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A World of Risk: The Current Environment For U.S. Nuclear Weapons Policy

Christopher F. Chyba and Karthika Sasikumar

The United States currently has some 10,000 nuclear weapons in its stockpile.¹ They are there because of a long chain of technical and political decisions made in the past. Although current U.S. nuclear weapons policy may be understood in light of this history, it should be assessed in the context of present international security risks. These risks include dangers left over from the cold war era, challenges posed by states that are newly growing in power, and the dramatic new presence of nonstate actors. The salient features of this new environment, the context of technology and international politics in which nuclear weapons decisions must now be made, are the subject of this chapter.

A New World of Risk

Shortly after the end of the cold war, a series of terrorist attacks in the 1990s, followed by those on September 11, 2001, emphasized the willingness of some individuals and groups to practice mass-casualty terrorism.² Some of the perpetrators were *nonstate* entities, operating without any significant state assistance; others were *substate* entities, meaning they did benefit from such assistance. Their aspirations included biological terrorism, such as the attempted anthrax attacks by the Japanese group Aum Shinrikyo in 1993, whose competence, fortunately, was not high.³ Documents captured in 2001 showed that al Qaeda also had an interest in biological weapons (though a

questionable capacity for pursuing them).⁴ Many U.S. analysts and politicians believe that some groups would employ nuclear terrorism if that option were available to them.⁵ How serious is this risk?

Nuclear Theft and Terrorism

It would be difficult to steal and smuggle a complete warhead from a state program, overcome whatever security measures might be installed on it, and then gain operational use of that warhead—but this possibility cannot be ruled out.⁶ A more likely path to a terrorist nuclear weapon would be to steal nuclear explosive material (NEM) in the form of plutonium or highly enriched uranium (HEU); there are already anecdotal examples of thefts of kilogram quantities of HEU from Russian facilities.⁷ In fact, HEU is present at hundreds of sites around the world, many of which contain enough HEU to make a nuclear weapon.⁸ While in principle a nonstate group could produce a working fission nuclear warhead with either stolen plutonium or HEU, plutonium warheads would pose a greater challenge because they require spherical implosive compression with precision timing.⁹ However, a gun-type HEU weapon (like the one used at Hiroshima) would be less demanding, and, according to a former director of a U.S. nuclear weapons laboratory, some substate groups could assemble such a weapon with relative ease if they had the HEU.¹⁰

Proliferation Rings

A terrorist group could already have access to plans for a more sophisticated, spherical implosion design. Apparently a nuclear equipment smuggling network put in place by A. Q. Khan—former director of the Khan Research Laboratory in Pakistan and leader of the uranium centrifuge enrichment program established to produce HEU for Pakistani atomic bombs—sold the design of a workable uranium implosion warhead to Libya.¹¹ The design is thought to be one originally provided to Pakistan by China and suitable for a missile warhead.¹² The Khan network may also have offered this design to Iraq in 1990, and to other nations.¹³ The possibility that copies of this warhead design are now available elsewhere in the world, perhaps outside of state control, cannot be discounted.

The Khan network also provided North Korea (formally, the Democratic People's Republic of Korea) with blueprints and components for uranium-enrichment centrifuges, evidently in exchange for ballistic missile technology.¹⁴ It also sold equipment to Libya, Iran, and perhaps other countries. Just as disturbing, it made use of firms in a variety of countries, including such

nontraditional nuclear suppliers as Malaysia, to manufacture centrifuge components whose ultimate destination was camouflaged by transshipment. In the worst case, were such nuclear and missile “proliferation rings” to be further developed, a set of countries or substate actors in the developing world might be able to cut loose from traditional nuclear suppliers and trade among themselves for the capabilities that their individual programs lack. The result would be a world in which it is much harder to curtail the transfer of technology related to missiles and nuclear weapons.¹⁵

Latent Proliferation

The Nuclear Non-Proliferation Treaty (NPT) of 1968, which counts all but four countries (India, Israel, Pakistan, and North Korea) among its members, allows only five states to possess nuclear weapons: the United States, Russia, the United Kingdom, France, and China, defined as the nuclear weapon states (NWS).¹⁶ The treaty prohibits all other members—the non-nuclear weapon states—from acquiring nuclear weapons.

A latent proliferator is an NPT member state that develops the capabilities needed for a nuclear weapons program, either within the limits of the treaty or under the façade of observing those limits.¹⁷ (Indeed, any country that includes uranium enrichment or plutonium reprocessing in its nuclear program unavoidably attains some degree of latency.) A latent proliferator’s strategy may be to withdraw from the NPT and build actual weapons on short notice, or simply to remain in the NPT while maintaining the capability for the rapid realization of nuclear weapons as a hedge against future threats. Over the past several decades, a number of countries in good standing with respect to the NPT have followed the hedging strategy, whereas North Korea chose to withdraw.¹⁸ Many countries, including the United States, worry that Iran is now intentionally pursuing a latent proliferation strategy for acquiring nuclear weapons.¹⁹

The Rise of New Nuclear Powers

India and Pakistan each conducted a rapid series of nuclear weapons tests in 1998, confirming their nuclear weapons capability.²⁰ Israel is not known to have tested any nuclear weapons, but its capacity in this regard is unquestioned, even if details remain opaque.²¹ Now to this list must be added North Korea, which has apparently produced enough plutonium for fewer than ten implosion weapons and has withdrawn from the NPT. Many have suspected that it has also manufactured the weapons themselves, and the North Korean Foreign Ministry has in fact made a claim to this effect.²²

At the same time, South Africa, as well as three successor states to the Soviet Union (Belarus, Kazakhstan, and Ukraine), have renounced their nuclear weapons and joined the NPT. Libya and Iraq are no longer trying to acquire nuclear weapons.²³ The good news is that the world has avoided the nightmare of having “15 or 20 or 25” nuclear powers by 1975, as envisioned by President John F. Kennedy.²⁴ We do not yet face “life in a nuclear-armed crowd.”²⁵ The bad news is that the potential for further nuclear proliferation and the possibility of a breakdown of the NPT regime clearly exists.²⁶

The rise of new nuclear powers is dangerous for several reasons.²⁷ First, nuclear proliferation raises the specter of nuclear war between regional powers, or between any of the five nuclear weapons states and these new powers. Were war to break out on the Korean peninsula, it is possible that nuclear weapons would be used. They might also be used in the Persian Gulf if Iran were to acquire them. Iran has completed a test program of its Shahab-3 missile (in July 2003), which is thought to be capable of carrying a 1,000-kilogram payload (large enough for a nuclear warhead) for 1,500 kilometers.²⁸ And, of course, Israel already has a nuclear arsenal. Another region of great nuclear risk is South Asia. In both the Kargil conflict of 1999 and the border standoff in 2001–02 following an attack on the parliament in New Delhi (allegedly backed by Pakistan), both Indian and Pakistani leaders issued veiled threats.²⁹ Indeed, it is possible that nuclear weapons may have made limited conventional attacks more likely, since the risk of nuclear war may provide confidence that conventional attacks would not be allowed to escalate too far.³⁰ The danger that conventional conflict could escalate into nuclear war has now been mitigated by a ceasefire and a gradual improvement of the political situation in Kashmir.³¹

Second, weapons and technology in the possession of new nuclear powers may be especially vulnerable to threat or sabotage by terrorist groups. And third, the arsenals of new nuclear powers may be more likely to be used in error. The arsenals’ small size makes them more vulnerable to a first strike. Fearing this, such powers may be swifter to use them, thereby increasing the chances of miscalculation. It may be especially difficult to resist the pressure to “use them or lose them” when missile flight times are short. Missiles can travel between India and Pakistan in less than ten minutes (compared with the cold war’s thirty-minute flight times for ICBMs flying between the United States and the Soviet Union). Were India or Pakistan in the future to configure their nuclear weapons on missile systems that had to be launched rapidly in order to avoid destruction in a first strike, this would increase the risk that misperception could trigger an erroneous nuclear response.³²

A Discontinuity in Nuclear Risk Assessment

All these factors—mass-casualty terrorism, the possibility of nuclear theft, nuclear smuggling by substate networks, and a gradual increase in the number of nuclear-armed states and in the potential for escalating regional conflicts—have led to a discontinuity in nuclear risk assessment compared with that of the cold war. U.S. nuclear strategy no longer hinges on being able to deter a single, comparably powerful, nuclear rival. Rather, the Bush administration’s 2002 National Security Strategy embraced “preemptive” attacks against certain potential adversaries, rather than a strategy of deterrence, under the assumption that terrorist groups and even certain “rogue” states cannot be deterred.³³ The administration’s 2006 National Security Strategy stated that the nation’s “strong preference and common practice is to address proliferation concerns through international diplomacy, in concert with key allies and regional partners,” but that if necessary, preventive attacks (called “preemption” in the strategy) would be used: “The place of preemption in our national security strategy remains the same.”³⁴

“Rogue” states are hardly a new challenge. During the cold war, the United States was deeply concerned about whether a nuclear-armed China could be deterred. Decisionmakers grappled with the same alternatives—preventive strike versus deterrence—now posed by states such as North Korea or Iran.³⁵ In addition, some cold war–era risks, such as that still posed by the Russian nuclear arsenal, remain relevant to U.S. security and cannot be ignored. For both reasons, certain cold war concepts, such as deterrence, will continue to play an important role in international security.

Global Strategic Trends

The constellation of new risks just described is not the only post–cold war trend of concern to U.S. nuclear weapons policy. Others include the changing U.S.-Russian relationship, the rise of China and India, the effects of globalization, and the overwhelming conventional military dominance of the United States itself.

The Changing U.S.-Russian Nuclear Relationship

With the thawing of cold war relations, the United States and Soviet Union made substantial reductions in their arsenals. Following the Soviet collapse, new negotiations envisioned cuts to even lower levels, where nuclear weapons would be counted in the thousands rather than the tens of thousands.³⁶

But this does not mean that nuclear risk has disappeared from the U.S.-Russia relationship. Hundreds of nuclear-armed missiles on both sides remain on high alert, ready to launch on a few minutes' notice.³⁷ This alone prolongs the risk of an inadvertent launch during some future crisis. Furthermore, Russia's early warning system against nuclear surprise attack has deteriorated considerably since the end of the cold war. There are now trajectories by which a missile launched from a U.S. nuclear missile submarine could reach Moscow without being detected prior to detonation, and the Russian leadership is aware of this.³⁸ The possibility of a false warning of attack and subsequent Russian launch must therefore be taken seriously. At the same time, the improved relationship between Russia and the United States (compared with the Soviet-U.S. relationship during the cold war) makes it less likely that either country would precipitously assume the worst in response to some initial apparent warning of nuclear attack.

