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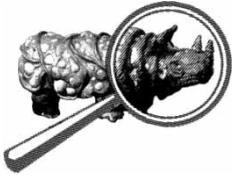
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Alexander Kolbin¹

CHINA AND NUCLEAR DISARMAMENT: IS REDUCTION OF CHINESE STRATEGIC NUCLEAR WEAPONS A POSSIBILITY?

Since the 2008 article by the Four Wise Men calling for a resurrection of the idea of *nuclear zero*² there has been a renaissance of many aspects of disarmament. For a variety of reasons many of them fell by the wayside in the early 2000s. But in the spring of 2009 Barak Obama became the first U.S. president to make *nuclear zero* part of the official discourse of American foreign policy. In April 2010 the United States hosted the first Nuclear Security Summit. The United States and Russia then signed the New START treaty in Prague, which entered into force in February 2011. Moreover, the 2010 NPT Review Conference produced the Action Plan on nuclear disarmament and nonproliferation.

The period from 2012 to 2020 could become even more important for nuclear disarmament than the previous decade. There will be two more NPT review conferences. The 2012 schedule includes another Nuclear Security Summit in South Korea, and a conference on setting up a WMD-free zone in the Middle East. By 2020 the United States is expected to complete all three phases of the deployment of the European segment of its global missile defense system³. In 2018 it will launch full-scale deployment of the advanced SM-3 Block IIA interceptors in the Asia Pacific segment of the system.⁴ Finally, it is quite likely that the implementation of the New START treaty will be completed by the end of this decade, and, as Russian Foreign Minister Sergey Lavrov put it, the time will come for “further talks on strengthening international stability and strategic parity.”⁵

Amid all these changes China, which has not made any significant changes to its nuclear strategy for the past 40 years, may find itself in a difficult situation. China has made substantial progress in every single area of national development; it has achieved steady economic growth, rapidly advanced its research and technological capability, and modernized its army. Many researchers have therefore come to view China as the only power that could conceivably challenge the supremacy of the United States over the coming decade. But China’s impressive growth also presents many challenges to the country itself.⁶ One of these challenges is adapting China’s nuclear strategy to its breakneck growth and to the emergence of the new strategic environment, which the country will inevitably have to deal with by the end of this decade.

As part of the new nuclear disarmament agenda, in recent years China has been facing growing calls to engage more actively and constructively in the process of achieving a world free of nuclear weapons. But is Beijing ready for this? And will it be ready any time soon? This paper will focus on discussing the most dangerous challenges China’s nuclear strategy may have to face in the period between 2012 and 2020. It will also consider the likelihood of progress towards a reduction of China’s strategic nuclear arsenal over this decade.

CHINA’S 2010 NATIONAL DEFENSE WHITE PAPER

In March 2011 China announced a new edition of its National Defense White Paper to give the international community a better idea of its defense strategy. The first edition of this document was published in 1995. Starting from 1998 fresh editions have been published bi-annually. Experts who study China’s nuclear policy have to parse each new edition for minute changes in



A N A L Y S I S

the text.⁷ One major difficulty for analysts is comparing the translations of these terms from Chinese into English to make sure that they are consistent. Another common difficulty frequently pointed out by experts on China's nuclear policy is its lack of transparency; there is not enough Chinese-language information available on the subject, making the task of accurate and reliable analysis of China's nuclear strategy very difficult.⁸

The Nuclear Disarmament section of the White Paper says that China has always advocated a universal ban on nuclear weapons and elimination of the existing arsenals. It stresses that the countries that possess the largest stockpiles of nuclear weapons bear special responsibility for nuclear disarmament. Beijing argues that these countries must significantly reduce their arsenals to make complete and universal nuclear disarmament possible. Once these conditions are in place the other nuclear powers must join multilateral talks on nuclear disarmament. Also, in order to achieve the goal of universal nuclear disarmament, "the international community should develop, at an appropriate time, a viable, long-term plan with different phases, including the conclusion of a convention on the complete prohibition of nuclear weapons."⁹

Given such a statement it is hard to imagine preconditions that would be more difficult to satisfy, thereby enabling China not to engage in nuclear disarmament for as long as it wishes. But that is not all. China also argues that in order to make a universal and complete prohibition of nuclear weapons possible, all the nations which possess nuclear weapons must refuse their policies of nuclear deterrence based on the possibility of first use of nuclear weapons. In other words, these nations must undertake a commitment "that under no circumstances will they use or threaten to use nuclear weapons against non-nuclear-weapon states or nuclear-weapon-free zones, and negotiate an international legal instrument in this regard."¹⁰

As for Beijing's own nuclear strategy, the White Paper insists that China has never tried to evade its obligations in the field of nuclear disarmament, and that the country is following a transparent and responsible nuclear policy. In addition, China abides by its commitment of no first use of nuclear weapons, whatever the circumstances. It has never deployed nuclear weapons on foreign territory, and it has always exercised the utmost restraint in the development of nuclear weapons. It has never participated in any form of nuclear arms race, nor will it ever do so. It will limit its nuclear capabilities to the minimum level required for national security, and it will support the efforts of non-nuclear-weapon states in establishing nuclear-weapon-free zones.

Another paragraph in the White Paper outlines China's stance on missile defense. Beijing believes that a global missile defense system would be detrimental to the international strategic balance and stability, undermine international and regional security, and have a negative impact on nuclear disarmament. "China holds that no state should deploy overseas missile defense systems that have strategic missile defense capabilities or potential, or engage in any such international collaboration," the document reads.¹¹

This position was repeated almost literally in an official statement made by China during the 2010 NPT Review Conference.¹² Indeed, China has been voicing most of these arguments (except for the objections against the deployment of a global missile defense system) ever since it acquired nuclear weapons back in 1964.¹³ To summarize Beijing's official position, the main obstacles preventing China from joining the nuclear disarmament process are as follows:

- The nuclear weapon states have not yet undertaken an obligation of no first use of nuclear weapons and to reflect this obligation in a multilateral agreement.¹⁴
- The United States and its allies are pressing ahead with the deployment of a global missile defense system.
- The United States and Russia, as part of their bilateral nuclear disarmament, have not yet reduced their arsenals to a level low enough to enable China to join a multilateral nuclear disarmament process.

