V. Chinese nuclear forces

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China maintains an estimated total stockpile of about 260 nuclear warheads, a number that has remained relatively stable over many years but is slowly increasing. Of China's planned triad of land-, air- and sea-based nuclear forces, only the land-based ballistic missiles and nuclear-configured aircraft are currently considered operational (aircraft only in a secondary nuclear role). About 190 warheads are assigned to these forces. The remaining warheads are assigned to non-operational forces, including new systems that are under development, operational systems that may increase in number in the future and reserves (see table 16.6).

The Second Artillery of the People's Liberation Army (PLA) is responsible for maintaining custodial and operational control over China's nuclear warheads and land-based missiles. In accordance with China's self-declared minimum deterrence strategy, the Second Artillery is said to maintain the missiles at a low level of alert in peacetime, in contrast to the cold war-era 'hair-trigger' postures maintained by Russian and US strategic forces. China's nuclear warheads are also believed to be 'de-mated' from their delivery vehicles, that is, stored separately and not available for immediate use.[1]

In May 2015, China published its latest biennial defence white paper, which focused thematically on the country's military strategy for the first time.[2] The white paper reaffirms that China's nuclear strategy is defensive in nature and that its nuclear forces have only two purposes—'strategic deterrence and nuclear counterattack'. These forces are said to be maintained at the minimum level required for safeguarding China's sovereignty and national security.

The 2015 defence white paper also reaffirms China's long-standing nuclear no-first-use (NFU) policy as a cornerstone of its deterrence posture.[3] As explained in official statements, the NFU policy consists of unequivocal commitments by China to never use nuclear weapons first 'at any time or under any circumstances' and to never use or threaten to use nuclear weapons against non-nuclear weapon states or nuclear weapon-free zones.[4] The omission of the NFU pledge in the previous white paper, published in 2013,

[1] Stokes, M. A., China's Nuclear Warhead Storage and Handling System (Project 2049 Institute: Arlington, VA, 12 Mar. 2010), p. 8; and Bin, L., 'China's potential to contribute to multilateral nuclear disarmament', *Arms Control Today*, vol. 41, no. 2 (Mar. 2011), pp. 17–21.

[2] Chinese State Council, *China's Military Strategy*, Defence White Paper (Information Office of the State Council: Beijing, May 2015).

[3] Chinese State Council (note 2).

[4] Statement by Mr Pang Seng, Director General of the Department of Arms Control and Disarmament of the MFA of the People's Republic of China, at the General Debate of the Second Session of the Preparatory Committee for the 2015 NPT Review Conference, Geneva, 22 Apr. 2013, p. 2.

Table 16.6. Chinese nuclear forces, January 2016

Type/Chinese designation (US designation)	Launchers deployed	Year first deployed	Range (km)[a]	Warhead loading	No. of warheads[b]
Land-based missiles[c]	*~150*[d]				*~150*
DF-3A (CSS-2)	~8	1971	3 000	1 x 3.3 Mt	~8
DF-4 (CSS-3)	~10	1980	5 500	1 x 3.3 Mt	~10
DF-5A (CSS-4 Mod 2)	~10	1981	12 000+	1 x 4–5 Mt	~10
DF-5B (CSS-4 Mod 3)	~10	2015	~12 000	3 x 200-300 kt	~30
DF-15 (CCS-6 Mod 1)	. .	1994	600	1 x 10-50 kt?	. .[e]
DF-21 (CSS-5 Mods 1/2)[f]	~80	1991	2 100[f]	1 x 200–300 kt	~80
DF-26 (CSS-?)	. .	(2015)	4 000+	1 x 200-300 kt	. .
DF-31 (CSS-10 Mod 1)	~8	2006	7 200+	1 x 200-300 kt?	~8
DF-31A (CSS-10 Mod 2)	~25	2007	11 200+	1 x 200-300 kt?	~25
DF-41	0	. .	. .	. .	. .
Sea-based missiles	*(48)*				*(48)*[g]
JL-1 (CSS-N-3)	. .	1986	>1 700	1 x 200–300 kt	. .
JL-2 (CSS-NX-14)	(48)	(2015)	>7 000	1 x 200-300 kt?	(48)
Aircraft[h]	*~20*				*~20*
H-6 (B-6)	~20	1965	3 100	1 x bomb	~20
Attack (. .)	. .	1972–. .	. .	1 x bomb	. .
Cruise missiles	*150–350*				. .
DH-10 GLCM[i]	150–350	2007	>1 500	1 x . .	. .
CJ-20 ALCM	. .	(2014)	>1 500	1 x . .	. .[j]
Total				**~218**	**(~260)**[k]

. . = not available or not applicable; ( ) = uncertain figure; ALCM = air-launched cruise missile; GLCM = ground-launched cruise missile; kt = kiloton; Mt = Megaton; SLBM = submarine-launched ballistic missile.

