1997 speech to the U.S. Army War College, Lt. General Li Jijun, Vice President of the PLA's Academy of Military Science, reiterated China's public position regarding its nuclear posture:

> China's nuclear strategy is purely defensive in nature. The decision to develop nuclear weapons was a choice China had to make in the face of real nuclear threats. A small arsenal is retained only for the purpose of self-defense. China has unilaterally committed itself to responsibilities not yet taken by other nuclear nations, including the declaration of a no-first-use policy, the commitment not to use or threaten to use nuclear weapons against non-nuclear states and in nuclear-free zones...In short, China's strategy is completely defensive, focused only on deterring the possibility

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[1148] The database on China compiled by the East Asia Nonproliferation Project, Center for Nonproliferation Studies, Monterey Institute of International Studies, is particularly helpful in covering the Chinese nuclear principles discussed here.

[1149] See, for example: Lewis and Xue, *China Builds the Bomb,* pp. 11-34.

[1150] Statement of the Government of the People's Republic of China, 16 October 1964, found in Lewis and Xue, *China Builds the Bomb*, pp. 241, 242.

> of nuclear blackmail being used against China by other nuclear powers.[1151]

The cornerstone of this publicly-declared defensive position is China's NFU policy. Since first detonating a nuclear device in October 1964, China has consistently declared an unconditional NFU policy.[1152] Since that time, China has persistently proposed that nuclear weapon states conclude a no-first-use agreement. The achievement of such an agreement was one of China's initial bargaining points in its CTBT negotiations. Later, China sought to gain such an agreement with the United States in return for a Sino-U.S. detargeting pledge. Neither of these efforts succeeded, though the CTBT was completed and a Sino-U.S. detargeting deal was reached. However, China and Russia signed a bilateral NFU accord in September 1994.

**Negative and Positive Security Assurances**

Another set of declaratory principles involves both negative and positive security assurances (NSAs and PSAs). As for NSAs, China's declaratory stance is clear:

> China undertakes 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. This commitment naturally applies to non-nuclear-weapon States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons [NPT] or non-nuclear-weapon States that have undertaken any comparable internationally binding commitments not to manufacture or acquire nuclear explosive devices.[1153]

Of note here is China's pledge not to use nuclear weapons against non-nuclear weapon states (i.e. Japan) under any circumstances; the U.S. NSA, for example, is conditional in retaining the possibility of nuclear weapons use against non-nuclear weapon states who take part in an attack on U.S. territory, armed forces, or allies.[1154]

As for PSAs, China has agreed with the other four major nuclear weapon states (France, Great Britain, Russia and the United States) to work within the Security Council

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[1151] Lieutenant General Li Jijun, *Traditional Military Thinking and the Defensive Strategy of China*, Letort Paper No. 1, Carlisle Barracks, PA: U.S. Army War College, 29 August 1997, p. 7.

[1152] China's no-first-use pledge: "China undertakes not to be the first to use nuclear weapons at any time or under any circumstances." See *China's National Statement On Security Assurances*, 5 April 1995.

[1153] Ibid.; see also China's white paper entitled *China: Arms Control and Disarmament,* Beijing: Information Office of the State Council, November 1995.

[1154] As presented by Ambassador Steven J. Ledogar, U.S. Ambassador to the Conference on Disarmament, 6 April 1995.

to take "appropriate measures to provide … necessary assistance to any non-nuclear weapon State that comes under attack with nuclear weapons."[1155] The precise nature of the assistance is not elaborated, and the Chinese statement makes clear that this position does not in any way compromise its desire for a universal NFU pledge and unconditional NSAs, nor does it endorse the use of nuclear weapons.

Of related note, Chinese declaratory policy is particularly critical of the policy of extended nuclear deterrence, or so-called "nuclear umbrellas," provided by other nuclear weapon states to their allies. In operational terms, this means China officially opposes the deployment of nuclear weapons outside national territories, and states that it has never deployed nuclear weapons on the territory of another country, a point corroborated by open-source evidence. When Japan sanctioned China for continued nuclear testing in 1995 and 1996 during the course of the CTBT negotiations, Beijing derisively dismissed Japanese censure as hypocritical, citing the fact that Japan enjoyed the protection of extended deterrence.

**Nuclear Weapon Free Zones**

China has signed onto several nuclear weapon free zone (NWFZ) treaties. These are the Treaty of Pelindaba (Africa NWFZ), the Treaty of Raratonga (South Pacific NWFZ), and the Treaty of Tlatelolco (Latin American NWFZ). During the ASEAN Regional Forum Minister's meeting in July 1999, China stated it would also sign the Southeast Asian NWFZ Treaty. In its 1995 white paper on arms control and disarmament, the Chinese government stated its support for "the establishment of nuclear-free zones in the Korean Peninsula, South Asia, Southeast Asia, and the Middle East."[1156]

At a conference focusing on a Central Asian NWFZ convened in Tashkent in September 1997, a Chinese Foreign Ministry official heading the Chinese delegation listed seven principles related to the establishment of NWFZs. Among them, China insisted that "any other security mechanism" should not interfere with the non-nuclear status of a nuclear weapon free zone, including military alliance relationships. In addition, perhaps with reference to the South China Sea, the Chinese official declared that NWFZs should not include "areas where there exist disputes over sovereignty of territory or maritime rights." He also called on nuclear weapon states to commit to an unconditional pledge not to use nor threaten to use nuclear weapons against NWFZs.

In practice, China's adherence to NWFZ pledges does not greatly affect its nuclear weapon deployments, especially given that it deploys no nuclear weapons abroad. Should China sign and ratify the Southeast Asian NWFZ Treaty, then presumably this would place an added political onus on its ability to threaten or use nuclear weapons against such targets as Vietnam or the Philippines, and, depending on caveats, if any, at the time of its signing, could also affect use in the South China Sea. However, the pledges of nuclear weapon states to adhere to NWFZs are not verifiable, and some include escape

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[1155] See China's National Statement.

[1156] See China: Arms Control and Disarmament.

clauses. For example, in signing the Treaty of Raratonga (South Pacific NWFZ), China stated that it could reconsider obligations in the event that other nuclear weapon states or treaty parties violated the treaty.

**Conceptual Contradiction and Evolution**

In reviewing these principles, we note a number of inconsistencies relevant to China's Second Artillery force modernization and doctrinal evolution.

First, a number of questions attend China's no-first-use (NFU) pledge. First, such a pledge is highly symbolic – it is not verifiable and any violation of the pledge would not be detected until it is too late. Second, as a practical matter, we need to recognize that the NFU pledge is probably less an altruistic principle, and more a simple reflection of the traditional operational constraints imposed on Chinese doctrine by the country's qualitatively and quantitatively limited nuclear arsenal: China maintains an NFU pledge because it fits with the realities of nuclear weapons inventory. As its force structure changes, so too might its NFU principle. Over the years there have been some indications that China's pledge may not be relevant to the first-use of nuclear weapons on Chinese soil. Faced with the threat of a conventional Soviet invasion in the 1980s, Beijing's military strategists argued that the first-use of nuclear weapons on Chinese territory would not have violated its NFU pledge. Similarly, mounting evidence in Chinese military writings and through interviews suggests increased unhappiness within the PLA about the NFU pledge, especially in consideration of the overwhelming stand-off conventional force of countries such as the United States. Revisions to the NFU pledge could advocate launch-on-warning or launch-under-early-attack policies.[1157]

In adhering to its NSA and PSAs, China's deployments and targeting would presumably be focused only on nuclear weapon states and possibly other states not party to the NPT or similar arrangements (such as India, for example). However, several questions arise about China's commitments, particularly with regard to NSAs. For example, like the NFU pledge, China's NSAs are not verifiable or enforceable. Also, the pledge would not apply to such states as India, Israel and Pakistan, which are not members of the NPT. Even if they joined, the question arises whether China's NSA would apply to a country such as India, which while not officially recognized by China as a nuclear weapon state, certainly has attained such *de facto* status.

In addition, observers question the need for certain Chinese deployments – such as the DF-21 series – insofar as its range and basing means its possible targets largely comprise non-nuclear weapon states. For example, the DF-21's basing and ranges suggest targets in Japan, Korea, Okinawa, the Philippines, or Vietnam, in addition to targets in the Russian Far East and India. If it is true, as asserted by Lewis and Xue, that China's target sets for the DF-3 included U.S. bases in the Philippines and Japan, this also runs contrary to Chinese NSAs. The fact that the DF-3 and-4 series missiles are already capable of reaching Russian and Indian targets raises further questions as to the purpose of the DF-21 series in the context of Chinese NSAs.

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[1157] Johnston, "China's New 'Old Thinking'," pp. 21-23.

We draw a number of points from this discussion of Chinese declaratory principles. First, these traditional principles are generally consistent with a "defensive" posture and a qualitatively and quantitatively limited nuclear arsenal. Given the reality of Chinese nuclear forces, therefore, these pledges come at little to no real "cost" in terms of reductions, disarmament, or dramatic alterations to Chinese nuclear posture overall. Second, with the possible exception of some deployments, such as the DF-21 series ballistic missile, the nuclear principles noted here are consistent with a posture largely concerned with the other major nuclear weapon states (especially the United States and the Soviet Union/Russia), as well as India. Third, nothing in these principles necessarily precludes China's nuclear weapons modernization program, but might place political limits on targeting and use options. Finally, while these principles may give us an overall understanding about China's formally stated views about when it would *not* use nuclear weapons, they provide no details about when they *would*.

In the end, we recognize that not only do these principles raise several unanswered questions, but China's ongoing strategic force modernization introduces pressures to possibly alter and refine them consistent with new strategic realities. Only through an empirical examination of the history, organization, and force structure of the Second Artillery can we address these unanswered questions and better grasp the Second Artillery's future posture.

## HISTORY OF THE SECOND ARTILLERY CORPS

There is little open source information on institutional history of the Second Artillery. Official accounts relate that the service was formally created on 1 July 1966 in Beijing.[1158] Premier Zhou Enlai reportedly chose the name "Second Artillery Corps" (*Dierpaobing*) for the new force, which he sought to distinguish from the PLA's traditional artillery corps (*paobing*).[1159] Zhou also reportedly allocated the national People's Armed Police headquarters to the force in 1969, when the former was disbanded.[1160] By 1986, the Second Artillery built its own headquarters in Xishan,

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[1158] Song Shilun, ed., *Zhongguo junshi baike quanshu: junzhi fence (shang)* [Chinese Encyclopedia of Military Affairs: Volume 1], Beijing: Junshi kexue chubanshe, 1995, p. 280.

[1159] "The Casting of China's Shield of Peace – A Record of Actual Events in the Development of the Second Artillery," *Xinhua*, 7 July 1996, in FBIS-CHI-96-137, 7 July 1996.

[1160] This explains the sometimes-heard misconception that the Second Artillery shielded the PAP from the excesses of the Cultural Revolution. In fact, the national-level PAP was abolished, and its political commissars stayed in place to perform the same role for the new tenant. The authors are grateful to Michael Schoenhals for this insight.

which can be seen from the road to the Badaling section of the Great Wall, northwest of Beijing.[1161]

The overall institutional development of the Second Artillery can be divided into four critical phases.[1162] Phase one was the "implementation of the plan of building strategic weapons in 1962. Phase two, which lasted from 1964 to 1977, centered on was research and development. Phase three, beginning in 1986 and ending in 1993, focused primarily on the replacement of the older generation of weapons. Phase four, which spans 1994 to the present, is principally concerned with the upgrading, development, and preparatory research.

Though the Second Artillery itself was created in 1966, the construction of China's missile capability and corresponding infrastructure assets began a number of years earlier. In 1956, the Central Committee Secretariat and the Politburo reportedly made the decision to develop guided missiles.[1163] In October 1956, the Defense Ministry's Fifth Academy, China's first guided missile technology research institute, was established.[1164] On 9 December 1957, more than 6000 cadres and soldiers from various military units and scientific research institutes reportedly established a ground-to-ground guided missile (*didi daodan*) training brigade.[1165] In June 1959, the Central Military Commission decided to dissolve the training group and establish two strategic guided missile combat battalions.[1166] On 18 March 1960, the first of the two proposed battalions was formally established at an artillery school in northwest China, with the hope that it would serve as a "seed unit" (*zhongzi budui*) of officers for the units to follow.[1167] On 10 September 1960, China successfully launched its first R-2 guided missile, with help from the Soviet

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[1161] From "Revealing Secret of China's Procedure for Pressing Nuclear Button", in *Tai yang pao* [Hong Kong], 31 January 2000, in FBIS, FTS20000206000049.

[1162] These demarcations can be found in "Jiang Zemin Defines Position of China's Strategic Rocket Forces", *Tai yang pao* [Hong Kong], 17 July, 2000, in FBIS, CPP20000717000021.

[1163] Liu Jingzhi, "Proudly Smiling at the Vast Sky – On the 50 Years of China's Missile Family," *Guangming ribao*, 14 September 1999, in FBIS, 17 September 1999.

[1164] Ibid.

[1165] Zhang Jiajun and Zao Zhi, "The Strong Contingent of Secret Rockets – The Historical Course of China's Strategic Guided Missile Units," *Xinhua*, 7 July 1996, in FBIS-CHI-96-135, 7 July 1996. The brigade designation of the unit can be found in Zhang Jiajun and Sun Jinhan, "Casting the Shield of Peace – Second Artillery Commander Yang Guoliang and Political Commissar Sui Yongju Talk About Building of Strategic Missile Force," *Liaowang*, No. 29, 21 July 1997, pp. 4-7, in FBIS, 28 August 1997.

[1166] Zhang Jiajun and Zao Zhi, "The Strong Contingent of Secret Rockets".

[1167] Ibid. The term "seed unit" and the brigade designation of the unit can be found in Zhang Jiajun and Sun Jinhan, "Casting the Shield of Peace."

Union.[1168] In 1963, the CMC made a decision to establish a strategic guided missile training battleground.[1169] Then deputy chief of staff Zhang Aiping led an inspection team to find a suitable site. On 28 September 1963 (another account claims autumn 1964), "tens of thousands" of officers and men from 88 army units assembled to construct the first strategic guided missile base.[1170] In October 1963, the missile battalion launched its first missile.[1171] China's first atomic bomb was successfully detonated on 16 October 1964, paving the way for the mating of weapon to delivery vehicle.

Other developmental milestones followed the formal establishment of the unit. According to official sources, the missile force in the "mid-seventies" organized a "long-range firing exercise with live warheads," involving "moving, camouflaging, and launching."[1172] The same source reports that this was the first time that the force operated "independently" as well as the first time that it employed "mechanized features," suggesting mobility. The soldiers fired four missiles in a "very short time" that hit their targets, leading Chinese experts to conclude that China's missile inventory was moving toward "maturity." On 18 May 1980, China successfully launched its first intercontinental ballistic missile.[1173] In the early 1980s, the missile force reportedly conducted its first "large-scale combined battle exercise" (*hecheng xunlian zhanyi yanxi*). These trends were conducted in parallel with the testing and deployment of an increasingly capable inventory of missiles, explored in much greater detail in the force structure section below. On National Day in 1984, a Chinese strategic missile formation paraded through Tiananmen Square, marking the first public appearance of Second Artillery units.[1174] A similar appearance was made at the 50th anniversary celebration in October 1999. In the early winter of 1994, the Second Artillery reportedly conducted its first "position survival exercise," involving emergency nuclear and chemical pollution monitoring and clean-up after being subjected to a surprise nuclear attack and launching a nuclear counterattack.[1175]

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[1168] Liu Jingzhi, "Proudly Smiling at the Vast Sky."

[1169] Zhang Jiajun and Zao Zhi, "The Strong Contingent of Secret Rockets."

[1170] "The Casting of China's Shield of Peace – A Record of Actual Events in the Development of the Second Artillery," *Xinhua*, 7 July 1996, in FBIS-CHI-96-137, 7 July 1996.

[1171] Xu Zuzhi, "China's Strategic Missile Unit Now Possesses Fighting Capability Under High-Tech Conditions," *Zhongguo xinwen she*, 1 October 1999, in FBIS-CHI-1999-1002, 1 October 1999.

[1172] "The Casting of China's Shield of Peace."

[1173] Liu Jingzhi, "Proudly Smiling at the Vast Sky".

[1174] Xu Zuzhi, "China's Strategic Missile Unit."

[1175] Ibid.

One of the most significant recent developments for the Second Artillery has been the introduction of conventionally-tipped missiles into its inventory, particularly short-range ballistic missiles aimed at Taiwan such as the Dongfeng-15 (DF-15) missile, known more commonly in the West by its export designation, M-9, or the Pentagon as the CSS-6; and the shorter-range Dongfeng-11 (DF-11), also known as the M-11 or CSS-7. Other systems discussed in the context of a Taiwan scenario are the DF-21 (CSS-5) and other longer-range systems.

From open sources, the DF-15 is judged to have a range of roughly 600km, with a payload of 500kg. It is capable of delivering both conventional and nuclear payloads, as well as chemical, biological, and cluster munition warheads. Estimates of CEP were initially pegged at 600m. This assessment was based on an algorithm that calculated CEP as 1% of range. Since 1996, there have been frequent reports that the Chinese are attempting to improve the guidance of these missiles utilizing the U.S.-built Global Positioning System (GPS) satellite cluster.[1176] In their 1996 RAND report on GPS-aided guidance for ballistic and cruise missiles, Irving Lachow and Gerald Frost concluded that a hypothetical missile with the DF-15's parameters, aided by GPS correction in the boost phase, could achieve significant improvements in accuracy.[1177] The M-11 SRBM, also known as the DF-11 or CSS-7, is a mobile, solid-fueled missile with a 300km missile and a 500kg payload. A recent Department of Defense report asserted that the M-11 "has not yet entered the PLA's inventory," though "an improved, longer-range version may be under development."[1178]

## ORGANIZATION OF THE SECOND ARTILLERY CORPS

The Second Artillery is China's Strategic Rocket Force, commanding its conventional- and nuclear-tipped missile arsenal. Unlike the Soviet Strategic Rocket Forces, the Second Artillery is not a service branch (*junzhong*), on par with the Ground Forces, Navy, and Air Force (known collectively in Chinese as *luhaikong*). Instead, the Second Artillery is only a service arm (*bingzhong*), which is one-half notch lower in bureaucratic rank.[1179] This, rather than attempts at deception, probably explains why Chinese discussions of the service branches never includes the Second Artillery.

The Second Artillery, with an estimated 90,000 personnel, consists of headquarters elements, six launch bases (*jidi*), one engineering design academy, four research

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[1176] This analysis can be found in Irving Lachow and G. Frost, "Satellite Navigation-Aiding for Ballistic and Cruise Missiles," Santa Monica, Calif: RAND, RP-543, 1996.

[1177] Ibid.

[1178] Secretary of Defense, "The Security Situation in the Taiwan Strait," Report to Congress Pursuant to the FY99 Appropriations Bill, 1 February 1999.

[1179] For a discussion of service branches versus service arms, see Song Shilun, ed., *Zhongguo junshi baike quanshu*, pp. 141-143. Other service arms include tank, artillery, air defense, engineering, communication, and chemical defense units.

institutes, two command academies, and possibly an early warning unit.[1180] As key operational strike units, brigades are likely only assigned one type of missile to facilitate command and logistics. The Second Artillery headquarters and subordinate bases oversee warhead and missile storage facilities; maintenance units; and special warhead/missile transportation services.[1181]

As a strategic-level asset, the Second Artillery is subject to strict command and control from the center. By necessity, it is therefore a very stove-piped institution, perhaps the most vertically integrated of all units within the People's Liberation Army. At the top of the structure sits the Second Artillery Headquarters, followed by the missiles bases and their subordinate launch brigades and companies.

**Headquarters (*Silingbu*)**

The headquarters of the Second Artillery shares many of the same organizational features as other headquarters units within the PLA's service branches. The national-level HQ is theoretically the highest command authority, and bears particular responsibility for policy, training and equipping the Rocket Forces. The HQ likely enjoys functional (*yewu*) control over planning, requirements, and budgeting, while the bases exercise administrative (*xingzheng*) control over the units in the field. During peacetime, the HQ likely maintains operational control of the forces, but wartime situations most likely would necessitate ad hoc arrangements. For the conventional forces, Chinese sources suggest a "skip echelon" command structure would be established, with the national command authority in Beijing dealing directly with a temporary "war front" (*zhanqu*) command.[1182] During a wartime situation, multiple conventional brigades would be subsumed into a conventional theater missile corps (*juntuan*) consisting of a corps command post, a corps logistics command post, and a number of subordinate theater missile brigades each with different types of theater missiles (see Figure 11.1). The corps command post would largely consist of command authorities from Beijing and Huangshan.[1183] The theater command center (*zhanyi zuozhan zhongxin*) would direct

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[1180] Bases are located at Shenyang (80301 Unit); Huangshan (80302 Unit); Kunming (80303 Unit); Luoyang (80304 Unit); Huaihua (80305 Unit); and Xining (80306 Unit).

[1181] "The Strategic Nuclear Force Organization," in *Guojia junzhixue* [The Science of the State Military System], undated, p. 3.