These are the most obvious obstacles, which China has been highlighting for several decades now. But there are other problems as well. They are less obvious, but no less important for that. These problems are preventing China from joining the nuclear disarmament process, and some of them may be intensified depending on the political course chosen by the United States (on issues such as placing weapons in space¹⁵ or recognizing Taiwan's independence), on the state of relations in the China–Pakistan–India triangle, and on the situation in North Korea. Also, in recent

years experts have started to mention possible joint Russian–U.S. efforts among the factors that could facilitate China’s engagement in nuclear disarmament.¹⁶

NO FIRST USE OBLIGATION AND ITS STRATEGIC ROLE

China undertook the obligation “never at any time or under any circumstances [to] be the first to use nuclear weapons” on October 16, 1964, the day it tested its first nuclear device.¹⁷ On October 17, 1964 it proposed an international summit to discuss the possibility of introducing a comprehensive ban on nuclear weapons and eliminating all the existing nuclear arsenals.

Any country that has undertaken the commitment of no first use of nuclear weapons should develop its nuclear forces based on the concept of a second (retaliatory) strike¹⁸—or, as the White Paper puts it, the strategy of “attacking only after being attacked.”¹⁹ The main objective of such a country’s nuclear policy is to make sure that its nuclear forces can deliver a retaliatory strike. In the case of China, and taking into account its no-first-use commitment, this requires constant efforts to improve the survivability of its nuclear deterrent.

What, then, are the ways of increasing survivability? First, the country has to keep secret numbers and performance characteristics of its nuclear arsenal, as well as any plans for improving those characteristics. Second, it has to increase the mobility of its delivery systems. Third, it must make those delivery systems as hard as possible to detect. Fourth, it should place some of its nuclear weapons in well-protected underground silos which cannot be penetrated even by the most advanced weaponry.²⁰ Fifth, it must gradually increase the numbers of the delivery systems. Sixth, it has to develop a reliable command-and-control system for its nuclear arsenal; most of the elements of such a system should be placed either in space or in highly protected facilities. Finally, such a country should always be prepared for any strategic surprises. At this time these surprises include the possibility of the adversary rapidly improving its missile defense capabilities, placing weapons in space, and building up the capability of its non-nuclear high-precision weapons.

When China’s nuclear doctrine was being formed the no-first-use commitment could be interpreted primarily as a political propaganda instrument; in the early stages the structure of the Chinese nuclear deterrent made it impossible to implement such a commitment in practice. However, later on that commitment started to gain real substance, although the process is still far from complete.²¹

Several researchers have identified three stages in the evolution of China’s nuclear deterrence strategy.²²

In the first stage China pursued the policy of so-called existential deterrence (*cunzaixing weishe*).²³ At that point China had already acquired nuclear weapons but possessed no effective delivery systems and no real capability to deliver a retaliatory strike. In the event of a crisis it could use its nuclear weapons only against targets close to its own borders. Such a situation remained essentially unchanged until at least 1982, when the first Chinese silo-based liquid-fuel intercontinental ballistic missile, the Dongfeng-5 (DF-5), entered service. Until that moment China’s main delivery systems were the Hong-6 (H-6) strategic bomber, which was a copy of the Tu-16 made under Soviet license in China, and a family of intermediate-range liquid-fuel ballistic missiles (DF-1, DF-2, DF-3 and DF-4), regarded as the first generation of Chinese missiles.²⁴

The second stage in the evolution of China’s nuclear deterrence strategy came in the late 1970s–early 1980s, when China developed its first ICBM. That made it possible for Beijing to adopt the concept of minimal deterrence (*zuidi weishe*).²⁵ At that stage China already had the capability to deliver a retaliatory strike. It possessed ICBMs and intermediate-range ballistic missiles (IRBMs); any potential adversary therefore had to take into account that if some of those missiles were to survive the first strike Beijing would be able to use them to inflict unacceptable damage on the aggressor.

The beginning of the implementation of the second stage can be traced back to 1978, when the Chinese leadership first spoke of the need for “a second generation of mobile missiles whose location can be kept secret and which would have a short time-to-launch.”²⁶ That objective required the deployment of mobile ground-based transporter-launchers, the development of nuclear-powered submarines armed with SLBMs, and an upgrade program for strategic bombers. The Chinese leadership also made the decision to use only solid fuel technology for



its future missiles (a resolution to that effect was adopted in 1983). Also, the country's missile industry launched an effort to standardize the components of its ground- and sea-based ICBMs and IRBMs.²⁷

Speaking of China's transition to solid-fuel rocket technology in the early 1980s it has to be said that according to the results of comparative analysis of solid- and liquid-fuel technology (conducted more than once by various groups of specialists), each technology has its pluses and minuses. The key advantage of liquid-fuel rockets is their better energy characteristics. It means that liquid-fuel rockets can deliver more warheads to penetrate the adversary's missile defenses.²⁸ The disadvantage of liquid-fuel missiles is that they require complex and expensive fuelling equipment. The liquid fuel itself is a highly toxic substance which poses great danger to the people and equipment coming into contact with it.²⁹

The key advantage of solid-fuel missiles is that they can be prepared for launch much quicker. Also, their launch itself is much less noisy, which is very important for nuclear missile submarines. Another advantage is that using solid-fuel missiles "eliminates the need for nuclear missile submarines to be equipped with a whole number of complex systems, including gas analysis, irrigation and fuel drainage systems which are needed in case one of the missiles starts to leak fuel."³⁰ Finally, the boost phase of solid-fuel missiles' trajectory is much shorter compared with liquid fuel technology (by a factor of 2 to 4), which translates into their greater ability to evade the adversary's missile defenses.³¹

China's decision to use only solid-fuel technology was seen as a signal of Beijing's intention to pursue a greater retaliatory strike capability of its nuclear forces by means of increasing the mobility of its ground-based ICBMs, making the future naval component of its nuclear triad harder to detect, and reducing the time to launch in the event of a nuclear conflict. On the whole the transition to solid-fuel technology gave China greater ability to comply with its no-first-use commitment.