[a] Aircraft range is for illustrative purposes only; actual mission range will vary.

[b] Estimates 1 warhead per nuclear-capable launcher, except the DF-5B, which is assessed to have 3 warheads.

[c] China defines missile ranges as short-range, <1000 km; medium-range, 1000–3000 km; long-range, 3000–8000 km; and intercontinental range, >8000 km.

[d] Only counts nuclear launchers. Some launchers might have 1 or more reloads of missiles.

[e] The CIA concluded in 1993 that China 'almost certainly' had developed a warhead for the DF-15 and was expected to deploy it, although it is unknown if the capability was ever fielded.

[f] The range of the nuclear DF-21 variants (CSS-5 Mods 1 and 2) is thought to be greater than the 1750 km normally reported.

[g] Assumes that warheads have been produced for the JL-2 SLBMs on China's four Type 094 class SSBNs but that the missiles are not yet operational. The JL-1 SLBM is no longer considered to be operational.

[h] China conducted several nuclear weapons tests using bombers (and one using a fighter) and has displayed models of nuclear bombs in military museums. The nuclear role of aircraft is uncertain, however, and, if it exists at all, it is only as a secondary mission. Figures for aircraft are for nuclear-configured versions only.

[i] Also designated the CJ-10.

[j] US Air Force Global Strike Command lists the CJ-20 as nuclear-capable; the US National Air and Space Intelligence Center (NASIC) does not.

[k] In addition to the c. 218 warheads thought to be assigned to operational forces, an additional 40 or so warheads are thought to be in storage or production to arm DF-26s,

additional DF-31As and future DF-41 missiles. The total stockpile is believed to comprise c. 260 warheads and is slowly increasing.

Sources: US Department of Defense, *Military and Security Developments Involving the People's Republic of China*, various years; US Department of Defense, *Military Power of the People's Republic of China*, various years; US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat*, various years; US Air Force Global Strike Command; US Central Intelligence Agency, various documents; Kristensen, H. M., Norris, R. S. and McKinzie, M. G., *Chinese Nuclear Forces and US Nuclear War Planning* (Federation of American Scientists/Natural Resources Defense Council: Washington, DC, Nov. 2006); 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; Google Earth; and authors' estimates.

had led some Western analysts to speculate that China was reassessing the conditions under which its no-first-use policy would apply and could move to a lower threshold for using nuclear weapons.[5] While dismissing speculation that China planned to abandon or de-emphasize its no-first-use policy, senior Chinese military officials acknowledged that the policy had come under critical scrutiny in the light of the new ballistic missile defences and medium- and long-range precision-guided conventional strike systems being fielded by the United States and other countries.[6]

In accordance with its minimum deterrence strategy, China has focused on making qualitative improvements to its nuclear forces rather than significantly increasing the size of the forces.[7] These improvements include a range of measures to enhance the Second Artillery's operational capabilities. According to the 2015 defence white paper, China will 'optimize its nuclear force structure' [by] 'improving strategic early warning, command and control, missile penetration, rapid reaction, and survivability and protection capabilities'.[8]

China is estimated to possess the smallest inventories of military highly enriched uranium (HEU) and plutonium of the five legally recognized nuclear weapon states (see section X). Although China has never officially declared a formal moratorium on the production of fissile material for military purposes, it is believed to have ceased military HEU production at some time between 1987 and 1989 and military plutonium production in 1991. The current inventories mean that China could not significantly expand its

[5] See e.g. Acton, J. M., 'Is China changing its position on nuclear weapons?', *New York Times*, 18 Apr. 2013; and Fravel, M. T., 'China has not (yet) changed its position on nuclear weapons', The Diplomat, 22 Apr. 2013.

[6] Yunzhu, Y., 'China will not change its nuclear policy', China–US Focus, 22 Apr. 2013. See also Kulacki, G., 'China's nuclear threshold and no first-use', All Things Nuclear, Union of Concerned Scientists, 24 Sep. 2014.