[1182] See Liu Zhenwu, ed., *Xiandai jundui zhihui* [Modern Military Command and Control], 2nd ed., Beijing: National Defense University Press, 1994, pp. 393-394.

[1183] *Lianhe zhanyi di erpaobing zuozhan*, p. 4. Another article supports the assertion that conventional Second Artillery units would be subsumed into the theater command structure, but notes that Beijing may direct operations though the Second Artillery chain-of-command. See Li Junsheng, "*Lianhe zhanyi didi changgui daodan budui zuozhan zhihui wenti tantao*" [Inquiry Into Joint Conventional Theater Surface-to-Surface Missile Unit Operational Command Problems], in *Lianhe zhanyi yu*

the missile campaign as one component of a joint strike force that also would include air forces, ground force artillery and tactical missiles, electronic attack assets, and special operations.[1184] Coordination will be carried out via a firepower coordination cell (*huoli xietiaozu*) within the theater command center.[1185]

For the nuclear forces, the evidence strongly suggests that the national command authority in Beijing would always retain strict control.[1186] Reportedly, the authority to use nuclear weapons rests collectively with the Standing Committee of the Political Bureau and the Central Military Commission (both groups now headed by Jiang Zemin).[1187]

In peacetime, the Second Artillery HQ staff is led by a primary echelon of comprised of four "first-level" (*yijibu*) departments (see Figure 11.2): headquarters department (*silingbu*), political (*zhengzhibu*), logistics (*houqinbu*), and technical and equipment department (*jizhuangbu*)/armament department (*zhuangbeibu*). These departments have a vertical (*tiao*) relationship with the four general departments in Beijing.[1188] Other top-level units include the discipline inspection commission (*jilu jiancha weiyuanhui*), which is probably subordinate to the Second Artillery Party Committee and the Central Military Commission's Discipline Inspection Commission.[1189]

Key personnel at Second Artillery HQ include the commander (*silingyuan*), political commissar (*zhengwei*), deputy commanders (*fusilingyuan*), deputy political commissars (*fuzhengwei*), and department directors. The principal leadership body within

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*junbingzhong zuozhan,* pp. 228-231. Li is from an unidentified (probably Second Artillery) Third Research Institute.

[1184] Guan Lingen, "Brief Analysis of Combined Fire Assault," *Jiefangjun bao*, 21 April 1998, p. 6, in FBIS-CHI-0519-98.

[1185] See Sun Xiaohe, "*Jiaqiang huoli xietiao, fahui zhengti weili*" [Strengthen Firepower Coordination, Give Play to Comprehensive Power], in *Lianhe zhanyi yu junbingzhong zuozhan* [Joint Theater and Service Operations], Beijing: National Defense University Press, 1998, pp. 281-285. Senior Colonel Sun is Deputy Director of the Guangzhou Military Region Service Arms Department.

[1186] See Michael Swaine, The Military and Political Succession in China: Leadership, Institutions, Beliefs, Santa Monica, Calif.: RAND, R-4254-AF, 1992, pp.122-27.

[1187] See "Revealing Secret of China's Procedure for Pressing Nuclear Button."

[1188] Kenneth Lieberthal and Michel Oksenberg, *Policy Making in China: Leaders, Structures, and Processes*, Princeton, New Jersey: Princeton University Press, pp.141-142.

[1189] Wang Shiyou, "*Qufen dangji zhengji, shixing kou ban'an* [Differentiate Party Discipline and Government Discipline and Implement with Appropriate Agencies]," *Jiefangjun bao*, 9 December 1987.

the forces is the HQ party committee. Extrapolating from other similar units in the PLA, the political commissar is likely the secretary of the party committee, with the commander serving as deputy secretary. The other leadership personnel listed above would likely form the standing committee (*changwei*) of the party committee.

**Headquarters Department *(Silingbu)***

The Headquarters Department manages the organizational structure, plans, deployment, transfer, and battlefield development of the Second Artillery operational and support troops. It is headed by a chief of staff and three deputy chiefs of staff. During a crisis, the apex of the HQ department is likely the Second Artillery Command and Control Center (*Erpao zhihui kongzhi zhongxin*).[1190] According to reports, a centralized crisis command center was established at Xishan in 1986, with two subordinate command centers set up in Wuwei in the Lanzhou Military Region and in Mianyang, in the Chengdu Military Region. At the time these subordinate centers were under the direction of Yang Dezhi and Yu Qiuli; command for the regional centers was transferred to Hong Xuezhi and Chi Haotian with the ascent of Jiang Zemin to chair the Central Military Commission in 1989. In 1995, three more regional command centers were reportedly established at Taiyuan, Shanxi province, Lushan, Henan province, and Weining, Guizhou province.[1191]

Some second-level departments (*erjibu*) can be identified (see Figure 11.3):

- The Political department (*zhengzhibu*) is charged with overseeing political work within the headquarters department. Probably has vertical relationship with the General Political Department and a horizontal relationship with the Second Artillery HQ Political Department. Division likely contains subordinate cadre affairs, party affairs, and propaganda divisions.
- The Communications department (*tongxinbu*) is responsible for the construction and transmission of communications between the Second Artillery headquarters and superordinate and subordinate units. It is known to have an Electronic Countermeasures (ECM) Regiment and a Communications Regiment, as well as a number of communications main stations (*tongxin zongzhan*).
- The training department (*junxunbu*) is probably responsible for developing training policies for subordinate bases and launch brigades.
- The military affairs department (*junwubu*) is probably responsible for general Second Artillery HW affairs, organizational issues, and recruiting.

Two additional likely second-level departments (*erjibu*) are an intelligence department (*qingbaobu*), charged with intelligence analysis, and a schools department (*junxiaobu*), responsible for planning, budget, regulations, facilities, administration,

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[1190] Lu Chunming, "*Zhichu zuozhan zhihui zonghe kongzhitai* [Integrate Operational Command And Control Platforms], *Jiefangjun bao*, 13 August 1988.

[1191] See "Revealing Secret of China's Procedure for Pressing Nuclear Button."

curricula, students, and staff at the Second Artillery's various professional military education institutions. Other incidental units include a mapping unit (*ditu dadui?*), computer center, weather center, and scientific research division (*keyanchu*). The scientific research division reportedly has a technology division (*jishuchu*).[1192] The mapping unit combines more than 10 types of specialized mapping sub-units, including a terrain squadron (*dizing zhongdui*).

**Political Department *(Zhengzhibu)***

The Political Department is charged with political work within the Second Artillery. It is led by a director, four deputy directors, and the directors of the divisions. Along with the party committees (*dang weiyuanhui,* or *dangwei* for short) and the political commissar system (*zhengwei*), the political department (*zhengzhibu*) manages personnel, propaganda, and morale affairs. Known second-level departments (*erjibu*) of the political department itself include (see Figure 11.4):

- The general office (*bangongshi*) is responsible for staff and paperwork within the Second Artillery political department. It likely contains subordinate units responsible for secretaries (*mishuchu*), documents (*guan dang'an chu*), and a confidential bureau (*jiyao*) for couriers and encrypted communications.
- The organization department (*zuzhibu*) is responsible for party affairs, overseeing the party committees throughout the Second Artillery HQ and at lower levels.
- The propaganda department (*xuanchuanbu*) is responsible for the dissemination of propaganda to lower levels, including internal Second Artillery publications like 2nd Artillery's internal newspaper and the *neibu* journal *Changying* [Flying Eagle].
- The security department (*baoweibu*) is responsible for all security affairs, ranging from physical security to counterintelligence.
- The culture department (*wenhuabu*) is in charge of cultural education and recreational affairs, and likely sponsors programs of activities for the rank-and-file.

Other likely second-level departments (*erjibu*) include:

- The cadre department (*ganbubu*) is responsible for personnel matters, including appointments, promotions, demotions. It likely includes a retired cadre bureau (*laoganbuju*).
- The liaison department (*lianluobu*)

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[1192] Zhang Jiajun, "*Chuangzao lianghao keyan huangjing, jiasu guofang keji fazhan* [Building a Quality Research Environment, Enhancing National Defense Development]," *Jiefangjun bao*, 10 April 1989.

- The mass work department (*qungongbu*) is responsible for relations between the Second Artillery headquarters and the local government and population.
- The procurate (*jianchayuan*) investigates disciplinary matters. It likely works closely with the Second Artillery Discipline Inspection Commission.
- The court (*fayuan*) tries personnel accused of crimes. It likely interacts with both the procurate and the Discipline Inspection Commission.

**Logistics Department (*Houqinbu*)**

The Logistics Department is responsible for all logistics affairs within the Second Artillery, including budgeting, transportation, fuel, equipment, health, armaments, housing, and logistics training and research. Five main second-level departments can be confirmed (see Figure 11.5):

- The General office (*bangongshi*) is responsible for staff and paperwork within the headquarters department. It likely contains subordinate units responsible for secretaries (*mishuchu*), documents (*guan dang'an chu*), and a confidential bureau (*jiyaoju*) for couriers and encrypted communications.
- The transportation department (*yunshubu*) is responsible for the procurement and maintenance of all Second Artillery transportation. It has a materials division (*qicaichu*)
- The materials and petroleum, oils and lubricants department (*wuzibu*) is mainly responsible for supply of all materials, as well as the procurement, storage, distribution of fuel and fuel-related equipment. The sub-units beneath the materials division are divided between those that deal with "common" (*tongyong*) and "special-use" (*zhuanyong*) materials, the latter of which may involve nuclear materials.[1193]
- The armament department (*junxiebu*)
- The capital construction and barracks department (*yingfangbu*) is responsible for the design, construction, and maintenance of all Second Artillery facilities.
- The health department (*weishengbu*) is responsible for health affairs within the Second Artillery, including medical aid and family planning. It is also likely responsible for the management of all subordinate medical facilities, including hospitals, sanitoriums, and research institutes.

Based on extrapolation from similar units, other likely Logistics Department second-level departments include:

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[1193] Zhang Jiajun, "*Linghuo, duobian, kexue* [Agile, Varied, Scientific]," *Jiefangjun bao*, 28 September 1988.

- The general office (*bangongshi*) is responsible for staff and paperwork within the Second Artillery logistics department. It likely contains subordinate units responsible for secretaries (*mishuchu*), documents (*guan dang'an chu*), and a confidential bureau (*jiyaoju*) for couriers and encrypted communications.
- The political department (*zhengzhibu*) is charged with overseeing political work within the logistics department. Probably has vertical relationship with the General Political Department and a horizontal relationship with the Second Artillery HQ Political Department. Division likely contains subordinate cadre affairs, party affairs, and propaganda divisions.
- The finance department (*caiwubu*) likely formulates the Second Artillery budget, requests funding from the center, dispenses funds to lower levels, and supervises accounting for units at all levels of the system. It likely contains an audit hureau (*shenjiju*).
- The quartermaster department (*junxubu*) is reponsible for the planning, procurement, storage, and distribution of provisions and clothing.

Other ancillary offices likely include the research office (*yanjiushi*), equipment research office (*zhuangbei yanjiushi*), and production management office (*shengchan jingying bangongshi*), which controls farms and other economic units.

**Technical and Equipment Department (*Jizhuangbu*)**

The Technical and Equipment Department is charged with engineering support, equipment maintenance, repair and overhaul of equipment, procurement, R&D, and storage. Units formerly relied on local factories, but in 1984 began working on "self-reliance." In 1987, intermediate and depot-level maintenance on 120 items was achieved. One second-level department, the procurement department (*dinggoubu*), has been identified (see Figure 11.6). Three other sub-units can be identified: a science and technology committee, science and technology information center[1194], and repair and spare parts factories/shops (*xiupeichang/suo*). Other likely second-level departments are a general office (*bangongshi*), which manages staff and paper work within the technical and equipment department, and political department (*zhengzhibu*), which oversees political work within the technical and equipment department.

**Base Units (*Jidi*)**

Beneath the headquarters, the next important organizational unit is the "base," or *jidi*. It shares the same four "first-level" departments as the headquarters (HQ, political, logistics, and technical/equipment), as well as most of the second-level departments(see Figure 11.7). These departments, which perform the same roles as their counterparts though at a lower-level, report horizontally to the base leadership, as well as vertically to their superior units at the national headquarters level. Other corps/base support elements

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[1194] Directory of Military Personalities, October 1999, p. 56.

include a reconnaissance unit (*jizhen dadui*); a surveying/mapping unit (*cehui dadui*); a computer center (*jisuan zhongxin*); a weather center (*qixiang zhongxin*); a communications regiment (*tongxintuan*); an ECM regiment (*dianzi duikangtuan*); and an engineering regiment (*gongchengtuan*). Additional engineering, air defense, and anti-chemical units can be assigned as needed.[1195] Among the units unique to the base level are a set of "equipment assurance units" (*zhuangbei baozhang budui*) which includes a missile/warhead storage unit (*zhuangbei jishu qinwu budui*), a transfer station (*zhuanyunzhan*), and a repair depot (*tezhuang xiulicang*).

**Brigade Units (Nuclear)**

Replicating most of the higher levels of command, a typical nuclear missile brigade contains four first-level departments, including headquarters, political, logistics, and equipment technology (*jizhuangbu*) departments, as well as most of the second-level departments. These offices, which perform the same roles as their counterparts though at a lower-level, report horizontally to the brigade leadership, as well as vertically to their superior units at the base and national headquarters level during non-crisis situations. During crisis and wartime situations, the nuclear brigades likely report directly to the national command center in the Western Hills (*Xishan*) in Beijing.

Very little is known from open sources about the structure of units for the silo-based nuclear brigades. Extrapolating from our understanding of the structure of mobile conventional theater missile brigades, the unique nuclear brigade elements for mobile forces, such as the DF-21 and DF-31, likely include a mobile brigade command post, a central depot (known as a "technical position" or *jishu zhendi*), a transfer point (*zhuanzai changping*), and an assigned set of pre-surveyed launch sites (*fashe zhendi*), as well as a set of reserve (*daiji*) launch sites. A mobile nuclear missile brigade also likely has a set of "equipment assurance sub-units" (*zhuangbei baozhang fendui*).[1196] Brigades probably have multiple firing battalions (*fasheying*), with each battalion assigned multiple companies.[1197] Companies subordinate to the launch battalion likely would be assigned at least one launcher, an electric power generation vehicle (*fadianche*), a surveying vehicle (*cekongche*), a communications command vehicle (*tongxun zhihuiche*), and a

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[1195] Ibid, p. 5. During peacetime, these units are subordinate to the base headquarters.

[1196] Ibid, p. 4. The equipment assurance sub-units, the transfer point, and the transport may be the responsibility of a battalion-level "technical unit" (*jishu ying*). A nuclear brigade's technical battalion manages a warhead station (*dantizhan*), an inspection station (*zhuangjianzhan*), and a technical service station (*jishu qinwuzhan*). See "*Guangrong bang* [Glorious Honor Roll]," *Chang ying* [*Flying Eagle*], undated 2 November 1993, p. 11 (hereafter "Glorious Honor Roll").

[1197] For reference to a fourth battalion within a Second Artillery brigade structure, see "Glorious Honor Roll," p. 10.

missile transport vehicle (*daodan yunshuche*). Battalions and companies would be assigned a zone within which to operate.[1198]

**Brigade Units (Conventional)**

Replicating most of the higher levels of command, a typical conventional theater missile brigade contains four first-level departments, including headquarters, political, logistics, and equipment technology (*jizhuangbu*) departments, as well as most of the second-level departments. These offices, which perform the same roles as their counterparts though at a lower-level, report horizontally to the brigade leadership, as well as vertically to their superior units at the base and national headquarters level during non-crisis situations. During crisis and wartime situations, the brigade likely reports to the war front command, as discussed earlier in the chapter.

The unique brigade elements include a mobile brigade command post, a central depot (known as a "technical position" or *jishu zhendi*), a transfer point (*zhuanzai changping*), and an assigned set of pre-surveyed launch sites (*fashe zhendi*), as well as a set of reserve (*daiji*) launch sites. A conventional missile brigade also has a set of "equipment assurance sub-units" (*zhuangbei baozhang fendui*).[1199] Brigades have at least four firing battalions (*fasheying*), with each battalion assigned at least three-four companies.[1200] Companies subordinate to the launch battalion likely would be assigned at least one launcher, an electric power generation vehicle (*fadianche*), a surveying vehicle (*cekongche*), a communications command vehicle (*tongxun zhihuiche*), and a

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[1198] Senior Colonel Wang Benzhi, "*Didi changui daodan huoli yunyong de jige wenti* [Some Questions Related to the Use of Conventional Surface-to-Surface Missile Firepower]," in *Lianhe zhanyi yu junbingzhong zuozhan* [Joint Theater and Service Operations], Beijing: National Defense University Press, 1998, pp. 236-241. Senior Colonel Wang is the Chief of Staff of the Second Artillery Huaihua Base (80305 Unit). One source states that an operational zone could be 20-40 square kilometers. It is unclear what echelon would operate in this size zone. See Lu Xiaohong, "*Daodan jidong fashe zhuangbei ji dimian shebei weizhuang yu yinshen jishu fenxi* [Analysis of Mobile Missile Launch and Ground Equipment Camouflage and Stealth Technology]," in Xu Dazhe, *Guowai dandao daodan jishu yanjiu yu fazhan* [Study and Development of Foreign Ballistic Missile Technology], Beijing: Astronautics Press, October 1998, pp. 193-202.

[1199] Ibid, p. 4. The equipment assurance sub-units, the transfer point, and the transport may be the responsibility of a battalion-level "technical unit" (*jishu ying*). A nuclear brigade's technical battalion manages a warhead station (*dantizhan*), an inspection station (*zhuangjianzhan*), and a technical service station *(jishu qinwuzhan*). See "Glorious Honor Roll," p. 11.

[1200] For reference to a fourth battalion within a Second Artillery brigade structure, p. 10.

missile transport vehicle (*daodan yunshuche*). Battalions and companies would be assigned a zone within which to operate.[1201]

**Academies and Schools (*xueyuan/xuexiao*)**

Within the Second Artillery, three senior professional military education institutions can be identified. The Second Artillery Command College (*Erpao zhihui xueyuan*) in Wuhan prepares officers for leadership positions within headquarters elements and launch brigades. The Second Artillery Engineering College (*Erpao gongcheng xueyuan*) - Xi'an[1202] educates technicians associated with equipment and technology departments at various headquarters and field units.

The Artillery Missile School (*Paobing daodan xueyuan*) brings together ground force and missile force officers, facilitating the deployment of ground-to-ground missiles such as the DF-11 Mod 1 with group armies.

**Research Institutes (*yanjiusuo*)**

The Second Artillery has one engineering design academy and four research institutes. The First Institute (*Dierpao diyisuo*) addresses problems associated with operations, TELs, and logistics, while the Second Institute (*Dierpao diersuo*) appears to have some interest in telecommunications.[1203] The Third Institute (*Dierpao disansuo*) conducts research on command automation, targeting, and mapping, and at least two researchers at the institute have written on deception issues in an internal volume.[1204] The precise focus of the Fourth Institute is unknown (*Dierpao disisuo*). The Engineering Design Research Institute (*Gongcheng sheji yanjiusuo*)[1205] was established in 1977, and performs engineering work on emplacements, command structures, barracks, and other

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[1201] Wang Benzhi, "Some Questions Related to the Use of Conventional Surface-to-Surface Missile Firepower," pp. 236-241; and Lu Xiaohong, "Analysis of Mobile Missile Launch and Ground Equipment Camouflage and Stealth Technology," pp. 193-202.

[1202] Zhang Jiajun, "*Zunshi zhongjiao xingcheng zhidu* [Respecting Teachers and Effective Teaching Forms a System]," *Jiefangjun bao*, 9 September 1988.

[1203] Shi Qing, "*Erpao yanzhi chu xinxing chengkong dianhua jiaohuanji* [Second Artillery Corps' Research Has Produced a New Type of Computerized Switchboard]," *Jiefangjun bao*, 14 August 1988.

[1204] Yuan Zaijiang and Deng Mihui, Second Artillery 3rd Institute, "*Junshi qipian jiqi dui zhanju de yingxiang* [The Influence of War Conditions Upon Military Deception]," in *Wojun xinxizhan wenti yanjiu* [Our Military's Information Warfare Studies], Beijing: Guofang daxue chubanshe, 1999, pp. 155-157.

[1205] Zhang Jiajun, "*Baochi zhiliang zuofeng, reqing wei budui fuwu* [Maintain a Good Work Ethic and Enthusiastically Support the Army]," *Jiefangjun bao*, 20 February 1989.

support infrastructure.[1206] There is also some evidence that the institute, also known as the Academy of Engineering Design, is involved in missile and warhead engineering design.

## SECOND ARTILLERY FORCE STRUCTURE

In the next two sections we take a careful look at China's nuclear force structure and hardware, draw inferences from this empirical data to clarify questions about China's doctrine and capabilities, and reach understandings about the Second Artillery's future strategic posture from the vantage point that means most for strategic policy: how does the posture of the Second Artillery actually affect the security balance in strategic, theater and conventional terms?