As part of the second stage in the late 1980s–early 1990s China began the deployment of its first ground-based mobile solid-fuel IRBM, the DF-21, which entered service in 1991.³² In 1988 the Chinese Navy took delivery of its first nuclear missile submarine, a Project 092 (Xia class) boat equipped with 12 vertical launchers capable of carrying Julang-1 (JL-1) SLBMs. But that sub was inferior in many ways to similar Western submarines, so it remained an experimental unit. It has never been on combat duty or left the inner Chinese waters.³³ Nevertheless, by the early 1990s the Xia and several other R&D projects had given China a solid foundation to develop the classic nuclear triad consisting of land, sea, and air components. The R&D focus during the second stage in the development of the Chinese nuclear arsenal was on mobile solid-fuel ground-based and sea-based missiles and on standardization of design and engineering solutions.

The third stage began in the mid-1990s and continues to this day. It is based on the concept of guaranteed minimal deterrence (*zuidi kexin weishe*).³⁴ In practice this means that China is now trying to make its retaliatory strike capability more reliable. To that end Beijing is increasing the proportion of mobile delivery means and systems whose location can be kept secret. It is increasing the size of its nuclear arsenal at a very moderate pace, while at the same time building up its performance characteristics very rapidly. R&D projects launched during the second stage are now entering service with the Chinese nuclear forces. China has also begun to develop new types of delivery systems and is pursuing extensive upgrade projects.

One of these new R&D projects is the JL-2, a new SLMB with improved flight performance and increased range. In 2000 an upgraded version of the DF-11 tactical missile, the DF-11A (increased range) entered service with the Chinese army. Also in 2000 China launched mass production of a modified DF-15 short-range ballistic missile, the DF-15A, with greater range and an ability to maneuver at the final stage of the trajectory. In 2002 it started to replace the already deployed DF-21 missiles with the DF-21A modification (greater range). In 2003 the DF-31 ground-based mobile ICBM entered service, significantly reducing the strategic missile technology gap between China and the two leading nuclear powers, Russia and the United States. A further modification of the missile, the DF-31A, entered service only three years later, in 2006.³⁵ Table 1 shows the status of China's nuclear arsenal in 2010.

During the same decade China also made great progress in improving the capability of the naval component of its strategic nuclear forces. According to some sources it also made efforts to upgrade the aviation component by equipping several H-6 and H-6M bombers with the new Changjian-20 (CJ-20) air-to-surface tactical cruise missiles capable of delivering tactical nuclear

Table 1. China's Nuclear Arsenal in 2010

Type of delivery system (NATO designation)	Number of deployed delivery systems	Range (km)	Number of warheads carried and yield	First deployed	Number of deployed warheads
Strategic delivery systems					~180
DF-4 (CSS-3)—liquid-fuel two-stage IRBM, mobile and silo-based	15–20	5.400	1 × 3.3 Mt	1980	~20
DF-5A (CSS-4 Mod 2)—liquid-fuel ICBM, silo-based	~20	13.000+	14–5 Mt	1981	~20
DF-21 (CSS-5) and modifications*—mobile solid-fuel IRBM (regional deterrence)	85–95	1.750+	1 × 200–300 kt	1991	~95
DF-31 (CSS-9)—mobile solid-fuel three-stage ICBM	10+	7.200+	1 × 200–300 kt	2003	~10
DF-31A (CSS-9 Mod 2)—mobile solid-fuel ICBM	10–15	11.200+	1 × 200–300 kt	2008–2010	~15
JL-1 (CSS-N-3)—SLBM (1 Xia Class nuclear missile sub, not fully deployed)	(12) ⁱ	1.770+	1 × 25–50 kt	1986	(12)
JL-2 (CSS-NX-5)—SLBM (up to 5 Jin Class nuclear missile subs at various stages of assembly or deployment)	(60)	7.200+	1 × 100 kt ⁱⁱ	2012 ⁱⁱⁱ	(60)
H-6 (and modifications)—bomber**	~82	3.100+	Up to 3 B-5 bombs × 2 Mt	1965	~20
Non-strategic delivery systems ^{iv}					?
Qiang-5 (and modifications)—fighter-bomber***	~120	Up to 400	1 bomb × 5–20 kt	1972	?
CJ-10 (DH-10)—surface-to-surface cruise missile	45–55	1.500+	1 × ?	2007	?
DF-15 (CSS-6)—SRBM****	90–110	600	1 × ?	1995	?
DF-11A (CSS-7)—tactical missile	120–140	300–450	1 × ?	2000	?

Notes: *This table also takes into account modified delivery systems capable of carrying both nuclear and conventional warheads.

**Several modifications of this bomber have been developed in China, but all of them were very similar to the Tu-16. Production ended in 1994. The project to develop a new bomber, which was launched quite a while ago, is still stuck at the engineering design stage.

***This fighter-bomber is a deeply upgraded version of the MiG-19, which China used to assemble under Soviet license (designated as the J-6). Mass production of the Q-5 fighter-bomber began in the 1970s. Following the acquisition of tactical nuclear weapons Beijing also launched a project to develop a modification of the Q-5 capable of carrying nuclear bombs with an estimated yield of 5–20 kt. The aircraft, which is still in production, has undergone several waves of upgrades. The new Q-7 fighter-bomber is being developed to replace the Q-5, but for now there is no information as to whether it will be used as a delivery system for nuclear weapons.

****The Second Artillery Force includes at least five active SRBM brigades. Another two brigades are serving with the Army; one is stationed in Nanjing Military District, another in Guangzhou Military District. All the Chinese SRBMs are deployed in the immediate vicinity of the Taiwan Strait.

ⁱMost experts believe that the JL-1 and JL-2 SLBMs have not yet become fully operational. The Navy section of China's National Defense 2008 White Book (P. 32) claims that "the Chinese Navy has several nuclear missile submarines". In this table the nuclear warheads and delivery systems presumably carried by the Chinese nuclear missile submarines are not counted towards the overall tally of nuclear warheads and delivery systems.

ⁱⁱSeveral open sources claim that the new JL-2 SLBMs can be armed with MIRVed head sections with 3 or 4 warheads.

ⁱⁱⁱAccording to some reports tests of the missile are in progress.