The U.S.-Russian strategic relationship continues to evolve. Some U.S. analysts argue that the trajectory of the two countries' nuclear arsenals is such that the United States is entering an era of "nuclear primacy" over Russia and China, in which it will be possible for the United States to destroy either country's long-range nuclear arsenals with a first strike.³⁹ In response, a Russian analyst formerly with the Soviet military intelligence agency has predicted President Putin would now "pull out all the stops and spend whatever necessary to modernize Russia's nuclear deterrent."⁴⁰ In his May 2006 annual address to the Federal Assembly, Putin spoke of a "new spiral" in the arms race and the need for new weapons to maintain the strategic balance.⁴¹

The Rise of China

Even as the cold war ended, some scholars and analysts in the United States began to express concern about the strategic challenge that China might pose. Some feared that China might become the next "peer competitor" to the United States, pointing to its rapid economic growth since Deng Xiaoping's economic reforms of the late 1970s.⁴² Estimating China's gross domestic product (GDP) is difficult, but at present, China's GDP is perhaps about one-seventh that of the United States and one-third that of Japan. Average annual growth in GDP appears to have been about 8 percent over the past quarter century, with some slowing in 2005.⁴³ Were China to continue a steady 8 percent growth while the United States maintained its annual 3 percent growth of the last twenty-five years, China's GDP would pull even with that of the

United States in about 40 years.⁴⁴ For a host of reasons, though, China is unlikely to sustain such growth over that long a period.⁴⁵

China's economic growth could bring with it a greater military challenge to the United States, particularly with respect to Taiwan, power projection beyond its borders, and its nuclear arsenal.⁴⁶ China asserted its changing global status in 2003 by becoming only the third nation to launch its own astronaut ("taikonaut") into space. Since then it has flown a two-astronaut capsule and announced ambitious plans for robotic missions to the Moon.⁴⁷

A report by the Office of the Secretary of Defense recently concluded that "the future of a rising China is not set immutably on one course or another," but asserts that "China does not now face a direct threat from another nation. Yet it continues to invest heavily in its military, particularly in programs designed to improve power projection."⁴⁸ The report anticipates that China will move toward a larger, more survivable strategic nuclear force. The Chinese, for their part, argue that U.S. deployments in missile defense and growing interest in space weapons will undermine their country's nuclear deterrent.⁴⁹ A Council on Foreign Relations task force predicts that over the next ten to twenty years, Chinese strategic missile modernization, under way for decades and progressing slowly, will increase the number of Chinese nuclear warheads capable of reaching the United States to between "tens" and "75 to 100."⁵⁰ In 2005 the United States shifted two ballistic missile submarines from the Atlantic to the Pacific, apparently in order to improve its ability to target Chinese nuclear forces.⁵¹

Despite these concerns, the United States seeks cooperation from China in resolving the worrisome proliferation challenges from North Korea and Iran. The United States also counts on China to maintain restraint toward India, since the Indian government claims that its nuclear weapons program is substantially driven by the Chinese threat.⁵² The future of the expansive and complex U.S.-China relationship is now an important factor in U.S. nuclear weapons policy thinking.

India and the United States: Natural Allies?

In a joint statement issued on July 18, 2005, Prime Minister Manmohan Singh of India and President George W. Bush agreed that "as a responsible state with advanced nuclear technology, India should acquire the same benefits and advantages as other such states."⁵³ This was widely taken to mean that the United States had de facto accepted India's self-declared status as a

nuclear weapon state. Just seven years earlier, President Bush's predecessor, Bill Clinton, had reacted to India's nuclear tests with dismay, saying that India had put itself "on the wrong side of history."⁵⁴

Today there is unprecedented enthusiasm for India seemingly across the U.S. political spectrum.⁵⁵ That such an alliance is "natural" was first asserted in September 1998 by India's prime minister at the time, A. B. Vajpayee.⁵⁶ In this vision of the future, the United States and India are loosely allied against terrorism on a global scale and, in the view of some, "as a hedge against a rising China" on the Asian continent.⁵⁷

India and the United States do have much more in common than their tense cold war relationship would suggest. Both are large multicultural democracies, both are concerned about the threat of Islamist terrorism, and both worry about the rise of China—yet have strong security and economic interests with it. Like China, India is on the rise economically: India's GDP in 2004 calculated in terms of purchasing power parity amounted to \$3.3 trillion, the sixth highest in the world.⁵⁸ The Indian economy is growing at about 7 percent annually and is an attractive market for the United States.⁵⁹ Indian firms now provide valuable business process services for American companies.

An October 2002 report from the U.S. Office of the Secretary of Defense reportedly states: "The U.S. military seeks a competent military partner that can take on more responsibility for low-end operations in Asia, such as peace-keeping operations, search and rescue, humanitarian assistance, disaster relief, and high-value cargo escort, which will allow the U.S. military to concentrate its resources on high-end fighting missions."⁶⁰ India seems to fit the bill for this outsourcing of military services. A month before the proposed nuclear deal, India and the United States signed a ten-year defense agreement to increase collaboration in intelligence, counterproliferation, and defense.⁶¹

India plans to launch Chandrayaan-1, its first robotic spacecraft to orbit the Moon, in late 2007 or 2008. In May 2006 NASA announced a memorandum of understanding with the Indian Space Research Organization to fly two U.S. scientific instruments on the spacecraft.⁶²

On the other hand, the United States and India have divergent interests on a number of issues. As the global superpower, the United States would like to maintain stability in South Asia. Its cultivation of Pakistan to that end inevitably is in some tension with India's security. On the terrorism issue, India is grateful for U.S. support but is troubled by American reluctance to put greater pressure on Pakistan to curb cross-border terrorism.

By strengthening its ties with China and Russia, India is hedging its bets. Sino-Indian relations are, in fact, at their highest peak in several decades.

India is also interested in establishing a natural gas pipeline from Iran to satisfy its ratcheting energy needs.

The Indian economy may be booming, but it has a lot of growing to do before it can catch up with the leading economies. In 2003 India was only the twenty-fourth largest export market for the United States and eighteenth in the list of exporters to the United States.⁶³ Moreover, while India's GDP is impressive, its per capita income remains very low, at \$3,100 in 2004, about a tenth of the U.S. figure.

Overwhelming U.S. Conventional Dominance

Whatever its fears of potential adversaries or hopes for potential allies, the United States continues to enjoy overwhelming dominance in the sophistication and global reach of its conventional armed forces.⁶⁴ Its crushing combat victories in the First and Second Persian Gulf Wars demonstrated to the world that the ongoing "revolution in military affairs" (RMA)—the incorporation of "smart" high-technology weapons (including precision-guided munitions, cruise missiles, surveillance, and stealth) into the armed forces and doctrine—had placed the U.S. military on an altogether different plane from that of its potential rivals.⁶⁵ This conventional dominance has important consequences for U.S. nuclear strategy.

By the 1990s, it was recognized that U.S. conventional dominance might lead some adversaries to pursue "asymmetric" warfare in response to the United States, rather than attempt the impossible task of meeting the U.S. military on its own terms.⁶⁶ After the First Gulf War, India's chief of army staff was famously quoted as saying that the lesson of the war was "Don't fight the Americans without nuclear weapons," the implication being that U.S. conventional military dominance might prompt nuclear proliferation in other countries.⁶⁷ As the U.S. secretaries of state, defense, and energy argued in a 2004 report to Congress:

North Korea and Iran appear to seek WMD [weapons of mass destruction] in response to their own perceived security needs, in part, to deter the United States from taking steps to protect itself and allies in each of these regions. In this regard, their incentives to acquire WMD may be shaped more by U.S. advanced conventional weapons capabilities and our demonstrated will to employ them to great effect—in Bosnia, Kosovo, Afghanistan, and during both wars with Iraq—than to anything the United States has done, or is doing, in the nuclear weapons arena.⁶⁸

The RMA may allow the United States to employ precision-targeted conventional weapons for military objectives where previously only nuclear weapons might have been sufficient, making it less dependent on nuclear capabilities. The Nuclear Posture Review has even envisioned the use of conventionally armed ballistic missiles against enemy nuclear forces.⁶⁹ In the Department of Defense's view, however, certain hard and deeply buried targets (HDBTs) will continue to lie beyond the reach of conventional weapons, so that nuclear weapons, and possibly new versions of earth-penetrating nuclear weapons, will be needed to be able to threaten these targets.⁷⁰ Indeed, increasing U.S. precision in striking targets protecting enemy leaders may spur potential enemies to build bunkers deeper underground, beyond the reach of conventional strikes. Accordingly, the Nuclear Posture Review has suggested that nuclear and conventional weapons be integrated into an offensive strike leg to be available for strategic operations, with the choice of weapon governed by the nature of the target. But then the United States risks the appearance of treating the nuclear weapon as "just another weapon" in the stockpile, rather than one of profound strategic significance.

Overwhelming conventional dominance allows the United States to depend less on nuclear weapons in military planning. But it may also invite nuclear proliferation and spur potential enemies to place hardened targets deeper underground.

The Globalization Trajectory

Another important factor affecting U.S. nuclear policy today is globalization—a phenomenon that is both concrete and amorphous. So many different global trends may be included in the bundle termed "globalization" that there is no standard definition.⁷¹ Many aspects of the "new world of risk" discussed earlier in this chapter could be considered manifestations of globalization. The Defense Science Board in 1999 defined it as "the integration of the political, economic and cultural activities of geographically and/or nationally separated peoples," noting that it "is not a discernable event or challenge, and it is not new. What is new is the dramatic acceleration of global integration and the resulting political, economic, and technological change the world has seen over the last decade."⁷²

Globalization affects nuclear policy and strategy in at least two ways. First, as already mentioned, the globalization of technology lowers the threshold for the acquisition, development, or production of nuclear, biological, chemical, or radiological weapons—so-called weapons of mass destruction—for states and perhaps even for substate or nonstate groups.⁷³ In the case of biological weapons, the biotechnological explosion and the fact that it is being

driven not by states but by universities and private enterprise guarantees that biotechnologies of increasing power will be available to small technically competent groups; many of these technologies could be applied to weapons as well as to peaceful ends.⁷⁴ Nuclear weapons–related capabilities seem to be spreading in a similar, but far slower and more restrained, manner.⁷⁵ This is abetted by the spread of information technology and the consequent access to a great deal of technical data.⁷⁶

Second, globalization draws national security attention to small states and even sub- and nonstate groups.⁷⁷ To the extent that nonstate groups are not easily deterred, nuclear deterrence is challenged as a cornerstone of U.S. strategy governing the purpose and use of its nuclear arsenal.⁷⁸ The Bush administration argues that threats from “rogue states” and nonstate actors underline the need for greater reliance on preemptive or even preventive attacks than on deterrence.⁷⁹

Still a World of Offensive Dominance

If some enemies facing the United States are now harder to deter, one might hope that strengthening defenses offers a way out. There is some truth to this in the case of a biological, chemical, or radiological attack, in that better methods of civil defense (such as improved disease surveillance and response) could make a large difference in the severity of the consequences of an attack.⁸⁰ By contrast, civil defense offers only limited hope for mitigating the consequences of a nuclear attack.