### History

According to Chinese sources, the Chinese Missile Research Academy (also known as the Fifth Research Academy) was established in October 1956 under the direction of Qian Xuesen.[1207] Ten research institutions were set up under the Fifth Academy to focus on the development of China's ballistic missiles. China began "copy production" of its first ballistic missile – a Chinese copy of a Soviet R-2 missile – in October 1958, and the missile was first tested three times in November and December 1960. Since that time the exact number of missile tests is difficult to discern through open sources, but by the end of the 1960s, China had conducted at least 30 MRBM (the DF-2 and –2A missiles) tests at ranges of up to 1500 kilometers. Major milestones in China's nuclear force modernization are noted over the following pages.

**DF-2 and –2A.** After a failed flight test on 21 March 1962 – in which shortly after take off, the missile erratically flew with its engine on fire before crashing near the launch pad -- the Chinese successfully tested the DF-2 numerous times in June and July 1964 following the first success on 29 June 1964. Following a February 1965 decision to increase the range of the DF-2, an increase of 20 percent in the range was achieved for the DF-2A, beginning with its first successful tests in November 1965. On 27 October 1966, the Chinese launched a DF-2 with an armed, live nuclear warhead from the Shuangchengzi to an impact area in the Lop Nur testing area.[1208] The DF-2 series, with ranges of 1000 and 1250km respectively and a yield of 20Kt, was "sited in Northeast

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[1206] Chen Dechun, "*Erpao gongcheng sheji yanjiusuo 10 nian we budui* [The Second Artillery Corps Engineering and Design Research Institute have Defrayed Engineering Costs by 50 Million Yuan in 10 Years]," *Jiefangjun bao*, 14 June 1987.

[1207] Unless otherwise noted, this section draws from Xie Guang, et al., eds., *Dangdai Zhongguo de guofang keji shiye* [Contemporary China's Defense Science and Technology Undertakings], vol. 1, Beijing: Dangdai Zhongguo chubanshe, 1992, chaps 8, 9, and 10.

[1208] Robert Norris, et al, *Nuclear Weapons Databook*, pp. 377-78.

China and targeted on cities and U.S. military bases in Japan."[1209] China was believed to have produced a total of 100 missiles between 1965 and 1971[1210], deploying approximately 50 missiles at one time.[1211] Retirement of the system reportedly began in 1979 and was completed by 1990.[1212]

**DF-3/3A.** The DF-3 was China's first indigenously developed ballistic missile.[1213] Official calls for an intermediate-range missile began in the summer 1964, with formal approval to commence the R&D process granted in May 1965. After the difficulties with the DF-2's "volatile liquid oxygen fuel," the DF-3 was reportedly the first of a series of Chinese missiles designed to utilize storable liquid fuels.[1214] The more stable fuels were also meant to improve readiness, since the Cuban Missile Crisis had illustrated that missiles with non-storable fuels (such as the SS-3s and SS-4s on Cuba) were ineffective in international crises, since they took long to prepare for launch and could not be maintained at high alert levels for extended periods of time.[1215] The missile was first successfully flight tested on 26 December 1966[1216] though it was not until a third flight test in May 1967 that the Chinese were fully satisfied. It took several years for the missile to be deployed, though the exact deployment date is in dispute. The IISS *Military Balance* lists a 1970 deployment, while the *Nuclear Weapons Databook* asserts a May 1971 deployment.[1217] The DF-3 was designed to carry a 2,150 kg warhead to a distance of 2,650 km (intended, when first conceived in the early 1960s, to hit U.S. military bases in the Philippines). Perhaps as many as 36 of these missiles were sold to Saudi Arabia in the late 1980s, as the slightly longer-range (2,850 km) DF-3A was

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[1209] Lewis and Hua, *China Builds the Bomb*, p. 212.

[1210] General Dynamics, *The World's Missile Systems*, 8th ed., Pomona, CA: General Dynamics, August 1988, p. 52.

[1211] Joint Chiefs of Staff, United States Military Posture FY 1982, p. 109.

[1212] Lewis and Hua, "China's Ballistic Missile Programs," p. 9.

[1213] Norris, et al., *Nuclear Weapons Databook,* p. 380. The DF-3 may have drawn in part from research and development conducted on the DF-1 which was originally based in part on the Soviet R-12 (NATO code name SS-4 or "Sandal"), which, like the DF-3, had a cluster of four engines, and which Chinese rocket scientists had learned about during training in Moscow in the 1950s. See Lewis and Hua, "China's Ballistic Missile Programs", p. 13.

[1214] Jane's Strategic Weapons Systems.

[1215] Center for Defense Information, Nuclear Weapons Database: Chinese Arsenal.

[1216] Lewis and Xue, *China Builds the Bomb*, p. 213.

[1217] See Norris, et al*., Nuclear Weapons Databook*, p. 381: Lewis and Hua, "China's Ballistic Missile Programs", p. 16, also provides the May 1971 date.

tested in December 1985 and January 1986, and commissioned in that year to replace the DF-3.

**DF-4.** The Chinese intermediate-range ballistic missile (IRBM) DF-4 was a more difficult undertaking. With a required range of up to 4000 km ("to strike the B-52 base on the U.S. island of Guam"[1218]), the Chinese formally authorized development of the missile in May 1965. This was to be China's first two-stage rocket (using the DF-3 as the first stage), and required technical breakthroughs in such areas as engine reliability in the near-vacuum of the upper atmosphere, developing high-altitude test simulator beds, developing more heat-resistant materials, and improved guidance systems for the longer-range missile. The first flight test of the missile failed in November 1969 – the second stage was not ignited/separated and the missile self-destructed – but the missile was successfully tested in January 1970. According to Lewis and Hua, because of the Sino-Soviet Ussuri River clashes in late 1969, the range of the missile was subsequently raised to 4500 km (and eventually attained a 4750 km range) in order to reach Moscow.[1219] According to Norris, et al., it "was initially planned to be deployed in silos but recognition of its vulnerability lead to reconsideration of rail-mobile basing."[1220] From 18 September to 2 October 1975, the Chinese conducted DF-4 rail-mobile tests over 8000km in ten provinces.[1221] In 1977, the Chinese finally chose a deployment plan based on cave storage, whereby the missiles would be brought out of the cave for erecting, fueling, and firing.[1222] A full-range test flight occurred on 2 August 1980.[1223]

**DF-5 and DF-5A.** China formally began development of the intercontinental ballistic missile (ICBM) DF-5 in March 1965, and its progress was also delayed by the exigencies of the Cultural Revolution. A first flight test was conducted on 10 September 1971, though this test – entirely within Chinese territory -- had to be conducted across a shorter range and different trajectory than the missile was designed for. It was not until 18 May 1980 – a full fifteen years after the missile began development – that the Chinese could conduct a full-range flight test from the mainland into the Western Pacific. This test was followed by a second full range test on 21 May 1980.

**Solid-fuel missiles.** According to Chinese sources, work on solid fuel missiles in China date back as far as October 1956, when Qian Xuesen was first setting up the Fifth Research Academy.[1224] First strides were made by the late 1950s and early 1960s in

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[1218] Lewis and Hua, "China's Ballistic Missile Programs", p. 17.

[1219] Ibid.

[1220] Norris, et al**.,** Nuclear Weapons Databook, p. 383.

[1221] Lewis and Hua, "China's Ballistic Missile Programs," p. 24.

[1222] Norris, et al., *Nuclear Weapons Databook*, p. 383.

[1223] Ibid., p. 382.

[1224] This section draws from "China's Solid Propellant ICBM Research," in *Dangdai Zhongguo de guofang keji shiye.*

developing and testing prototype solid propellant. Static tests were made with 300mm diameter engines in 1965 and on 1400 mm diameter engines in December 1966.

Initially work was conducted with the intention of using solid fuels for a single-stage rocket, But, deeming such missiles' ranges as too short, in March 1967 Chinese military-technical authorities decided to go forward in the development of two-stage, "medium range" solid fuel surface to surface strategic missiles, to be mated with the ongoing nuclear submarine under development (the submarine-based missile was later to evolve into the DF-21 land-based system). However, again owing to the exigencies of the Cultural Revolution, Chinese sources note that serious work on the solid-fuel missile program did not begin until August 1978.[1225] However, it was not until launch equipment tests in April and May 1984, followed by launch tests in May 1985 (DF-21) and May 1987 (DF-21A), that these systems became fully operational in the early 1990s. This culminated a nearly 30-year development effort.

Another version of the DF-21, the submarine-launched JL-1, was first tested from a submerged conventionally-powered Golf-class submarine on 7 October 1982, but this launch failed as the missile lost control soon after ignition and self-destructed. On 12 October 1982 the missile was successfully launched from the submerged Golf submarine. As for launching from China's nuclear-powered submarine, the missile failed its first test on 28 September 1985, again turning over and self-destructing. It was not until three years later, on 15 September 1988, that a fully successful JL-1 launch took place from the submerged Xia-class nuclear submarine; a second successful test was conducted on 27 September 1988, culminating a difficult 30-year development process for Chinese SLBMs dating back to the late 1950s. According to open sources, China has not since 1988 test launched its JL-1 from the Xia-class nuclear submarine.

By the early 1990s, China had also tested and began deployment of two short-range, nuclear-capable ballistic missiles, the DF-15 (CSS-6/M-9) and 300 kilometer-range DF-11 (CSS-X-7/M-11).[1226] Both missiles were originally developed for export and it was only after China pledged not to export these missiles that they were incorporated into the Second Artillery.[1227] The DF-15 has been operational since 1994, [1228] and was tested approximately 10 times as part of the missile exercises China

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[1225] Lewis and Hua note that problems in warhead miniaturization, nuclear submarine development, and bureaucratic turf battles also slowed the program.

[1226] The nuclear capability of these missiles is cited in U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1226 of the FY98 National Defense Authorization Act, October 1998.

[1227] The authors are indebted to Evan Medeiros for this point.

[1228] U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1226 of the FY98 National Defense Authorization Act, October 1998.

conducted around the Taiwan Strait in July-August 1995 and March 1996.[1229] The CSS-X-7/M-11 was not believed to be deployed with Chinese forces as of October 1998, [1230] though some foreign sources familiar with the PLA believe that the 300km DF-11 has already been fielded by at least two PLA group armies.[1231] The 1999 *DoD Report to Congress on the Security Situation in the Taiwan Strait* reported that an improved, longer-range version of the DF-11 might be under development,[1232] a fact that was later verified by the 1 October 1999 military parade in Beijing.[1233]

**Testing.** China's 32-year testing program is the smallest of the five major nuclear powers, with 45 tests between 1964 and 1996. By comparison, the United States tested more than 20 times as much, with over a thousand blasts over a more than 50-year program. This static examination of the total number of tests gives us evidence of comparative scale, but changes in annual averages can also signal intent. The amount of Chinese testing increased marginally after 1979 from 1.3 to 1.7 tests per year, but it is important to note that American testing between 1979 and 1992 averaged 13.6 detonations per year.

By previous standards, Chinese testing accelerated significantly in the mid-1990s, though this intensified program was likely linked to China's stated intention from early 1994, at the outset of CTBT negotiations, to conclude a test ban by the end of 1996. This timeline suggests that a political decision to sign the treaty in principle had been made by 1993 or earlier, and may have intensified in the face of increasing international condemnation of China's test program, which continued throughout the CTBT negotiation process.[1234] The pace of Chinese testing certainly intensified over the

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[1229] On the 1995 and 1996 Taiwan Strait missile tests, see "China Announces Missile Launch Testing," *Executive News Service*, 19 July 1995; and "Taiwan Detects Chinese Missiles," *Executive News Service*, 8 March 1996.

[1230] U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1226 of the FY98 National Defense Authorization Act, October 1998.

[1231] Reported in Mark Stokes, "PLA Strategic Warfighting in the 21st Century: Space and Theater Missile Development," (paper presented at the Conference on the People's Liberation Army, 10-12 September 1999, U.S. Army War College, Carlisle Barracks, Pennsylvania).

[1232] 1999 DoD Report to Congress on the Security Situation in the Taiwan Strait, Washington, DC: Government Printing Office, 1999, p. 4.

[1233] See *Jane's Defense Weekly* coverage of the parade.

[1234] An informal testing moratorium among four of the nuclear weapon states – Soviet Union/Russia, the United States, France and the United Kingdom – had already been in place for several years. The Soviet Union's last test was in October 1990; the newly independent state of Russia has not since tested; the last U.S. test was in September 1992; the last U.K test was in November 1991. France had participated in the

period 1994-96. China's six tests over a twenty-five month period (June 1994-July 1996, which overlapped with the negotiations of the CTBT) more than doubled China's average testing pace. It was also the only time in Chinese history that nuclear weapons were tested twice in three successive years.[1235] Also, this period marked the only time in Chinese testing history that blasts occurred in either July or August – outside the typical Chinese testing "season" – which also indicates a sense of urgency within the military and nuclear scientific communities.[1236] Finally, it seems likely that the initial bargaining positions put forth by China – such as on verification and inspection procedures and leaving the door open to peaceful nuclear explosions – both offered the military the possibility of further testing, and may have succeeded in stalling the negotiation process to grant China's testing program more time. Almost immediately after China announced in early June 1996 that it would have one more test, it stepped away from its objections to the treaty allowing the negotiations to come to a conclusion.

The Cox Report strongly suggests that the combination of nuclear espionage and the intense series of underground tests described above has accelerated the PRC's attainment of advanced, MIRVable small warheads, but some important caveats must be offered. First and foremost, the warheads employed by U.S. nuclear forces are highly complicated devices that are extremely difficult to build. They are the product of decades of dedicated research and development, using some of the most advanced techniques available. As such, there are limits on the amount of benefit that can be wrought from simply obtaining the designs for these weapons.[1237] As one sober observer writes,

> China's theft of the W-88 design used for the U.S. Navy's *Trident* missile warhead, for example, does not allow its engineers to reconstruct the thousands of parts and electronic components that form the completed weapon. Even the computer codes China may have obtained are mathematical models of the physical characteristics of a nuclear explosion. They cannot be used to design and manufacture a warhead. Chinese

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moratorium for nearly four years, from late 1991 until late 1995, when it resumed its final series of six tests which ran from September 1995 to January 1996.

[1235] With 45 tests over a period of 381 months (October 1964 through July 1996), China averaged about 0.118 tests every month, or 2.95 tests on average for a 25-month period. Comparably intensive testing for China occurred over the period October 1975 to December 1978, when China tested nine times over a 38 month period, and four times in 1976 alone.

[1236] Thirty-two of China's 45 tests – more than 70 percent – took place in either May-June or September-October.

[1237] This line of argument is most credibly presented by Richard Garwin and Wolfgang Panofsky. See Richard L. Garwin, "Why China Won't Build U.S. Warheads," *Arms Control Today,* April/May 1999, pp. 28-31; and Wolfgang K.H. Panofsky, "Assessing the Cost vs. Benefit of U.S.-Chinese Nuclear Cooperation," *Arms Control Today,* April/May 1999, pp. 28-31.

> engineers may well have obtained some useful information, but they lack the data and experience required to design and build replicas of sophisticated U.S. warheads from the stolen information.[1238]

This line of reasoning is supported by the damage assessment by the intelligence community, which concluded that China had not deployed any operational system using the stolen designs, despite a lapse of more than 10 years since the alleged espionage.[1239] Passage of the CTBT could have locked this situation in place for the foreseeable future, though its defeat in the Senate should prepare us for the likelihood of a resumption of Chinese testing and thus the possible conquering of important developmental hurdles in the area of smaller warheads.

**Current Force Structure**

As a result of this historical progression, one of the most intriguing aspects of China's nuclear weapons program has been its quantitatively and qualitatively limited nature over time. These limitations are characterized in practice by a relatively small number of warheads, technically and numerically limited delivery vehicles, an overwhelming reliance on land-based systems, persistent concerns over the arsenal's survivability, reliability and penetrability, and a limited program of research, development and testing.

China's current nuclear weapons arsenal totals about 400 devices, 300 of which consist of warheads and gravity bombs for use on its strategic "triad" of land-based ballistic missiles, bomber and attack aircraft, and one nuclear-powered ballistic missile submarine (SSBN)(see Table 1).[1240] According to the U.S. Defense Department, over 100 warheads are deployed for use on China's ballistic missiles, with additional warheads in storage.[1241] The Chinese SSBN is thought to deploy 12 single-warhead missiles. The remaining warheads reportedly consist of about 100 tactical nuclear weapons, including bombs for tactical bombardment, artillery shells, atomic demolition munitions, and

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[1238] Paul Godwin, "China's Nuclear Forces: An Assessment," *Current History*, September 1999.

[1239] The Intelligence Community Damage Assessment on the Implications of China's Acquisition of U.S. Nuclear Weapons Information on the Development of Future Chinese Weapons, 21 April 1999.

[1240] See, for example, Robert S. Norris and William M. Arkin, "British, French, and Chinese Nuclear Forces," *Bulletin of the Atomic Scientists,* November/December 1996, p. 66; and Robert S. Norris and William M. Arkin, "Global Nuclear Stockpiles, 1945-1997," *Bulletin of the Atomic Scientists,* November/December 1997, p. 67.

[1241] Office of the Secretary of Defense, *Proliferation: Threat and Response*, Washington, D.C.: U.S. Government Printing Office, November 1997, online version.

possibly short-range missiles.[1242] China has the capability to increase the size of its nuclear arsenal using its existing stockpile of fissile material. One source indicates that China has an inventory of between two and six tons of plutonium and 15 to 25 tons of highly enriched uranium.[1243] Iain Johnston estimates that China has enough fissile material to double or triple its arsenal.[1244] However, according to the U.S. Defense Department, "China is not currently believed to be producing fissile material for nuclear weapons, but it has a stockpile of fissile material sufficient to increase or improve its weapon inventory."[1245]

In addition to ballistic and cruise missiles, according to the U.S. Defense Department, "China also has a variety of fighters, bombers, helicopters, artillery, rockets, mortars, and sprayers available as potential means of delivery for NBC [nuclear, biological, and chemical] weapons."[1246] China is working to modernize its capabilities in terms of ballistic and cruise missiles, bombers, and multi-role aircraft, but relies upon deterrent systems and technologies which are at least 20 years behind the capabilities of the four major declared nuclear powers. According to Chinese sources, the overall capabilities of the strategic rocket forces have advanced in recent years owing to better, more modern training, the development of strategic missile simulator training, improvements in technical reconnaissance, weather forecasting, geographical surveying, anti-chemical warfare and logistics support, and the introduction of some "1000 technological research results."[1247] Estimates of Chinese nuclear-capable ballistic missile forces are shown in Table 1. Estimates vary as to the exact number of these missiles, but China benefits from a large, well-developed infrastructure for the development and production of ballistic missiles.

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[1242] Norris, et al., *Nuclear Weapons Databook*, pp. 370-371. Beijing has not acknowledged possession of tactical weapons. See Jonathan D. Pollack, "The Future of China's Nuclear Weapons Policy," in John C. Hopkins and Weixing Hu, eds., *Strategic Views from the Second Tier: The Nuclear Weapons Policies of France, Britain, and China*, New Brunswick: Transaction Publishers, 1995, p. 160.

[1243] David Albright, Frans Berkhout, and William Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities, and Policies*, New York: Oxford University Press, 1997, pp. 77, 129.

[1244] Johnston, "China's New 'Old Thinking'," p. 36.

[1245] Office of the Secretary of Defense, *Proliferation: Threat and Response* (on-line version).

[1246] Ibid.

[1247] *Xinhua*, 23 May 1996, in Foreign Broadcast Information Service, *Daily Report: China*, FBIS-CHI-96-105, 23 May 1996.

**Table 11.1 Range of Estimates of Chinese Nuclear Weapon Delivery Vehicles**

| Delivery vehicle (Western designator) | Range (km) | Nuclear Weapons Databook (1994) | Military Balance (98-99) | Jane's Strategic Systems (9/98) | Various |
|---|---|---|---|---|---|
| ***Land-based missiles*** | | | | | |
| DF-3A (CSS-2) | 2850 | 50 | 38+ | 60-80 | 40-80[1248] |
| DF-4 (CSS-3) | 4750 | 20 | 10+ | 20-35 | 10-20[1249] |
| DF-5A (CSS-4) | 13,000+ | 4 | 17 | 15-20 | 4-10[1250], 20[1251] |
| DF-21A (CSS-5) | 1800 | 36 | 8 | 35-50 | 25-50[1252] |
| DF-15/M-9 (CSS-6) | 600 | N/A | 4 | 400 | 160-200[1253] |
| DF-11/M-11 (CSS-7) | 300 | N/A | N/A | 200 | |
| DF-11A (CSS-7 Mod 2) | 300 | N/A | N/A | N/A | 32[1254] |
| DF-31** | 8000 | 0 | 0 | 0 | 0 |
| DF-31A** | 12,000 | 0 | 0 | 0 | 0 |
| ***Aircraft*** | | | | | |
| H-6 (B-6/Tu-16) | 3100 | N/A | N/A | N/A | 100-120 |
| Q-5 (A-5/MiG-19) | 400 | N/A | N/A | N/A | 100+ |
| ***SLBMs*** | | | | | |
| JL-1 (CSS-N-3) | 1700 | 24 | 12 | 12 | 12 |
| JL-2 (CSS-N-4)** | 8000 | 0 | 0 | 0 | 0 |

*Notes:*

** According to Stan Norris, a nuclear weapons expert in Washington, D.C., the DF-41 is now known as the DF-31A. The DF-31, DF-31A, and JL-2 are under

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[1248] Dunbar Lockwood, "The Status of U.S., Russian, and Chinese Nuclear Forces in Northeast Asia," *Arms Control Today*, November 1994, p. 24.