^{iv}Information about China's non-strategic nuclear weapons is limited and contradictory. Non-strategic nuclear weapons are in service with the Second Artillery Force, the Army and frontline (tactical) aviation.



warheads.³⁶ In December 2002 China launched the first Project 093 (Shang class) nuclear-powered submarine, which is based on the Russian Project 671RTM design. The sub entered service in late 2006. The Shang class was then used as a starting point to develop the Project 094 (Jin class) sub. Its only difference from Project 093 is a 30-meter long missile compartment with 12 vertical launchers for the JL-2 SLBMs. Project 094 is believed to be much superior to the older Project 092 (Xia class). It has a better nuclear power plant, more capable missiles and electronics, and is less noisy compared with its predecessors. The three-stage solid-fuel JL-2 SLBM shares many components with the DF-31 ICBM and can carry a single nuclear warhead with a yield of up to 1,000 kt. According to some sources China is now developing a MIRVed head section for this SLBM (three 100 kt warheads).³⁷ The first test launches of the JL-2 were held in July 2004, but they were largely unsuccessful, and the current operational state of that SLBM is unclear.³⁸

As of early 2011 China's nuclear forces included land-based, sea-based, and air-based components, with both strategic and non-strategic delivery systems (see Table 1). After comparing data from various open sources it can be said with a fair degree of confidence that the Chinese nuclear arsenal now includes about 240 strategic delivery systems and about 375 non-strategic systems.³⁹ The overall number of Chinese warheads (deployed and in storage) that can be mounted on strategic delivery systems is about 260.⁴⁰

In the future China is likely to continue its efforts aimed at improving its guaranteed minimal deterrence capability by means of further increasing the proportion of mobile and hidden delivery systems in its nuclear arsenal. The quantitative size of the Chinese strategic nuclear forces is likely to continue its moderate growth. Beijing will probably continue to develop new delivery systems and upgrade the existing ones. In any event experts believe that at present China does not yet have adequate nuclear capability to underpin its no-first-use obligation to the full extent and without damage to the implementation of the country's nuclear strategy.

IMPACT OF THE U.S. MISSILE DEFENSE SYSTEM

In 1972 the Soviet Union and the United States signed the Treaty on the Limitation of Anti-Ballistic Missile Systems. The treaty was based on the recognition of the fact that ABM systems can undermine strategic stability if they protect a country's territory from a massive nuclear strike by intercepting a large proportion of attacking missiles and warheads. If, on the other hand, ABM systems protect only ICBM, SLBM, and strategic aviation bases and the upper tiers of command-and-control systems they can strengthen strategic stability.⁴¹ That is why Washington's decision to withdraw from the ABM Treaty in 2002 and to reject any restrictions on the development of missile defense systems can undermine international strategic stability. That stability is based "not on quantitative parity of strategic weapons but on the parity of the two sides' capability to inflict guaranteed unacceptable damage on the adversary in a retaliatory strike, no matter how the nuclear conflict unfolds."⁴²

China, which has a limited number of nuclear warheads and delivery systems, is now faced with the deployment of elements of the U.S. missile defense system near the Chinese borders. This represents a serious challenge to China's nuclear deterrence capability. At present Beijing has about 40 ICBMs capable of reaching the U.S. mainland.⁴³ In the event of a hypothetical nuclear exchange between the United States and China at least some of those ICBMs will be taken out by the first strike, given American technological superiority in nuclear and high-precision weapons.⁴⁴ And the U.S. missile defense system capable of intercepting the Chinese missiles which survive the first strike would make the Chinese nuclear strategy incapable of ensuring the country's national security.

Since Washington's withdrawal from the ABM Treaty the United States "has made great progress in improving its multi-layer missile defense system in Asia Pacific; that system can now intercept any type of ballistic missiles, of any range, and at any phase of their trajectory (boost, midcourse and terminal)." At this moment the American missile defense system in Asia Pacific "includes reconnaissance and information early warning means such as strategic radars capable of detecting ICBMs at a range of over 5,500km, as well as land and sea-based interceptors."⁴⁵

The United States is also providing assistance to its key allies in the region (primarily Japan, Australia, and South Korea, as well as Taiwan) in developing tactical missile defense systems and, potentially, strategic missile defenses. Japan already has a multi-layer missile defense system consisting of tracking systems, interceptors, early warning systems, and a command-and-control

system.⁴⁶ Also, the United States and Japan are jointly developing the next generation of interceptors, the SM-3 Block IIA, which is to be deployed starting from 2018. Australia is acquiring ships which can be made compatible with the Aegis system. Meanwhile, South Korea and the United States are conducting a joint assessment of missile threats in the region.

Theoretically there are at least two ways of reducing the threat posed by the American missile defense system in Asia Pacific to China's nuclear deterrence capability. The most obvious way is to rapidly increase the size of the Chinese nuclear arsenal by building more of the existing missile types and developing new ones capable of penetrating missile defenses. That includes missiles equipped with MIRVed and highly maneuverable warheads.⁴⁷ The U.S. Department of Defense believes that by 2015 China's nuclear forces will include an additional number of DF-31A ICBMs and improved DF-5A missiles.⁴⁸

But if China chooses this path it will have to expend significant financial resources. Given the proclaimed task of "coordinated development of the economy and national defense,"⁴⁹ this could have a serious negative impact on the Chinese economy. Second, such a course of action would inevitably trigger a new wave of alarmism over the Chinese threat and damage China's existing positive image in the area of nuclear nonproliferation.⁵⁰ Third, any program to build large numbers of new warheads would require an additional amount of fissile material. That would push back even further the potential time frame for China's constructive involvement in negotiating a ban on the production of fissile materials for weapons purposes. It might even make fresh nuclear tests by China necessary,⁵¹ making it impossible for the Comprehensive Nuclear Test Ban Treaty (CTBT) to enter into force.⁵² Another thing to keep in mind is China's longstanding pledge never to participate in a nuclear arms race and to maintain its nuclear arsenal at a minimally sufficient level to ensure its national security.⁵³

In any event, if China were to build up its nuclear arsenal, that would have negative effects for the entire system of regional security in Asia Pacific. Faced with such a scenario Japan and South Korea might try to acquire their own nuclear capability. Such a move by China could also trigger a nuclear arms race between India and Pakistan⁵⁴ and have a very adverse impact on Russian–Chinese strategic dialogue. Besides, a rapid increase in the numbers of Chinese nuclear weapons would disturb the strategic balance in Asia Pacific, prompting the United States and its allies to speed up their missile defense deployment in the region.