[7] Zhang, H., 'China', ed. R. Acheson, *Assuring Destruction Forever: Nuclear Weapon Modernization Around the World* (Reaching Critical Will: New York, 2012), p. 17; and Zhao, T., 'Strategic warning and China's nuclear posture', Carnegie Endowment for International Peace, 28 May 2015.

[8] Chinese State Council (note 2).

nuclear warhead stockpile without restarting production of military fissile material.

Land-based ballistic missiles

China's nuclear-capable land-based ballistic missile arsenal consists of approximately 150 missiles of 7 types. This number has remained stable over the past decade. The arsenal is undergoing gradual modernization as the Second Artillery replaces ageing silo-based, liquid-fuelled missiles with more survivable mobile solid-fuelled models. It is concurrently investing in improved communication capabilities for its nuclear forces to ensure the integrity of command and control arrangements for a larger, more dispersed mobile missile force.[9]

The US Department of Defense (DOD) estimates that China currently deploys 50–60 intercontinental ballistic missiles (ICBMs).[10] This number has remained stable over the past decade. The silo-based, liquid-fuelled, two-stage Dong Feng DF-5A and the road-mobile, solid-fuelled, three-stage DF-31A are currently China's longest-range operational ICBMs. The shorter range DF-31 ICBM has gradually replaced the ageing liquid-fuelled, two-stage DF-4 ballistic missile, but the deployment of the system appears to have halted at approximately eight missiles in favour of the more advanced DF-31A. According to unconfirmed reports, China may be developing a new version of the missile, the DF-31B, with improved range and payload capabilities.[11]

In addition, China is developing the DF-41, a new road-mobile ICBM with a range that will reportedly allow it to strike targets throughout the continental United States.[12] Development work on the DF-41 appears to be at an advanced stage, but it is unclear when the missile will enter into service. According to unconfirmed reports citing US officials, the Second Artillery carried out launcher tests for a rail-mobile version of the missile in December 2015.[13]

After many years of development work, China appears to have decided to modify some of its ICBMs to be able to deliver nuclear warheads in multiple

[9] O'Connor, S., 'Sharpened "Fengs": China's ICBM modernisation alters threat profile', *Jane's Intelligence Review*, vol. 27, no. 12 (Dec. 2015), pp. 44–49; Zhang, H., 'How US restraint can keep China's nuclear arsenal small', *Bulletin of the Atomic Scientists*, vol. 68, no. 4 (July 2012), pp. 73–82; and US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2014*, Annual Report to Congress (DOD: Washington, DC, May 2014), p. 28.

[10] Stewart, V. R. (Lt Gen.), Director, Defense Intelligence Agency, 'Worldwide threat assessment', Statement before the US Senate, Armed Services Committee, 26 Feb. 2015, p. 11.

[11] Fisher, R., 'Evidence emerges of a possible DF-31 variant', *Jane's Defence Weekly*, 3 Mar. 2015.

[12] Gertz, B., 'China flight tests multi warhead missile', Washington Free Beacon, 11 Dec. 2015.

[13] Fisher, R., 'China developing new rail-mobile ICBM, say US officials', *Jane's Defence Weekly*, 23 Dec. 2015.

independently targetable re-entry vehicles (MIRVs). There had been speculation that China was prioritizing the deployment of MIRVs in response to growing concerns about the implications of US missile defence capabilities for its assured retaliation strategy.[14]

In its 2015 annual report on China's military power, the US DOD assessed that China had deployed MIRVs on a small number of ICBMs for the first time.[15] The missile identified in the DOD report as being MIRV-equipped was a modified version of the DF-5A ICBM, designated the DF-5B. Although a less survivable system due to its fixed silo basing, the DF-5B is capable of delivering heavier payloads than any of China's solid-fuelled ICBMs in service or under development.[16] The Second Artillery's DF-5B force appears to be a modest one, consisting of approximately 10 converted ICBMs able to carry up to 3 warheads each.[17] In September 2015, China confirmed the deployment of the DF-5B 'MIRVed nuclear missile', which appeared for the first time in the annual military parade held in Beijing.[18]

According to the 2015 US DOD report, the DF-41 road-mobile ICBM under development is also 'possibly capable of carrying MIRVs'.[19] A flight test of a DF-41 missile in August 2015—the fourth such test in three years—reportedly confirmed US government assessments that the new missile could carry multiple warheads.[20] Some analysts have speculated that the deployment of MIRVs on the ageing DF-5B ICBM was an interim arrangement necessitated by delays in the DF-41 development programme.[21]

Ballistic missile submarines

China has experienced difficulties in developing a sea-based nuclear deterrent. In the 1980s PLA Navy (PLAN) built a single Type 092 nuclear-powered ballistic missile submarine (SSBN). The submarine has never conducted a deterrent patrol and is not thought to be operational, despite several refits.