[1249] Ibid.

[1250] Ibid.

[1251] National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999, p. 11.

[1252] Lockwood, "The Status of U.S., Russian, and Chinese Nuclear Forces", p. 24.

[1253] Department of Defense, "The Security Situation in the Taiwan Strait," Report to Congress Pursuant to the FY99 Appropriations Bill, 26 February 1999.

[1254] Two future brigades of 16 launchers each was first reportedly in Bill Gertz, "China Points More Missiles at Taiwan; U.S., in Turn, Helps Island Boost Defenses," *Washington Times*, 23 November 1999, p. A1; and Bill Gertz, "Second Chinese Missile Base Detected Near Taiwan: Report," *Washington Times*, 8 December 1999, p. A1.

development, and are not expected to be in service until the early 2000s or later (DF-31 and JL-2) or until approximately 2010 (DF-31A); the DF-31 was flight-tested in August 1999 and a computer simulation on the DF-31A was reportedly conducted recently.

*Sources:* Adapted from Robert Norris, et al, *Nuclear Weapons Databook*, p. 377-78; *The Military Balance 1998/99*, London: Oxford University Press, October 1998, p. 178; *Jane's Strategic Systems*, September 1998; Robert S. Norris and William M. Arkin, "Appendix 11A. Tables of nuclear forces," in *SIPRI Yearbook 1997*, Oxford: Oxford University Press, 1997, Table 11A.5, p. 401; and National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999.

From Table 11.1, it is clear that the Chinese nuclear force structure is primarily land-based, relying on a range of missile systems. On the short-range end of the land-based missile spectrum, China reportedly possesses several hundred DF-11s and DF-15s, which have ranges of 300km and 600km, respectively. The DF-15 can deliver a 500-kilogram payload to a maximum range of 600 kilometers, with a CEP of 600m.[1255] The DF-11 reportedly has an 800kg warhead and a 150m CEP.[1256]

In the medium- to –intermediate range inventory, the PRC fields three types of missiles (DF-3A, DF-4, and DF-21). Deployed in caves and valleys to increase its survivability, China's liquid-fueled DF-3As have a range of 2800km and reportedly carry a single warhead with an estimated yield of 1-3 megatons. [1257] The liquid-fueled DF-4s, with a range of 4850-5500 kilometers, are deployed in silos and tunnels and have a single warhead with an estimated yield of 1-3 megatons.[1258] The solid-fueled, mobile DF-21As have a range of 1800km and a 600kg warhead with a yield of 200-300Kt.[1259]

In the ICBM category, China's DF-5 ICBMs can reach targets in all of the United States.[1260] Each silo-based missile carries a single warhead, with an estimated yield of 3-5 megatons.[1261]

In its weaker second leg of the triad, China has deployed 12 single-warhead JL-1s, a submarine-launched ballistic missile (SLBM) with a range of 1700 kilometers aboard

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[1255] We suspect that the CEP of the DF-15 is now much lower than 600m. Lower estimates of the DF-15's CEP have been discussed in the Hong Kong and Taiwan media, but 600m is the only verifiable number in open sources.

[1256] Stokes, "PLA Strategic Warfighting," pp. 10-11.

[1257] Lockwood, "The Status of U.S., Russian, and Chinese Nuclear Forces", p. 24.

[1258] Ibid.

[1259] Ibid.

[1260] National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," September 1999, p. 11.

[1261] Lockwood, "The Status of U.S., Russian, and Chinese Nuclear Forces", p. 24.

its one *Xia*-class nuclear submarine.[1262] These missiles have faced operational difficulties, and it was not until 1988 that they were first test-launched successfully from the *Xia*-class submarine. According to Paul Godwin, "this troubled ship has spent most of its time docked or in local waters and is not considered operational."[1263] The limited range of the missile, the problems it has had in deployment and operation, and the limited experience of the Chinese in long-range submarine operations limits the value of this system as a strategic weapon. Beijing may also have learned some valuable negative lessons from the experience of the Soviet Union, whose SSBN force was forced to retreat to bastions by a superior U.S. attack submarine fleet.

China's bomber and ground-attack fleet is made up of two aircraft, both of which are based on 1950s Soviet designs: the *Hong*-6 (H-6) bomber (Soviet Tu-16 design) and the *Qian*-5 (Q-5) ground attack aircraft (a redesign of Soviet MiG-19). Given the nascent state of China's in-flight refueling capability, the maximum ranges of these aircraft are approximately 3,000 and 800 kilometers, respectively. China reportedly halted production of the H-6 in 1982, and now deploys between 100 and 120 H-6s (some in a nuclear role). China deploys over 400 Q-5 aircraft (perhaps 30 currently in nuclear role).[1264]

**Towards An Organic View of Chinese Nuclear Force Structure**

Viewed as an organic whole, the Chinese nuclear force structure defies simple categorization as either a limited or minimal deterrent. Instead, the multi-faceted force is made up of strategic, theater, and tactical systems of varying range, accuracy, and yield. The small ICBM force, anchored by the DF-5 family of missiles, appear to be second-strike minimal deterrence forces. The theater systems are unlikely to be used in a second-

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[1262] There is a discrepancy among analysts as to how many Xia class submarines China has. Some analysts state that China has two such vessels. The Jane's Information Group, however, notes that "To maintain one submarine on continuous patrol takes a minimum of three, and, to be absolutely safe, and optimum number of five hulls. Because of this known requirement, there has been a tendency in the West to exaggerate the Chinese [nuclear-powered ballistic missile submarine] programme, both in terms of numbers and timescales". Richard Sharpe, ed., *Jane's Fighting Ships 1994-95*, Coulsdon, Surrey: Jane's Information Group, 1994, p. 114.

[1263] Godwin, "China's Nuclear Forces".

[1264] *The Military Balance 1997/98*, London: Oxford University Press, October 1997, p. 178; Robert S. Norris and William M. Arkin, "Appendix 11A. Tables of nuclear forces," p. 401. According to the *Military Balance*, China still deploys over 200 of the older H-5 bombers in a conventional role. For information on Chinese military aircraft production, see Randall Forsberg, ed., *International Fighter Study*, Cambridge, Mass.: Institute for Defense and Disarmament Studies, January 1994, Table 3.5; and Kenneth W. Allen, Glenn Krumel, and Jonathan D. Pollack, *China's Air Force Enters the 21st Century*, Santa Monica, California: RAND, 1995.

strike, minimal deterrent role following a preemptive strike. Instead, theater systems look like offensive systems meant to strike U.S. forces and bases in Asia to degrade conventional capability. The short-range, ballistic missile forces, which are also nuclear capable, further confuse the situation by serving a variety of conventional warfighting and nuclear warfighting roles. Perhaps the best way to understand the nature of this multi-function force structure is to deductively infer the purpose of each element in the force by examining range and deployments, payloads and CEP, readiness, and C4I structure.

**Ranges, Deployments, and Targets**. The Chinese nuclear force inventory encompasses a wide variety of ranges, and the deployment of these forces offer a wide variety of potential targets. The basing of China's missiles is summarized in Table 11.2 below.

**Table 11.2 Suspected Chinese Strategic Missile Bases (derived from open sources)**

| Base # | Base MUCD | Base and Selected Brigade Locations | Reported Missile Types |
|---|---|---|---|
| 51 Base | 80301 | *Headquarters:* Shenyang, Jilin Province<br>*Brigades:* Tonghua (DF-3A and DF-21), Dengshahe (DF-3A) | DF-3A (CSS-2)<br>DF-21 (CSS-5) |
| 52 Base | 80302 | *Headquarters:* Huangshan (Tunxi), Anhui Province<br>*Brigades:* Leping (DF-15), Lianxiwang (DF-3A), Yongan (DF-11A), Xianyou (DF-11A) | DF-15 (CSS-6)<br>DF-3A (CSS-2)<br>DF-11A (CSS-7 Mod 2) |
| 53 Base | 80303 | *Headquarters:* Kunming, Yunnan Province<br>*Brigades:* Chuxiong (DF-21), Jianshui (DF-3A) | DF-3A (CSS-2)<br>DF-21 (CSS-5) |
| 54 Base | 80304 | *Headquarters:* Luoyang, Henan Province<br>*Brigades:* Luoning (DF-5), Sundian (DF-4) | DF-4 (CSS-3)<br>DF-5 (CSS-4) |
| 55 Base | 80305 | *Headquarters:* Huaihua, Hunan Province<br>*Brigades:* Tongdao (2 | DF-4 (CSS-3) |

| | | | |
|---|---|---|---|
| | | brigades of DF-4) | |
| 56 Base | 80306 | *Headquarters:* Xining, Qinghai Province<br>*Brigades:* Datong (DF-3A), Delingha (DF-4), Da Qaidam (DF-4), Liujihou (DF-3A)[1265] | DF-3A (CSS-2)<br>DF-4 (CSS-3) |
| N/A | 80310 | *Headquarters:* Baoji, Shanxi Province | Warhead storage facility |
| N/A | N/A | *Headquarters:* Yidu, Hubei or Shandong Province | DF-3A (CSS-2) |

Note: In addition, reports also cite the following launch sites:
DF-5: Jiuquan (war reserves), Wuzhai (war reserves)

Sources: Mark A. Stokes, *China's Strategic Modernization: Implications for U.S. National Security*, Maxwell, AL: Air Force Institute for National Security Studies, October 1997; Leonard S. Spector, Mark G. McDonough, with Evan S. Medeiros, *Tracking Nuclear Proliferation: A Guide in Maps and Charts*, Washington, D.C.: Carnegie Endowment for International Peace, 1995, pp. 52-56; Bill Gertz, "New Chinese missiles target all of East Asia," *Washington Times*, 10 July 1997, p. A1; Bill Gertz, "China Points More Missiles at Taiwan; U.S., in Turn, Helps Island Boost Defenses,"p. A1; and Bill Gertz, "Second Chinese Missile Base Detected Near Taiwan: Report," p. A1. The MUCDs have been collected from open sources, including assorted *neibu* Second Artillery publications.

From the locations of these bases and the ranges of their deployed missiles, several inferences can be drawn about the likely target for these missiles. The DF-3As and DF-21s of Base 80301 are likely targeted on Japan, Korea, Okinawa, or the Russian Far East. The DF-15s of Base 80302 are almost certainly aimed at Taiwan. The DF-3As and DF-21s of Base 80303 are likely targeted against countries south and southwest of China, including the Philippines, Vietnam, and India. The DF-5s of Base 80304 are the major CONUS-oriented systems, while the DF-4s of both Base 80304 and Base 80305 might be aimed at Hawaii. Finally, it seems likely that the DF-3As and DF-4s of Base 80306 are targeted at sites in the former Soviet Union, including Moscow, or possibly also India.

How did the structure evolve to this arrangement? Lewis and Hua maintain that China's nuclear weapons program "proceeded without such strategic guidance" and that "until the early 1980s, there were no scenarios, no detailed linkage of the weapons to

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[1265] The Liujihou brigade was not listed with the other brigades of Base 80306, but its proximity to Qinghai suggests that it should be part of this base.

foreign policy objectives, and no serious strategic research." [1266] They even go so far as to say that neither the "Chinese leader nor his senior colleagues on the Central Military Commission considered, communicated, or authorized the investigation of the broader strategic purposes of the program."[1267] As Lewis and Hua predicted, we have difficulty believing this to be true. From an examination of the sources of their collected works, no one can doubt the authors' access to critical personnel or documents from China's nuclear programs or missile programs, though the level of citation from central leadership documents is considerably lower. While we doubt that the first generation of leaders, especially Mao, understood the scientific or technical aspects of nuclear combat, they were at least able to articulate the strategic targets for these weapons and task the weapons complex accordingly. Indeed, the authors seem to contradict themselves when they relate stories wherein researchers are told the specifications for specific missiles (i.e., range, payload, etc…) by central authorities, who then later change the range and payload requirements for individual missiles to reflect new strategic goals. For example, they assert that the military commission in 1970 commanded that the range of the DF-4 be increased from 4,000km to 4,500km, "bringing Moscow within range of bases in Da Qaidam, Qinghai Province."[1268] This story, along with others in the narrative about the sequential development of missiles capable of hitting the Philippines, Guam, Hawaii, and the U.S., suggest that someone, somewhere at a central level was making decisions about the strategic purpose and direction of various missile systems, which was then reflected in the seemingly logical pattern (defined as matching geographic location with range to target) of base and missile deployments.

One important dilemma that confronts any analyst trying to understand the overall nature of the Chinese nuclear force posture is reconciling the mixture of strategic and theater systems with claims of either minimal or limited deterrence. However, comparative cases of nuclear force structure evolution offer clues about China's intentions. In the Soviet case, it is important to note that Moscow did not draw a sharp distinction between their strategic and theater nuclear weapons systems. The best example of this was the road-mobile SS-20, which was developed to de-couple the U.S. from its allies in Europe and Asia by holding theater targets at risk and preventing Washington from defending allies. The Soviets referred to this combination of strategic and theater nuclear weapons as the "seamless web of deterrence." Is the same thing happening in China? Clearly, China and the former Soviet Union share some commonalities in their strategic environment and goals. Like the Soviets, China seeks to de-couple the U.S. from its allies in the region, especially Japan and Korea, by using the threat of theater nuclear weapons. In recent years, this threat has become particularly important in a Sino-U.S. conflict over Taiwan, which could escalate to the point where it threatens to split the U.S.-Japan defense alliance. However, the United States withdrew its theater nuclear forces in 1991. How has this changed the rationale for the DF-21A and

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[1266] Lewis and Hua, "China's Ballistic Missile Programs", pp. 6-7.

[1267] Ibid., p. 6.

[1268] Ibid., p. 17.

other Chinese theater nuclear forces, since they no longer have a second-strike role?[1269] To explicate this situation, a deconstruction of the Chinese force is required.

**Payloads, CEP, and Targeting**. Until the DF-31 comes online, the Chinese strategic nuclear forces is dominated by missiles with high yield warheads and large CEPs. For example, the DF-4 ICBM has an estimated yield of 1-3 megatons and a CEP of almost a mile.[1270] The mainstay of the Chinese ICBM force, the DF-5, is more accurate, but still has a yield of 3-5 megatons and a CEP of more than a quarter-mile. This combination of high yield with low accuracy suggests that the force is designed for countervalue, or "city-busting" attacks against "soft" targets such as concentrated population centers, and other locations of political and economic value.[1271] Counterforce warfighting, by contrast, requires far more accuracy than offered by these systems.

**Readiness and Survivability**. In the past, the limited numbers, low level of readiness, and slow response times of China's land-based missiles and bombers left China vulnerable to an overwhelming and incapacitating first-strike. China does not currently have space-based or land-based early warning assets. A senior U.S. intelligence official has confirmed that Chinese missiles are usually unfueled and unmated to their warheads.[1272] Furthermore, the process of loading the liquid fuel tanks and installing the warheads can take two to four hours.[1273] Because of the lengthy pre-launch exposure times of more than 2 hours for the DF-3A, decisions were taken which led eventually to

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[1269] Of course, it must be recognized that the Chinese may not believe the 1991 withdrawal took place.

[1270] Claire Hollingsworth, "China's Growing Missile Might," *Defense and Foreign Affairs*, March 1985, p. 28.

[1271] See, for example, Institute for National Strategic Studies, *Strategic Assessment 1997,* Washington, D.C.: National Defense University, 1997, p. 50; Godwin and Schulz, "Arming The Dragon," p. 6; and Xue, "Evolution of China's Nuclear Strategy," pp. 173-76.

[1272] Robert Walpole, National Intelligence Officer for Strategic and Nuclear Programs, briefing to Carnegie Endowment for International Peace, 17 September 1998**.** In discussing command and control concepts, a Chinese source writes: "The most crucial aspect of preventing a nuclear accident [*yiwai shigu*] is to take the utmost care in designing safeguard measures when developing nuclear weapons. … [S]imply separating the nuclear parts from the other parts and storing them separately is actually the best safeguard measure against a nuclear accident." See Liu Zhenwu, ed., *Xiandai jundui Zhihui* [Modern Military Command and Control], 2nd ed., Beijing: National Defense University Press, 1994, pp. 395-96.

[1273] Godwin, "China's Nuclear Forces."

operating the DF-4 from caves and the DF-5 from silos.[1274] While cave- and silo-basing reduces pre-launch exposure, the basing mode could not significantly reduce the overall preparation time for launch, including fuelling, arming, positioning (in case of non-silo-basing), targeting and range-setting, and other preparatory checks.[1275] Given these time-constraints, the Chinese DF-3A, DF-4, and DF-5A in today's arsenal may still take from 1 to 2 hours to launch. From this incomplete data, we tentatively infer that the Chinese nuclear force is incapable of launch-on-warning or launch-under-attack. This readiness and survivability level is consistent with a minimal deterrent posture

China has also sought to improve survivability by establishing a credible triad. As early as the mid-1950s, China began developing a sea-based deterrent, though this small program continues to face a number of serious technological obstacles.[1276] China has held only one known SLBM test from the *Xia*-class submarine, and the existence of only a single boat obviates the possibility of regular patrolling.[1277] Efforts to further integrate Chinese bombers into the triad have been impeded by the vulnerability of PRC airfields and the high cost of modern aircraft capable of penetrating advanced air defenses.[1278] In addition, Chinese nuclear-capable bombers are limited in range and are highly vulnerable to sophisticated air defenses, making it unlikely that the bomber force would be effective in a nuclear delivery role against either Russia or U.S. forces in the Western Pacific region.[1279] Despite strenuous efforts, therefore, the sea-based and bomber-based legs of China's triad are still relatively unreliable, especially in the context of intercontinental nuclear combat with the United States. As a result, China has been forced to focus on ensuring the survivability of its land forces by deploying road-mobile, solid-fuel systems.

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[1274] On 23 October 1978, the DF-3 was able to achieve a response time of 2 hours, 32 minutes. See Lewis and Hua, "China's Ballistic Missile Programs", pp. 22-24.

[1275] Report of the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China, Washington, DC: U.S. Government Printing Office, 1999, p. 192 (hereafter Cox Report), citing testimony by Robert Walpole, states that "the intercontinental CSS-4s [DF-5s] are deployed in their silos without warheads and without propellants during day-to-day operations."

[1276] Lewis and Xue, China's Strategic Seapower.

[1277] Estimates vary as to the minimum number of submarines necessary for sustained patrolling, ranging from 4-6 hulls.

[1278] Harlan Jencks, "PRC Nuclear and Space Programs," in Richard H. Yang, ed., *SCPS Yearbook on PLA Affairs 1987*, Kaohsiung, Taiwan: Sun Yat-sen Center for Policy Studies, National Sun Yat-sen University, 1987, p. 110.

[1279] Robert G. Sutter, *Chinese Nuclear Weapons and Arms Control Policies: Implications and Options for the United States*, CRS Report 94-422S, Washington, D.C.: Congressional Research Service, 25 March 1994, p. 7.

**C4I Structure.** The Second Artillery is tasked with implementing the reliable and secure command and control of China's nuclear and conventional missile forces.[1280] The Second Artillery was formally established in 1966, based upon a "special" artillery corps formed in 1958 following the Chinese decision to develop nuclear weapons. The Second Artillery is a separate service arm, distinct from the army, navy, and air force. The central command and control center for all Chinese forces, including SAC, is located is Xishan, in the hills west of Beijing, where strategic operational orders originate. Direct communication with China's six launch bases would be passed through the SAC headquarters and its communications regiment. It is important to note that this system bypasses China's military region commands, and connects directly to base commands. Base commands in turn communicate with their respective launch brigades. The SAC reportedly operates about six launch bases each led by a major general. Each base has two to three missile brigades each commanded by a colonel, with each brigade operating one type of missile. These brigades consist of up to four launch battalions (see Table 2).

At a political level, ultimate authority to use nuclear weapons is "subject to the unified command of the Central Military Commission. Only the commission's chairman [currently Jiang Zemin, who is also head of the Chinese Communist Party and the Chinese President] has the power to issue an order to use such weapons after top leaders reach a consensus on the issue."[1281] However, it is likely that such a decision would require a consensus decision within the Central Military Commission and other senior military elders.[1282] In wartime, a "skip echelon" system would be in effect, with the central command communicating directly with launch bases. According to at least one Chinese author, at the launch command level, two individuals must independently check a launch order, cross-confirm each other's order, and both must agree to launch.[1283]

As for the technical aspects of Chinese nuclear C4I, little is available in open sources as to the precise systems employed to assure safe and reliable communication between the central leadership and the launch bases. However, increasingly in recent years, reports have surfaced in the open literature describing various new technologies and systems that help strengthen China's command and control system. In some cases the "breakthroughs" reported suggest that the past level of command and control structures was not particularly advanced. For example, the official People's Liberation Army Daily in early 1998 noted that the SAC "after three years of arduous work" developed a new digital microwave communications system which now allows for a

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[1280] This section relies in part on Mark A. Stokes, *China's Strategic Modernization,* especially the section on the Second Artillery.