Finally, a sharp increase in the size of the Chinese nuclear arsenal would probably mean that Beijing has abandoned its current defensive posture, including its no-first-use commitment. At the very least, that commitment would become more of a propaganda tool than a practical strategy. Such an increase could signal a transition to the "launch under attack" strategy, whereby Beijing would try to reduce to a minimum the time between the enemy's strike and the launch of its own nuclear missiles. That would require advanced and highly reliable early warning systems—which, according to various sources, China either does not have at all or is only just beginning to deploy. According to some sources at present China stores nuclear warheads separately from the missiles. A number of researchers believe this is because China "lacks reliable technical means for preventing unauthorized use of nuclear weapons."⁵⁵

The second path, which China is more likely to take, is to continue strengthening its guaranteed minimal deterrence capability. In practice that would translate into further efforts to increase the proportion of mobile delivery systems in the Chinese nuclear arsenal, and developing various measures to defeat missile defense systems, including MIRVed maneuverable warheads and anti-satellite weapons.⁵⁶ If China chooses this option it will continue increasing the quantitative size of its nuclear arsenal at a moderate pace, and pursue upgrade programs for weapons systems already in service. It will also focus on developing the naval component of its strategic nuclear triad to make sure that its nuclear weapons are mobile and hard to detect, while also abiding by its no-first-use commitment.⁵⁷

According to some sources, by 2020 China will be able to deploy up to five Project 094 (Jin class) nuclear missile submarines.⁵⁸ Nevertheless, even if all five are successfully deployed, these subs will be able to deliver a guaranteed retaliatory strike against the United States only if they conduct their patrols relatively far away from the Chinese coast.⁵⁹ That will require adequate defenses against the adversary's anti-submarine measures in open seas.⁶⁰ At present the Chinese Navy is no match for American naval strength. The naval component of the Chinese nuclear triad has always lagged behind the other two components. For that reason the Chinese military have little experience in conducting such operations. Meanwhile, the U.S. Navy is constantly improving its



capability versus the navies of potential adversaries.⁶¹ What is more, if the American missile defense system in Asia Pacific acquires sufficient capability versus the adversary's missiles the threat to the Chinese Navy from its American counterpart will increase even further; by containing the Chinese submarines in one geographic area the U.S. Navy would be able to target its missile defenses against China's main naval strength.⁶²

THE NEW START TREATY—A VIEW FROM CHINA

Immediately after the signing of the new START Treaty by Russia and the United States, some experts and politicians in both countries began to declare that the time has come to involve the other nuclear powers, especially China, in the nuclear disarmament process. They argue that China remains the only official nuclear weapon state which, rather than reducing its nuclear arsenal, is actually continuing to increase it. They also pointed out that within the next decade the size of the Chinese nuclear arsenal is expected to reach the Russian and U.S. levels.⁶³

Chinese experts, meanwhile, saw the signing of this treaty as an achievement limited mainly to Russian–U.S. relations. They said the treaty reflected “a consensus achieved by the two largest nuclear powers.”⁶⁴ They were quite optimistic about the prospects for the treaty's implementation when it entered into force. But they also said the document had some clear drawbacks, including the fact that it limits only the deployed warheads, and does not cover the warheads in storage. They also regretted that the treaty does not address the problem of tactical nuclear weapons or conventional weapons; nor does it limit the deployment of missile defense systems. Taking into account such views on the New START treaty expressed by Chinese experts, it would be too soon to expect any significant progress on China joining the nuclear disarmament process in the near future. The above-mentioned White Paper, which was released in March 2011, i.e. after the entry into force of the New START treaty, only repeats China's calls on Russia and the United States to continue reducing their nuclear arsenals; the new treaty itself is not even mentioned in the document.⁶⁵

Also, even though Chinese experts have been fairly optimistic about the prospects for the implementation of the new treaty, Russian and American politicians have since made plenty of statements that can weaken such optimism. Just recall the ongoing confrontation between the two countries over Washington's plans to station elements of its global missile defense system in Europe.

As for China's repeated demands for Russia and the United States to achieve significant reductions of their nuclear arsenals, it is not clear how deep those reductions should be to satisfy Beijing.⁶⁶ Some say that bringing the two countries' holdings of nuclear warheads to about 1,000 should be enough for China to consider joining the nuclear disarmament process in a multilateral format.⁶⁷ Others believe that the necessary level is 800 warheads, i.e. three times as many as China currently has.⁶⁸ Still others argue that China cannot participate in a phased nuclear disarmament process at all because its nuclear arsenal is too small as it is. They say that for China a more feasible approach might be to set a ceiling, to be followed later by complete elimination.⁶⁹ In other words, even if the New START treaty is implemented successfully and on schedule China is unlikely to be ready to reduce its own nuclear arsenal by 2020.

WILL THERE BE CUTS?

It seems unlikely that in the next decade China will show any willingness to reduce its strategic nuclear arsenal. There are many reasons for this, both external and internal.

The main internal reason is China's strategy of strengthening its guaranteed minimal deterrence capability by increasing the proportion of mobile and hidden delivery means and developing countermeasures against the potential adversary's missile defenses, including MIRVed warheads. Beijing will continue to increase the numbers of its nuclear weapons at a moderate pace, and carry on with upgrade programs for the existing weaponry. Most experts agree that over the next decade China will not acquire adequate deterrence capability to underpin its longstanding no-first-use policy. The country will therefore continue to increase the size of its strategic nuclear arsenal at a moderate pace until that capability is sufficient for the purposes of no first use.

The external factors include the deployment of missile defense systems in Asia Pacific and the outcome of the U.S.–Russian bilateral disarmament process.

Speaking of missile defenses, the most likely scenario is that China will not seek to build up its strategic nuclear arsenal in response to the deployment of BMD systems in Asia Pacific. Such a step would have too many negative effects for the security situation in the region and for China itself. Increasing the size of the Chinese nuclear arsenal at a moderate pace while at the same time improving its performance characteristics would be an adequate response; it would also be in line with China's no-first-use policy. But unless the American missile defense system in Asia Pacific is dismantled, or unless some way of establishing U.S.–Chinese cooperation on missile defense is found, Beijing will not join the nuclear disarmament process any time soon.