The intercontinental ballistic missile defense system now under construction by the United States may ultimately prove capable of intercepting small numbers of ballistic missiles launched against it, although a realistic capability of that kind is not yet in place.⁸¹ Moreover, a group intending to terrorize or strike the United States with a nuclear weapon could employ many easier methods to this end—smuggling it on board a ship, for example. Hence the utility of a missile defense system is limited, and the interdiction of an attack cannot be counted upon. In this sense, the world remains one of offensive dominance—as was the case in the cold war—meaning that those possessing nuclear weapons are disturbingly likely to be able to deliver them to their intended target.

Current Status of Nuclear Forces and Nuclear Use Doctrine throughout the World

U.S. nuclear decisionmaking must be alert to the size and employment doctrines of the world’s other nuclear powers. All parties to the NPT, including

the nuclear weapon states, are formally obligated by Article VI “to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.”⁸² Since the end of the cold war, the nuclear weapon states with the two largest arsenals, the United States and Russia, have substantially reduced their total number of warheads. They are committed by treaty—and, in the case of the United States, unilateral declaration—to further cuts. France and Britain have also reduced the size of their much smaller nuclear forces, apparently for financial reasons. Any discussion of nuclear arsenals and doctrines must also include India, Pakistan, Israel, and North Korea, the four additional states known or thought to have nuclear weapons outside the NPT framework.

Russian Federation

The Russian Federation inherited the nuclear stockpile of the former Soviet Union as well as its NWS status. (As already mentioned, the other successor states that inherited Soviet nuclear weapons—Belarus, Kazakhstan, and Ukraine—subsequently relinquished them.) The Soviet Union conducted its first nuclear weapon test in 1949, only four years after the United States first tested. The Soviet Union conducted 715 tests between 1949 and 1990; Russia has not conducted any tests since the union’s fall. Russia has signed and ratified the Comprehensive Test Ban Treaty (CTBT). It is thought to have an arsenal of about 16,000 intact nuclear weapons, comprising perhaps 3,800 deployed strategic weapons, 3,400 operational nonstrategic (so-called tactical) warheads, and 8,800 intact warheads held in reserve or inactive stockpiles.⁸³

Russia’s strategic nuclear forces include weapons on bombers, intercontinental ballistic missiles (ICBMs), and submarine-launched ballistic missiles (SLBMs), although much of this force has been in rapid decline. Under the Treaty of Moscow (also called the Strategic Offensive Reductions Treaty, or SORT) signed between Russia and the United States in 2002, Russia agreed to reduce the number of its strategic warheads to between 1,700 and 2,200 offensively deployed strategic weapons by December 31, 2012.

The collapse of the Soviet Union engendered great concern in the West over the security of nuclear warheads and nuclear explosive materials; the United States has spent over \$10 billion to assist the states of the former Soviet Union to secure these.⁸⁴ Although substantial progress has been made in this regard, as of early 2004 perhaps only half of the 150–210 sites in Russia where nuclear warheads are stored had received security upgrades with

U.S. government assistance.⁸⁵ By that date a similar fraction of the roughly 600 tons of potentially vulnerable nuclear material outside of nuclear weapons in Russia had had some form of security upgrades installed.⁸⁶

Over the past two decades, Russia has actually increased the role of nuclear weapons in its security doctrine. In 1982 the general secretary of the Soviet Communist Party, Leonid Brezhnev, established a no-first-use nuclear policy, but Russia abandoned this policy in 1993, likely out of concern for its dwindling conventional capabilities.⁸⁷ In 1996 First Deputy Defense Minister Andrei Kokoshin acknowledged this explicitly.⁸⁸ In its 1997 statement of national security policy, the National Security Concept, Russia indicated that nuclear arms would be used only “in case of a threat to the existence of the Russian Federation.”⁸⁹ But the January 2000 Concept signed by President Vladimir Putin provided a somewhat weaker criterion for first use of nuclear weapons, saying that they may be used “in case of the need to repel an armed aggression when all other means of settling the crisis situation have been exhausted or proved ineffective.”⁹⁰ Russia’s 2000 Military Doctrine gives a more expansive statement: “The Russian Federation keeps the right to use nuclear weapons in response to the use of nuclear weapons or other WMD against Russia or its allies, as well as in response to the large-scale conventional aggression in critical situations for the Russian national security.”⁹¹

United Kingdom

The United Kingdom conducted its first nuclear test in 1952, the first of forty-four such tests it conducted through 1991. It is thought to have produced more than 800 nuclear warheads by 1992. It has signed and ratified the CTBT.⁹² The United Kingdom’s nuclear force structure now consists of four Trident nuclear missile submarines, one of which is on patrol at any time; the 1998 Strategic Defence Review (SDR) stipulated that each boat would carry forty-eight warheads when on patrol. By 1998 the U.K. arsenal’s previous nuclear gravity bombs had been withdrawn from service. That is, the U.K. nuclear arsenal now relies on a single type of warhead and submarine delivery system. The SDR also stated that the future U.K. stockpile would consist of fewer than 200 operationally available warheads, a reduction of more than 70 percent of the potential explosive power of the arsenal since the end of the cold war.⁹³

The SDR explicitly states that the United Kingdom’s nuclear operating posture is such that its submarine missiles will not be targeted and will normally be at several days’ notice to fire, “rather than the few minutes quick-reaction alert that we sustained throughout the Cold War.”⁹⁴ The submarine

force is viewed as a minimum deterrent “that does not depend on the size of other nation’s arsenals but on the minimum necessary to deter any threat to our vital interests.”⁹⁵ However, in 2002 Defence Minister Geoff Hoon told members of Parliament that some states willing to sacrifice their own people might not be deterrable, and that Britain would be willing to use nuclear weapons against certain states if they employed “weapons of mass destruction” against British soldiers in the field.⁹⁶

Official British policy is to “press for multilateral negotiations towards mutual, balanced and verifiable reductions in nuclear weapons. British nuclear weapons will be included in such negotiations when the Government is satisfied with verified progress towards the goal of the global elimination of nuclear weapons.”⁹⁷

France

France conducted 210 nuclear tests between the time of its first test in 1960 and its last in 1996. It is thought to have produced over 1,100 nuclear warheads; it currently deploys about 350 nuclear weapons on 84 nuclear-capable aircraft and 48 submarine-launched ballistic missiles on four nuclear submarines, three of which are deployed at any given time. In 1995–96, President Jacques Chirac decided to dismantle two of France’s ground-based short- and intermediate-range nuclear missile systems. France joined the NPT in 1991 and has signed and ratified the CTBT.⁹⁸

In a speech delivered in June 2001, President Chirac made public the results of nuclear strategy decisions taken over a three-year period in meetings of the Conseil de Défense.⁹⁹ During the cold war, France’s nuclear posture had focused on “deterrence by the weak of the strong,” that is, on France’s ability to deter the Soviet Union despite its relatively smaller military capacities. Now, as had been partly anticipated by a 1994 Defense White Paper, France might need its deterrent in cases where it was not the “weak” party!¹⁰⁰

I just now noted the development by certain states of ballistic missile capabilities that could give them the means, one day, to menace European territory with nuclear, biological, or chemical weapons. Were they moved by hostile intentions toward us, the leaders of these states should know that they would be exposing themselves to damage that would be absolutely unacceptable for them.

And in this case, the choice would not be between the total annihilation of a country or inaction. The damage to which a possible aggressor would expose itself would be primarily directed against its centers

of political, economic, and military power. Of course, by its nature, the nuclear weapon is different and the world understands this. What I am affirming to you is that France, faithful to its concept of non-use, has, and will keep, the means to maintain the credibility of its deterrent in the face of all the new threats.¹⁰¹

Chirac's speech has been interpreted as a move away from an anti-cities strategy to one with a wider array of nuclear strike options of a more precise and discriminate nature.¹⁰² In November 2001, Chirac declared that the September 11 terrorist attacks in the United States did not undermine France's deterrent, for nuclear deterrence "was never designed to work against individuals or terrorist groups. It is aimed at states."¹⁰³ Chirac's military adviser during the formulation of the new nuclear deterrent strategy confirmed in June 2003 that the threat of nuclear retaliation also applied to "any attack on a French city with chemical or biological weapons" by "a dictator in a 'rogue' state."¹⁰⁴

In a speech in January 2006, said to reflect changes adopted in a routine five-year review of French nuclear doctrine, President Chirac expanded the circumstances under which France might use nuclear weapons, implying that France would consider a nuclear response to a large, state-sponsored terrorist attack even if that attack did not involve "weapons of mass destruction": "The leaders of states who would use terrorist means against us, as well as those who would consider using in one way or another weapons of mass destruction, must understand that they would lay themselves open to a firm and adapted response on our part. This response could be a conventional one. It could also be of a different kind." Chirac stated that "under no circumstances" would France use nuclear weapons for purely military, as opposed to strategic, purposes and reiterated that nuclear deterrence was not intended to be effective against "fanatical terrorists" operating independently of established governments.¹⁰⁵

People's Republic of China

Since its first nuclear weapons test in 1964, China has conducted forty-five such explosions, with its last test in 1996. China has about 400 nuclear weapons, most on short- and medium-range ballistic missiles. About 20 Chinese inter-continental ballistic missiles are able to reach the western continental United States. China has nuclear weapons potentially deliverable by plane, missile, and submarine, although it has only one ballistic missile submarine, which has never left coastal waters and is not operational. China is modernizing its

nuclear arsenal in all these areas but continues to do so slowly. In particular, it is developing and may have begun to deploy a mobile, three-stage, solid-fueled ICBM, the DF-31, which has an estimated range of 8,000 kilometers. China has signed but not ratified the CTBT.¹⁰⁶