[1281] Xue, "Evolution of China's Nuclear Strategy", p. 180; and Lewis and Xue, *China's Strategic Seapower*, p. 325, fn. 31.

[1282] For an excellent analysis of Chinese command and control of its military forces, see Michael Swaine, *The Military and Political Succession in China: Leadership, Institutions, Beliefs*, Santa Monica, Calif.: RAND, R-4254-AF, 1992, pp. 119-39.

[1283] Liu Zhenwu, *Xiandai jundui zhihui*, p. 395.

secure "all-weather" communications for missile launch. "With the new system" the article notes, "the Second Artillery will no longer be affected by natural conditions such as weather."[1284]

At the same time, however, the Pentagon reports that "China has made significant efforts to modernize and improve its command, control, communications, computers, and intelligence infrastructure."[1285] Given the importance of nuclear weapons to Chinese security, we assume that similar advances in C4I modernization have occurred in the strategic rocket forces. There is some evidence, for instance, that the Second Artillery seeks to connect much of its infrastructure with secure, landline fiber-optic cable.[1286] Moreover, open source reports detail the deployment of an "automated command and control system."[1287] From these changes, we can infer desire for greater survivability and positive control of nuclear weapons. They probably also reflect a greater desire for operational security, as well as enhanced denial and deception against other countries' increasingly advanced national technical means.[1288] By itself, however, the modernization of Chinese nuclear C4I does not automatically imply that the force is transitioning to a flexible response, counterforce footing. The changes might signal desire for eventual launch under attack (LUA) capability, but the current inventory of missiles and the next generation of replacements are not capable of the reaction times necessary for such a capability. Instead, it is more likely that the C4I modernization program is meant to improve the credibility of China's minimal deterrent posture in the short- to medium-term.

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[1284] "*Daodan shixian 'quantianhou' tongxin baozhang* [Missile Launch 'All-Weather' Communications Guaranteed]," *Jiefangjun bao,* 5 January 1998, p. 2.

[1285] U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1305 of the FY97 National Defense Authorization Act, April 1997.

[1286] Ge Xinqing, Mao Guanghong, and Yu Bo, "*Xinxizhanzhong daodan budui mianlin de wenti yu duice* [Questions and Answers Facing Missile Units in Information Warfare]," in *Junshi xueshu*, ed., *Wojun xinxizhan wenti yanjiu*, pp.189-192.

[1287] Han Tiejun and Li Qinsuo, "*Didi changdui daodan budui zuozhan de jiben yuance* [Fundamental Principles of Conventional Surface-to-Surface Missile Unit Operations]," in *Lianhe zhanyi yu junbingzhong zuozhan*, pp. 232-235.

[1288] For a detailed Chinese discussion of the need for more advanced and survivable nuclear weapons command, control, and communication, see Lin Zhenwu, ed., *Xiandai jundui zhihui,* pp. 393-416.

**Future Nuclear Posture**

**Doctrine.** Over the past decade, certain indicators suggest that these long-held aspects of Chinese nuclear weapons doctrine may be undergoing some reconsideration.[1289] As Paul Godwin argues,

> Minimum deterrence, which uses a single countervalue punitive strike on cities to deter, is seen by many Chinese strategists as passive and incompatible with what they see as a future requirement for more flexible nuclear responses.[1290]

Recent reports suggest a high-level, ongoing debate over the future of Chinese strategic forces. Out of this debate has come Jiang Zemin's statement of "five musts" which provide ample flexibility and nuance to guide the Second Artillery toward a more complex, capable and forward-leaning force in the future. Jiang is quoted as saying the "five musts" are: (1) China "must own strategic nuclear weapons of a definite quality and quantity in order to ensure national security; (2) China "must guarantee the safety of strategic nuclear bases against the loss of combat effectiveness from attacks and destruction by hostile countries"; (3) China "must ensure that our strategic nuclear weapons are at a *high degree of war preparedness*"; (4) "when an aggressor *launches* a nuclear attack against us, we must be able to *launch nuclear counterattack and nuclear re-attack* against the aggressor"; (5) China "must pay attention to the global situation of strategic balance and stability, and, when there are changes in the situation, *adjust our strategic nuclear weapon development strategy* in a timely manner."[1291]

As a result, one observer argues that some Chinese military planners are considering a shift to a "limited" deterrent posture, which could include the introduction of limited war-fighting capabilities, improved command and control and early warning systems, smaller, survivable, mobile, more accurate, and diverse cruise and ballistic missile nuclear delivery systems, possible abandonment of the NFU policy, missile defenses, and the addition of counterforce targets.[1292] This view has gained backing in other detailed research which notes that "China's strategic modernization R&D [research and development] support this shift toward a limited warfighting approach to nuclear

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[1289] For a Chinese perspective on this issue, see Yang Huan, "China's Strategic Nuclear Weapons," in Michael Pillsbury, ed., *Chinese Views of Future Warfare*, Washington, DC: National Defense University Press, 1997, pp. 131-135.

[1290] Godwin, "China's Nuclear Forces."

[1291] From "Jiang Zemin Defines Position of China's Strategic Nuclear Weapons", in *Tai yang pao* [Hong Kong], 17 July 2000, in FBIS CPP20000717000021 (emphasis added).

[1292] Johnston, "China's New 'Old Thinking'."

warfare."[1293] Such a capability would allow China to respond to "any level of nuclear attack, from tactical to strategic."[1294]

However, as the previous pages suggest, from a strictly doctrinal perspective, it is likely that such a shift must await shifts in the domestic political hierarchy and its view of the outside world, factors which have consistently driven Chinese doctrinal choices. Moreover, as noted in the previous section on force structure, technological constraints will remain one of the foremost drivers determining the direction of doctrine in the near-term.

Rather than force a stark analytical choice between *either* a doctrine of "minimal deterrence" *or* one of "limited deterrence", it makes more sense to draw out two important nuances to better understand this debate. First is to recognize the differences between "operational doctrine" and what we might call "aspirational doctrine" in the Chinese context. Second is to recognize that the Second Artillery – which oversees strategic nuclear, theater nuclear, and conventional missiles – more likely operates on three levels of doctrine: *credible minimal deterrence* with regard to the continental United States and Russia; *"limited deterrence"* with regard to China's theater nuclear forces; and an *offensively-configured, preemptive, counterforce warfighting posture* of "active defense" or "offensive defense" for the Second Artillery's conventional missile forces.

**Force Structure.** Various governmental reports suggest that Chinese nuclear force structure will increase in numbers and quality. In 1995, then-Secretary of Defense William Perry stated that China "has the potential to increase the size and capability of its strategic nuclear arsenal significantly over the next decade."[1295] According to the U.S. Department of Defense in 1997, "China probably will have the industrial capacity, though not necessarily the intent, to produce a large number, perhaps as many as a thousand, new missiles within the next decade."[1296] General Hughes, then Director of the DIA, testified in 1999 that "the number of Chinese strategic missiles capable of hitting the United States will increase significantly during the next two decades."[1297] Publicly released estimates of the number of ICBMs capable of reaching the U.S. range from "tens"[1298] to the Cox

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[1293] Mark A. Stokes, China's Strategic Modernization, p. 96.

[1294] Godwin, "China's Nuclear Forces."

[1295] Secretary of Defense William Perry, *Annual Report to the President and the Congress*, Washington, DC: Government Printing Office, 1995, p. 83.

[1296] U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1305 of the FY97 National Defense Authorization Act, April 1997.

[1297] General Patrick M. Hughes, Director of the Defense Intelligence Agency, Senate Armed Services Committee hearings on "Current and Projected National Security Threats," 2 February 1999.

[1298] National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," p. 11.

Committee's ambitious estimates of "up to 100" ICBMs with 1000 MIRVed warheads by 2015.[1299] According to the Pentagon, "China plans to begin production and deployment of at least one solid-propellant ICBM that will provide China's strategic nuclear forces [with] improved mobility, survivability, accuracy, and reliability."[1300] Reportedly, Chinese sources also confirm the modernization program. At a July 2000 work conference of the Central Military Commission in Xishan, strategic nuclear force development for the period 2001-2009 was characterized as, "further replacement of the older generation of weapons, further upgrading, and further development."[1301]

There are two principal impetuses behind the modernization of the Chinese nuclear force structure. The first is the predictable process of replacing aging weapons systems with more modern counterparts. Most of China's operational missile forces, especially the CONUS-capable ICBMs, are 1950s-vintage liquid-fueled systems. As General Hughes has testified, "China's strategic nuclear force is small and dated, and because of this, Beijing's top military priority is to strengthen and modernize its strategic nuclear deterrent."[1302] This effort has been assisted and accelerated in part by the ready access to technologies now available from Russia. The second driving factor behind Chinese modernization is a rising concern about the survivability of its nuclear deterrent, particularly given the prospect of the Strategic Defense Initiative in the 1980s and now the deployment of theater and national missiles defenses by the United States. Chinese perceptions about the survivability of its force were also undermined by DESERT STORM, which highlighted the ability of U.S. conventional forces to destroy fixed targets with precision-guided munitions and the concomitant inability of those same forces to destroy mobile targets. This realization no doubt reinforced the perceived desirability of modern, road-mobile nuclear forces.

The two principal programs in this modernization effort will be the DF-31 and the DF-31A.[1303] The mobile, solid-fuel DF-31 will have a range of 8,000 kilometers, and carry a payload of 700 kilograms. The origins of this missile are controversial. Lewis and Xue argue that the First Academy drew up plans beginning in 1974 to develop not only the JL-1 SLBM, but three other solid-propellant missiles as well over the subsequent decade, namely the DF-21, DF-21A, and the JL-2 SLBM.[1304] Another source claims that the DF-31 missile was an outgrowth of the DF-23 road-mobile, solid-fueled program,

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[1299] *Cox Report*, pp. 185-86.

[1300] Ibid.

[1301] See "Jiang Zemin Defines Position of China's Strategic Nuclear Weapons."

[1302] General Patrick M. Hughes, Director of the Defense Intelligence Agency, Senate Armed Services Committee hearings on "Current and Projected National Security Threats," 2 February 1999.

[1303] Department of Defense, "Selected Military Capabilities of the People's Republic of China."

[1304] Lewis and Xue, *Strategic Seapower*, p. 181.

which began development in 1978 as a land-based missile, and was then modified to also serve as the basis for a submarine-launched SLBM, known as the JL-2. To confuse matters even further, a different Lewis article asserts that the R&D for the DF-23 began in August 1970, during "a particularly tense moment ion Sino-Soviet confrontation."[1305] Regardless of its development path, the DF-23 was renamed the DF-31 in January 1985, although the designation JL-2 was not changed. In August 1999, China publicly declared the first full flight test of the DF-31.[1306] It is expected that the DF-31 will be deployed perhaps by the early 2000s.

The planned follow-on to the DF-31, the DF-31A, was officially initiated in July 1986.[1307] The three-stage, solid-propellant ICBM will have a range of 12,000 kilometers, thus making it capable of striking all targets in the CONUS. It is therefore the logical replacement to China's aging DF-5 force, which it will begin replacing around 2010. According to Lewis and Hua, the final basing mode for the DF-31A is still unclear, though it will be stored in caves and will likely be deployed on a road-mobile TEL.

Some reports indicate that China will launch a major effort to develop and construct a follow-on to the *Xia*-class nuclear ballistic missile submarines to be deployed after 2000. The next generation submarine, the 09-4, would probably deploy 16 of the new JL-2 SLBM, with a range of about 8000 kilometers.[1308] However, political and technological constraints may delay or even suspend the deployment of this boat.[1309]

**Implications.** These future nuclear posture trends hav signiicant implications for mobility, fuels, C4I accuracy, force size, warhead size, and the relative importance of conventional vs. nuclear missiles in the Chinese arsenal.

*Mobility.* Despite yeoman effort, the Chinese have largely failed to field a credible triad. Instead, the force remains highly unbalanced, with land-based missiles predominant over bombers and SLBMs, especially in the intercontinental category. As a result, Beijing has been forced to improve the survivability of its land-based missiles. Apart from the addition of solid fuels and improved C4I infrastructure, the Chinese began to move from silos and caves to a road-mobile force with missiles loaded on transporter-erector-launchers (TELs) as early as the 1970s.[1310] With the planned deployments of the DF-31 and DF-31A ICBMs over the next ten to twenty years, the Chinese nuclear inventory will thus become increasingly mobile over time. This move will have the effect of enhancing the credibility of China's minimal deterrent posture, as long as such a large

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[1305] Lewis and Hua, "China's Ballistic Missiles," p. 27.

[1306] National Intelligence Council, "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015," p. 11.

[1307] Lewis and Hua, "China's Ballistic Missile Programs," p. 29.

[1308] Office of Naval Intelligence, *Worldwide Submarine Challenges 1997* February 1997, p. 22.

[1309] Lewis and Xue, *China's Strategic Seapower,* pp. 236-37.

[1310] Lewis and Hua, "China's Ballistic Missile Programs," p. 25.

force size asymmetry exists between China and the larger nuclear powers. Moreover, the deployment of the DF-31 and DF-31A theoretically increases deterrence stability with other nuclear powers by making China's force more survivable.

*Solid Fuel.* One impediment to greater flexibility and survivability in the Chinese force were the hazards associated with volatile liquid propellants.[1311] The move to solid fuel increases the credibility of the Chinese force by improving reaction times, thus raising its overall readiness level. As Godwin points out, however, solid fuels also "contain less thrust than liquid fuel, requiring China to develop smaller, lighter warheads with much better yield-to-weight ratios than its older weapons."[1312]

*C4I Modernization.* Speaking in 1999, the then-Director of the Defense Intelligence Agency General Patrick Hughes testified to Congress that China was actively engaged in "upgrade programs" for its nuclear C4I.[1313] Overall, the modernization of Chinese nuclear C4I increases the credibility of the Chinese force by strengthening command and control. Specifically, it enhances the leadership's positive control over the force, increasing the probability that the NCA could survive an attack and respond. In the paradox of nuclear strategy, this development actually increases deterrence stability between China and other nuclear powers.

*Accuracy.* There is reason to believe that the Chinese Second Artillery is attempting to improve the accuracy of its strategic rocket forces. Pre-surveyed launch sites increase the potential accuracy of the new mobile systems. Chinese research institutes are reportedly attempting to increase precision by developing better gyros and inertial measurement units.[1314] According to the Pentagon, China is using the Global Positioning System to make "significant improvements" in its missile capabilities. As an example, the DOD cites the use of GPS for midcourse guidance correction to improve missile accuracy, and also asserts that such satellite updates will "increase the operational flexibility of China's newer mobile missiles."[1315] A RAND study on this subject concluded that GPS-aiding of ballistic missile guidance could improve accuracy by 20-25

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[1311] The struggles over the transition from liquid to solid-fuel are well documented in ibid.

[1312] Godwin, "China's Nuclear Forces".

[1313] General Patrick M. Hughes, Director of the Defense Intelligence Agency, Senate Armed Services Committee hearings on "Current and Projected National Security Threats," 2 February 1999.

[1314] Stokes, China's Strategic Modernization, p. 91.

[1315] U.S. Department of Defense, "Selected Military Capabilities of the People's Republic of China," report to Congress pursuant to Section 1305 of the FY97 National Defense Authorization Act, April 1997.

percent.[1316] Greater accuracy might signal a desire for eventual counterforce capabilities, though force size will be an important constraint on successful transition to a more offensive posture.

*Greater Numbers.* The Cox Report and other analyses predict that the Chinese nuclear force structure will likely increase in size, and therefore pose a greater threat to the United States.[1317] Why would the Chinese force increase in size? An increase in missiles would make it more difficult for an opposing force to "decapitate" the Chinese force, which has been a prevailing fear since the beginnings of the program and has only become more frantic in an age of growing American predominance in space-based reconnaissance. More Chinese missiles might signal a possible shift from a retaliatory countervalue posture to an offensive counterforce posture, particularly if accompanied by necessary improvements in accuracy. According to Godwin, a sufficient number of weapons could permit China for the first time to attempt intrawar escalation control, since Beijing would retain enough forces to respond at a higher level if the aggressor chooses to escalate a nuclear exchange.[1318]

An increase in missiles is also the logical response to the deployment of theater and national missile defenses among the United States and its allies, which the Chinese view as an organic whole rather than separate programs (as one Chinese arms controller put it, "two sides of the same coin"). Proponents of TMD/NMD point out that the Chinese are already modernizing their missile forces, so defenses are not to blame for increases in the quality and quantity of the Chinese force. This is probably true, but must also be accompanied by an honest recognition that TMD/NMD deployment will likely accelerate this effort and push the Chinese to spend more money on relatively cheap anti-missile defense accessories, such as countermeasures and decoys. Perhaps the only good news is that limited increases in Chinese missiles would paradoxically increase deterrence stability between China and other nuclear powers and allow China to maintain a no-first-use principle by reducing the likelihood that the PRC's force could be destroyed in an all-out pre-emptive attack.

At the same time, we must also entertain the definite possibility that the new generation of missiles are meant only to replace the aging veterans of the fleet, particularly the DF-4 and DF-5. If the Chinese eventually exchange the road-mobile, solid-fueled DF-31s and DF-31As for these liquid-fueled, silo- and cave-based missiles on a one-to-one basis, or even two-to-one basis, then the net result is *ceteris paribus* an increase in the credibility of China's previously suspect minimal deterrent, not necessarily a fundamental shift to an offensive posture. Moreover, as the significant delays in the IOCs of past systems and the inaccurate estimates of DF-31/DF-31A/DF-25 deployments in Lewis and Hua's 1992 article attest, we should not be overly optimistic about the

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[1316] Scott Pace, et al., *The Global Positioning System: Assessing National Policies*, Santa Monica, Calif.: RAND, Critical Technologies Institute, MR-614-OSTP, 1995, p. 68.

[1317] *Cox Report*, pp. 185-86.

[1318] Godwin, "China's Nuclear Forces".

production timelines or output estimates offered by the Chinese for the rollout of the next generation of missiles, but should instead maintain a sober view of the impressive but sometimes erratic production cycles in the Chinese missile system.

*MIRVing?* Since the late 1980s, China has conducted a series of smaller-yield tests, apparently intended to develop smaller, lighter warheads with an improved yield-to-weight ratio,[1319] though this trend could be traced as far back as 1970.[1320] Most analysts agree that the likely purposes was to develop new warheads for single placement on China's next generation solid-fuel ICBMs (DF-31 and DF-31A), as well as ensure the safety and reliability of new warhead designs.[1321] The antecedents of the DF-31 and DF-31A programs, which were initiated in the early 1970s, were move to mobile forces required the development of smaller missiles, which in turn required smaller warheads.

Others have added an additional, controversial motivation for the testing of smaller warheads – the development of a multiple warhead capability, possibly MRV or even MIRV.[1322] The Cox Committee, for example, concluded that "the PRC has demonstrated all of the techniques that are required for developing a MIRV bus, and that the PRC could develop a MIRV-dispensing platform within a short period of time after making a decision to proceed."[1323] Often, this desire is linked to a perceived future Chinese intent to develop flexible response, counterforce-oriented nuclear forces, though the smaller warheads could also be used as MIRVs on the existing DF-4s and DF-5As. There is significant evidence to suggest that the Chinese have been actively interested in developing multiple warhead technology for more than 20 years.[1324] However, the current small size of the Chinese force and the mainstream projections of the size of the

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[1319] Banning N. Garrett and Bonnie S. Glaser, "Chinese Perspectives on Nuclear Arms Control," *International Security*, vol. 20, no. 3, Winter 1995/96, pp. 55-56; Godwin and Schulz, "China and Arms Control," p. 9; Robert S. Norris, "Nuclear Arsenals of the United States, Russia, Great Britain, France and China: A Status Report," presented at the 5th ISODARCO Beijing Seminar on Arms Control, Chengdu, China, 12-15 November 1996, p. 5; and Norris and Arkin, "British, French, and Chinese Nuclear Forces," pp. 66-67.

[1320] Lewis and Hua, "China's Ballistic Missiles, " p. 21.

[1321] Dingli Shen, "The Prospects For A Comprehensive Test Ban Treaty: Implications Of Chinese Nuclear Testing," in W. Thomas Wander, Eric Arnett, and Paul Bracken, eds., *The Diffusion of Advanced Weaponry: Technologies, Regional Implications, and Responses*, Washington, D.C.: American Association for the Advancement of Science, 1994, pp. 272-273.

[1322] Cox Report.

[1323] Ibid.