Finally, speaking of the nuclear disarmament process in the bilateral U.S.–Russian format and of China's reaction to it, we have to take into account that even if the New START treaty is implemented successfully and on schedule, China is unlikely to cut its own strategic nuclear forces after 2020. What is more, it is hard to see China taking part in multilateral nuclear disarmament after 2020 even if the United States and Russia reduce their arsenals below the ceilings agreed in the new treaty. There is a strong likelihood that even in such a situation some of the nuclear-weapon states will refuse to adopt the no-first-use policy, and that China and the United States will be unable to find a joint solution to the problem of missile defenses in Asia Pacific. 

NOTES

¹ The author thanks Dr Victor Esin and Dr Sergey Ponamarev for their valuable comments on this paper, and Dr Julia Fetisova for invaluable help in working with Chinese-language sources.

² P. Shultz, W. Perry, G. Kissinger, and S. Nunn, "Toward a Nuclear Free World," *Wall Street Journal*, January 15, 2008, <http://online.wsj.com/article/SB120036422673589947.html?mod=opinion_main_commentaries>, last accessed February 22, 2012.

³ For detailed description of the phased adaptive approach to the deployment of the Euro-Atlantic segment of America's global missile defense system, see Patrick O'Reilly, "Trans-Atlantic Missile Defense: Looking to Lisbon," Welcome and First Keynote, 10/12/10, Transcript, *U.S. Atlantic Council*, <<http://www.acus.org/event/transatlantic-missile-defense-looking-lisbon/welcome-first-keynote-transcript>>, last accessed February 22, 2012.

⁴ Statement of Dr James N. Miller, Principal Deputy Under Secretary of Defense for Policy before the House Committee, on Armed Services Subcommittee on Strategic Forces. 2011, March 2, <http://armedservices.house.gov/index.cfm/files/serve?File_id=10a50d6f-ece1-475f-bb5e-00ab478aefdb>, last accessed February 22, 2012.

⁵ "Lavrov: Discussion of Global Stability Possible only after Implementation of New START Treaty," *RIA-Novosti*, January 14, 2011, <<http://ria.ru/politics/20110114/321524293.html>>, last accessed February 22, 2012.

⁶ One interesting source is the "Domestic Trends in the United States, China and Iran" analysis prepared in 2008 for the RAND Corporation by a group of U.S. researchers. The paper names 2020 as the year when "China will enter a 'perfect storm' of economic, environmental, and social problems largely of its own making. In the next 10–15 years, while trying to grow and transform its economy, China will confront the intertwined problems of premature depletion of its energy resources, faltering economic growth, inadequate provisions for its aging population, and the need to remediate an extensively damaged environment. China's ability to modernize and expand its military at the same time will be constrained by these domestic challenges." The paper is available at: http://www.rand.org/pubs/monographs/2009/RAND_MG729.pdf, last accessed February 22, 2012.

⁷ Based on the analysis of several editions published since 1998 experts have identified a rather significant evolution of the role and place of the terms "deterrence" and "policy of deterrence" in China's nuclear strategy. In the 1998 edition the words "policy of nuclear deterrence" had a distinctly negative connotation; they were used to describe only the nuclear strategies of other nuclear powers. In the 2000 edition the term "deterrence" did not appear at all. And in 2006, when China first made public the key provisions of its nuclear strategy, "nuclear deterrence" was highlighted as the main task of the Second Artillery Force. See, for example: Huaping Liu, "The Evolution of China's Nuclear Strategy and Multilateral Nuclear Disarmament. Program on Strategic Stability Evaluation (POSSE)," <http://www.posse.gatech.edu/sites/default/files/Liu_Jan15_Revision.pdf>, last accessed February 22, 2012.



⁸ See, for example: Nikita Perilyev, “Transparency with Chinese Characteristics,” *PacNet*, No. 5, January 24, 2011, <<http://csis.org/files/publication/pac1105.pdf>>, last accessed February 22, 2012.

⁹ “China’s National Defense in 2010: Arms Control and Disarmament,” March 31, 2011, <http://news.xinhuanet.com/english2010/china/2011-03/31/c_13806851_38.htm>, last accessed February 22, 2012.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² “Implementation of the NPT,” report presented by China, 2010 NPT Review Conference, UN, May 4, 2010, <http://www.un.org/ga/search/view_doc.asp?symbol=NPT/CONF.2010/31&referer=http://www.un.org/en/conf/npt/2010/statespartiesreports.shtml&Lang=R>, last accessed February 22, 2012.

¹³ See “Statement of the Government of the People’s Republic of China,” October 16, 1964, <<http://www.nti.org/db/china/engdocs/nucsta64.htm>>, last accessed February 22, 2012); “China’s Instrument of Accession to the Non-proliferation Treaty,” March 11, 1992, <<http://nuclearthreatinitiative.org/db/china/engdocs/nptdec.htm>>, last accessed February 22, 2012. For more details about the evolution of Chinese policy on nuclear nonproliferation, see Evan S. Medeiros, *Reluctant Restraint: The Evolution of China’s Nonproliferation Policies and Practices, 1980–2004* (Stanford: Stanford University Press, 2007); Mingquan Zhu, “The Evolution of China’s Nuclear Nonproliferation Policy,” <<http://irchina.org/en/xueren/china/view.asp?id=653>>, last accessed February 22, 2012.

¹⁴ Detailed analysis of the possibility of such an agreement being signed is offered in Chapter 19 of the paper: A. Arbatov, and V. Dvorkin, eds., *Nuclear Reset: Arms Reduction and Nonproliferation* (Moscow: ROSSPEN, 2011), pp. 351–366.

¹⁵ At least until 2009 the United States actively worked on the development of weapons systems capable of triggering an arms race in space. That is especially true of anti-satellite weaponry, air and space-based laser weapons, the placement of some elements of the missile defense system in space, and the placement in space of weaponry capable of destroying targets on Earth. However, following the election of President Barack Obama most of those programs have been suspended. The United States has since unveiled a new national space initiative with an emphasis on developing international cooperation in space. For more details, see A. Arbatov and V. Dvorkin, eds., *Space: Weapons, Diplomacy and Security* (Moscow, ROSSPEN, 2009), pp. 66–76, <http://carnegieendowment.org/files/12659outer_space_arbatov.pdf>, last accessed February 22, 2012.