For about thirty years after China exploded its first atomic bomb, it had “no coherent, publicly articulated nuclear doctrine.”¹⁰⁷ However, China’s 1998 white paper on national defense stated: “From the first day it possessed nuclear weapons, China has solemnly declared its determination not to be the first to use such weapons at any time and in any circumstances, and later undertook unconditionally not to use or threaten to use nuclear weapons against non-nuclear-weapon states or nuclear-weapon-free zones.”¹⁰⁸ That same document endorsed a 1996 Chinese proposal at the United Nations urging that “all nuclear-weapon states should commit themselves not to be the first to use nuclear weapons at any time and in any circumstances, [and] undertake unconditionally not to use or threaten to use nuclear weapons against non-nuclear-weapon states or nuclear-weapon-free zones.”¹⁰⁹

China reportedly follows a counter-city deterrent posture, with a small number of warheads sufficient to constitute a “minimum deterrent.” This defensive posture has sometimes been referred to as an “anti-nuclear-blackmail” strategy.¹¹⁰ In its 2005 white paper on arms control, China declared that nuclear weapon states should conclude at an early date “an international legal instrument on the complete prohibition and thorough destruction of nuclear weapons.”¹¹¹

Despite China’s no-first-use policy, over the past decade occasional voices in the Chinese military have sent a different message. In 1995 Xiong Guangkai, now the deputy chief of the general staff of the People’s Liberation Army, reportedly told a Pentagon official that China would consider using nuclear weapons in a conflict with the United States over Taiwan. Xiong was quoted as saying that Americans should worry more about Los Angeles than Taipei.¹¹² At an official briefing with a visiting delegation of correspondents in July 2005, Major General Zhu Chenghu, an active-duty officer, stated he believed the Chinese government was under internal pressure to change its no-first-use policy to make clear it would use nuclear weapons if need be in a Taiwan conflict. He stated that these were his personal views. China would need to use nuclear weapons, he explained, because “we have no capability to fight a conventional war against the United States. We can’t win this kind of war.”

General Zhu’s remarks were played down by Beijing officials who characterized them as only his personal views.¹¹³ Since then, Chinese strategists have

strongly criticized Zhu's remarks. Retired Major General Pan Zhenqiang described them as "dead wrong" and "sure to do serious damage to the understanding of Beijing's nuclear policy by the international community," whereas the doctrine of no first use is in Beijing's "foremost security interests."¹¹⁴ The 2005 Chinese white paper on arms control reaffirms the no-first-use policy.¹¹⁵

India

India has not signed either the NPT or the CTBT. It conducted a test of a "peaceful" nuclear device in 1974 and five tests of nuclear weapons in May 1998, after which it declared itself a nuclear weapon state. India is estimated to have produced enough plutonium for between 75 and 110 nuclear weapons, though the actual number of weapons manufactured is unknown. It has developed and deployed short- and intermediate-range ballistic missiles, but in a classified 2001 memorandum, the Indian Air Force reportedly concluded that until the end of the decade, India's fighter-bombers would remain the country's only feasible delivery system for nuclear weapons.¹¹⁶

India has not published an official nuclear doctrine, but within days of its May 1998 tests it announced that its nuclear doctrine would be guided by the principles of minimum nuclear deterrence and no-first-use against nuclear weapon states, and non-use against non-nuclear nations.¹¹⁷ In 1999 it released a draft nuclear doctrine written by its National Security Advisory Board stating that "in the absence of global nuclear disarmament . . . India shall pursue a doctrine of credible minimum nuclear deterrence," and that "the fundamental purpose of Indian nuclear weapons is to deter the use and threat of use of nuclear weapons by any State or entity against India and its forces. India will not be the first to initiate a nuclear strike, but will respond with punitive retaliation should deterrence fail."¹¹⁸ The draft's no-first-use and non-use pledges were modified by Prime Minister Vajpayee in 2003, however, when he reiterated India's no-first-use pledge but then retained the option to respond with nuclear weapons if India were attacked with biological or chemical weapons by a nuclear or non-nuclear weapon state. Indian news reports of this announcement noted that the retention of this option was similar to that claimed by the United States.¹¹⁹

Pakistan

Pakistan conducted a number of nuclear tests in May 1998, following the Indian tests, and declared itself to be a nuclear weapon state. Like India, Pakistan has not signed the NPT or the CTBT. It is estimated to have produced

enough highly enriched uranium (along with much smaller amounts of plutonium) to produce 60 to 130 nuclear weapons, although the actual number manufactured is unknown and may be much smaller. President Pervez Musharraf has indicated that normally these weapons are maintained in a disassembled state, although the director of Pakistan's Army Strategic Plan Division, General Khalid Kidwai, has stated that they could be assembled "very quickly."¹²⁰ Pakistan has a variety of medium-range ballistic missiles and is developing longer-range options, but its primary nuclear delivery vehicle likely remains the fighter-bomber, particularly the F-16 bought from the United States.¹²¹ Nonetheless, President Musharraf said in 2003 that the induction of the Ghauri missile into the army's Strategic Forces Command in January of that year would "radiate the necessary effects of deterrence."¹²²

Pakistan has not made public a formal nuclear doctrine.¹²³ Foreign Minister Abdul Sattar stated in 1999 that "minimum nuclear deterrence will remain the guiding principle of our nuclear strategy," but that the number of warheads might have to change as India built up its nuclear force, to guarantee the survivability and credibility of Pakistan's deterrent. Nevertheless, "we shall not engage in any nuclear competition or arms race."¹²⁴ Pakistan rejects a no-first-use policy, likely because it lacks strategic depth and its conventional forces are at a disadvantage in relation to India.¹²⁵ General Kidwai reportedly cited the following scenarios among a number of unofficial thresholds for nuclear use: where India conquers a large part of Pakistan, India destroys a large part of Pakistan's land or air forces, India "proceeds to the economic strangling of Pakistan," or India "creates a large-scale internal subversion in Pakistan."¹²⁶

Israel

Israel has maintained an "opaque" nuclear posture, never officially acknowledging that it is a nuclear weapon state.¹²⁷ Nonetheless, it is thought to possess enough nuclear material for between 100 and 170 weapons, deliverable by short- and medium-range ballistic missiles; it could also deliver nuclear weapons using fighter-bombers purchased from the United States. It may have tested sea-launched nuclear-capable cruise missiles.¹²⁸ Israel is not a member of the NPT but signed the CTBT in 1996.

The conditions under which Israel would choose to use its nuclear weapons are not known. A last-resort deterrent to prevent destruction by conventional military attack or chemical or biological attacks on its cities are widely cited rationales for its nuclear capability.¹²⁹ Israel's then foreign minister Ehud Barak stated in 1996 that without proven and reliable regional

peace agreements, “Israel’s nuclear policy, as it is perceived in the eyes of the Arabs, has not changed, will not change and cannot change, because it is a fundamental stand on a matter of survival which impacts all the generations to come.”¹³⁰ Shimon Peres said in 1998 that the nuclear option was intended to provide a chance for peace: “not in order to have a Hiroshima, but to have an Oslo.”¹³¹ Some speculate that the rationale extends beyond deterrence to being capable of preemptive attack and nuclear warfighting.¹³² Israel might also use the arsenal as a tool of both peacetime and wartime pressure on the United States.¹³³

North Korea

North Korea appears to have reprocessed enough plutonium for fewer than ten nuclear weapons, although whether it has actually built these weapons remains unclear.¹³⁴ In February 2005 a spokesman for North Korea’s Foreign Ministry claimed that it has manufactured such weapons, “in response to the Bush Administration’s increasingly hostile policy towards North Korea.”¹³⁵ Given the country’s current plutonium production facilities, its nuclear stockpile will probably grow by about one warhead a year, unless the negotiations under way among North Korea, South Korea, China, Japan, Russia, and the United States put a halt to its program.¹³⁶

Summary: The Proliferation Landscape

More than a quarter century has passed since President John F. Kennedy expressed the fear that the world would have “15 or 20 or 25” nuclear powers, “unless we are successful.” Instead, five nuclear weapons states have been formally recognized by the NPT, another two states are known to have tested nuclear weapons and have declared themselves as nuclear weapons states, one state remains opaque about its nuclear status but is widely acknowledged to be a nuclear power, and one state has declared that it has manufactured nuclear weapons and may, in fact, have a small number of warheads. Three successor states to the former Soviet Union, as well as South Africa, gave up their nuclear weapons in the 1990s.¹³⁷

Among the eight or nine nuclear powers, China is the only one that has made an unqualified pledge of no first use of nuclear weapons, although certain senior active-duty officers have suggested that first use has not been discounted. Most others have adopted a general no-first-use posture with possible exceptions for retaliation against the use of biological or chemical weapons, or have been ambiguous about the circumstances under which they would initiate first use of nuclear weapons.

Key Issues for U.S. Nuclear Policy

Recent trends in technology and international politics constitute the environment in which decisions about U.S. nuclear weapons must now be made. They inform the evolving U.S. nuclear weapons policy and are in turn affected by it. The subject matter of this book is primarily, though not exclusively, nuclear weapons *policy* rather than *strategy*. We distinguish between the two along the lines of the definition proposed by English military historian Liddell Hart: strategy is “the art of distributing and applying military means to fulfill the ends of policy.”¹³⁸

As the sole current superpower, the United States has immense influence on global affairs. In many respects, it is also the “norm leader,” which means that its decisions may lead other governments to reconsider their own policies.¹³⁹ Decisionmakers are confronted by questions of the balance between multilateral initiatives and unilateral action, between long-term efforts to strengthen international cooperation and short-term imperatives, and between preparing for the worst-case scenario and encouraging positive trends that may sometimes seem intangible. Arms control and nonproliferation measures often involve trading a tangible unilateral capability (though one that may or may not actually be realizable) for gains that are more difficult to quantify, or are even diffuse, and that depend in part on the behavior of at least one other country. There is no general rule for weighing the potential benefits and drawbacks of the one course against the other.

Nevertheless, certain issues are crucial for the formulation of U.S. nuclear weapons policy. These include:

- The interactions and changing balance among strategies of dissuasion, deterrence, preemptive attack, and preventive war.

- The nuclear nonproliferation regime, its historical successes and failures, and the lessons to be drawn from this history.