The PLAN has developed a successor SSBN, the Type 094. According to the US DOD's 2015 annual report on China's military power, four Type 094

[14] Zhao, T. and Logan, D., 'What if China develops MIRVs?', *Bulletin of the Atomic Scientists*, 24 Mar. 2015.

[15] US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2015*, Annual Report to Congress (DOD: Washington, DC, May 2015), p. 8.

[16] O'Connor (note 9), p. 48.

[17] Broad, W. and Sanger, D., 'China making some missiles more powerful', *New York Times*, 16 May 2015; and Wright, D., 'China and MIRVed warheads', All Things Nuclear, Union of Concerned Scientists, 20 May 2015.

[18] Erickson, A. S., 'Showtime: China reveals two "carrier-killer" missiles', The National Interest, 3 Sep. 2015.

[19] US Department of Defense (note 15), p. 8.

[20] Gertz, B., 'China tests new long-range missile with two guided warheads', *Washington Free Beacon*, 18 Aug. 2015.

[21] Minnick, W., 'Chinese parade proves Xi in charge', *Defense News*, 6 Sep. 2015.

SSBNs are currently operational and one boat is under construction.[22] A senior US military commander told Congress in April 2015 that the PLAN may have eight Type 094 class submarines in operation by 2020—a significant increase over previous US intelligence forecasts—but US naval intelligence appears to project four or five boats.[23] Over the past decade the PLAN has invested considerable resources in building the naval infrastructure needed to support the SSBN fleet.[24]

The Type 094 SSBN will eventually be armed with up to 12 three-stage, solid-fuelled JL-2 SLBMs. The JL-2 is a sea-based variant of the DF-31 ICBM. The JL-2 programme has encountered delays due to technical difficulties and the missile has not yet entered operational service. There has been considerable speculation about when the Type 094/JL-2 system will conduct an initial deterrent patrol. In recent years the US DOD has issued numerous predictions that the commencement of patrols was imminent but so far the Type 094 SSBN submarine has remained close to Chinese shores.

Aircraft and cruise missiles

The PLA Air Force (PLAAF) is believed to maintain a small number of nuclear gravity bombs to be delivered by the Hongzha-6 (H-6) medium-range bomber and potentially also a shorter-range combat aircraft. At least 12 of China's nuclear test explosions in 1965–79 were bombs delivered by aircraft. However, the PLAAF is not believed to have units whose primary mission is to deliver nuclear bombs.

The PLA deploys several types of cruise missile, but only the ground-launched Donghai-10 (DH-10, also designated Changjian-10, CJ-10) cruise missile has been reported as being nuclear capable.[25] Although not explicitly confirmed in official Chinese sources, sea-launched and air-launched versions of the DH-10, have also been developed.[26] China is reportedly developing a long-range cruise missile, designated the CJ-20, that will be deployed on the PLAAF's upgraded H-6K aircraft.[27] It is unclear whether the new missile is nuclear-capable.

[22] US Department of Defense (note 15), p. 32.

[23] Fisher, R. 'US upgrades assessment of China's Type 094 SSBN fleet', *Jane's Defence Weekly*, 19 Apr. 2015; and Kristensen, H. M. 'New Nuclear Notebook: Chinese Nuclear Force Modernization', *FAS Strategic Security Blog*, 13 Nov, 2013.

[24] For a comprehensive overview of China's submarine bases and facilities see Kristensen, H. M., 'China SSBN Fleet getting ready: but for what?', FAS Strategic Security Blog, Federation of American Scientists, 25 Apr. 2014.

[25] US Air Force, National Air and Space Intelligence Center (NASIC), Ballistic and Cruise Missile Threat (NASIC: Wright-Patterson Air Force Base, OH, May 2013), p. 29.

[26] Gormley, D., Erickson, A. and Yuan, J., 'A potent vector: assessing Chinese cruise missile developments', *Joint Forces Quarterly*, no. 75 (Sep. 2014), pp. 102–103.

[27] Gormley, et al., (note 26), p. 103; and US Department of Defense (note 15), p. 46.