¹⁶ See Cristina Hansell, and William C. Potter, eds., *Engaging China and Russia on Nuclear Disarmament* (James Martin Center for Nonproliferation Studies, 2009), <<http://cns.miis.edu/opapers/op15/op15.pdf>>, last accessed February 22, 2012.

¹⁷ Statement of the Government of the People’s Republic of China, October 16, 1964, <<http://www.nti.org/db/china/engdocs/nucsta64.htm>>, last accessed February 22, 2012.

¹⁸ Arbatov and Dvorkin, op. cit., p. 60.

¹⁹ “China’s National Defense in 2010,” op. cit.

²⁰ A detailed study of the current state of the system of storage of nuclear warheads in China was completed in March 2010 by the Project2049 Institute. See Mark A. Stokes, “China’s Nuclear Warhead Storage and Handling System,” <http://www.project2049.net/documents/chinas_nuclear_warhead_storage_and_handling_system.pdf>, last accessed February 22, 2012.

²¹ The Russian expert A. Arbatov argues that even at this time “the Chinese strategic nuclear forces, its missile attack early warning systems and the command-and-control and communications infrastructure are too vulnerable to ensure a retaliatory strike after a hypothetical disarming first strike by the United States or Russia.” See Arbatov and Dvorkin, op. cit., p. 60.

²² See Michael Chase, “China’s Second Artillery Corps: New Trends in Force Modernization, Doctrine, and Training,” *China Brief*, February 27, 2007, <[http://www.jamestown.org/single/?no_cache=1&tx_ttnews\[tt_news\]=4012](http://www.jamestown.org/single/?no_cache=1&tx_ttnews[tt_news]=4012)>, last accessed February 22, 2012); Enrico Fels, “Will the Eagle Strangle the Dragon? An Assessment of the U.S. challenges towards China’s Nuclear Deterrence,” *Trends East Asia*, No. 20 (February 2008), <<http://www.ruhr-uni-bochum.de/oaw/poa/pdf/TEAS20.pdf>>, last accessed February 22, 2012); Bin Li, “Nuclear Weapons and International Relations [*Hewuqi yu guoji guanxi*],” briefing presented at Beijing University, November 25, 2003, <learn.tsinghua.edu.cn/2000990313/nuir.pdf>, last accessed February 22, 2012.

²³ Bin Li, op. cit.

²⁴ V. Shunin, “Key Stages in the Development of Ballistic Missiles in China,” *Zarubezhnoye Voennoye Obozreniye*, No. 7 (2009), pp. 50–53.

²⁵ Bin Li, op. cit.

²⁶ *Ibid.*

- ²⁷ Huan Yang, "China's Strategic Nuclear Weapons: Chinese Views of Future Warfare," Institute for National Strategic Studies, <<http://www.fas.org/nuke/guide/china/doctrine/huan.htm>>, last accessed February 22, 2012.
- ²⁸ A. Khramchikhin, "Future ICBM: Solid or Liquid Fuel?," *Novoye Voennoye Obozreniye*, June 17, 2011, <http://nvo.ng.ru/realty/2011-06-17/1_mbr.html>, last accessed February 22, 2012.
- ²⁹ "Rearmament Program for Russian Strategic Missile Troops to Consider both Liquid-fuel and Solid-fuel Missiles," *ARMS-TASS*, February 29, 2008, <http://www.militaryparitet.com/teletype/data/ic_teletype/1964/>, last accessed February 22, 2012.
- ³⁰ D.I. Mant, and K.M. Ermokhin, "Those who Follow in the Footsteps cannot become Leaders," *Atomnaya Nauka*, December 26, 2008, <<http://www.proatom.ru/modules.php?name=News&file=print&sid=1639>>, last accessed February 22, 2012.
- ³¹ Khramchikhin, op. cit.
- ³² Robert N. Norris, and Hans M. Kristensen, "Chinese Nuclear Forces 2010," *Bulletin of the Atomic Scientists*, No. 66(6), pp. 134–141.
- ³³ V. Fedorov, and V. Mosalev, "China's Submarine Strength," *Zarubezhnoye Voennoye Obozreniye*, No. 7 (2010), pp. 52–60.
- ³⁴ Bin Li, op. cit.
- ³⁵ Shunin, op. cit.
- ³⁶ "China's CJ-20 Air Launched Cruise Missile to be Operational with H-6 Bomber," *Pakistan Defense*, December 7, 2009, <<http://www.defence.pk/forums/china-defence/40868-china-s-cj-20-air-launched-cruise-missile-operational-h-6-bomber.html>>, last accessed February 22, 2012.
- ³⁷ "Nuclear Weapons and National Security," Rosatom Institute of Strategic Stability, Saransk, *Red October*, 2008, p. 105, <http://www.iss-atom.ru/book-22/nuc_weap_iss.pdf>, last accessed February 22, 2012.
- ³⁸ Fedorov and Mosalev, op. cit.
- ³⁹ For more details about the development of strategic and non-strategic nuclear weapons see, for example: A. Arbatov, "Tactical Nuclear Weapons: Problems and Solutions," *Nezavisimoye Voennoye Obozreniye*, May 20, 2011, <http://nvo.ng.ru/concepts/2011-05-20/1_nuclear.html>, last accessed February 22, 2012.
- ⁴⁰ These calculations and the information in Table 1 are based on the following sources: Shunin, op. cit.; Annual Report to Congress, "Military and Security Developments Involving the People's Republic of China," May 6, 2011, <http://www.defense.gov/pubs/pdfs/2011_cmpr_final.pdf>, last accessed February 22, 2012); Norris and Kristensen, op. cit.; "The Military Balance 2010," International Institute for Strategic Studies, 2010, pp. 398–408. "Nuclear Weapons and National Security," Rosatom Institute of Strategic Stability, op. cit., p. 105. "China's National Defense in 2008," Information Office of the State Council of the People's Republic of China, Beijing, January 29, 2009, pp. 27–43, <http://merln.ndu.edu/whitepapers/China_English2008.pdf>, last accessed February 22, 2012); M. Stokes, "China's Nuclear Warhead Storage and Handling System," Project 2049 Institute, March 12, 2010, p. 21.
- ⁴¹ Arbatov and Dvorkin, op. cit., p. 31.
- ⁴² "Development of Forward-based Elements of the American Missile Defense System: Technological Aspects and Possible Response Measures," *Security Index* (Russian edition), No. 1 (88) (2009), pp. 75–93.
- ⁴³ Kevin Kallmyer, "START and China: Really?," Center for Strategic and International Studies, September 23, 2010, <<http://csis.org/blog/start-and-china-really>>, last accessed February 22, 2012.
- ⁴⁴ Bin Li, "The Impact of the U.S. NMD on the Chinese Nuclear Modernization," <<http://www.emergingfromconflict.org/readings/bin.pdf>>, last accessed February 22, 2012.
- ⁴⁵ V. Kozin, "U.S. Missile Defense System: Eastern European System being Adjusted, the Asian System being Ramped Up?," *Natsionalnaya Oborona*, No. 12 (December 2010), <<http://old.nationaldefense.ru/283/308/index.shtml?id=3894#>>, last accessed February 22, 2012.
- ⁴⁶ Statement of Dr James N. Miller, Principal Deputy Under Secretary of Defense for Policy, before the House Committee on Armed Services Subcommittee on Strategic Forces, March 2, 2011, <http://armedservices.house.gov/index.cfm/files/serve?File_id=10a50d6f-ece1-475f-bb5e-00ab478aefdb>, last accessed February 22, 2012.
- ⁴⁷ Bin Li, op. cit.
- ⁴⁸ Annual Report to Congress, "Military and Security Developments Involving the People's Republic of China 2011," May 6, 2011, p. 44, <http://www.defense.gov/pubs/pdfs/2011_cmpr_final.pdf>, last accessed February 22, 2012.