- New challenges to the nonproliferation regime, especially those posed by the spread of weapons-related technologies, latent proliferation, and nuclear smuggling networks.

- Appropriate responses to these challenges, including to current “hard cases,” particularly those of Iran and North Korea, and for very different reasons India, Israel, and Pakistan.

- The interdiction of the delivery of nuclear weapons, including the role of ballistic missile defense.

- The role of potential new nuclear weapons and choices to be made regarding nuclear use.

Some of these factors are discussed individually in the following chapters, while others receive attention throughout the book. Important among these is the evolution of U.S. nuclear weapons policy since the end of the cold war and its impact on the nuclear decisions of other countries.

Decisions about the construction and employment of nuclear weapons are among the most profound that any government, and any national leader, can possibly make. Hundreds of thousands, and possibly many millions of lives rest on making these decisions well. Today the margin for error may be as small as that during the cold war, and the context for these decisions is far different, as is the manner in which decisions made by any one power ramify through the entire system. The authors of this book endeavor to provide something better than a mere sketch of how the United States should choose to maneuver within this new context, but necessarily something less than a complete guide. The dynamic nature of the technical and political environment will require a regular assessment of the changing landscape. Certain long-standing principles have proven their worth and should not be abandoned on the basis of exaggerated claims of their irrelevance. Others will need to be updated, modified, or left behind. We have done our best in the following chapters to draw these distinctions and to point to their trajectories through time. Future decisionmakers will need to do better. We hope that we have helped.

Notes

1. For estimates of the size of the current U.S. nuclear weapon stockpile, see Joseph Cirincione, Jon B. Wolfsthal, and Miriam Rajkumar, *Deadly Arsenals: Nuclear, Biological, and Chemical Threats*, 2nd ed. (Washington: Carnegie Endowment for International Peace, 2005), pp. 203–17. For a definition of the term “nuclear weapon,” see Committee on International Security and Arms Control, *Monitoring Nuclear Weapons and Nuclear-Explosive Materials* (Washington: National Academies Press, 2005), pp. 89–91.

2. Attempted mass-casualty terrorist attacks in the 1990s included the World Trade Center bombing in 1993, the Oklahoma City bombing in 1995, the Aum Shinrikyo’s sarin nerve gas attack in Tokyo in 1995, and the Aum’s attempted anthrax attacks in 1993. See C. F. Chyba, *Biological Terrorism, Emerging Diseases, and National Security* (New York: Rockefeller Brothers Fund Project on World Security, 1998) (206.135.15.24/pws/Chyba_Bioterrorism.pdf), and “Biological Terrorism and Public Health,” *Survival* 43 (Spring 2001): 94–106. Also, Richard Betts, “The New Threat of Mass Destruction,” *Foreign Affairs* 77, no. 1 (1998): 26–41; Ashton B. Carter and William J. Perry, *Preventive Defense: A New Security Strategy for America* (Brookings, 1999), pp. 143–74; and Stephen Simon and Daniel Benjamin, “America and the New Terrorism,” *Survival* 42 (Spring 2000): 59–75.

3. For a careful account of Aum's biological and other attacks, see D. E. Kaplan, "Aum Shinrikyo (1995)," in *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, edited by J. B. Tucker (Cambridge, Mass.: MIT Press, 2000), pp. 207–26. See also Milton Leitenberg, "The Experience of the Japanese Aum Shinrikyo Group and Biological Agents," in *Hype or Reality: The "New Terrorism" and Mass Casualty Attacks*, edited by Brad Roberts (Alexandria, Va.: Chemical and Biological Arms Control Institute, 2000), pp. 159–72.

4. See Mike Boettcher, "Evidence Suggests al Qaeda Pursuit of Biological, Chemical Weapons," November 14, 2001 (archives.cnn.com/2001/WORLD/asiapcf/central/11/14/chemical.bio/); *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States* (New York: W. W. Norton, June 2004), p. 151; and *Report of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction*, Report to the President of the United States, March 31, 2005, pp. 267–78. See also the critical discussion in Milton Leitenberg, *Assessing the Biological Weapons and Bioterrorism Threat* (Carlisle, Pa.: U.S. Army War College Strategic Studies Institute, December 2005).

5. At their first presidential debate on September 30, 2004, Senator John Kerry and President George W. Bush concurred "that the biggest threat facing this country is weapons of mass destruction in the hands of a terrorist network." A transcript of the debate is available at www.debates.org/pages/trans2004a.html.

6. For a discussion of the security of Russian nuclear warheads, see Matthew Bunn and Anthony Wier, *Securing the Bomb: An Agenda for Action* (Harvard University, Project on Managing the Atom, May 2004), pp. 51–56. Evaluating the security of nuclear weapons in a number of other programs, especially in the Pakistani program, is more difficult. In January 2002, Pakistani general Khalid Kidwai reportedly stated that Pakistani warheads do not have permissive action links (or PALs, devices designed to prevent the explosion of the warhead by an unauthorized user), although the bombs are normally kept in a disassembled state. See Paolo Cotta-Ramusino and Maurizio Martellini, *Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan* (Como, Italy: Landau Network, Centro Volta, February 11, 2002) (lxmi.mi.inf.n.it/~landnet/Doc/pakistan.pdf). See also Richard L. Garwin and Georges Charpak, *Megawatts and Megatons: A Turning Point in the Nuclear Age?* (New York: Alfred A. Knopf, 2001), p. 342. Garwin and Charpak state that PALs on a stolen warhead could eventually be overcome, but that this would be challenging for a nonstate or unsophisticated state program.

7. NEM refers to any mixture of materials that can be made to support an exponentially growing chain reaction triggered by "fast" neutrons. For a list of the most important such materials, see "Physics and Technology of Nuclear Explosive Materials," in Committee on International Security and Arms Control, *Monitoring Nuclear Weapons and Nuclear-Explosive Materials* (Washington: National Academies Press, 2005), app. A, pp. 221–44. This appendix also explains the difference between NEM and "fissile" material; all fissile material is NEM but not all NEM is fissile. According to Garwin and Charpak, *Megawatts and Megatons*, p. 59, the gun-type Hiroshima weapon contained about 60 kilograms of HEU. More complicated implosion designs require 25 kilograms of HEU, or as little as 15 kilograms or less for increasingly sophisticated designs. See Leonard Spector with Jacqueline Smith, *Nuclear Ambitions: The Spread of Nuclear Weapons 1989–1990* (Boulder, Colo.: Westview Press, 1990), app. A. For an account of

recent attempts of the theft of NEM, see “Anecdotes of Nuclear Insecurity,” *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan*, edited by Matthew Bunn, Anthony Wier, and John Holdren (Harvard University, Project on Managing the Atom, March 2003), pp. 166–78.

8. For example, there are 128 research reactors or associated facilities with 20 kilograms of HEU or more. See U.S. Government Accountability Office, *Nuclear Nonproliferation: DOE Needs to Take Action to Further Reduce the Use of Weapons-Usable Uranium in Civilian Research Reactors*, GAO-04-807 (2004) (www.gao.gov/new.items/d04807.pdf). Another compilation lists 350 facilities with HEU in at least fifty-eight countries; see Robert Schlesinger, “24 Sites Eyed for Uranium Seizure,” *Boston Globe*, August 24, 2002. See also Bunn, Wier, and Holdren, *Controlling Nuclear Warheads and Materials*, pp. 15, 71–72.

9. See Garwin and Charpak, *Megawatts and Megatons*, pp. 347–50.

10. Albert Narath, “The Technical Opportunities for a Sub-National Group to Acquire Nuclear Weapons,” in *XIV International Amaldi Conference on Problems of Global Security* (Rome: Accademia Nazionale Dei Lincei, 2003), pp. 19–32.

11. See, for example, Robin Wright and Glenn Kessler, “Iran, Libya, and Pakistan’s Nuclear Supermarket,” *Disarmament Diplomacy* 75 (January/February 2004): 39–42.

12. See references in Cirincione and others, *Deadly Arsenals*, p. 172; and John Pike, “Pakistan Nuclear Weapons,” *GlobalSecurity.org* (www.globalsecurity.org/wmd/world/pakistan/nuke.htm).

13. See discussion and citations in Chaim Braun and Christopher F. Chyba, “Proliferation Rings: New Challenges to the Nuclear Nonproliferation Regime,” *International Security* 29 (Fall 2004): 16.

14. In August 2005, President Pervez Musharraf of Pakistan confirmed that A. Q. Khan had provided North Korea with uranium centrifuges. See Salman Masood and David Rohde, “Pakistan Now Says Scientist Did Sell Koreans Nuclear Gear,” *New York Times*, August 25, 2005.

15. The discussion in this paragraph is drawn from Braun and Chyba, “Proliferation Rings.” For a somewhat skeptical view, see Alexander H. Montgomery, “Ringing in Proliferation: How to Dismantle an Atomic Bomb Network,” *International Security* 30 (Fall 2005): 153–87.

16. The NPT was signed on July 1, 1968, and entered into force on March 5, 1970. Treaty on the Non-Proliferation of Nuclear Weapons available online at www.state.gov/www/global/arms/treaties/npt1.html. India, Israel, and Pakistan have never joined the NPT. North Korea announced its withdrawal from the NPT in January 2003. See “North Korea Announces Withdrawal from NPT, January 10: Statement and Reaction,” *Disarmament Documentation* (www.acronym.org.uk/docs/0301/doc02.htm).

17. For a discussion of latent proliferation in the context of Iran, see George Perkovich, “Dealing with Iran’s Nuclear Challenge” (Washington: Carnegie Endowment for International Peace, April 28, 2003) (www.ceip.org/files/projects/npp/pdf/Iran/irani-annuclearchallenge.pdf). In January 2004, Iran’s president Mohammad Khatami stated publicly that his country’s nuclear program was peaceful and that Iran was “vehemently” opposed to the production of nuclear arms. See “Iran Denies Receiving Nuclear Material from North Korea,” Agence France-Presse, Davos, Switzerland, January 21, 2004 (www.spacewar.com/2004/040121200135.i5cph0v8.html).

18. In October 2005, North Korea indicated it was ready to rejoin the treaty provided that some of its demands were met (www.nti.org/d_newswire/issues/2005_10_21.html#9E3CE6E2).

19. For an account of accusations and denials regarding the Iranian program, see Braun and Chyba, "Proliferation Rings," pp. 17–20.