[1324] The Intelligence Community Damage Assessment on the Implications of China's Acquisition of U.S. Nuclear Weapons Information on the Development of Future Chinese Weapons, 21 April 1999 (hereafter The Intelligence Community Damage Assessment).

future force make it unlikely that China seeks multiple warheads for counterforce purposes. Instead, an examination of the timelines for MIRV research in China suggest that the focus of the multiple warhead effort is anti-BMD. Lewis and Hua assert that the Chinese began to study MRVs and MIRVs in 1970 as a response to U.S. deployment of multiple warhead systems, but lowered the priority of the effort in March 1980 after more than a decade of problems.[1325] Work on multiple warheads was resumed on 10 November 1983, however, when the First Academy included them in the DF-5A modification program.[1326] Some reports suggest that missile tests undertaken between fall 1986 and late 1987 were for the development of multiple-warhead missiles, including at least one such test for the DF-5A ICBM.[1327]

Why the renewed interest after years of difficulty? Lewis and Hua give us no clues, but the U.S. announcement of the Strategic Defense Initiative in March 1983 seems too great a coincidence to ignore. If we assume that U.S. SDI and now NMD research is driving the current round of Chinese efforts to develop multiple warheads, then a number of potential implications can be offered. The first critical variable is the status of Chinese nuclear testing. Despite allegations of nuclear espionage, Chinese accession to the CTBT would significantly impair China's ability to make progress in this area, particularly given the conclusion of the Jeremiah Commission that China has not deployed a MIRV on its ICBMs.[1328] Even if we assume that the Chinese have already achieved a level of miniaturization necessary for MIRVing or will do so in the near future, a second critical variable will be the size of the future Chinese nuclear force posture, particularly the CONUS-capable forces. If China maintains a relatively small ICBM force, eventually replacing its several dozen DF-4s and DF-5As with a comparable number of DF-31s and DF-31As, respectively, then Chinese MIRVing along with robust decoys and countermeasures is likely meant to try and overwhelm the proposed 100- or 200-interceptor NMD system, not necessarily perform offensive counterforce attacks. A larger force of ICBMs makes this distinction murkier, but the overwhelming, triadic force asymmetry of the United States vis-a-vis China for the foreseeable future severely reduces the possibility that China could hope to achieve its goals with a preemptive strike.

*Increased reliance on conventional missiles.* Given China's immediate security contingencies vis-à-vis Taiwan, the Second Artillery over the past 10 years has dramatically restructured its force to give conventional missiles – such as the DF-11 and DF-15 – far more weight in its overall posture. Looking ahead, it is likely that more effective, conventionally-armed land-attack cruise missiles (LACMs) will also be integrated into the Second Artillery force structure, doctrine, and operational

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1325 Lewis and Hua, "China's Ballistic Missiles", p. 21.

1326 Ibid., pp. 21-22.

1327 Lin, *China's Nuclear Weapons Strategy,* p. 51; Stockholm International Peace Research Institute, *SIPRI Yearbook 1987: World Armaments and Disarmament*, Oxford: Oxford University Press, 1987, p. 34.

1328 *The Intelligence Community Damage Assessment*, 21 April 1999.

planning.[1329] As one researcher at China's National Defense University has written, "nuclear retaliation remains the solid foundation of the Strategic Rocket Forces …" But given events such as the Desert Storm and the U.S.-led NATO effort against Yugoslavia, "the particular features of world military combat and China's peripheral situation demands that the Second Artillery develop its conventional ballistic missile capability." The author argues the Second Artillery shift conceptually from "nuclear retaliation" (*he baofu*) to **"**nuclear /conventional, two roles" (*he chang liang yong*).[1330] The discussion above on China's build-up of conventional missiles provides ample physical evidence of this shift in how the Second Artillery will approach its mission in the future.

**CONCLUSIONS**

Based on a review of Chinese nuclear principles, and an empirical study of the history, organization and force structure of the Second Artillery, we reach a number of important findings. We conclude that the operational survivability of China's nuclear retaliatory capability vis-à-vis major nuclear powers was and probably still is open to question, particularly in the context of an all-out preemptive strike. At best, then, China's minimal deterrent was primarily psychological, though the potency of this aspect of the deterrent should not be underestimated. The PRC's missile modernization program, therefore, has been a quest to increase the credibility of this deterrence posture by improving the readiness and survivability of the force. Measures being implemented are a transition from volatile liquid fuels to more stable solid fuels, a transition from fixed basing to mobile basing, and the construction of a robust C4I infrastructure. As of yet, the Chinese have not operationally deployed any of either of their planned solid-fueled, road-mobile ICBMs, though the shorter range DF-31 seems to be nearing IOC after more than 30 years of work. When these systems come online, the Chinese will have finally succeeded in fielding a much more credible minimal deterrent force, whose mobility and readiness theoretically increase the chances that some percentage of the force could survive a first strike and thus effectively deter potential attackers.

At the same time, however, the Chinese force has grown to encompass more than simply minimal deterrent forces, including theater and tactical systems. Viewed in its totality, the Chinese nuclear force structure seems to defy simple categorization as either minimal or "limited" deterrence. The multi-faceted force is made up of strategic, theater, and tactical systems of varying range, accuracy, and yield, reflecting the very different

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1329 Mark Stokes, "China's Military Space and Conventional Theater Missile Development: Implications For Security In The Taiwan Strait," in Robert Sutter, ed., and Bates Gill, "China's Second Artillery: Transition to Credible Deterrence," in China and Weapons of Mass Destruction: Implications for the United States, Washington, DC: Government Printing Office, 5 November 1999.

1330 Sun Kuaiji, "*Cong 'he bao fu' dao 'he chang liang yong* [From 'Nuclear Retaliation' to 'Nuclear/Conventional Two Roles']," *Ban Yue Tan* [China Comment], no. 1, 2000.

missions it is required to perform. The small ICBM force, anchored by the DF-5 family of missiles, appear to be second-strike minimal deterrence forces. The theater systems, by contrast, are unlikely to be used in a second-strike, minimal deterrent role following a preemptive strike. Instead, theater systems look like offensive systems meant to strike U.S. forces and bases in Asia to degrade conventional capability. The short-range, ballistic missile forces, which are also nuclear capable, further confuse the situation by serving a variety of conventional warfighting and nuclear warfighting roles. For the future, the doctrine and force structure of China's Second Artillery must be analyzed at three distinct levels: a posture of *credible minimal deterrence* with regard to the continental United States and Russia; a more offensive-oriented posture of *"limited deterrence"* with regard to China's theater nuclear forces; and an *offensively-configured, preemptive, counterforce warfighting posture* of "active defense" or "offensive defense" for the Second Artillery's conventional missile forces.

How did the Chinese force evolve into this arrangement? First, our analysis tends to confirm the arguments of Lewis, *et al.* of the *importance of technology as a determinant of Chinese doctrine*. The progression of missile systems, with their gradually expanding ranges and capabilities, defined the limits of the possible for the Chinese leadership. However, we disagree that technology alone determined the nature of the Chinese nuclear force posture. Central guidance on ranges and payloads, while admittedly vague, appears to conform with strategic-level perceptions of threats and goals in the external security environment, especially when matched with the corresponding logical deployment pattern outlined in section three. Perhaps it could be said that the Chinese made a *virtue out of necessity* in the construction of their nuclear deterrent, accepting the technological constraints of the system and making rational choices under those constraints.

In the end, however, we question whether China ever actually achieved a fully credible minimal deterrent. Thus, our attention has focused on the discontinuity between reality and aspiration, which is oftimes referred to as the "capabilities-doctrine gap." At the present stage in the Second Artillery's modernization, China is nearing an historic convergence between doctrine and capability, allowing it to increasingly achieve a degree of *credible minimal deterrence* vis-à-vis the continental United States – a convergence of its doctrine and capability it has not confidently possessed since the weaponization of China's nuclear program in the mid-1960s.

But what about "limited deterrence"? Recent studies find that since at least the late-1980s, Chinese military writings have promoted the need for China to develop a "limited deterrence" – as opposed to a "minimal deterrence" – doctrine. While these writings are not considered official declarations of doctrine, the fact that they are written by military analysts and appear in officially-sanctioned military publications gives them a special salience which deserves further scrutiny. In analyzing these writings, Johnston observes the emergence of "more comprehensive and consistent doctrinal arguments in favor of developing a limited flexible response capability" and that "Chinese strategists

have developed a concept of limited deterrence … to describe the kind of deterrent China ought to have."[1331]

In general and specific terms, these Chinese writings call for limited, counterforce, war-fighting capabilities "to deter conventional, theater, and strategic nuclear war, and to control and suppress escalation during a nuclear war."[1332] According the Chinese analysts, such a posture requires:

> a greater number of smaller, more accurate, survivable, and penetrable ICBMs; SLBMs as countervalue retaliatory forces; tactical and theater nuclear weapons to hit battlefield and theater military targets and to suppress escalation; ballistic missile defense to improve the survivability of the limited deterrent; space-based early warning and command and control systems; and anti-satellite weapons (ASATs) to hit enemy military satellites.[1333]

Because such a posture would require a significant increase in Chinese capabilities, Johnston correctly highlights the gap between this proposed doctrine on the one hand, and actual capabilities on the other. As Godwin points out, the lack of any space-based reconnaissance or early warning systems means that Beijing's command and control system does not have the ability in real time to determine the size and origin of the attack, making it difficult to determine what kind of response is required - an essential component of the more sophisticated versions of limited deterrence found in Chinese military journals.[1334] Johnston also notes that actually achieving such a deterrent posture is not an inevitable outcome, owing to a number of possible constraints.

We have little basis for questioning the findings of Johnston about internal military writings on nuclear deterrence, especially the striking lack of discussion of the term "minimal deterrence." There are a number of possible explanations. Paul Godwin suggests that Mao Zedong's death in 1976 and the implementation of Deng Xiaoping's military reforms in the late 1970s permitted China's military analysts to explore issues of doctrine and strategy "free from the stultifying requirement to verify everything they wrote with a literal interpretation of Mao's writings and statements."[1335] Second, Godwin points to the increased battlefield nuclear weapons threat on the Sino-Soviet border, which "raised the salience of strategic deterrence and nuclear warfighting to a level it had never before achieved," encouraging Chinese military analysts to read

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[1331] Johnston, "China's New 'Old Thinking'," p. 5.

[1332] Ibid., p. 19.

[1333] Ibid., p. 20.

[1334] Godwin, "China's Nuclear Forces".

[1335] Ibid.

extensively in Western theories and journals.[1336] Johnston himself offers some additional explanations in the last few pages of his *International Security* article.[1337] Many of the PLA authors explicitly contrast limited and minimal deterrence, obviating the possibility that they have simply renamed the previous doctrine for bureaucratic purposes. The authors appear to be well-placed to affect the operational doctrine of the Second Artillery, removing the possibility of a disjuncture between academic and military writings, as occurred between the writings of RAND strategists and the war-winning strategy of General LeMay at Strategic Air Command. If limited deterrence is defined as flexible response, counterforce warfighting, then perhaps limited deterrence is the *aspirational* doctrine for a future Second Artillery, though the past production timelines of the missile industry should sober our expectations of its appearance anytime soon.

We would add three more caveats to interpret the emergence and meaning of an ostensible limited deterrence posture in China. First, assuming a continued adherence by China to its testing moratorium, and the possibility that it will ratify the CTBT in the future, we question the ability of China to confidently develop smaller, lighter, and more accurate nuclear warheads (including potential MRV and MIRV capability) consistent with the limited deterrent aspirations described by Chinese analysts in the late-1980s and early 1990s.

Second, it is possible that the tripartite system we describe is a confirmation of Johnston's conclusions about limited deterrence, and we have simply come to the same place from a different direction. Perhaps the Chinese, when they looked at the multifunctional force structure they created, felt that minimal deterrence no longer could encompass all of the various defensive and offensive, long-range and short-range systems in their arsenal. Borrowing from Confucius, they may have concluded that harmony could only be restored when the name of the thing matched the nature of thing, and the product of this *zhengming* was "limited deterrence."

Third, however, even if we accept limited deterrence as an overarching *aspirational* goal of this multi-faceted system, we still reject the misinterpretation of Johnston's writings by some, such as the Cox Committee and others, to mean that the Chinese are unquestionably engaged in an aggressive modernization of their missile forces meant to enable counterforce warfighting. Indeed, as we have outlined in this paper, there are legitimate, alternative explanations for many of the hardware trends in China. Reforms in mobility, readiness, and C4I infrastructure are readily and more comprehensively explained as an attempt to increase survivability from foreign attack – simply the long-sought confidence of a credible deterrent, notwithstanding Chinese analytical differentiation between "limited" and "minimal" deterrence -- and not necessarily to achieve a warfighting, war-winning strategy. Moreover, as long as the numbers of the force stay beneath a certain level, increases in accuracy and multiple warheads do not pose a threat to American and Russian overwhelming nuclear superiority. American strategic nuclear forces, we must remember, still number around

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[1336] Ibid.

[1337] Johnston, "China's New 'Old Thinking', " pp. 35-36.

8,000 deployed on 575 ICBMs, 102 strategic bombers, and 17 SSBNs. Indeed, a single *Trident* SSBN, carries more missiles (24) than the entire Chinese ICBM inventory.

The troubling countertrend involves the introduction of theater and national missile defenses into the equation, dramatically complicating China's strategic environment. Whereas China previously faced a world marked by the threat of offense racing, the post-BMD world will be marked by the unpredictable interactions of offense racing, defense racing and countermeasure/decoy racing. In this environment, China would be acting rationally if it accelerated the desultory pace of its missile modernization, spending more money on relatively cheap countermeasures and decoys. In order to develop smaller warheads for penetrating missile defenses, it would be acting in its self-interest by opting out of CTBT and resuming testing. Finally, China might even seek to foil missile defenses by proliferating its countermeasures technology to other emerging nuclear states. All of these trends would reduce the security of the United States. It is our hope that a sober understanding of the nature and purpose of Chinese nuclear force modernization and doctrinal evolution could forestall such an outcome.

**Figure 11.1 National Wartime Second Artillery Command Structure (Conventional Weapons)**

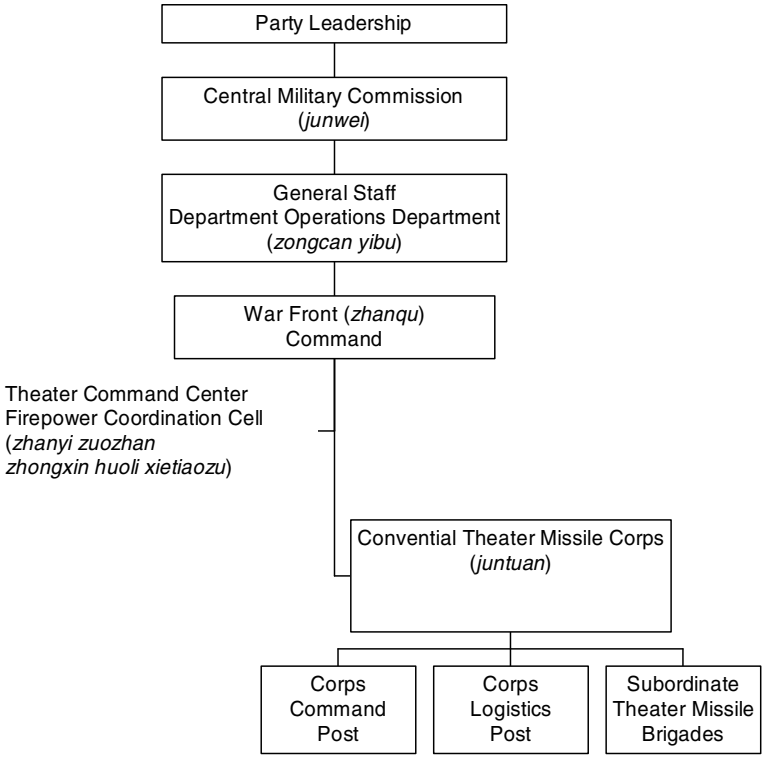


**Figure 11.2 Known Second Artillery Headquarters Units**

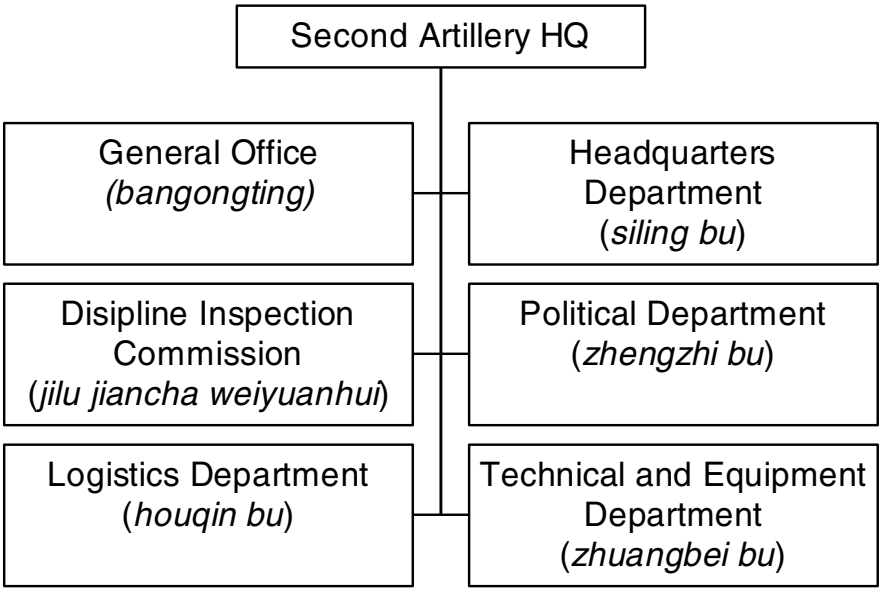


**Figure 11.3 Known Second Artillery Headquarters Department Units**

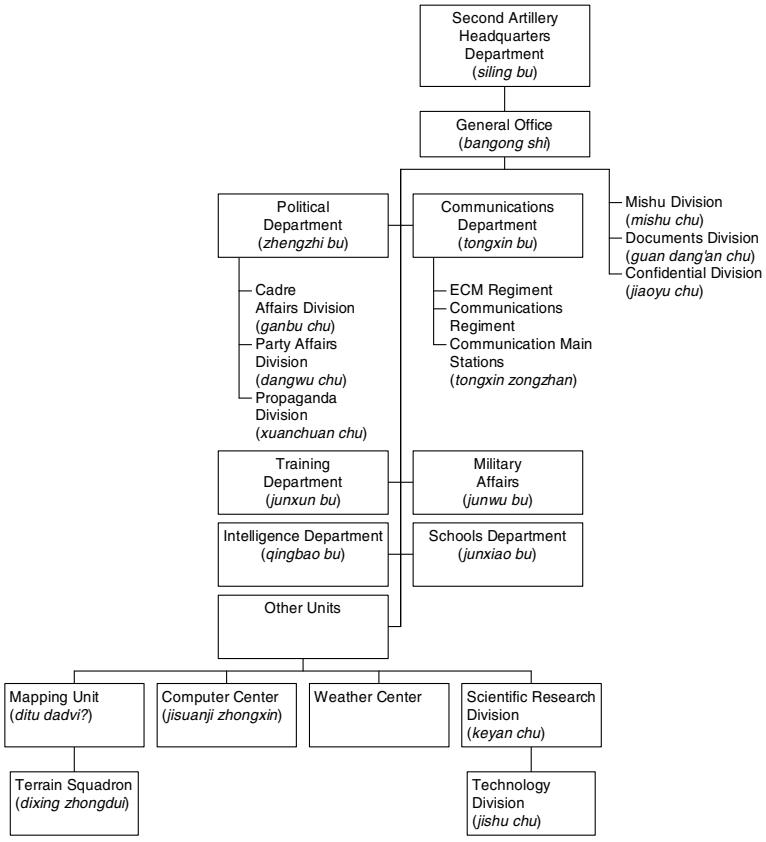
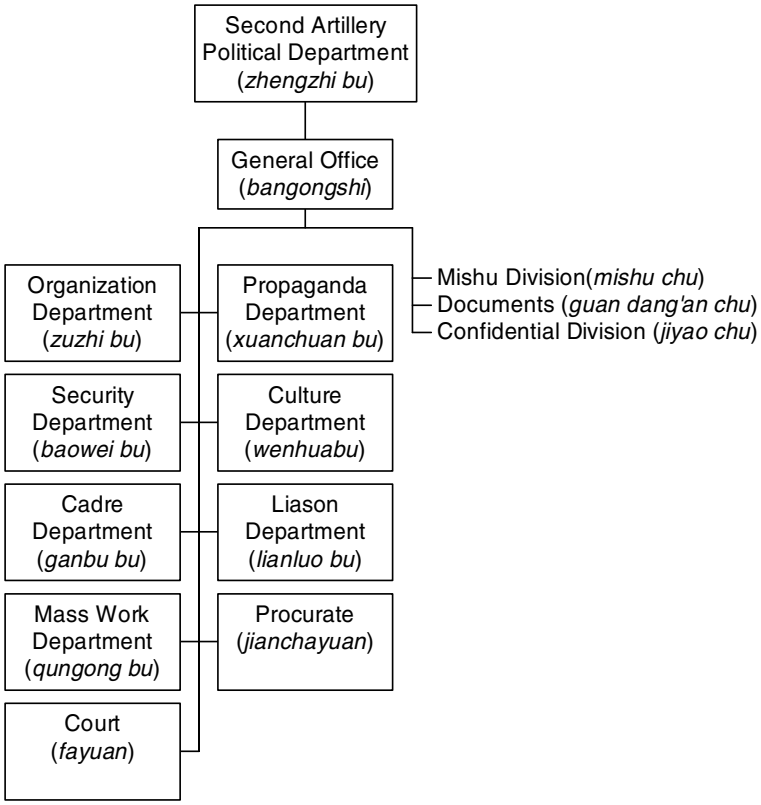