⁴⁹ “China’s National Defense in 2008,” op. cit., p. 9.

⁵⁰ John Warden, and He Yun, “U.S. Missile Defense and China: An Exchange,” *PacNet*, No. 50, September 6, 2011, <<http://csis.org/files/publication/pac1150.pdf>>, last accessed February 22, 2012.

⁵¹ Bin Li, op. cit.

⁵² In future China could become much less dependent on test detonations of nuclear devices to improve their combat characteristics. This is thanks largely to the rapid development of supercomputer technologies in China, which are a critical element of the so-called “nuclear tests in a lab” infrastructure. For details on the development of such supercomputers in China see Richard Yonck, “The Supercomputer Race,” 26 September, 2010, <<http://www.wfs.org/content/supercomputer-race>>, last accessed February 22, 2012.

⁵³ “China’s National Defense in 2010,” op. cit.

⁵⁴ Fels, op. cit., p. 9.

⁵⁵ Arbatov and Dvorkin, op. cit., p. 60.

⁵⁶ Annual Report to Congress, “Military and Security Developments Involving the People’s Republic of China,” May 6, 2011, p. 44, <http://www.defense.gov/pubs/pdfs/2011_cmpr_final.pdf>, last accessed February 22, 2012.

⁵⁷ See Toshi Yoshihara, and James R. Holmes, “China’s New Undersea Nuclear Deterrent, Strategy, Doctrine, and Capabilities,” *Joint Force Quarterly*, July 2008, <http://www.usnwc.edu/getattachment/Research—Gaming/China-Maritime-Studies-Institute/Published-Articles/JFQ_ChineseSSBN_YoshiharaHolmes.pdf>, last accessed February 22, 2012.

⁵⁸ Konstantin Chuprin, “The Great Underwater Wall,” *Novosti VPK*, June 22, 2010, <http://vpk.name/news/40613_velikaya_podvodnaya_stena.html>, last accessed February 22, 2012.

⁵⁹ “Chinese Responses to U.S. Military Transformation and Implications for the Department of Defense,” RAND Corporation, 2006, <http://www.rand.org/pubs/monographs/2006/RAND_MG340.pdf>, last accessed February 22, 2012.

⁶⁰ For details on the development of Chinese anti-submarine defenses, see Mark A. Stokes, “China’s Evolving Conventional Strategic Strike Capability: the Anti-ship Ballistic Missile Challenge to U.S. Maritime Operations in the Western Pacific and Beyond,” Project2049 Institute, September 14, 2009, <http://project2049.net/documents/chinese_anti_ship_ballistic_missile_asbm.pdf>, last accessed February 22, 2012.

⁶¹ “Chinese Responses to U.S. Military Transformation and Implications for the Department of Defense,” op. cit.

⁶² Fels, op. cit., p. 11.

⁶³ See Peter Brookes, “New START Treaty’s China Challenge,” *New York Post*, September 20, 2010, <http://www.nypost.com/p/news/opinion/opedcolumnists/new_start_treaty_china_challenge_5niHZQbbup6t knXsyjN2ll>, last accessed February 22, 2012.

⁶⁴ “U.S.–Russia Nuke Treaty ‘Good for Global Stability,’” *China Daily*, January 28, 2011, <http://www.chinadaily.com.cn/cndy/2011-01/28/content_11930816.htm>, last accessed February 22, 2012.

⁶⁵ “China’s National Defense in 2010,” op. cit.

⁶⁶ Gill Bates, “China and Nuclear Arms Control: Current Positions and Future Policies,” *SIPRI Insights on Peace and Security*, 4 April, 2010, <<http://books.sipri.org/files/insight/SIPRIInsight1004.pdf>>, last accessed February 22, 2012.

⁶⁷ D. Shen, “China’s Nuclear Perspective: Deterrence Reduction, Nuclear Non-proliferation, and Disarmament,” *Strategic Analysis*, Vol. 32, No 4 (July 2008), p. 643.

⁶⁸ Bates, op. cit.

⁶⁹ Bin Li, “China: A Crucial Bridge for the 2005 NPT Review Conference,” *Arms Control Today*, Vol. 35, No. 1 (January/February 2005), <http://www.armscontrol.org/act/2005_01-02/Li>, last accessed February 22, 2012.