20. For a history of the Indian program tracing its roots to domestic politics, see George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (University of California Press, 1999). For a sympathetic account of this history, see Sumit Ganguly, "India's Pathway to Pokhran II: The Prospects and Sources of New Delhi's Nuclear Weapons Program," *International Security* 23, no. 4 (1999): 148–77. The Pakistani program is described in Samina Ahmed, "Pakistan's Nuclear Weapons Program: Turning Points and Nuclear Choices," *International Security* 23, no. 4 (1999): 178–204.

21. For a summary of the Israeli program, see Cirincione and others, *Deadly Arsenals*, pp. 259–75. For the program's history, see Avner Cohen, *Israel and the Bomb* (Columbia University Press, 1998).

22. For a discussion of the North Korean claim, see Paul Kerr, "Examining North Korea's Nuclear Claims," *Arms Control Today* 35 (March 2005). For a summary of the North Korean program, see Cirincione and others, *Deadly Arsenals*, pp. 279–91. A technical account of the North Korean plutonium program is available in David Albright and Kevin O'Neill, eds., *Solving the North Korean Nuclear Puzzle* (Washington: Institute for Science and International Security Press, 2000).

23. The Libyan and Iraqi nuclear weapons programs are reviewed by Cirincione and others, *Deadly Arsenals*, pp. 317–61. See also Bruce Jentleson and Christopher Whytock, "Who 'Won' Libya? The Force-Diplomacy Debate and Its Implications for Theory and Policy," *International Security* 30 (Winter 2005/06): 47–86.

24. President Kennedy's comments are often paraphrased and sometimes recalled incorrectly. In response to a question at a news conference on March 21, 1963, Kennedy said: "Personally I am haunted by the feeling that by 1970, unless we are successful, there may be 10 nuclear powers instead of four, and by 1975, 15 or 20. With all of the history of war, and the human race history, unfortunately, has been a good deal more than peace, with nuclear weapons distributed all through the world, and available, and the strong reluctance of any people to accept defeat, I see the possibility in the 1970s of the President of the United States having to face a world in which 15 or 20 or 25 nations may have these weapons. I regard that as the greatest possible danger and hazard." See President John F. Kennedy, News Conference 52, March 21, 1963, John F. Kennedy Library and Museum, Boston.

25. The phrase is from Albert Wohlstetter, *Moving toward Life in a Nuclear Armed Crowd?* ACDA/PAB-263 (Los Angeles: Pan Heuristics Division of Science Applications, December 1975), rev. April 1976. A subsequent version, titled "Life in a Nuclear Armed Crowd," appears in Albert Wohlstetter and others, *Swords from Plowshares* (University of Chicago Press, 1979), chap. 6, pp. 126–50.

26. For a discussion of the prospects for a variety of nations continuing to adhere to the nuclear nonproliferation regime, see Kurt M. Campbell, Robert J. Einhorn, and Mitchell B. Reiss, *The Nuclear Tipping Point: Why States Reconsider Their Nuclear Choices* (Brookings, 2004). See also Tanya Ogilvie-White, "Is There a Theory of Nuclear Proliferation? An Analysis of the Contemporary Debate," *Nonproliferation Review* 4 (Fall 1996): 43–60.

27. There is a long-standing scholarly debate over whether, and if so why, nuclear weapons proliferation to more and more countries is dangerous. Here we note that preventing nuclear proliferation has been a cornerstone of U.S. international security policy for decades. For the scholarly debate, see Scott D. Sagan and Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate Renewed* (New York: W. W. Norton, 2003).

28. See Felicity Barringer, "Traces of Enriched Uranium Are Reportedly Found in Iran," *New York Times*, August 27, 2003.

29. In his first address after the attack on parliament in December 2001, as the country prepared for troop mobilization, India's prime minister Vajpayee declared: "Now the fight against terrorism has reached its last phase. We will fight a decisive battle to the end." See "War against Terrorism Will Be Fought Decisively: PM," *indiainfo.com*, December 13, 2001 (newsarchives.indiainfo.com/spotlight/parliament/13pm4.html). A few days later, Pakistan's foreign minister countered: "India should know that Pakistan is in a position to make an effective defence of its territory. Our forces are absolutely well-prepared to counter any aggressive mood." "India-Pakistan Tensions Mount," Associated Press, December 26, 2001.

30. This is known to political scientists as the "stability/instability paradox." For a nuanced view of the limitations of the applicability of this paradox to the India/Pakistan conflict, see S. Paul Kapur, "India and Pakistan's Unstable Peace: Why Nuclear South Asia Is Not Like Cold War Europe," *International Security* 30 (Fall 2005): 127–52.

31. Kashmir has been a source of conflict between India and Pakistan since partition in 1947 and has played a part in four wars since then. A ceasefire between the two countries has been in effect since November 2003, surviving occasional cross-border sniping, a change of government in India, and the terrorist attacks on New Delhi in October 2005.

32. Zia Mian, R. Rajamaran, and M. V. Ramana, "Early Warning in South Asia: Constraints and Implications," *Science and Global Security* 11, no. 2–3 (2003): 109–50. Currently, neither India nor Pakistan has its nuclear weapons mounted on missiles held in a state of high alert.

33. White House, National Security Strategy of the United States of America, September 17, 2002 (www.whitehouse.gov/nsc/nss.html). The document alternates between affirmations of deterrence and assertions of its limitations. See also Robert Jervis, "Confrontation between Iraq and the U.S.: Implications for the Theory and Practice of Deterrence," *European Journal of International Relations* 9, no. 2 (2003): 315–37.

34. White House, National Security Strategy of the United States of America, March 2006 (www.whitehouse.gov/nsc/nss/2006/nss2006.pdf), p. 23.

35. Francis J. Gavin, "Blasts from the Past: Proliferation Lessons from the 1960s," *International Security* 29 (Winter 2004/5): 100–35.

36. The United States and the Russian Federation signed the Moscow Treaty in May 2002, which commits them to reducing their operationally deployed strategic nuclear weapons to between 1,700 and 2,200 by the end of 2012. The treaty does not include non-strategic weapons or reserve strategic nuclear weapons. The Moscow Treaty was ratified by the U.S. Senate in March 2003, with some reporting conditions attached. For a summary of the treaty, see Committee on International Security and Arms Control, *Monitoring Nuclear Weapons*, pp. 26–27. In May 2004 President Bush approved a plan to cut the U.S. nuclear stockpile (that is, all warheads, including reserves) "almost in half" by 2012. See Linton F. Brooks, administrator of the National Nuclear Security Administration,

“A New Triumph of Sanity,” remarks delivered to the Carnegie Endowment for International Peace Nonproliferation Conference, Washington, June 21, 2004 ([www.nnsa.doe.gov/docs/speeches/2004/speech_%20Carnegie_Nuclear%20_Policy_\(6-04\).pdf](http://www.nnsa.doe.gov/docs/speeches/2004/speech_%20Carnegie_Nuclear%20_Policy_(6-04).pdf)).

37. See, for example, former senator Sam Nunn, cochairman of the Nuclear Threat Initiative, “U.S. Nuclear Weapons Policies and Programs,” remarks delivered to the Carnegie Endowment for International Peace Nonproliferation Conference, Washington, June 21, 2004 (www.nti.org/c_press/statement_nunnceip_062104.pdf).

38. See Pavel Podvig, “History and the Current Status of the Russian Early-Warning System,” *Science and Global Security* 10 (2002): 21–60.

39. Keir A. Lieber and Daryl G. Press, “The Rise of U.S. Nuclear Primacy,” *Foreign Affairs* 85 (March/April 2006): 42–55.

40. Vitaly Shlykov, quoted in Fred Weir, “In Moscow, Buzz over Arms Race II,” *Christian Science Monitor*, April 24, 2006.

41. President Vladimir Putin, Annual Address to the Federal Assembly, May 10, 2006 (www.kremlin.ru/eng/speeches/2006/05/10/1823_type70029_105566.shtml).

42. For critical discussions of China as the next U.S. peer competitor, see Thomas J. Christensen, “Posing Problems without Catching Up,” *International Security* 25 (Spring 2001): 5–40; Alastair Iain Johnston, “Is China a Status Quo Power?” *International Security* 27 (Spring 2003): 5–56; and Aaron L. Friedberg, “The Future of U.S.-China Relations: Is Conflict Inevitable?” *International Security* 30 (Fall 2005): 7–45.

43. Mathew Shand and Fred Gale, *China: A Study of Dynamic Growth*, Report WRS-04-08, USDA/ERS (Washington: U.S. Department of Agriculture, October 2004) (www.ers.usda.gov/publications/wrs0408/); Robert Wang, “China’s Economic Growth: Source of Disorder?” *Foreign Service Journal* 82 (May 2005): 18–23; Melinda Liu, “China Slows Down: Falling Prices, Profits and Oil Demand Signal That the Breakneck Boom Is Shifting to Safer Speed,” *Newsweek International*, August 22, 2005 (msnbc.com/id/8940949/site/newsweek/page/2/).

44. Were U.S. economic growth to average 2 percent, China, with persistent 8 percent growth, would pull even in about 35 years; were U.S. economic growth to stop altogether, China with continuing 8 percent growth would pull even in about a quarter century. Data for U.S. GDP are from World Bank, *United States at a Glance* (Washington, September 14, 2004) (www.worldbank.org/data).

45. Shand and Gale, *China: A Study of Dynamic Growth*.

46. Christensen, “Posing Problems”; Harold Brown, Joseph W. Prueher, and Adam Segal, eds., *Chinese Military Power: Report of an Independent Task Force Sponsored by the Council on Foreign Relations Maurice R. Greenberg Center for Geoeconomic Studies* (New York: Council on Foreign Relations Press, 2003).

47. See, for example, Peter Harmsen, “China’s Shenzhou Safely Places Two Astronauts in Orbit,” *SpaceDaily*, October 12, 2005 (www.spacedaily.com/news/china-05zzzzzzzzl.html).

48. Office of the Secretary of Defense, *Annual Report to Congress: The Military Power of the People’s Republic of China, 2005* (Government Printing Office, July 2005), esp. p. 13: “The pace and scope of China’s military build-up are, already, such as to put regional military balances at risk. Current trends in China’s military modernization could provide China with a force capable of prosecuting a range of military operations in Asia—well

beyond Taiwan—potentially posing a credible threat to modern militaries operating in the region.” For similar views, see National Security Strategy of the United States of America, September 2002: “In pursuing advanced military capabilities that can threaten its neighbors in the Asia-Pacific region, China is following an outdated path that, in the end, will hamper its own pursuit of national greatness.” For a reply, see “The Pentagon Eyes China’s Military: Back to Threat-Based Planning,” *IISS Strategic Comments* 11, issue 5 (July 2005).