**Figure 11.4 Known Second Artillery Political Department Units**



## Figure 11.5 Known Second Artillery Logistics Department Units

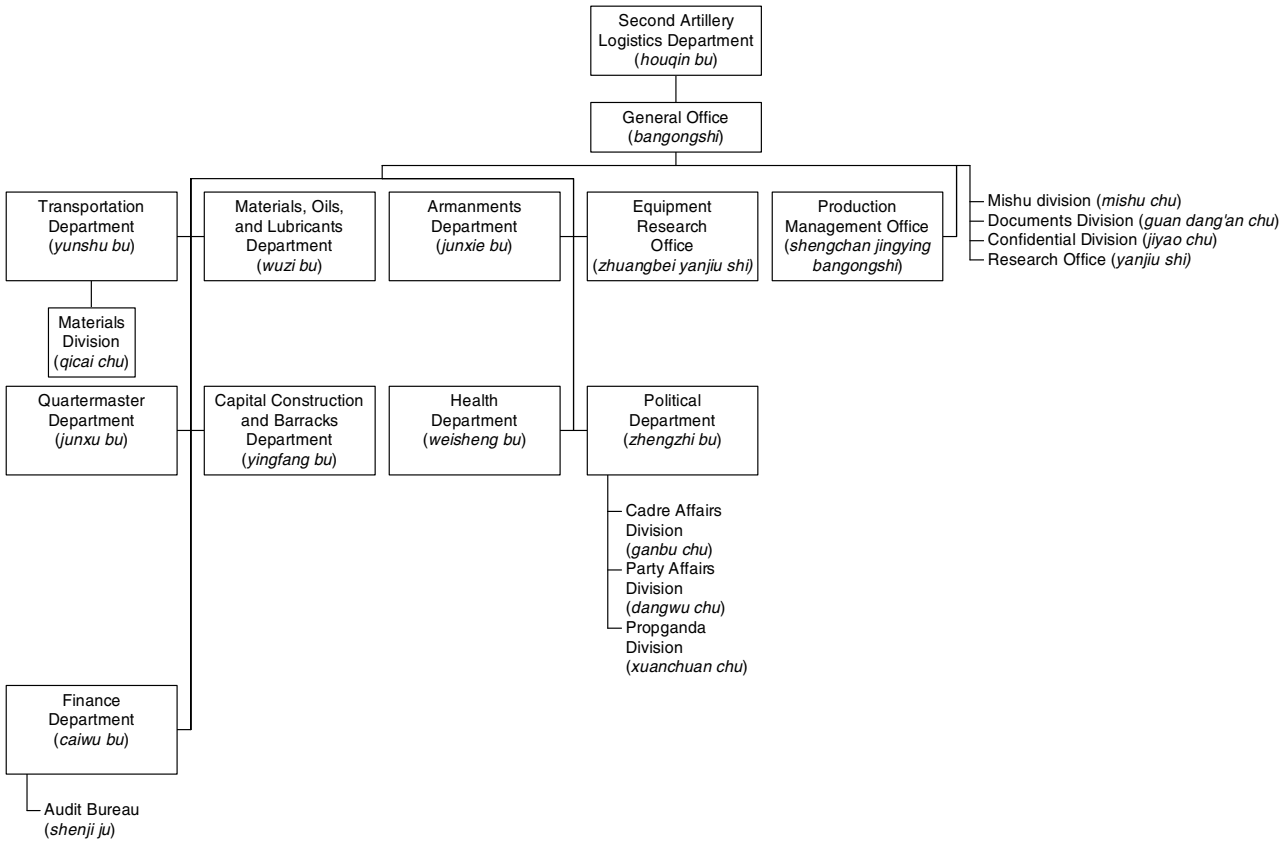


**Figure 11.6 Known Second Artillery Technical and Equipment Department Units**

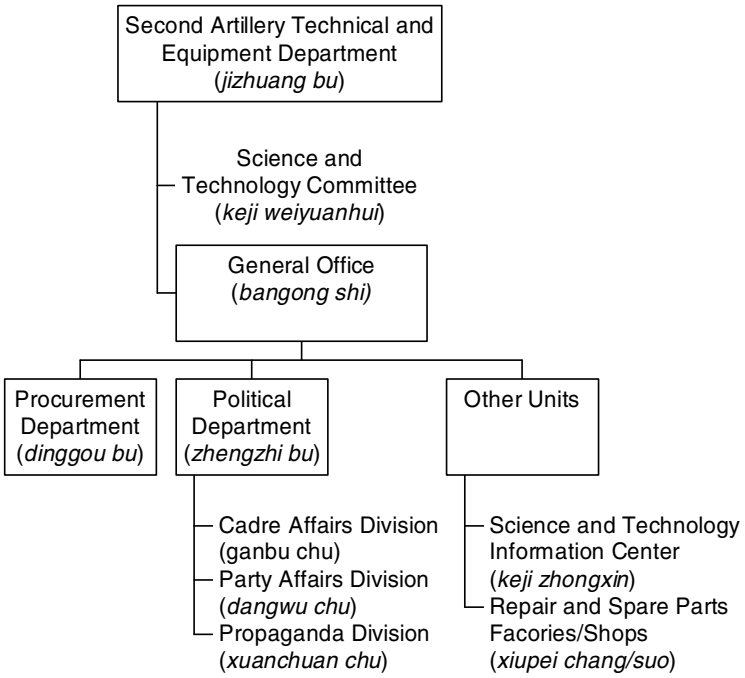


**Figure 11.7 Known Base Unit Headquarters Units Second Artillery**

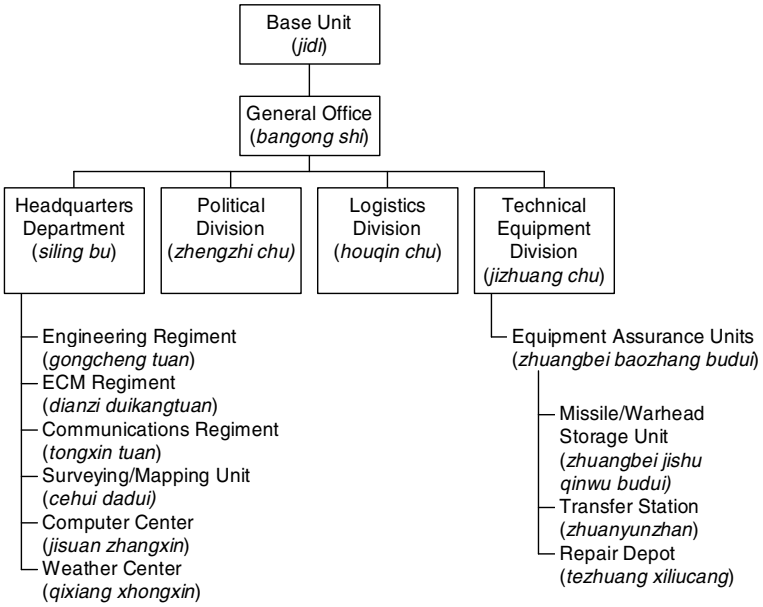



**Figure 11.8 Base Headquarters Department (*silingbu*) Second Artillery**

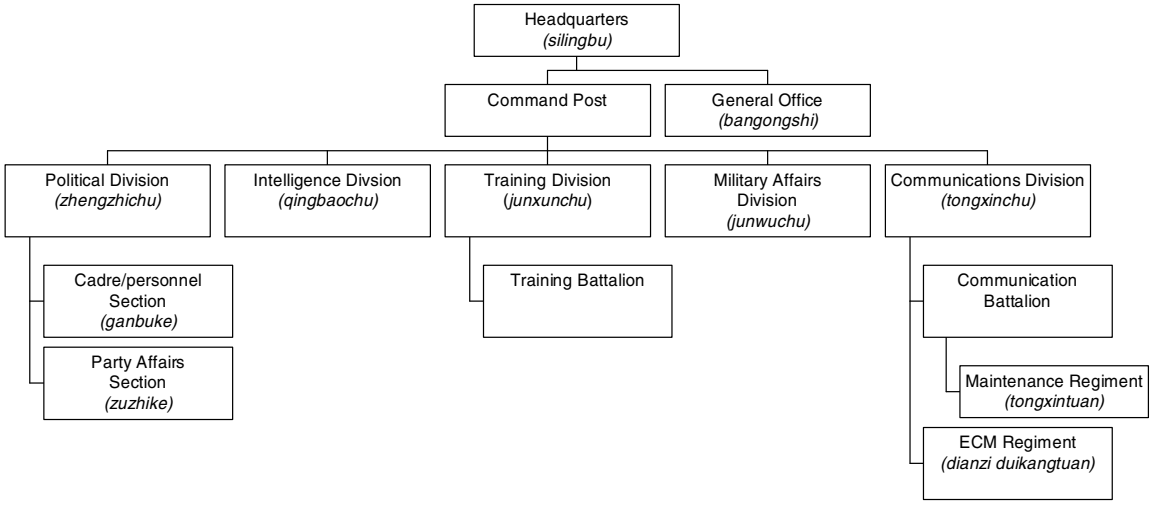


**Figure 11.9 Known Base Political Division Units (*zhengzhi chu*) Second Artillery**

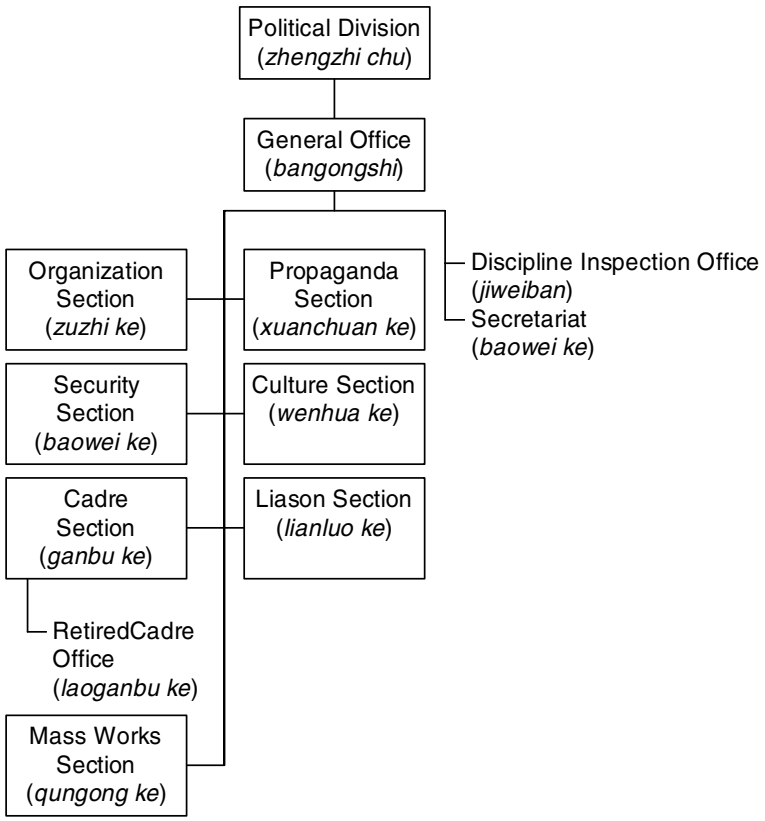


**Figure 11.10 Known Base Logistics Department Units (*houqin chu*) Second Artillery**

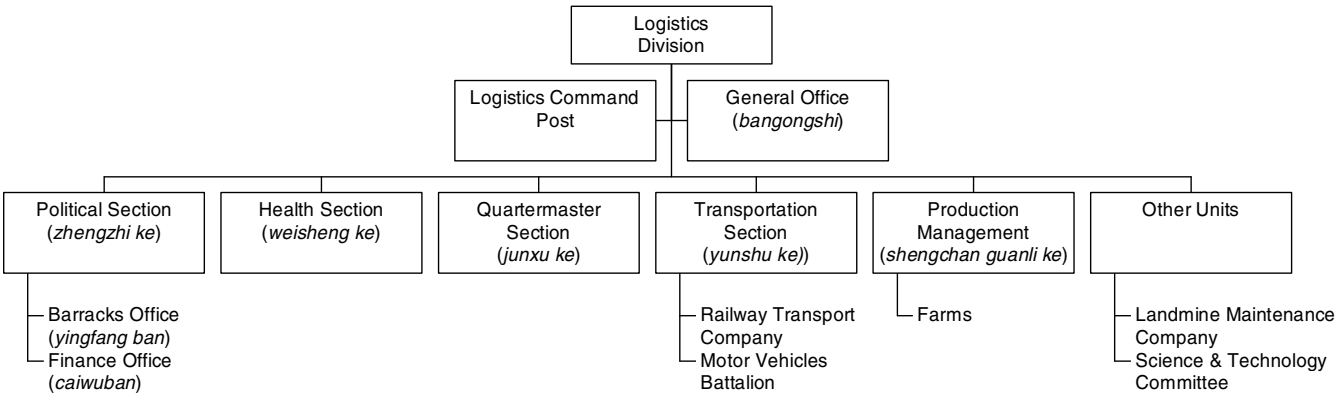
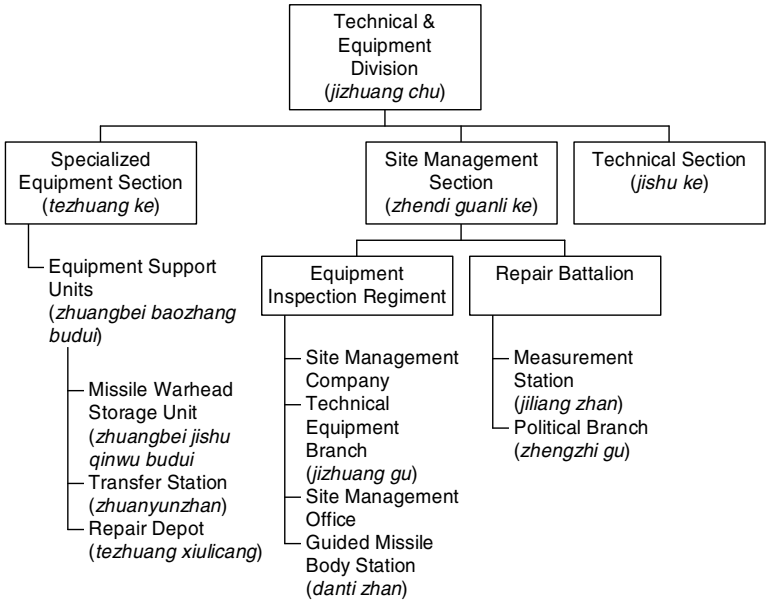
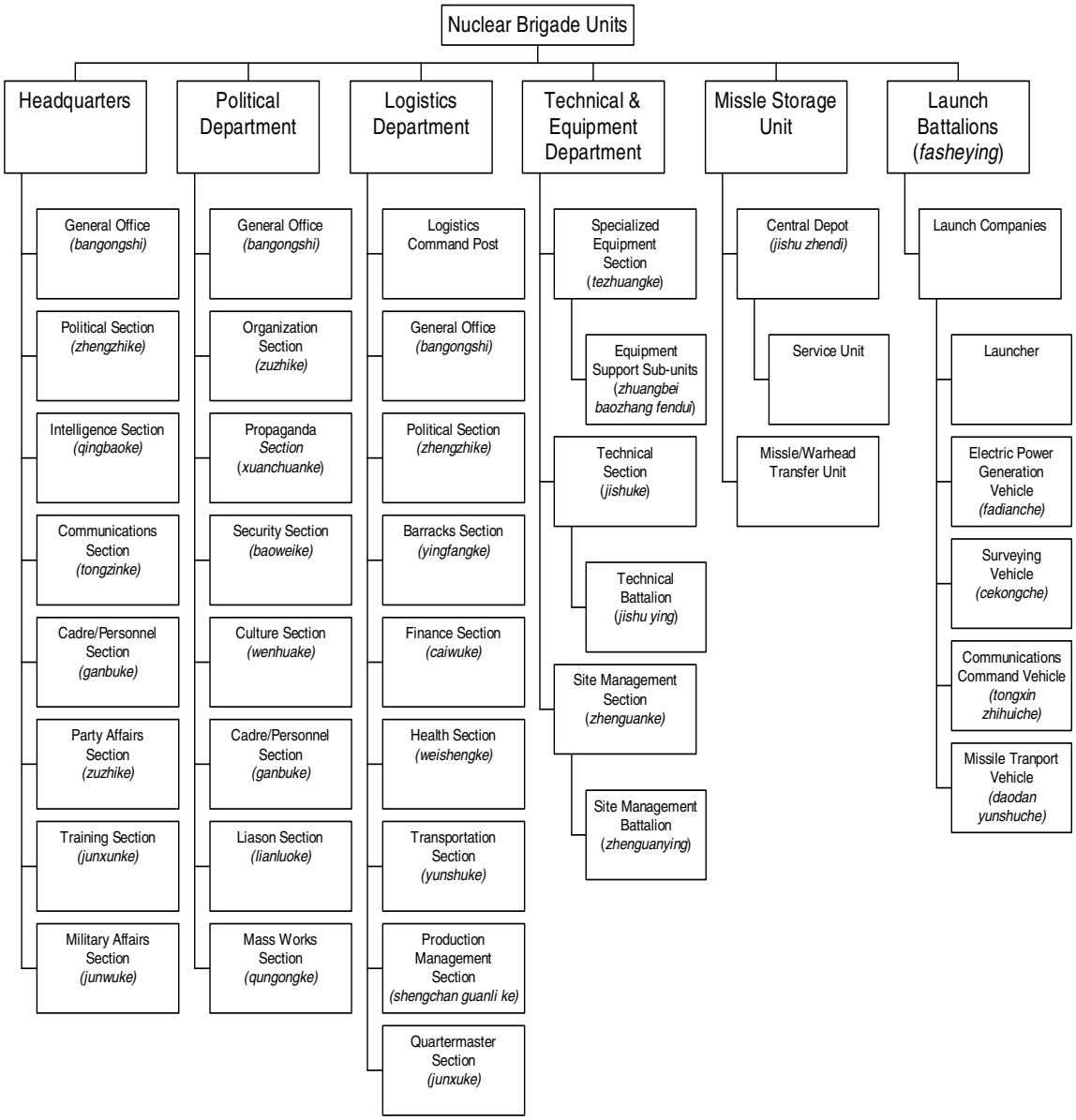


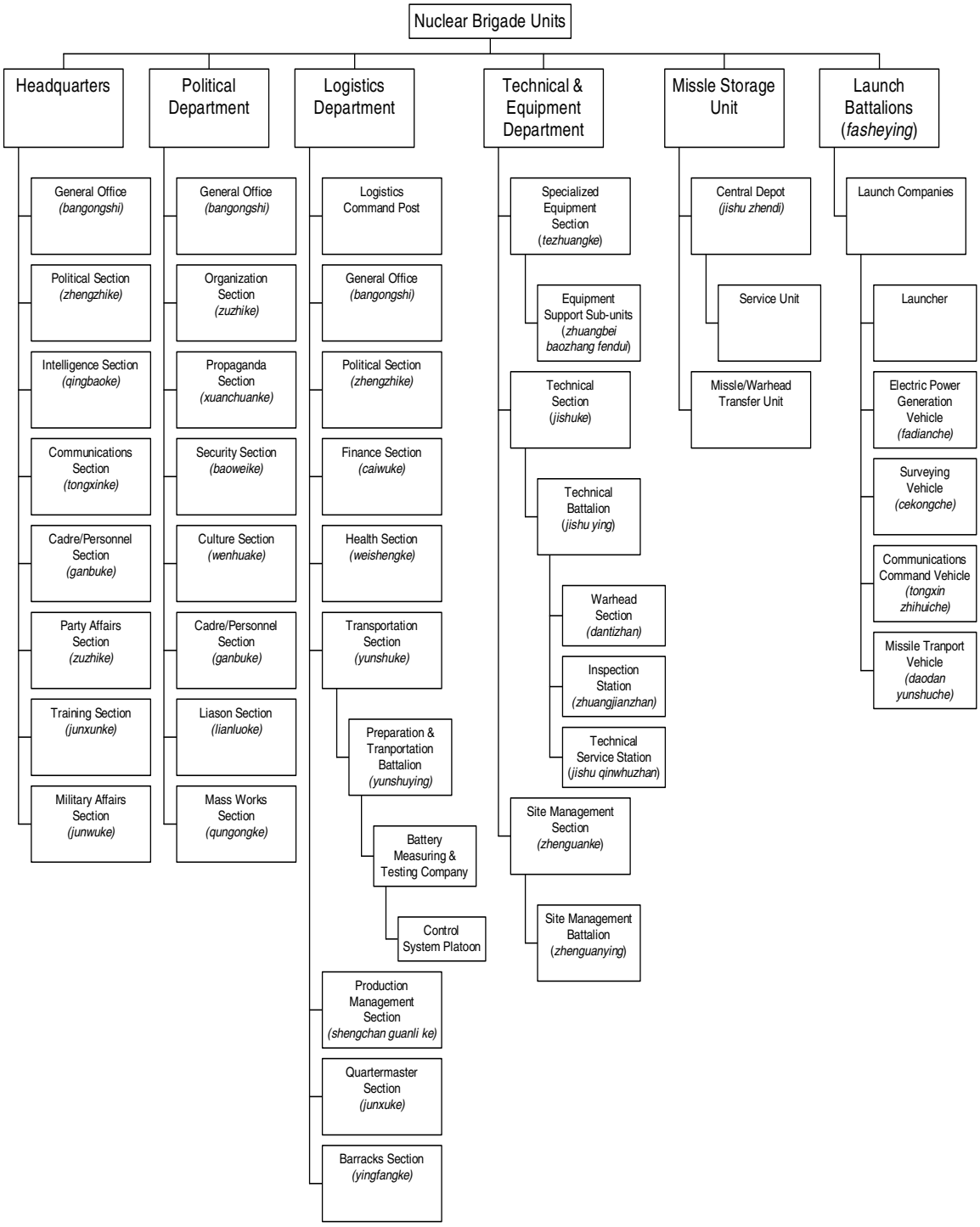
**Figure 11.11 Known Base Technical & Equipment Division Units (*jizhuang chu*)**
**Second Artillery**



## Figure 11.12 Known Nuclear Missile Brigade Units



## Figure 11.13 Known Conventional Missile Brigade Units



**APPENDIX: Known Second Artillery Military Unit Cover Designators (MUCDs)**

Number Translations:

80XXX is also known as an MUCD (E) designator, with each number matched to a corresponding letter, 8 equals M and so on.