49. See quoted remarks of Chinese officials in Hui Zhang, “Action/Reaction: U.S. Space Weaponization and China,” *Arms Control Today* 35 (December 2005): 6–11.

50. See Brown, Prueher, and Segal, *Chinese Military Power*, pp. 51–53.

51. See Robert S. Norris and Hans M. Kristensen, “NRDC Nuclear Notebook: U.S. Nuclear Forces, 2005,” *Bulletin of the Atomic Scientists* 61 (January/February 2005): 73–75 (www.thebulletin.org/article_nn.php?art_ofn=jf05norris).

52. In a letter to President Clinton two days after India’s nuclear tests on May 11, 1998, Prime Minister Vajpayee wrote: “I have been deeply concerned at the deteriorating security environment, specially the nuclear environment, faced by India for some years past. We have an overt nuclear weapon state on our borders, a state which committed armed aggression against India in 1962. Although our relations with that country have improved in the last decade or so, an atmosphere of distress persists mainly due to the unresolved border problem. To add to the distress that country has materially helped another neighbour of ours to become a covert nuclear weapons state” (www.indianembassy.org/indusrel/pmletter.htm).

53. White House, Office of the Press Secretary, *Joint Statement between President George W. Bush and Prime Minister Manmohan Singh*, July 18, 2005 (www.whitehouse.gov/news/releases/2005/07/20050718-6.html).

54. William Clinton, *President’s Radio Address*, May 25, 1998.

55. Researchers at both the Cato Institute and the Carnegie Endowment have advocated a closer U.S.–India partnership and U.S. acceptance of India’s nuclear status. See Victor M. Gobarev, *India as a World Power: Changing Washington’s Myopic Policy* (Washington: Cato Institute, 2000); and Ashley Tellis, *India as a New Global Power* (Washington: Carnegie Endowment for International Peace, 2005).

56. Atal Behari Vajpayee, *India, USA and the World: Let Us Work Together to Solve the Political-Economic Y2K Problem* (Asia Society, September 28, 1998) (www.asiasociety.org/speeches/vajpayee.html).

57. Tellis, *India as a New Global Power*.

58. Purchasing power parity attempts to take into account the relative purchasing power of different countries’ currencies for the same goods and services. Figures from Central Intelligence Agency, *Rank Order—Purchasing Power Parity*, last updated January 10, 2006 (www.cia.gov/cia/publications/factbook/rankorder/2001rank.html).

59. G. Srinivasan, “ESCAP Pegs India’s Growth Rate at 7.5 pc,” *Hindu Business Line*, April 27, 2005; and Dominic Wilson and Roopa Purushothaman, *Dreaming with the BRICs: The Path to 2050* (Goldman Sachs, October 2003) (www.gs.com/insight/research/reports/report6.html).

60. Quoted in “U.S. Military Wants India to Undertake Low-end Operations in Asia,” *Hindu*, July 4, 2003.

61. U.S. Embassy, New Delhi, *New Framework for the U.S.-India Defense Relationship*, June 28, 2005 (newdelhi.usembassy.gov/ipr062805.html).

62. NASA press release 06-219, "NASA Agrees to Cooperate with India on Lunar Mission," May 9, 2006.

63. Embassy of India, *India-U.S. Economic Relations*, 2004 (www.indianembassy.org/Economy/economy.htm).

64. Ian Roxborough, "Globalization, Unreason and the Dilemmas of American Military Strategy," *International Sociology* 17 (September 2002): 339–59.

65. For a review and the historical context, see MacGregor Knox and Williamson Murray, eds., *The Dynamics of Military Revolution, 1300–2050* (Cambridge University Press, 2001). The U.S. victories in initial combat operations did not, of course, speak to American ability to manage the Iraqi occupation.

66. See, for example, Charles Dunlap, "Joint Vision 2010: A Red Team Assessment," *Joint Force Quarterly* (Autumn/Winter 1997/98): 47–49; Lloyd J. Matthews, "Challenging the United States Symmetrically and Asymmetrically: Can America Be Defeated?" U.S. Army War College Strategic Studies Institute, July 1998 (www.strategicstudiesinstitute.army.mil/pdffiles/PUB230.pdf).

67. Quoted by Patrick J. Garrity, *Why the Gulf War Still Matters: Foreign Perspectives on the War and the Future of International Security*, Report 16 (Center for National Security Studies, July 1993), p. xiv.

68. *Report to Congress on An Assessment of the Impact of Repeal of the Prohibition on Low Yield Warhead Development on the Ability of the United States to Achieve its Nonproliferation Objectives*, jointly submitted by the secretary of state, the secretary of defense, and the secretary of energy, March 2004, p. 4.

69. The Nuclear Posture Review is a classified document, but substantial portions were leaked. These are available at www.globalsecurity.org/wmd/library/policy/dod/npr.htm.

70. For example, the leaked Nuclear Posture Review reads in part: "With a more effective earth penetrator, many buried targets could be attacked using a weapon with a much lower yield than would be required with a surface burst weapon. This lower yield would achieve the same damage while producing less fallout (by a factor of ten to twenty) than would the much larger yield surface burst. For defeat of very deep or larger underground facilities, penetrating weapons with large yields would be needed to collapse the facility."

71. Ellen L. Frost, "Globalization and National Security: A Strategic Agenda," in *The Global Century: Globalization and National Security*, edited by Richard L. Kugler and Ellen L. Frost (National Defense University, 2001), pp. 35–74 (www.ndu.edu/inss/books/Books_2001/Global%20Century%20-%20June%202001/C2Frost.pdf).

72. The report adds: "Most important, the phenomenon of accelerated global integration is largely irresistible." *Final Report of the Defense Science Board Task Force on Globalization and Security*, December 1999 (www.acq.osd.mil/dsb/reports/globalization.pdf), p. 5. The Defense Science Board is a federal advisory committee established to provide independent advice to the secretary of defense.

73. In an August 1948 resolution, the United Nations Commission for Conventional Armaments defined WMD as "atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or

other weapons mentioned above.” See United Nations Security Council, Commission for Conventional Armaments, “Resolution Adopted by the Commission at its Thirteenth Meeting, 12 August 1948, and a Second Progress Report of the Commission,” S/C.3/32/Rev.1 (August 12, 1948), p. 2. We choose not to use the term WMD here, first, because radiological and chemical weapons are poorly described as “weapons of mass destruction” since they are unlikely to achieve casualties greater than those achieved by conventional explosives, and, second, the term “WMD” lends itself to intellectual confusion as it tends to blur the very important differences among nuclear, biological, and other weapons. For a discussion of these points, see Christopher F. Chyba, “Toward Biological Security,” *Foreign Affairs* 81 (May/June 2002): 122–36.

74. Christopher F. Chyba and Alex L. Greninger, “Biotechnology and Bioterrorism: An Unprecedented World,” *Survival* 46 (Summer 2004): 143–62; and National Research Council, *Globalization, Biosecurity, and the Future of the Life Sciences* (Washington: National Academies Press, 2006) (darwin.nap.edu/books/0309100321/html/).

75. See Braun and Chyba, “Proliferation Rings.” The role of tacit knowledge in nuclear weapons construction must also be considered, however. See Donald MacKenzie and Graham Spinardi, “Tacit Knowledge, Weapons Design, and the Uninvention of Nuclear Weapons,” *American Journal of Sociology* 101 (July 1995): 44–99. The importance of tacit knowledge is especially argued by Montgomery, in “Ring in Proliferation.”

76. William Miller, “Deterrence, Intervention, and Weapons of Mass Destruction,” in *The Global Century*, edited by Kugler and Frost, pp. 299–313 (www.ndu.edu/inss/books/Books_2001/Global%20Century%20-%20June%202001/C14Mille.pdf).

77. Roxborough, “Globalization, Unreason and the Dilemmas of American Military Strategy.”

78. For the argument that deterrence is unlikely to be effective against at least certain biological terrorist attacks, see Chyba, “Biological Terrorism and Public Health,” and “Toward Biological Security.” For a discussion of the circumstances under which terrorism can be deterred, see Robert Trager and Dissislava Zagorcheva, “Deterring Terrorism: It Can Be Done,” *International Security* 30 (Winter 2005/06): 87–123.

79. The putative difficulty in deterring leaders of so-called rogue states or terrorist groups is a key aspect of the 2002 National Security Strategy.

80. Chyba, *Biological Terrorism, Emerging Diseases, and National Security*, and “Biological Terrorism and Public Health.”

81. See, for example, John Hendren, “Missile-Defense Test Failure Adds to Program Delays,” *Los Angeles Times*, February 15, 2005; and U.S. Government Accountability Office, “Missile Defense Agency Fields Initial Capability but Falls Short of Original Goals,” GAO Report GAO-06-327, March 15, 2006.

82. Treaty on the Non-Proliferation of Nuclear Weapons (www.state.gov/t/np/trty/16281.htm).

83. Estimates for the number of Russian tactical warheads are especially uncertain. Much of the basic factual information in this section is taken from Cirincione and others, *Deadly Arsenals*, pp. 121–62. See also the regularly updated Nuclear Threat Initiative, “Country Profiles,” www.nti.org/e_research/profiles/index.html.

84. Substantial progress has been made, but a great deal still needs to be done. See Bunn and Wier, *Securing the Bomb*.

85. The estimate of 150–210 sites counts each separate bunker at a facility as an individual site. These data are from *ibid.*, pp. 51–56.

86. *Ibid.*, pp. 45–51.

87. Philipp C. Bleek, “Russia Adopts New Security Concept; Appears to Lower Nuclear Threshold,” *Arms Control Today* 30 (January/February 2000).

88. Kokoshin said: “Under the current circumstances, when there is no opportunity to build substantial general-purpose force at all azimuths, the nuclear shield becomes even more important to prevent the aggression.” Quoted in Yuri Fedorov, “Russia’s Doctrine on the Use of Nuclear Weapons,” Pugwash Meeting 279, November 2002, *Pugwash Online* (www.pugwash.org/reports/nw/fedorov.htm).

89. Quoted in Bleek, “Russia Adopts New Security Concept.”

90. National Security Concept of the Russian Federation. Full English translation from *Rossiiskaya Gazeta*, January 18, 2000 (www.fas.org/nuke/guide/russia/doctrine/gazeta012400.htm).