803XX series are base-level units. The last number corresponds to the base designation, ie. 80301 is also known as the 51 Base, and 80302 is also known as the 52 Base.

80401-80416 Series are the basic launch units (launch brigades)—this number will increase as the 2nd Artillery expands its conventional force. The last two digits (D and E) denote the brigade designation. For example, 80401 denotes the 801st Missile Brigade.

8043X- 8045X series are probably more specialized units at the regiment level. They may be used for testing or experimental purposes. Two of the units in this series end in 1, (80431, 80451) and the other three are all located in the 80310 Base.

805XX series are engineering or construction units of regimental size. At 80590 level and beyond, the units appear to be special engineering units. It may be that these units are formed only for a special project and are officially disbanded when the project is over, with some of the officers remaining behind with the newly-established missile site units. For example, see the Sub-unit 13, described in Base 54, as 80591.

807XX Series are regiments or battalions that support the various bases. The third or "C" digit (7) indicates that the unit is a missile support unit. The fourth digit in the 807XX series corresponds to the base. For example, the 80713 unit is subordinate to the 80301 Unit (51 Base) in Shenyang. The last digit denotes the type of unit. For example, the 807X1 units have been identified as training battalions, the 807X3 units are warhead battalions, and the 807X4 are repair battalions. The 807X3 warhead battalions may be called "technical units" (*jishu ying*). This is apparently different from the jishu ying at sub-battalion level, such as in 80408 in Base 53.

808XX series may be training or transport units directly under the 2nd Artillery headquarters to deal with some special warhead and missile storage facilities, maintenance units, and special warhead/missile transportation services. It may include a communications engineering regiment, surveying/mapping "group" (*da dui*), which has a subordinate 2nd company and satellite battalion.

**Base 51**: 80310 (Shenyang, Liaoning Province)
Launch complexes at Tonghua and Deshenghua.
-Three launch brigades and three support units identified, as well as the following:

(1) Political Department
Discipline Inspection Office
(2) Logistics Department
Barracks Office
Motor Vehicle Battalion
Radio Station
(3) 101 Sub-Unit
(4) Bei'an Farm in Helongjiang

80406: 806 Missile Brigade (Hancheng City, Shaanxi)
(1) Technical and Equipment Dept., Specialized Equipment Office (*tezhuang chu*)
(2) First Launch Battalion
(3) Logistics Department
- Finance Section

80410: 810 Missile Brigade (Dalian, Liaoning)
(1) Technical and Equipment Dept.
(2) 3rd Launch Battalion
(3) 2nd Battalion, includes Sub-Units: 213, 253, 242, 250

80451: (as of 1995 the 80451 unit was an experimental unit for the introduction of the DF-21 in the Tonghua area

(1) Technical and Equipment Office
(2) Specialized Equipment Section (*gu*)
(3) 1st Launch Battalion (EM says 1 Launch Battery at Company level)

80714: Repair battalion
(1) Measurement Station (*jiliang zhan*)

80711: Training battalion

80713: Equipment Inspection Regiment (possibly specializing in warhead inspection, also possibly known as "warhead battalion" or "technical unit")

(1) Technical and Equipment Office, Site Management Section (*gu*) according to MS,
(2) Guided missile body-station (*Danti zhan*)

**Base 52:** 80302, Huangshan, Anhui (not Jiangxi, as MS claims, right?) Province
One launch complex near Lianxiwang , with both nuclear and conventionally-armed missiles

(1) Unit has total of three launch units and 4 support units, as well as the following:

Logistics Department
- Barracks Office
- Sanlong Tree Farm

(2) Science and Technology Committee

Engineering Battalion
Landmine Maintenance Company
128 Sub-Unit
133 Sub-Unit

80302:
(1) Technical and Equipment Dept.
(2) Site Mgmt. Office

80407: 807th Missile Brigade
(1) Technical and Equipment Dept.
(2) Specialized Equipment Section
(3) Site Location Brigade

80411: 811 Missile Brigade (Shitai, Anhui Province)
(1) Technical and Equipment Dept.,
(2) 2 Launch Battalions
(3) 3rd and 4th Battery
(4) 4th Battalion includes Sub-Units: 190, 233, 242, 252, 272,

80415: DF-15 Brigade (Leping, Jiangxi Province)

80724: Support Unit for Base 52, (Xiuning, Anhui), Repair battalion
(1) Political Office (at regiment level)
(2) 2nd Car rooms (*Er che jian*)

80723: Support Unit for Base 52 (warhead battalion)
(1) Sub-unit 410 (Jingdezhen, Jiangxi Province)
(2) Sub-unit 420

80721: Support Unit (training battalion)
(1) Political Office (at regiment level)
(2) Logistics Office (at regiment level)

80722: Support Unit

**Base 53**: 80303 (Kunming, Yunan Province)
-Two launch units and two support units identified to date

(1) Political Department
-Secretariat
(2) Logistics Department
-Finance Office
-Railway Transportation Company
(3) Motor Vehicles Battalion
(4) Number 70
(5) Sub-Unit 112
(6) Telephone Operators Platoon

80303:
(1) Technical and Equipment Dept., Site Management Office

80402: 802 Missile Brigade, (Jianshui, Yunan Province)
(1) Technical and Equipment Dept.
(2) Specialized Equipment Section
(3) First Launch Battalion
(4) Political Dept., Propaganda Section
(5) Armaments Dept.

80408: 808 Missile Brigade
(1) Technical and Equipment Department
(2) Technical Battalion (*Jishu ying*)

80733 Warhead battalion
(1) Technical Service Station

80734 Measurement Station (*Jiliang zhan*), repair battalion

**Base 54**: 80304 (Luoyang, Henan Province)
-Has 7 launch units and 5 engineering units identified to date.

(1) Headquarters Department
-Directly Subordinate Work Office
-Communications Battalion
-Maintenance Company
-Anti-Chemical Warfare Company
-Directly Subordinate Guard Company
-Engineering Office
(2) Political Department
-Organization Office
(3) Combat Service Office
(4) 111 Sub-Unit

80304: Technical and Equipment Dept., Site Management Office

80401: 801st Missile Brigade (Nanchao, Lingbo City, Henan)
(1) Technical and Equipment Dept.
(2) Technical Section (*Jishu ke*)
(3) 3rd Launch Battalion
(4) 2nd Battalion
-Sub-units 216 and 262

80404: Formerly 804 Brigade, now believed to be "First Asia Brigade," located in NW plateau
(1) Technical and Equipment Dept.,
(2) 1st Launch Battalion
(3) Preparation/Transportation Battalion
-Measuring and Testing Battery (at Co. level)
-Control System Platoon
(4) 1st Battery (Co. level)
(5) 6th Battery (Co. level)

80413:
(1) Technical and Equipment Dept., Specialized Equipment Section
(2) 1st Launch Battalion
-Technical Support Co.

80741: Training battalion
(1) 3rd Battalion
(2) Training unit

80742: Support unit, located in western Henan

80743: (Western Henan)
(1) 2nd Equipment Inspection Station (*zhuangjian, er zhan*)
(2) Technical and Equipment Office (*chu*, at regiment level)

80744: (Luoyang, Henan)
(moved from Luanchuan, Henan to Luoyang in 1997)
(1) 2nd Car Rooms (*er che jian*)
(2) Dispensary

80590: Engineering Technical Unit
(1) Political Dept.
(2) Organizational Section
(3) Logistics Dept.
(4) Armament Dept.

80591: 1st Installation Regiment, Second Artillery Engineering Technical General Unit (western Henan)

(1) Sub-unit includes # 13, located in Jingzhou County, Hunan.

80592: 2nd Installation Regiment, Second Artillery Engineering Technical General Unit (Luoyang, Henan)

(1) 2nd Installation Company
(2) 5th Company
(3) Sub-units include 626

80593: 3rd Installation Regiment (engineering technical general unit)

(1) Processing Company

80596:

(1) Machine repair shop, and the shop dispensary

**Base 55**: 80305 (Huaihua, Hunan Province)

-Two launch battalions, one support battalion and one engineering battalion

(1) Political Department
    -Propaganda Office
(2) Logistics Department
    -Motor Vehicle Battalion
        -1st Company
(3) Anti-Chemical Warfare Company
(4) Communications Company
    -Telephone Platoon
(5) Repair Shop
(6) Cultural Center
(7) 124 Sub-Unit
(8) Anti-Epidemic Station
(9) Qianjing Farm

80305:

(1) Technical and Equipment Dept.
(2) Site Management Office

80403: 803rd Missile Brigade, (Jingzhou, Miao-Dong Autonomous County)

(1) Equipment and Technical Dept
(2) 2nd Battalion
(3) Medical Unit
(4) Technology Battalion,
(5) Radio Co.

80405:
(1) 2nd Car Room (*er che jian*)
(2) Sub-unit 731

80753: Warhead battalion
(1) 2nd Inspection Station

80504: Engineering Unit (at least one of these units is located at the 55 Base)
(1) 1st Battalion, 3rd Co, (western Hunan)
(2) Installation Co.

**Base 56**: 80306 (Xining, Qinghai)
-Three launch battalions, 2 support units,

80306:
(1) Technical and Equipment Dept.
(2) Specialty Equipment Office

80409: (Datong, Qinghai)
(1) Technical and Equipment Dept.
(2) Technical Support Office

80412: (Wulan (or Ulan), Qinghai)
(1) Technical and Equipment Dept.
(2) Specialty Equipment Office
(3) Site Management Battalion
(4) Logistics Dept., Finance Section
(5) Sub-Unit 122

80431: Experimental or testing unit
(1) Technical and Equipment Office
(2) Site Management Section
(3) 1st Equipment Inspection Station (*jian yi zhan*)

80761 Training battalion

80764
(1) 2nd Car Room (*Er che jian*)

**80310:** Storage unit (Baoji, Shanxi Province).
(1) Technical and Equipment Dept.
(2) Technical Office
(3) 1st Office of the Equipment Inspection Station

80435:
(1) Technical and Equipment Office

(2) Site Management Section

80436:
(1) Equipment and Management Office
(2) Railroad Transportation Battalion
(3) Road Transportation Battalion

80438:
(1) Second Car Room (*Er che jian*)

80437

80414: 814 Missile Brigade (Yizheng City, Shandong)
(1) 2nd Technical Support Co.

**No location or subordination available for:**

80424
80469
80470- (this unit includes a Medical Unit at the Brigade/Regiment level)

80502: (this was an engineering unit noted from 1987-1990 at an UI missile base.

(1) Engineering section (at regiment level)
(2) Sub-units of 1st and 6th company

80505

80507 Medical unit, at regiment level

80509
80512:
(1) Sub-units include 1st and 3rd Company and 3rd Battalion. This unit was reported to have engaged in important national defense construction work in mountains in recent years.

80520: Sub-unit 606

80529: Sub-unit 4th Company

80522:
(1) Political Office (at regiment level), with sub-unit 634

80597

**Hospitals**:

Each missile base has an on-site base hospital numbered 531-536. The last digit of the hospital corresponds with the last digit of the missile base and its MUCD.

**Post Script**

1 March 2001

The October 2000 Revision of Second Artillery Military Unit Cover Designators (MUCDs)

Ellis Melvin and Harlan Jencks

The PLA system of Military Unit Cover Designators (MUCD's, *junshi danwei daihao*) is an operational security measure. It was instituted in the 1950's to provide a minimal level of concealment for the true designations of PLA units and organizations. MUCD's appear in the open press, on unit letterheads, on the signboards of entrances to units' headquarters, on unit buildings such as division hospitals, on scrolls awarded to units, and even on athletic uniforms. Analyses of MUCDs in this open source material can enable foreign analysts to identify units in many articles, aid in identifying unit leaders, help in finding unit locations and movements, and may yield information on individual units' tables of organization and equipment. It is possible in many instances to determine the echelon of an organization from the numbering scheme; identifying an MUCD as army, division, brigade or regiment-level.

Because MUCD's are so widely used, they inevitably become compromised over time. The MUCD system has undergone revisions over the years, most recently in 1975, following its complete compromise during the 'Great Proletarian Cultural Revolution'. Because it was used for so long, the 1975 number scheme was thoroughly compromised.

Natural disasters, such as the floods in 1998, also caused military units to sometimes appear in the clear. This was particularly true in the Shenyang Military Region in civilian news articles about military units fighting the flood in Heilongjiang. The MUCD system that went into effect on 1 Oct 2000 not only remedies the problem of compromised MUCD's in the old system but also remedies problems within the old system caused by changes within the PLA. Under the old system, the abolished Fujian Military Region, Kunming Military Region, Wuhan Military Region and Urumqi Military Region all had their own blocks of numbers. The Air Force was split into two distinct blocks and the General Staff Department and new General Armament Department took over the units that used the old COSTIND block. Three group armies have been abolished, some divisions and their subordinate regiments have been put into the People's Armed Police, downgraded to brigades with the subordinate regiments abolished, or have been made reserve units, or have even been abolished. The intent of the new MUCD system was not only to remedy security problems, but also to reflect the current structure of the PLA.

On 1 October 2000, the MUCD numbering scheme was completely revised for The entire PLA. All GAD units now have new MUCD's in the 63000-series. The Strategic Rocket Force (Second Artillery) has a new set of MUCD's in the 96000-series. While the new Second Artillery scheme is not nearly as transparent as the old one, it has been worked out (mostly) in less than five months, thanks to the availability of a plethora of open source Chinese publications and web sites. Collection was done mostly be SEROLD Hawaii (publishers of the Directory of P.R.C. Military Personalities) and by Ellis Melvin. He and Harlan Jencks collaborated in analyzing the new system, with

assistance from Kenneth Allen and Dennis Blasko. Table 1 presents both the new and old MUCD's for Strategic Rocket Force missile and warhead units, including the launch brigades. Some information on other SRF support units is presented, but these units are still mostly unidentified.

Table 1

**Second Artillery MUCDs**

Notes: New MUCDs in effect as of 1 October 2000 Old MUCDs in effect 1975 2000

Base/Army-level units in bold

| New MUCD | True Name/Designation | Old MUCD |
|---|---|---|
| 96101 | Missile Base 51 | 80301 |
| 96111 | Missile Brigade 806 | 80406 |
| 96113 | Missile Brigade 810 | 80410 |
| 96115 | Missile Brigade 816 | 80416 |
| 96121 | UI Support Regiment | |
| 96122? | UI Support Regiment? | |
| 96123? | 51 Base Warhead Regiment | 80713 |
| 96124? | UI Support Regiment? | |
| 96125? | UI Support Regiment? | |
| 96151 | Missile Base 52 | 80302 |
| 96161 | Missile Brigade 807 | 80407 |
| 96163 | Missile Brigade 811 | 80411 |
| 96165 | Missile Brigade 815 | 80415 |
| 96167 | Missile Brigade 817 | 80417 |
| 96169 | UI Missile Brigade?* | |
| 96171 | UI Support Regiment | |
| 96172? | UI Support Regiment? | |
| 96173? | 52 Base Warhead Regiment | 80723 |
| 96174? | UI Support Regiment? | |

| | | |
|---|---|---|
| 96175? | UI Support Regiment? | |
| 96201 | Missile Base 53 | 80303 |
| 96211 | Missile Brigade 802 | 80402 |
| 96213? | Missile Brigade 808 | 80408 |
| 96221 | UI Support Regiment | |
| 96222? | UI Support Regiment? | |
| 96223? | 53 Base Warhead Regiment | 80733 |
| 96224? | UI Support Regiment? | |
| 96225? | UI Support Regiment? | |
| 96251 | Missile Base 54 | 80304 |
| 96261? | Missile Brigade 801 | 80401 |
| 96262 | Training Regiment? | |
| 96263 | Missile Brigade 804 | 80404 |
| 96265 | Missile Brigade 813 | 80413 |
| 96271? | UI Support Regiment? | |
| 96272 | UI Support Regiment | |
| 96273? | 52 Base Warhead Regiment | 80743 |
| 96274? | UI Support Regiment? | |
| 96275? | UI Support Regiment? | |
| 96301 | Missile Base 55 | 80305 |
| 96311 | Missile Brigade 803 | 80403 |
| 96313 | Missile Brigade 805 | 80405 |
| 96315 | Missile Brigade 814 | 80414 |
| 96321? | UI Support Regiment? | |
| 96322? | UI Support Regiment? | |
| 96323 | 55 Base Warhead Regiment | 80753 |
| 96324? | UI Support Regiment? | |
| 96325? | UI Support Regiment? | |
| 96351 | Missile Base 56 | 80306 |
| 96361 | Missile Brigade 809 | 80409 |
| 96362 | Training Regiment? | |
| 96363 | Missile Brigade 812 | 80412 |
| 96371? | UI Support Regiment? | |

| | | |
|---|---|---|
| 96372? | UI Support Regiment? | |
| 96373 | 56 Base Warhead Regiment | 80763 |
| 96374 | UI Support Regiment? | |
| 96375 | UI Support Regiment? | |
| 96401 | Baoji Test & Training Base | 80310 |
| 96421 | Support Unit | |
| 96438 | Transport Regiment? | 80438 |
| 96451 | SRF Training Base | 80310 |
| 96501 | UI SRF Army-level Unit | |
| 96512 | Subordinate Brigade | |
| 96514 | Engineer Regiment in Xinjiang | 80552 |
| 96516 | Subordinate Unit | |
| 96518 | Subordinate Unit | |
| 96522 | Subordinate Unit in Luoyang, Henan | |
| 96531 | UI Engineer Tech General Unit | 80590 |
| 96542 | 1st Installation Regiment | 80591 |
| 96544 | 2nd Installation Regiment | 80592 |
| 96546 | 3rd Installation Regiment | 80593 |
| 96548 | Probable Subord. Regiment | 80594? |
| 96552 | | 80596 |
| Unmarked entries have been observed in Chinese publications<br>? indicates data deduced from the pattern | | |

**How the System Works: Blocks of Fifty**

Second Artillery Headquarters is MUCDs 96000. Units internal to the Headquarters may be numbered 960xx, although none have been reported.

Base/Army-level units, beginning with the Missile Armies, have blocks of 50 numbers, beginning with 51st Missile Army (96101), followed by 52nd Missile Army (96151), 53rd Missile Army (96201), 54th Missile Army (96251), 55th Missile Army (96301), and 56th Missile Army (96351). Missile Armies are followed by other Army-level units, also with blocks of fifty numbers.

Brigade-level units are numbered within their respective Bases/Armies. Missile Launch Brigades use odd numbers only, beginning with the Army MUCD plus ten. Thus, 51st Missile Army controls Missile Launch Brigades 96111, 96113, and 96115.

For the analyst, the good news about the new system is that the MUCD of a Missile Launch Brigade indicates the Army to which it is subordinate (e.g., 9611x brigades all

belong to 51st Army). The bad news is that, in contrast to the old system, the new Brigade MUCDs give no clue as to their true names/numbers. We have to already know (thanks to the old system) that 51 Base controls Brigades 806, 810, and 816.

If the reader finds this system confusing, that is exactly what the Chinese intended.