91. “Military Doctrine of the Russian Federation,” *Nezavisimaya Gazeta*, April 22, 2000, p. 5. English translation quoted in Fedorov, “Russia’s Doctrine on the Use of Nuclear Weapons.”

92. For details, see Cirincione and others, *Deadly Arsenals*, pp. 197–201, and references therein; Nuclear Threat Initiative, “Country Profiles”; and Rebecca Johnson, “End of a Nuclear Weapons Era: Can Britain Make History,” *Arms Control Today* 36 (April 2006).

93. Strategic Defence Review, chap. 4: “Deterrence and Disarmament,” pars. 62–68 (www.fas.org/nuke/guide/uk/doctrine/sdr98/chapt04.htm).

94. Strategic Defence Review, Factsheet 22: “Nuclear Deterrent” (www.fas.org/nuke/guide/uk/doctrine/sdr98/nuclear.htm).

95. Strategic Defence Review, chap. 4, par. 61 (www.fas.org/nuke/guide/uk/doctrine/sdr98/chapt04.htm).

96. Geoff Hoon quoted and paraphrased in “U.K. ‘Prepared to Use Nuclear Weapons,’” *BBC News*, March 20, 2002 (news.bbc.co.uk/1/hi/uk_politics/1883258.stm).

97. Strategic Defence Review, Factsheet 22.

98. For details, see Cirincione and others, *Deadly Arsenals*, pp. 189–95, and references therein; see also Nuclear Threat Initiative, “Country Profiles.”

99. President Jacques Chirac, speech at the Institut des Hautes Etudes de Défense Nationale, June 8, 2001 (www.elysee.fr).

100. Ministère de la Défense, *Livre Blanc sur la Défense* (Paris: Service d’Information et de Relations Publiques des Armées, February 1994).

101. President Jacques Chirac, speech, June 8, 2001, translation by Chyba.

102. See David S. Yost, “France’s Evolving Nuclear Strategy,” *Survival* 47 (Autumn 2005): 117–46.

103. President Jacques Chirac, discours lors de sa visite à la Marine Nationale, Toulon, November 8, 2001. Quoted in *ibid.*

104. Henri Bentégeat, interview in *Jane’s Defence Weekly*, June 4, 2003.

105. President Jacques Chirac, quoted in Ariane Bernard, “Chirac Hints at Nuclear Reply to State-Supported Terrorism,” *New York Times*, January 20, 2005; and in Oliver Meier, “Chirac Outlines Expanded Nuclear Doctrine,” *Arms Control Today* 36 (March 2006).

106. For details, see Cirincione and others, *Deadly Arsenals*, pp. 163–81, and references therein; see also Nuclear Threat Initiative, “Country Profiles.”

107. Alastair Iain Johnston, “Prospects for Chinese Nuclear Force Modernization: Limited Deterrence versus Multilateral Arms Control,” *China Quarterly* 146 (June 1996): 552–53.

108. “The Issue of Nuclear Weapons,” in *China’s National Defense*, Beijing, July 1998 (russia.shaps.hawaii.edu/security/china-defense-july1998.html).

109. *Ibid.*

110. For more on these points, see Center for Nonproliferation Studies, “China’s Nuclear Doctrine” (cns.miis.edu/research/china/coxrep/doctrine.htm).

111. *China’s Endeavors for Arms Control, Disarmament and Non-proliferation*, Beijing, September 2005.

112. Cited in Joseph Kahn and David Lague, “Chinese General Threatens Use of A-Bombs if U.S. Intrudes,” *New York Times*, July 15, 2005.

113. “China Plays Down Nuclear Threat,” *BBC News*, World Edition, July 16, 2005 (news.bbc.co.uk/2/hi/asia-pacific/4688471.stm).

114. Quotations from Pan Zhenqiang, “China Insistence on No-First-Use of Nuclear Weapons,” *China Security* 1 (Autumn 2005): 5–9. General Pan is former director of the Institute for Strategic Studies of the National Defense University of the People’s Liberation Army. Pan provides five reasons why China has chosen a no-first-use policy: (1) the only purpose of nuclear weapons is retaliation to nuclear attack, pending complete nuclear disarmament; (2) changing the no-first-use policy would threaten the strategic stability between China and the United States; (3) changing the no-first-use policy would deliver a “crushing blow” to international arms control and efforts to maintain peace and stability; (4) such a change would tarnish China’s international image; and (5) such a change would threaten rather than stabilize cross-strait relations. For supporting views, see also the articles by Shen Dingli and Sun Xiangli in the same issue of *China Security*.

115. “Since the first day when it came into possession of nuclear weapons, the Chinese government has solemnly declared that it would not be the first to use such weapons at any time and in any circumstance.” See *China’s Endeavors for Arms Control*, sec. III.

116. For more details, see Cirincione and others, *Deadly Arsenals*, pp. 221–37, and references therein; see also Nuclear Threat Initiative, “Country Profiles.”

117. See C. Raja Mohan, “No First Use of Nuclear Weapons,” Pugwash Meeting 279, November 2002 (www.pugwash.org/reports/nw/rajamohan.htm).

118. *Draft Report of National Security Advisory Board on Indian Nuclear Doctrine*, August 17, 1999 (www.indianembassy.org/policy/CTBT/nuclear_doctrine_aug_17_1999.html), secs. 2.1, 2.3, and 2.4.

119. C. Raja Mohan, “Nuclear Command Authority Comes into Being,” *Hindu*, January 5, 2003 (www.hinduonnet.com/2003/01/05/stories/2003010504810100.htm). For Indian views on India’s options with respect to “weapons of mass destruction,” see also Raja Menon, *A Nuclear Strategy for India* (New Delhi: SAGE, 2000); Raja Menon, ed., *Weapons of Mass Destruction: Options for India* (New Delhi: SAGE, 2004); and Delhi Policy Group, *Nuclear Weapons and Security* (New Delhi: Bibliophile South Asia, 2005).

120. Quoted in Cotta-Ramusino and Martellini, *Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan*.

121. For more details, see Cirincione and others, *Deadly Arsenals*, pp. 239–58, and references therein; see also Nuclear Threat Initiative, “Country Profiles.”

122. President General Pervez Musharraf, quoted in Rana Qaisar, “Pakistan Army Gets Hatf-V Missiles,” *Lahore Daily Times*, January 9, 2003.

123. For a comprehensive review of what is known or inferred about Pakistan’s nuclear doctrine, see Rifaat Hussain, “Nuclear Doctrines in South Asia,” SASSU Research Report 4 (December 2005) (www.sassu.org.uk/publications/R_Hussain.pdf).

124. Abdul Sattar, speaking in Islamabad in November 1999, quoted in Rifaat Hussain, “Nuclear Doctrines in South Asia,” p. 13.

125. See, for example, Stephen P. Cohen, “India, Pakistan and Kashmir,” *Journal of Strategic Studies* 25 (December 2002): 57.

126. General Khalid Kidwai, quoted by Cotta-Ramusino and Martellini, *Nuclear Safety, Nuclear Stability, and Nuclear Strategy in Pakistan*.

127. For histories of the Israeli nuclear weapons program, see Cohen, *Israel and the Bomb*; Seymour M. Hersh, *The Samson Option: Israel’s Nuclear Arsenal and American Foreign Policy* (New York: Random House, 1991).

128. For these claims, see Cirincione and others, *Deadly Arsenals*, pp. 259–75. See also Warner D. Farr, “The Third Temple’s Holy of Holies: Israel’s Nuclear Weapons,” Counterproliferation Paper 2 (U.S. Air Force Counterproliferation Center, September 1999); Nuclear Threat Initiative, “Country Profiles”; and remarks by C. F. Chyba in *The Comprehensive Test Ban Treaty: Next Steps*, CISAC-LAWS Roundtable Discussion (Stanford University, July 19, 2000), pp. 59–62.

129. Israel “must be in a position to threaten another Hiroshima to prevent another Holocaust.” See Avner Cohen and Marvin Miller, *Nuclear Shadows in the Middle East: Prospects for Arms Control in the Wake of the Gulf Crisis* (Cambridge, Mass.: MIT Press, 1990), p. 18; see also Cirincione and others, *Deadly Arsenals*, pp. 268–69.

130. Quoted in Gerald Steinberg, “Middle East Peace and the NPT Extension Decision,” *Nonproliferation Review* 4 (Fall 1996): 17–29.

131. Shimon Peres, quoted in “Before Meeting with King, Peres Claims Israel’s Nuclear Arsenal Was Built for Peace,” *Jordan Times*, July 14, 1998.

132. Suggested by Louis Rene Beres, “Israel’s Bomb in the Basement: A Revisiting of ‘Deliberate Ambiguity’ vs. ‘Disclosure,’” in *Between War and Peace: Dilemmas of Israeli Security*, edited by Efraim Karsh (London: Frank Cass, 1996), pp. 113–33.

133. See the discussion in Farr, “The Third Temple’s Holy of Holies.”

134. See Nuclear Threat Initiative, “Country Profiles.”

135. Anthony Faiola and Philip P. Pan, “N. Korea Declaration Draws World Concern,” *Washington Post*, February 11, 2005.

136. Braun and Chyba, “Proliferation Rings,” p. 11; and “Joint Statement of the Fourth Round of the Six-Party Talks,” Beijing, September 19, 2005 (www.state.gov/r/pa/prs/ps/2005/53490.htm).

137. Belarus, Kazakhstan, and Ukraine were left with nuclear weapons deployed on their territories after the breakup of the Soviet Union; these countries gave up their weapons and ratified or acceded to the NPT by 1993, 1994, and 1994, respectively. South Africa acceded to the NPT in 1991 and by 1994 had destroyed the six nuclear devices it had manufactured beginning in the late 1970s. See Cirincione and others, *Deadly Arsenals*, pp. 407ff.

138. See Sir Basil Henry Liddell Hart, *Strategy*, 2nd ed. rev. (London: Faber & Faber, 1967), pp. 319–21. See also *Department of Defense Dictionary of Military and Associated Terms*, Joint Publication 1-02, April 12, 2001 (as amended through 30 November 2004) (www.asafm.army.mil/pubs/jp1-02/jp1-02.pdf).

139. For a discussion of the role of the United States in establishing a norm of the non-use of nuclear weapons, see, for example, Nina Tannenwald, “The Nuclear Taboo: The United States and the Normative Basis of Nuclear Non-Use,” *International Organization* 53 (Summer 1999): 433–68.